

UNEP
WESR Strategy and Conceptual Approach

07 March 2022

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Executive Summary

UNEP is committed to WESR as a flagship programme to deliver data and analytics services to keep the global environment under review. As such, through WESR, the Global Environmental Data Strategy (GEDS) and the newly instituted Digital Transformation and Science Policy Subprogrammes, there is a unique opportunity for UNEP to embrace the digital and deliver quality data products and services for climate change, nature and pollution to the UN System, member countries and stakeholders around the world. WESR's mission is to provide a coordinated and federated data system of the best, openly accessible environmental data, information and knowledge to support decision-making, policy and action at the global, regional, national and local levels for sustainable development and national planning needs.

Background

In its 50th year UNEP must embrace the opportunities of the digital age and significantly advance its provision of environmental data, information and knowledge supporting its mandate, the UN, Member States and other stakeholders. This strategy and conceptual approach outline how UNEP will enhance the development of the World Environment Situation Room (WESR), headquartered in Nairobi, as a user-centric, demand-driven platform designed to meet the challenges of the next 50 years. It will facilitate access to real-time data, information, and analytics via a federated data system to support keeping the environment under review and to enhance countries' capacity to monitor and achieve the environmental targets of the Sustainable Development Goals (SDGs) and Multi-Lateral Environmental Agreements (MEAs). The timeliness and accessibility of data and information are essential to inform evidence-based policy and decision-making, whilst promoting innovation, transparency, flexibility, and fostering mutual accountability in the achievement of the SDGs and post-UNEP@50 agenda.

Goals

UNEP, through the WESR, will be the go-to source within the UN system for environmental data and analytics. The goals for the WESR are:

Enhance the science-policy interface. WESR will enhance the science-policy interface through integrated, flexible, and coherent access to scientific information and publications, geospatial data, environmental assessments, and foresight analyses, which can be harnessed for monitoring and reporting on the SDGs and MEAs.

Keep the global state of the environment under review. WESR will provide the data backbone to support scientific assessments including the Global Environment Outlook (GEO) process combined with the digital dissemination of high quality, disaggregated data, and expert analyses.

Build partnerships. UNEP will use its convening power to build a partnership network to enhance UNEP's capabilities in providing access to and use of environmental data to contribute to

consolidating global to national efforts to address data fragmentation and leverage the best available data.

Strengthen governance and data standards. UNEP will build a strengthened governance structure to translate needs and priorities from the user community into its product development cycle, increase political buy-in at the country level, provide guidance on partnership development, provide technical and domain expertise on matters such as data standards, and align the WESR initiative with other UNEP programmes and initiatives.

The Approach

WESR will implement a demand-driven approach that uses agile methodologies to iterate on design and production. WESR will meet its goals by:

- Providing an interoperable, federated and de-centralized approach enabling users to search, visualize, analyse, access, process, link and download data products and services using open APIs and web services.
- Archiving WESR data warehouse holdings in an analysis ready format, (e.g., projects data and SDGs target and indicators where UNEP is a custodian agency).
- Linking and integrating existing platforms curated by UNEP so that users can easily find applications, tools and resources.
- Providing easy and open access to the best, publicly available geospatial and earth observation data, environmental data and statistics, analytical models and algorithms, and decision-ready information products and services.
- Creating a collaborative environment that embraces user-centric and co-design principles.
- Implementing metrics and KPIs to monitor progress on uptake, usage and impact.

The intent is to be pragmatic in the approach by identifying use cases based on needs identified through both internal consultation and engagement with countries and other stakeholders and prioritized through the governance framework.

Data, Products and Services

At its core, WESR will make geospatial and earth observation data, environmental data and statistics, and UNEP publications readily accessible.

The platform will enable these services to be shared and delivered while enabling users to not only ingest those provided by UNEP, but to create their own products. Growing this capacity leverages the “convening” power of UNEP by allowing users to have the data and information they need at their fingertips, while creating the enabling infrastructure, standards and guidelines for how to use the data, platform and services effectively.

Governance

Strengthening existing governance mechanisms for WESR will be inclusive, transparent, aligned and responsive in their operations. It will be important to seek expert guidance both at the strategic

and technical levels from governments, major stakeholders and partners to UNEP. This will build buy-in from both policy and technical entities and enable financial and technical support for WESR.

Partnerships are crucial to the WESR development as they can provide a practical extension of UNEP given its limited reach and resources. Partnerships will be strengthened in the Global South, by strengthening the HQ function in Nairobi, by establishing new GRIDs and collaborating centres, integrating collaborating centres from academic networks in the Global South

Capacity Development

Implementation of the WESR strategy requires capacity development along the value chain of stakeholders, including at the global and regional levels, within the federation of WESR partners, and within UNEP itself.

Regional capacity should target UNEP Regional Office staff playing a key role in implementing the engagement strategy, Regional Economic Commissions, research institutes, regional NGO partners, with the goal of reaching improved capacity to grow regional environmental data networks and to create communities of practice among national initiatives. UNEP HQ will need to build its capacity by engaging or training staff responsible for implementing engagement strategies, as well as technicians responsible for guiding the development of the back end of WESR.

A Phased Approach

The way forward through a 2030 timeframe is presented in three phases: 1) setting the foundation by improving the strategic and operational mechanisms for WESR; 2) increasing capacity and usage by further engaging, developing the platform and its use cases, and enabling uptake; and 3) evolving to a federated data system with networked data, users and applications enabling users to create their own innovations. Each phase builds on the previous as the federated system continues to advance and curate the delivery of data, information and knowledge based on identified needs and priorities from the user community.



WESR development is scalable based on available funding. The options first allow UNEP to increase its capabilities to develop and manage WESR to support UNEP’s normative processes, and second to extend its capabilities and reach by engaging with countries through regional mechanisms and partners.

Phase I: The goal of Phase I is for UNEP to leverage the work to date on the WESR prototype and build the strategic foundation that allows WESR to become fully operational.

Phase II: The goal of Phase II is to further develop the WESR infrastructure, products and services but focus on engagement, building trust and building capacity to ensure uptake and usage.

Phase III: The goal of Phase III is for WESR to have the network of data, users, applications and knowledge in place where data is flowing bidirectionally across organizations and platforms creating a data ecosystem approach. Governments, private sector and civil society are not only using data, products and services provided by WESR, but creating their own innovations powered by WESR.

For each phase, there are 2 options presented. While current discussions with UNEP Leadership has indicated the normative option as the way forward for the time being, for the purposes of this forward looking strategy and conceptual approach, both options are still provided in case the thinking shifts in the near future:

- 1) *Normative* – where UNEP continues to develop WESR in support of its priorities and those of the broader UN System, while continuing engagement with Member States through the CPR process.
- 2) *Increased Country Engagement* – where UNEP invests at scale to engage with countries at the ministerial level to ensure products and services made available by WESR are based on needs and priorities at the country level and fit-for-purpose. Capacity development at the country level is supported through regional and national partners. This does not imply that UNEP will work directly in all 193 member countries, but rather scale up the delivery of products by working with pilot countries through regional entities.

1 Introduction

In March 2019, the United Nations Environmental Assembly (UNEA), through its Ministerial Declaration and Resolution 4/23, provided a clear and strong mandate for UNEP to work with UN system entities and other stakeholders to have a global environmental data strategy (GEDS) by 2025. In response, UNEP implemented Project A4 - World Environment Situation Room - global knowledge platform on the Environment (Big Data on the Environment Initiative) and Project A5 – Foresight and Emerging issues as part of the UNEP Medium Term Strategy (2018 – 2021), which constituted the programmatic base for the implementation of the World Environment Situation Room (WESR).

The WESR is a flagship UNEP initiative supporting the delivery of the Global Environmental Data Strategy (GEDS) under UNEA resolution 4/23. WESR is a federated platform delivering the best available data, information, knowledge, and analytics curated by UNEP experts and partners. The platform is founded on a distributed network of partners, both internal and external to UNEP, connected through a set of common standards to allow data, information and decision-ready products and services to be leveraged by UNEP, member countries and other stakeholders to support environmental decision-making and action.

WESR is a delivery vehicle for UNEP to implement four main aspects of the new Medium-Term Strategy (2022-2025) as presented in the Digital Transformation sub-programme:

- Environmental analysis and technical support to UN country teams and the related Common Country Analysis (CCA), State of the Environment (SoE) reporting and National Development Planning (NDP).
- Monitoring global and national progress regarding the environment-related Sustainable Development Goals (SDGs) and Multilateral Environmental Agreements (MEAs).
- The data and information backbone of the Global Environment Outlook (GEO) with up-to-date and credible data and information on the state of the environment and trends which can be readily accessed.
- Finally, WESR will assist the digital transformation of UNEP’s subprogrammes by providing data and analytics to users.

To provide context, the articulation among UNEP’s Digital Transformation Subprogramme (DTS) strategy, the GEDS, and the WESR is described below. Even though the DTS only starts operating on 01 January 2022, the interplay among these initiatives is important.

The DTS has two main implementation pathways. On the one hand, it focuses externally on using digital technologies to accelerate and scale solutions for addressing climate change, biodiversity protection and pollution prevention. On the other hand, it focuses internally on upgrading UNEP's business processes through ICT to enable more efficiency, agility, collaboration, innovation and data-driven decision making. The DTS provides the broader vision into where UNEP should be going and supports several business processes, both internal and external to UNEP that will increase environmental awareness and action. The DTS points the organization toward supporting national development efforts. The DTS strengthens capacity within UNEP. For example, it envisages the recruitment of environmental data experts within a digital acceleration lab who will support its implementation across UNEP divisions. WESR will be one of the key flagship digital transformation initiatives supporting both internal and external objectives.

GEDS is UNEP's environmental data strategy that maps the organization's efforts into the UN Secretary General's initiatives on New Technology, Big Data, *inter alia*. Although the genesis of GEDS and the DTS have different timelines, it can be assumed that GEDS is that part of the DTS strategy specific to environmental data.

Given this framework, WESR is the vehicle that puts GEDS into operation through offering services to the normative reporting functions of UNEP and to define, develop, and offer environmental and information data services to Member States.

Given the importance of WESR's service to UNEP, the broader UN System, Member States and other stakeholders, two consultancies were commissioned by UNEP in September 2021 to take stock of the current approach, strategies, and direction of WESR as to how it supports UNEP's three priority areas of climate change, nature, and pollution. The stock taking was in alignment with GEDS and the new DTS and other broader UN strategies focused on the use of data, technology, innovation, and digital cooperation. Since then, both consultancies unified their approach such that the strategy, roadmap, and business plan produced will be based on the expert review and guidance by both consultants.

This document provides the strategic and conceptual approach for implementing WESR over the 2022-2030 timeframe (the next two Medium Term Strategy periods: 2022-2025 and 2026 – 2029). By implementing the strategy, in particular the option of providing direct support to Member States to access critical data for environmental monitoring and reporting, UNEP will increase its relevance and credibility as an (the) authoritative source for environment data and assessments at global, regional, and national levels. Member States will benefit from improved policy and decision-making due to access to needed information.

The document is intended mainly for the use of UNEP staff, starting with Senior Management, to guide them in the way forward, based on a strong inter-divisional collaboration which supports an effective governance mechanism that will pursue a demand-driven approach as WESR's main guiding principle.

1.1 Approach

The approach for developing the strategy and conceptual approach for WESR derives from a review of supporting documents provided by UNEP including lessons learned from the UNEP-Live project, WESR's precursor. Additionally, 45 interviews were conducted with UNEP staff and other stakeholders external to UNEP, and in-person meetings were held during a mission to Nairobi HQ during 19-22 October 2021. A survey of 12 UNEP data platform managers was conducted to learn the hopes and concerns about participation in the WESR. Finally, the consultants collected feedback from UNEP Leadership, SMT and the Committee of Permanent Representatives (CPR).

An important lesson from the UNEP-Live project is summarized in Box 2.1, *to wit*: The approach of “build it and they will come” does not work and risks losing trust from UNEP partners and Member States.

The consultants produced a situation assessment which served as a starting point for the development of the DDIS, roadmap and business case. The major findings from the assessment pointed to the fact that the strategy must meet the following needs:

Box 2.1: One evaluation respondent claimed, “*UNEP Live (made) promises about what a great thing this could be immediately.... But then everyone has been disappointed because ... it just wasn't functioning, and it never functioned as promised and that's user's legitimacy. I think you're much better off to do something that you can manage, deliver real value in that space, whatever it is, and then slowly add on because you maintain legitimacy, you gain the trust of the community. So, you end up having lost trust under that effort.*”

- i) to increase cooperation and coordination across divisions,
- ii) to move from a supply-driven to a demand-driven and agile approach, and
- iii) to develop a more inclusive approach to engagement and governance

This document comprises the following sections:

- **Section 2** introduces the Value Proposition for the WESR, including a WESR mission statement and the core principles it follows.
- **Section 3** presents the demand-driven approach that underpins the strategy. It covers the engagement strategies and use cases that will be developed using a co-design methodology wherein the suppliers and users of environmental data cooperate to determine: i) what should be delivered, ii) through which combination of partners (the federation) it will be offered, and iii) the capacity needed to uptake environmental data and information.
- **Section 4** covers matters related to WESR governance concerning both programme and data decision making. It presents how to grow the circle of internal and external partners to strengthen governance mechanisms.
- **Section 5** introduces the technical infrastructure on which the WESR should be built and which serves as the foundation for the development of products and services created with the end-

user in mind. These products include geospatial and earth observation data, environmental data and statistics, and documents, content and media.

- **Section 6** details the institutional factors that condition WESR's development, including internal processes such as procurement, interdivisional cooperation, access to budget resources, incentives, accountability and staffing resources, and external factors such as Member State buy-in and political matters.
- **Section 7** provides the roadmap segmented into three phases along with business plan options for the way forward.
- **Section 8** presents the risks and assumptions that accompany the strategy.

2 Mission, Value Proposition, and Guiding Principles

This section presents a mission statement based on WESR's role within the delivery of the Global Environmental Data Strategy (GEDS) and a summary of WESR's value propositions that are both internal to UNEP and external to the global community and UNEP Member States. Guiding principles are offered for WESR's implementation, and which also serve as a reference for its governance structures.

2.1 Mission Statement

The mission for WESR is to provide a coordinated and federated data system of the best openly accessible environmental data, information, and knowledge to support decision-making, policy and action at the global, regional, national and local levels for sustainable development.

2.2 Value proposition

The basic assumption underlying WESR's value proposition is that access to credible, accurate, and timely environmental data and information will inform and improve decision making, transparency and accountability for sustainable development, whether at global, regional, national or local levels. Improved decision making will lead in turn, either directly or indirectly, to a reversal in ecosystem decline and improved quality of life for Earth's citizens.

The value proposition derives from the successful achievement of the above mission and can be divided into two internal and two external kinds of benefits.

First, organization of UNEP's internal data and information holdings can reduce institutional fragmentation as different projects align themselves with a common data strategy. For example, by having data and information accessible through WESR, it is possible that synergies across assets can be identified and promoted as different units become more aware of the data and information available across divisions. Such synergies are useful for horizon scanning (foresight) and identification of emerging issues, used in processes to prioritize organisational strategies and communication efforts. Furthermore,

efficient internal organization of UNEP's data may enhance UNEP's reputation as users see it as an efficient and credible source of environmental data for the UN system.

Second, better access to environmental data and information is an important internal capability for UNEP's scientific assessment reports which in turn, underpin UNEP normative functions of providing scientifically accurate, timely and credible reports for decision-making platforms. Examples include UNEA (and previously its Governing Council) resolutions on lead in fuels, mercury, plastics in the environment, biodiversity, climate change, etc. If trend data are readily available, successive State of the Environment reports (GEO, EGR, etc) can refer to a common baseline and show progress or decline. Media and research institutes can benefit from access to the underlying data from the assessment reports.

Third, support to Member States' planning for sustainable development is a prime UNEP function – improving access to environmental data, interpreted information (analytics), and knowledge for their own planning purposes. This support includes the valuable assistance for SDG reporting by making information available through a common portal.

Fourth, to make digital public good datasets on the environment more easily discoverable, accessible and interoperable so that that can be used by private sector actors and civil society for decision-making, monitoring progress, and creating new innovations and entrepreneurship opportunities.

2.3 Principles

The data and digital strategy and framework are based on the following principles. These principles serve as guideline for strategy development and serve as a reference point for governance mechanisms:

1. *Demand-driven.* Data, content and technology delivered by UNEP will be responsive to needs, challenges and priorities of users to UNEP, the broader UN system, member countries and partner organizations.
2. *User-centric design.* User needs, research and co-design will be central to the technology development process to provide a streamlined and intuitive user experience.
3. *Accountability and transparency.* The decision-making process from the governance framework should be accountable and transparent to the user community. A robust metrics and KPI framework will be put into place to understand usage and impact.
4. *Partnerships.* WESR will develop strategic partnerships at the global, regional and national levels to support the data and technology needs of the platform, while ensuring alignment and collaboration with existing programs and projects.
5. *Public goods.* WESR will be based on a public good model where core data, products and services are free and open.

6. *Data ecosystem.* Innovation and entrepreneurship will be enabled and promoted to use data to create new applications, businesses and other innovations from users around the world.
7. *Capacity development.* A holistic capacity development process through partnerships will enable users from the lay audience, to developers, to scientists and decision-makers to make use of WESR data, products and services.
8. *Diversity and inclusion.* WESR will ensure geographic, gender and multi-stakeholder balance in its approach to engagement, product development and governance.
9. *Nimble and agile.* WESR, as part of the digital transformation agenda, will aim to be action oriented, responsive, adaptive and iterative to deliver fit-for-purpose solutions in a timely and agile manner.
10. *Interoperability.* WESR will not be redundant, but rather leverage existing data, tools and applications through a robust API and web services framework.

3 Transition to a Demand-Driven Approach

As a trusted broker of environmental data and analytics, the aspiration for UNEP is to become more relevant at both International and country levels, and therefore, develop technology, products and services that benefit UN entities and countries alike. Currently, UNEP operates mostly as a normative organization addressing environmental data, information, and knowledge needs for the wider UN System through and for processes such as the Common Country Analysis (CCA), SDGs and MEAs. While these processes have indirect benefit back to Member States, the question now is to what extent UNEP further engages with countries and other stakeholders around specific needs and priorities to inform which data, products and services are needed through the Digital Transformation Subprogramme, WESR and GEDS. As the digital economy continues to expand, UNEP needs to ensure that environmental data and analytics are available as digital public goods that are credible and that can be harnessed by digital platforms and algorithms to drive environmental outcomes.

At the same time, WESR needs to shift from a supply-driven, “build it and they will come” approach to one that is more agile and user-centric where specific needs and priorities are translated into use cases for data, applications, services, and standards. This shift requires an engagement and development process that builds technology incrementally based on direct feedback from users and adjusts as necessary. At the first level, this needs to happen internally to UNEP by working with users across Divisions, and the broader UN System in order for UNEP to be responsive to its organizational needs. At another level, further engagement with countries through regional mechanisms can identify needs and use cases at the country-level.

Either way, the approach needs to be pragmatic, with engagement, communications and outreach that builds trust and relationships with users across UNEP as an organization, and with stakeholders at the regional and country level. Local expertise should be leveraged, and assumptions tested through an iterative process building solutions that are agile and fit-for-purpose.

But how can UNEP evolve to take on a more user-centric, demand driven approach? There are essentially three main components:

1. Increase engagement and user interaction across UNEP and the UN System, and ideally, through regional mechanisms by piloting at the country level.
2. Move technology development from a Waterfall to Agile and user-centric approach, and
3. Develop a multi-stakeholder and inclusive approach to governance that is both top-down and bottom-up.

Each of these components is outlined in the following sub-sections.

3.1 Communications and Outreach

Having a strong communications and outreach strategy is critical to delivering the demand-driven approach as it outlines approaches for engaging and communicating with stakeholders and users of WESR. The strategy should aim to:

- Conduct a stakeholder mapping to better define the audience and users of WESR and its outputs.
- Define an engagement approach with member countries to better understand needs and priorities and deliver a user-centred design approach.
- Promote the use of WESR products and services.
- Increase awareness of environmental challenges and opportunities aligned to UNEP's vision and mission.

Fundamental to the understanding, design and uptake of WESR products and services will be engagement with stakeholders both internal and external to UNEP. Therefore, communications and outreach should be central and cut across the WESR implementation as part of the engagement strategy. The approach should align with the broader approach taken by the DTS and leverage the capabilities of the Communications Division. The strategy should include the following elements:

- Prioritize efforts to engage data users and data producers.
- Create a communications network through partner organizations
- Create clear messaging and collateral articulating the value proposition and objectives
- Develop user personas and targeted communication for different user types
- Guidance on creating user-centred/co-design approaches
- Develop and share user stories, case studies, and partner stories
- Social media strategy for content and campaigns
- Develop an ongoing calendar of key events and stakeholder engagement opportunities
- Support and conduct outreach for hackathons and challenges

The table below presents an illustrative communication and outreach plan for WESR’s representative target audiences.

Target audience	Persona	Examples of Communication / Outreach Activities	Goal
General public	Members of public and civil society groups interested in environmental status and trends; casual users looking for credible, science-based facts and indicators	Assess demand for data and indicators from UNEP publications; Science and Comms Divisions process results for informing use cases.	Increase knowledge of availability and accessibility of environmental science products among general public. Long term goal is to have and informed public participating in policy setting due to access to data and information (AQ, WQ)
UN sister agencies	Staff members of UN agencies (UNDP, OCHA, FAO, etc) who need data, statistics, indicators and analytics for reporting, prioritizing activities, and supporting national governments.	Using entry points such as CCA teams, organize trainings and workshops to better understand user needs and demonstrate utility of WESR prototypes. Assess demand for data and indicators from UN sister agencies; Science Division processes results for informing use cases.	Increase knowledge of availability and accessibility of environmental science products within UN community for common country analysis and priority setting in tandem with national governments being served by the UN agencies. Equip UN staff members with required environmental data and information to undertake their duties.
Federation members	Staff from institutions sharing the WESR mission to promote access to environmental data and information. Can be data experts, applications developers, data suppliers, etc.	Federation members participate in co-design workshops with UNEP staff to orient federation growth and user centric approach. Participation in annual workshops to address matters related to changing user needs and related governance matters.	Increase in quality and quantity of federation members, based on direction from WESR governance structures. Increase in data and information product quality through Federation contributions.

National governments	Ministry staff working on sustainable development planning, management and reporting	Target user needs surveys at staff regularly interacting with UN country team members. Organize cross-ministry consultations on environmental information systems supply and demand. Results used to inform WESR product / service development.	Engage national ministry staff to become regular users of and contributors to WESR products. National reports (MEAs, etc) increasingly reflect uptake of WESR products.
Scientists	University researchers who use UNEP publications for context within their research, access data and indicators with credible sources. Researchers who are looking for new areas of scientific investigation refer to foresight and horizon scanning products from UNEP.	Target user needs survey at selected research institutions (perhaps including Yale, Columbia, Tongji, etc) which already participate in UNEP networks. Use GEO author and other networks to assess needs for producing UNEP publications (Agile methodology). Feedback from scientists used for orienting engagement strategy.	Improve uptake of UNEP science products with research community. Increase #'s of citations from UNEP publications. Increase cadre of young scientists who are informed on environmental issues. Increase numbers of research institutes providing analytic capacity as part of WESR federation.

It is suggested that in collaboration with the Communications Division, such a plan be established for developing a comprehensive WESR Communications and Outreach Strategy. This could be developed internally by the Communications Division, or a Terms of Reference be created to contract external expertise with specific experience on communications strategies for the environment, data for development, international development and/or digital transformation.

In addition, how information and knowledge is delivered through unep.org and WESR needs better alignment and coordination. WESR aims to deliver data, information and knowledge with documents and media being a core component of the data infrastructure. However, where the line is between what unep.org should be delivering and what WESR should, or how this should be integrated, is unclear. This is a key issue that should be included in the development of the WESR communications strategy.

3.2 Engagement

Engagement with users and stakeholders internal and external to UNEP is fundamental to understanding needs and priorities, building trust, and designing products and services that are fit-for-purpose. At the internal level, the value proposition for WESR needs to be better understood by the organization and how Divisions, programmes and projects can better engage and participate through better communication and inclusion. The governance section provides some recommendations in this regard. At the external level, engagement at the country-level is a more complicated matter that requires UNEP to further evaluate its role from UN system service delivery to country-level service delivery and other stakeholders. In either case, engaging with decision-makers, users and stakeholders is critical to building the needed relationships and trust that allows for buy-in, uptake and usage.

While in the near-term, UNEP will likely stay at the normative level, it is suggested that some level of country engagement at the ministerial and national institute level occur to understand demand. This expands beyond UN regional offices and UN Country Teams, which has been the operation to date. This will continue to be the key question for UNEP regarding the level to which it can or should engage outside of existing processes. Therefore, some experimentation will be likely as part of this engagement process to identify what does and does not work.

For example, addressing food insecurity is a priority for Kenya, which may be only further exacerbated by the impacts of climate change. Kenya needs timely and accurate data so that it can better understand its agricultural production capabilities and how these are impacted as a result of climate change. To understand the issues at a cross-sectoral level, the Ministries of Agriculture and Irrigation, Environment, Water and Sanitation and National Statistics need to be consulted, as well as other development partners, NGOs and private sector. The result may point to delivering better access to satellite data that allows for machine learning models to predict the distribution of crop type, area and yield. This can then be intersected with climate-risk models, like the Earth Stress Monitor (STRATA) that is also being developed by UNEP to better understand vulnerability. These analyses can generate specific use cases for the types of data, data products and services required for Kenya, along with the capacity development needs for Kenya to manage this process internally, especially as it applies to decision-

making and policy at the national level. Kenya also needs access to solutions that have been adopted in other countries faced with similar challenges in similar ecosystems. This kind of match making between problems and solutions is a recurrent request from many countries.

However, it is impractical to think that UNEP can do this level of engagement and assessment for every country in the world. At the regional level, issues in one country may also be found in neighbouring countries, and therefore identifying existing regional mechanisms that can be leveraged to conduct outreach on the broader digital transformation and WESR agendas will be important. At the regional level, 2-3 countries can be identified that provide the right balance of geography, politics, culture and capability. By working with UN agencies such as UNDP who have national presence, more in-depth consultation can take place within these countries as a proxy for the region where products and services can be designed to work in the “pilot” countries and then scaled to the region. Regional institutions like the UN Economic Commissions can be used as one entry point, but additional regional fora should be identified that may be thematically oriented around, for example, agriculture, climate change, biodiversity, etc.

It will also be important to partner with local institutions with the capacity and mandate to support this level of engagement. Leveraging existing expertise will allow for better adoption, engagement and alignment using trusted relationships and allow for scaling that would not be possible if engaging unilaterally. Developing a network of implementation partners will also allow for an additional pathway to capacity development and user engagement.

3.3 Use Cases

Often, a user needs assessment is conducted to better understand what types of problems and solutions are needed across a range of stakeholders. A use case is defined as a specific situation in which a product or service could potentially be used to inform a specific decision or action. Needs and priorities identified through the engagement process discussed above can be translated into a set of use cases that can direct the development roadmap for technology products and services served by WESR or other UNEP curated platforms.

For example, in the development process of Digital Earth Pacific, a program currently being initiated by the Pacific Community (SPC), national workshops were held with the Marshall Islands, Vanuatu and Tonga to conduct a formal needs assessment. Ministries across government and other stakeholders were brought together to discuss the work they are currently doing to address national development priorities and how they are using geospatial and earth observation data, and the policy implications related to their work and institutions. Objectives of the Digital Earth Pacific program were made clear and international partners were also invited to showcase various innovations applicable to the country. Through an interactive format, stakeholders were able to communicate what was and wasn't working, what data were needed, how these needed to be applied, and what capacity was needed internally to own and manage problem. Over 50 use cases were identified from the 3 countries, each being representative of the 3 subregions of the Pacific. The commonalities across the three countries were

then prioritized to guide the near-term roadmap for the first products and services (coastline change and agriculture) to be made available by the program.

In the case of WESR, use cases and demonstration projects have been identified, but the process needs to be strengthened and aligned to the country-level for use cases to be relevant to Member States. Several use cases were identified through consultations that demonstrate how WESR could be applied for users both internal and external to UNEP. This is for example purposes only illustrating a pragmatic approach to technology development where one goes deep on each use case as building blocks to broader platform:

1. *Global Environment Outlook (GEO)*. For WESR to provide the data backbone for GEO, a proof of concept must be followed. The proof of concept should target the optimum balance between a fully indicator-based GEO and a literature review-based GEO, which could be tested with GEO authors as part of an engagement strategy. On the one hand, consumers of GEO products desire to have near-real time data available for state and trends of the environment. On the other hand, GEO authors do not want to provide their own interpretation of charts and graphs that are in WESR. They prefer to gather peer-reviewed interpretations of the same. Although the optimum balance may shift over time, initial requirements indicated by the GEO Team for use of the WESR include:
 - a. A front-end portal for on-line collaboration for GEO authors to support drafting and share text and graphics (MS Word 365 was mentioned). NB: on-line access to journals is still a requirement for some authors. This front-end window must be in place for the GEO team to use in 2022. GEO authors should not be forced to use a package they don't like.
 - b. Authentication of data in WESR for GEO authors to use. Users will come to WESR if the data are authenticated. The value of WESR's data aggregation function still needs proof of concept for the GEO authors.
 - c. An increase in data available in WESR, as there was a big gap for GEO6. For example, data on Air Quality are more readily available than on biodiversity trends.
2. *Monitoring progress against key SDG and MEA indicators*. The SDGs have many data requirements across the indicator framework, and UNEP is the custodian agency to 25 of these indicators. Countries across the world are facing gaps on data needed to monitor and implement the SDGs and MEA targets, as well as communicating progress and addressing implications on policy and decision-making. SDG dashboards with a view to solving for the data gap, creating capacity and working with ministries for how the SDGs align to national development priorities are needed.
3. *Integration of Global Environmental Monitoring System (GEMS)*. As a full integration model of an existing platform into WESR, a use case can be co-designed with relevant water and environment sector authorities to demonstrate the value of this integration. In the case of GEMS, for example, access to earth observation data can provide GEMS additional efficiency and scale by modeling water availability and quality based on historical and current trends, refining the models based on its

in situ datasets, and creating country level dashboards for countries to better understand their water security. By engaging users on the GEMS team and relevant stakeholders through a co-design process, benefits and challenges of integration can be better understood and the value proposition of WESR more clearly communicated.

4. *Harmonizing MEA reporting:* MEA reporting is complicated by the fact that core data sets which are common to each MEA are not always used when preparing reports. The result is that trends and findings from such reports are not easy to integrate and compare. Furthermore, national government officers are frustrated by the inability to integrate MEA reports to better understand overall trends and threats to SDGs.
5. *Enabling horizon scanning, foresight, data and scenario analysis and intelligence functions:* The foresight process combines a myriad of techniques to characterize these processes, such as scoping studies, horizon-scanning, trend analysis and emerging issues analysis. Currently, there are numerous UNEP products which are not analysed to draw such insights. It is therefore essential that UNEP identify the use case of identifying emerging environmental issues and threats, which will require the integration of existing assets and federation of others.

Rather than expanding the WESR too rapidly as user needs will be varied, it is key to identify strategic and prioritized use cases that can further support building and realizing the value proposition for WESR. The WESR team must be focused and pragmatic by starting with only a few use cases and getting these well-established through engagement, co-design, communications and implementation. It is better to build iteratively through specific use cases, learn from the process, improve as needed, and deploy such that the end product can be taken-up and used. KPIs should also be adopted and monitored for each use case.

3.4 Co-Design

As use cases are prioritized, increasing the potential for uptake and usage of derived data, products and services can be achieved through implementing a user-centric, co-design process. It is best to engage with users and experts who will most directly interact with the product being offered so that the solution can be designed according to a user experience that is familiar. A poor user experience is one of the biggest barriers to technology adoption, as is not delivering a product that is fit-for-purpose.

It is also important to use local knowledge and expertise on the methods used to create digital products and services. In many cases, methods have already been developed through local and regional institutions that should be leveraged. Issues related to bias, equity, privacy and data sovereignty can often be identified through a co-design process. The user-centric approach generates additional buy-in and ownership for the end-product, builds trust and relationships, and creates a user community.

Fundamentally, the key objective of a co-design process is to engage and learn from the end users. It allows for digging deeper into the problem to be solved, understanding how a user currently addresses

the problem, and seeing what improvements need to be made. Several methods can be deployed to conduct co-design activities including:

- Hosting co-design workshops
- Hosting events that capture feedback
- Conducting feedback surveys
- Sharing documents for comment
- Creating communities of practice, user groups or working groups
- User testing

Developing a more user-centric approach as described in the above sections is a specialized field that incorporates user experience research, design, data science, and strong communication and facilitation skills. The WESR team may need to consider outsourcing some of this functionality to both support its implementation and to build capacity internally while the team grows inclusive of these skills.

3.5 Agile Product Development

Moving to an Agile product development process to support user-centric, and iterative design will be important to support a demand-driven approach and building out technology that is responsive to user needs. This approach is complementary to the engagement and co-design approaches in previous sections and will support further interaction with users to ensure products developed are fit-for-purpose.

Plan. Based on the engagement between the WESR team and users internally to UNEP or at the country level, a specific need will be prioritized and translated into a use case. Ideation will take place on how a solution can be developed for this use case based on existing or newly acquired data.

Design. Based on the identified use case, a product is conceptualized based on engagement with users who provide inputs into how this product will function and be useful. The design concept further supports the plan by clearly articulating the requirements for the product and the user profile.

Develop. A prototype, or minimum viable product (MVP), gets developed representing the first iteration of the solution. The prototype is used to assess the technical feasibility of the product and whether it is providing the required functionality and outcomes to meet the user needs. Based on user input, the product can go through stages of development leading up to the launch as in alpha, beta, etc.



Test. Based on the assumptions identified through the previous stages, the prototype is tested with users to better understand its applicability, what is and is not working, where improvements can be made and whether a pivot is required. It is completely acceptable to go back to the planning stage to re- envision how this product can be developed based on user feedback, or completely scrap the idea and move on to a new product at this point.

Deploy. Based on user feedback, the product may be ready for a release (alpha, beta, etc.) and is ready for broader consumption beyond the previously consulted users. The product is now operationalized, stable and in working order. Systems should be put into place for monitoring its usage, performance and maintaining its access and availability.

Review. At this point, the results achieved are reviewed in regards to meeting the initial plan and set of requirements. Is the product meeting the user expectations for this stage of the product development? Based on this evaluation, the Agile development process either starts over or moves onto to the next iteration and staging for the product.

3.6 Partnerships

To achieve the broader vision of UNEP, and what this means for delivering impact from the digital transformation subprogramme, GEDS and WESR, strong, multi-stakeholder partnerships at national, regional and international levels will be required. Partnerships will be important as they can provide a practical extension of UNEP given its limited reach, mandate and resources by developing a network of partners to support programme delivery.

While the One Global Partnership has been formulated to focus communication and cooperation on WESR development, many of the organizations included are international, global north or UN oriented. While such a membership can be leveraged, a more diverse range of partners from the Global South is likely needed to provide the reach UNEP needs at national and regional levels. In addition, how institutionalized the One Global Partnership is within UNEP more broadly remains unclear as the direct working relationship of these partners remains within the WESR team. Organizations involved in this partnership likely have many ways to contribute beyond WESR, and therefore, expanding its reach and transparency can likely lead to greater outcomes.

The aims for developing partnership should be to:

- Identify new and relevant data sources
- Develop technology according to the latest trends, standards and best practice
- Access domain expertise, and most importantly, local expertise
- Establish relationships and trust
- Create delivery mechanisms through institutions with specific mandate
- Align with related programs, projects and initiatives

- Amplify the program through additional networks and communications channels
- Create network effects through interoperability and data sharing
- Create access to more capacity for data analytics
- Support user engagement, design and capacity development
- Create opportunities for buy-in, political support and uptake of services
- Support fundraising
- Leverage capacity and capabilities external to UNEP
- Create opportunities for scaling services

Keeping these aims in mind, several categories for partnerships can be created:

1. *Data Partner.* A partnership that is focused on the exchange and sharing of data.
2. *Technology Partner.* A partnership that is focused on the development of technology, infrastructure and standards.
3. *Delivery Partner.* A partner that can support the delivery of program objectives at the national and regional level. This can include providing domain expertise, user engagement and co-design, capacity development, communications and building political support.
4. *Domain Expertise Partners.* Organizations and companies that UNEP may want to partner with who have specific domain expertise in UNEP's priority areas, identified needs and priorities at the country level, capacity development or data and technology.

It is likely that one partner may fit multiple categories but creating these categories can more specifically articulate the objectives and expected outcomes of each partnership. It will also provide further clarity to each potential partner on their role and responsibilities. The Data and Digital Governance Group should have a role in vetting proposed partnerships.

Partnerships should be mutually beneficial to work, require nurturing through consistent communication and management, and take time to be effective. A few guidelines to be considered in developing and managing partnerships include the following:

1. *Define what success looks like.* There should be alignment and synergy with the partner organization in regard to the intended outcomes. Define what success looks like to each party and how common interests and incentives can be aligned.
2. *Create a pragmatic partnership agreement.* Memoranda of Understanding, Letters of Intent, Contracts, or in some cases, informal agreements can all be used as viable instruments for development partnerships. The key is to engage with the partner organization, clearly identify roles, responsibilities and expected outcomes, and use the instrument that will require least bureaucratic overhead. In some cases, especially with the private sector, the intent of a

partnership can be delivered without having any formal agreement in place. While this may seem odd, this is how some companies operate.

3. *Intellectual property.* Worth noting is to ensure that intellectual property concerns are covered and well understood by each party. Ensure that agreements are in place with the specific entity carrying out the work – and not through an umbrella organization where IP issues can be diluted down to third parties.
4. *Plan and manage.* Ensure that a point of contact (POC) from each party is assigned for managing the partnership. UNEP may want to consider partnership management roles in this regard. The POCs will work to formulate a plan that identifies key activities, expectations and milestones, and will regularly check in on the value and outcomes of the partnership.
5. *Communications.* These partnerships are important. Therefore, create announcements on newly developed partnerships and create communications on progress, milestones or other story worthy events.

UNEP can also consider a brokering mechanism in relation to country level needs and priorities. Through a network of trusted partners established through the above process, a catalogue can be developed on key services each partner can offer. These services can then be “matched up” against needs with a country where the relationship or agreement is developed directly between these parties through this brokering service. As a result, UNEP is still providing a service on supporting country-level challenges through a scalable approach where it does not, nor can it, take on all challenges.

3.7 Capacity Development

To fully implement the WESR, in alignment with the engagement approach, there are several dimensions for capacity development that must be pursued in phases.

Implementation of the WESR strategy requires capacity development along the value chain of stakeholders, including at the country and regional levels, within the federation of WESR partners, and within UNEP itself. A holistic capacity development strategy is therefore needed by understanding the capacity needed for the general public, technical users, journalists, and decision-makers. Each requires a different orientation for WESR ranging from a basis in communications to increased levels of training and engagement opportunities, and it will be important to consider the range in audience for how capacity should be delivered.

At the national level, capacity development should target Ministry staff, university and research institutes, NGO partners, environmental data experts. National level capacity should focus on how to manage digital data within the (existing) national DTS strategy as opposed to creating a new one. Capacity is needed to analyse data and compute environmental statistics and indicators for SOE / MEA / SDG reporting.

The complexity of training will advance with each of the phases. Whereas the initial focus may be on data capture, sharing and reporting, with time there will be a growing need for data analytics and foresight.

At the regional level, capacity will be needed to implement the engagement strategy in those countries selected for country-level WESR engagement. Workshops in technical training can be offered through national or regional institutions. Regional level capacity should target UNEP staff, Regional Economic Commissions, research institutes, regional NGO partners, with the goal of reaching improved capacity to manage regional environmental data networks and coordinate national initiatives.

UNEP HQ will need to build its capacity by engaging or training staff responsible for implementing engagement strategies, as well as technicians responsible for managing WESR. Training on WESR use will need to be part of the planned internal training on digital transformation for UNEP staff responsible for environmental monitoring and reporting.

Training activities could include the promotion of cultural transformation through IT and flattening of vertical hierarchy.

A key question is whether and to what extent can IT solutions reduce cost of building national capacity given the reality that relationship building requires more than just IT and requires sustained communication and feedback.

4 Governance

Governance covers matters related to high-level issues such as programme direction, partnerships, budget, priority setting and cross-divisional collaboration. Governance also covers decision making related to data development and touches on interoperability, quality, security, etc. Lastly, there needs to be an incentives and accountability framework in place that supports decision-making and guidance from the governance mechanism.

4.1 Programmatic Governance

Governance for WESR, aligned to GEDS and the DTS, needs further strengthening, accountability and transparency. Given that a key objective for UNEP is to provide value to Member Countries, understanding the needs and priorities of Member Countries will be important, something that can be more directly understood by including their representation, even through informal channels, in the governance structure. This can ensure alignment and buy-in at the country-level. To be clear, the intent here is to bring perspective into the guidance of WESR through national institutions, government agencies or other major stakeholder at the country level. This can be done outside of formal Member Country representation.

Additional actors including the private sector, academia and civil society will also have a role in providing expertise on the latest data and technology, civic engagement, accountability, research, outreach and communications and policy. In short, strong partnerships and strong advocacy is going to be required for UNEP to have an influence on how environmental data and technology is applied at the country level, and what this means for the normative, global processes UNEP supports.

Therefore, designing a governance framework that takes a top-down and bottom-up approach is suggested. The top-down provides more of the strategic advisory function and builds broader buy-in and support for the program, while the bottom-up ensures alignment with existing programs and initiatives, maintains open communication avenues with users for needed feedback, supports the work programme and creates new opportunities for engagement.

While the Data Governance Group and Acting as One structures exist, these mechanisms have been weak with limited turnout, oversight and accountability. Furthermore, vertical hierarchy in UNEP impedes cultural transformation needed for digital transformation to succeed.

It is suggested that these two groups consolidate into the proposed Data and Digital Governance Group (see Figure 5.1) ensuring adequate representation from leadership and staff. The DDGG is responsive to a Strategic Advisory Group and a Technical Advisory Group:

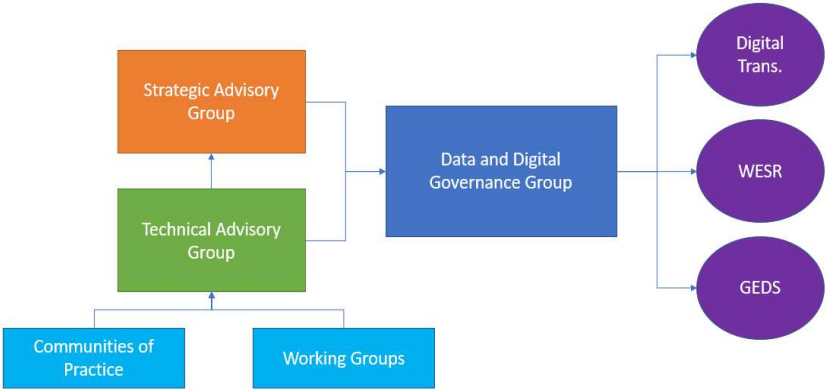


Figure 5.1: A functional data and digital governance group.

The Strategic Advisory Group (SAG) includes high-level representation from government, private sector and civil society organizations. For government representation, UNEP Regional Offices can be consulted to identify 1-2 countries that can support this strategic guidance function on a rotating basis. While the Permanent Committee Representative (CPR) process offers one mechanism for member country input into broader UNEP direction, it is also a political process that wouldn't allow for the same level of engagement specific to WESR that the above suggests. The SAG could also include other regional and international organizations across the UN System or otherwise like the Group on Earth Observations, UNDP or World Resources Institute, for example, that can further support and amplify the objectives of WESR. Key functions would be to:

- Provide strategic guidance on use cases and engagement strategies
- Build political buy-in
- Identify partnerships
- Provide feedback on work program
- Support advocacy and outreach
- Support fundraising
- Set standards and procedures for bring new Federation members into the WESR partnership

The Technical Advisory Group (TAG) provides a more bottom-up function and multi-stakeholder with inclusion of national institutions, private sector, civil society organizations, domain experts and research institutions. In fact, many of the organizations currently identified in the One Global Partnership would be good candidates for this group. Key functions of the TAG would be to:

- Provide technical expertise
- Provide guidance on work programme priorities
- Identify opportunities for alignment with existing program, projects, data and technology
- Create Communities of Practice and Working Groups (as needed)
- Identify emerging trends, issues and areas for innovation

Overall, the main objectives for strengthening the governance mechanism are to provide more transparency, oversight and accountability, while also ensuring that WESR and related initiatives under the digital transformation subprogramme are responsive and aligned to user needs and priorities. By including external groups to provide this insight, UNEP can further ensure relevancy and buy-in.

4.2 Data Governance

At the highest level within the UN, the Secretary-General's Data Strategy and Roadmap for digital transformation and cooperation sets goals for the UN system to fully engage in the digital age so that its benefits flow to Member States. UNEP's role within the SG's strategy is to implement digital transformation within its work processes and to ensure that Member States have access to data and information that they need for implementing and reporting on environmentally sustainable development.

In general, a data governance framework supports an organizations' overall data management strategy and sets procedures and guidelines to standardize, integrate and protect data, while ensuring it is being used ethically, and to reduce organizational risks. The framework can improve both internal and external communication around the intended uses of data, increase value and reduce costs, and help an organization mitigate against any uncomfortable confrontations in the future from stakeholders on issues related to ethics, privacy, costs, bias, appropriate use, which will undoubtedly arise.

A data governance framework can cover the following:

- Data structure, architecture and API framework
- Data storage, deployment and archive
- Data security
- Privacy, confidentiality and access
- Data integration and interoperability
- Business model (i.e. free and open, pay-for, or something in between)
- Content
- Analytics, machine learning and AI
- Metadata
- Data quality
- Data value chain

By having a data governance framework in place, a level of transparency is achieved that sets the rules for how data and information products are collected, managed, created, distributed and used. Given that data, products and services made available by UNEP will likely follow a digital public good model¹ and be free and open, it will be important for UNEP to clearly outline what this means from a user perspective. Countries, with good reason, will often question why external or global data should be used, and more importantly, why they should give their national data to a global institution. They may be typically reluctant to sign data sharing agreements. They will need reassurance that WESR or other digital transformation activities do not interfere or compromise their sovereign data, and that any data exchange occurs within a secure environment.

Products and services provided by WESR will also have downstream implications. For example, providing data on the potential of flood risk has implications for urban development, insurance, licensing, and of course, human well-being. Hence, there are financial, social and environmental costs depending on how the data are used, and therefore, the underlying assumptions and use constraints must be well documented. Otherwise, UNEP could be held liable for unintended uses or errors in the data. Terms of use and ways to limit potential liability will need to be adopted.

4.3 Incentives and Accountability

Implementation of WESR requires that teams work across Divisions and Regions. An effective policy of incentives and accountability where teamwork is rewarded will facilitate reaching WESR goals. Although set at the DT subprogramme level, such policies will greatly influence success in large projects such as the WESR.

Incentives

Corporate incentives could favour uptake of digital technology. Examples of such incentives include:

¹ <https://digitalpublicgoods.net/standard/>

- Financial, wherein project work that features strengthening the WESR will be considered in the allocation of funds from new partnership agreements.
- Individual, with authority allocated to team leaders, (thereby flattening hierarchy), and promotion based on performance as reflected in ePAS reviews.
- Awards and internal recognition such as certificates of achievement as new demand-driven WESR products are rolled out and taken up by the user community.
- Training, wherein staff will have access to digital transformation training opportunities.
- Job satisfaction from the increased usage of data and platforms through an integrated and federated approach to distribution.
- Internal competitions and hackathons.

Accountability and Performance

Accountability for WESR and the DTS should be shared by those responsible for their implementation, both directly and indirectly. As described above, interdivisional cooperation is key to WESR's success, so it is normal that UNEP staff should be held accountable if lack of cooperation leads to failure. Although the ePAS system is the main tool for evaluating individual performance, other measures of accountability could be put in place and linked to the ePAS. Examples include:

- Members of the Senior Management Team can set goals within their annual workplan related to participation in the DTS and WESR initiatives and pass these down to their staff. Strong leadership from the UNEP Executive Office will strengthen this measure.
- Following the example from leadership, performance indicators linked WESR participation could be included within annual ePAS.
- New projects will need to demonstrate adherence to core digital transformation goals and processes including products within the WESR. Projects with a strong data component that do not use WESR standards and protocols for any digital outputs in their operations will be excluded from the benefits of interoperability.
- Adoption of KPIs and website indicators and regular publication of indicators in an internal WESR dashboard.

In addition, metrics for determining usage and impact from the WESR platform should be put into place. Some of these will be "manual" metrics, but others should be implemented as part of the code base and associated APIs to understand usage. Most importantly, the metrics from a data and platform perspective should not be those that incentivize more and more data to be included, but rather focus on usage and impact. In other words, it is not about quantity, but rather quality.

Based on the Monitoring Plan and Budget for WESR, a number of indicators already identified include the following:

- Increase in number of evidence-based, environmental assessments that are produced using open environmental data available on the online platform (the World Environment Situation Room)
- Continuous identification of emerging environmental issues by Governments, global institutions and other stakeholders based on data made available on the open environmental data available on the World Environment Situation Room.
- Increase in tagged and maintained datasets enabling systematic user access to relevant data on the environmental dimension of the Sustainable Development Goals.
- Increase in the number of experts and assessment practitioners using the online knowledge platform Communities of Practice as a participatory process to strengthen the science policy interface
- Volume of Data made available based on environmental themes
- Number of users in the participatory process that strengthens the science policy interface to generate evidence based environmental assessments (Communities of Practice)
- Effectiveness of platform based on % of users providing positive feedback on how the World environment Situation Room has facilitated exchange knowledge and improved the assessment process.
- Number of technical support missions and national level capacity building workshops undertaken with the support of this project in Kyrgyzstan, Tajikistan, Uzbekistan.
- Number of developing countries receiving institutional and technical support for accessing digital repositories of scientific publications
- Number of countries with access to the reporting toolkit to support improved sharing and use of environmental data.

The indicators above articulate a good set of impact-oriented measures. It is unclear how these indicators have been used or monitored, or how they have influenced the development and operations of WESR. As the previously articulated governance structure for WESR strengthens, this framework should be re-evaluated to ensure its appropriateness as well as creating a clear process for transparency and accountability.

A few additional technically oriented indicators related to platform usage and integration could also include:

- Number of platforms integrated into WESR and at what level. This should be interpreted more as a guiding statistic as opposed to a metric of success given the goal should not be to have as many platforms integrated as possible.
- Number of users visiting WESR, amount of time on WESR, pages visited, number of downloads, what APIs and datasets are being accessed.
- Data being ingested into other platforms.
- API tokens requested.

5 Technical Infrastructure

The development of the technical infrastructure, products, services and standards provided by WESR should follow the principles previously defined.

By ensuring a flexible and iterative development process, implementation of the strategy can ensure that solutions are being developed to be fit-for-purpose, based on specific needs, and that user experience, capacity development and outreach ensures uptake and usage.

Development of the technical infrastructure can be generalized into four categories:

1. **Input datasets or the core data infrastructure.** The foundational data used to create products and services.
2. **The platform.** The software infrastructure and tools that support data visualization, discovery and analysis.
3. **Services.** The information products and applications derived from input datasets.
4. **Standards.** The set of data standards and APIs that enable discoverability, inter-operability and quality control

5.1 Core Data Infrastructure

The core data infrastructure should serve as the data warehouse that supports UNEP programmes and projects including providing the foundation for data served by WESR. As currently configured, the three main types of data and information served fall in the following buckets:

1. Geospatial and earth observation data
2. Environmental data and statistics
3. Documents, content and media

This concept is already captured in the current design of WESR as illustrated in the red box below (Figure 6.2):

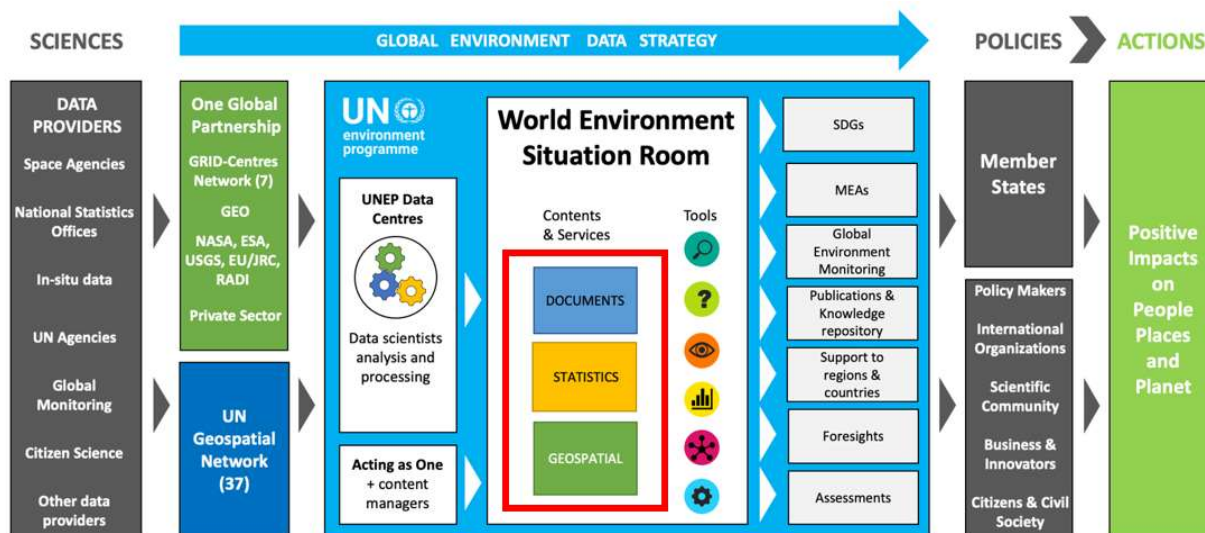


Figure 6.2: WESR conceptual diagram

The engagement process outlined above should also inform what data the core data infrastructure supports. Generally, an initial step in developing data platforms is to better understand what data exists, its format, quality, sharing rights and how it is intended to be used. This could provide an overall understanding of the data holdings within UNEP and allow for prioritization of what data WESR can or should serve (refer to data governance). The simple principle here is that more data does not necessarily mean success. It all comes back to what data is most needed and useful, how it is curated, and what that means for the user experience around how users can access and use these data for their objectives.

Geospatial and Earth Observation Data

Open and free satellite data is now being made available by USGS and ESA and the major cloud computing companies, Google, Microsoft and Amazon are all making these available in the latest, analysis-ready formats for Landsat and Sentinel data. These data provide data in 10-30 m resolution and can be used for many use cases, especially in the environmental domain. These data are being structured in cloud-optimized GeoTIFFs (COG), in analysis ready format (Level 2) where available, and in some cases, according to a Spatio-Temporal Asset Catalog (STAC), which is quickly becoming the standard for exposing geospatial and earth observation data so that it can be easily indexed and discoverable. UN Agencies such as FAO have also developed platforms such as the System for Earth Observation Data Access, Processing and Analysis for Land Monitoring (SEPAL) to support the analysis of remotely sensed data. UNEP's STRATA platform is also being developed to harness satellite data to identify climate security hotspots.

Each company differs in the range of geospatial datasets, models, robustness of cloud computer services, available products and the extent to which components are open-source or not. Amazon, for example, has the Amazon Sustainability Data Initiative (ASDI) that aims to make sustainability data for the Earth open and free and focuses on the infrastructure for storage and compute. Microsoft's AI for Earth and Planetary Computer initiatives aim to do the same, but also offer front-end applications and is

completely open-source based on the Pangeo community (<https://pangeo.io/>). Google Earth Engine is a go-to analytical environment for many developers and remote-sensing scientists.

All these options should be explored for WESR as a way to “power” the geospatial and earth observation capabilities of the core data infrastructure. Currently, they are the industry standard for access to large earth observation datasets where archives from American and European satellites are already made available in the right formats for broader mass consumption. Given that UNEP is already utilizing the Azure cloud, it is recommended that using the Planetary Computer be considered. For one, the Planetary Computer is completely open-source, deploys the STAC API, provides fundamental satellite data as well as a catalogue of many other datasets likely useful to UNEP and its users, and can be set up such that all user authentication and control is managed by UNEP. Following this recommendation could provide a strong partnership opportunity with Microsoft that can be useful in relation to its sustainability agenda and leveraged for the development of new applications, innovation and engagement with the private sector.

Environmental Data and Statistics

According to UNEP’s Roadmap for Environmental Statistics, Accounting and Analysis, the roadmap seeks to close the data gap on environment statistics and accounting, particularly for the 25 SDG indicators for which UNEP is the custodian, the post 2020 Biodiversity, Chemicals and Waste Frameworks, and to lead on the development of environment statistics, tools and methodologies for their effective use.

Operational objectives in the Roadmap include making available an initial core set of basic data and analytics on environmental SDG indicators for the UN System and Member States and to tailor them to the needs and priorities of UN RCs in support the UN CCA and the UN System Development Cooperation Framework (UNSDCF). The Roadmap initially targets a group of 15 countries, and depending on results, an additional 20 countries in a later phase. Further work will target refinement of the data and analytics on environment on the WESR country pages, including through bringing in national level data products. From a demand-driven perspective and what this means for ownership and buy-in, who owns the country pages should be sorted in terms of how they are managed, updated and made relevant for the country in support of its priorities, policy and decision-making.

A key point in the vision statement calls for the availability and effective use of timely and trustworthy environmental data and statistics. Therefore, WESR needs to become the platform that brings these data together from multiple sources and makes them available in a useful format.

To do so, a robust API management framework will be needed (see below) to access data from other systems and member countries

Documents

WESR aims to also provide access to a range of documents, publications and media that provide information and knowledge from UNEP processes and core priorities areas. This includes reports and national plans submitted by countries as part of InforMEA that provide information for policy makers,

journalists, civil society organizations and the general public on matters related to multi-lateral environmental agreements (MEAs).

Inherent in many of these reports are data that are often not accessible given that the reports are in PDF format. A desired integration process articulated by several staff at UNEP suggested a capability to “scrape” PDFs to extract data tables into machine readable files like .csv. These files could then be linked with data collected and provided through other divisions and made accessible via WESR.

To best understand what content should be made available as part of this third component, current repositories should not be replicated, but rather integrated through APIs or search capabilities. There should also be close collaboration in prioritizing what content becomes available through the Science Division, UNEP.org site, InforMEA and Library Services as the question of reducing the number of UNEP publications is under debate.

5.2 Platform

The WESR platform needs to enable an integrated approach for how data, information and knowledge are made available to users across the UNEP organization, the UN System, partner organizations and users and stakeholders around the world. The platform needs to enable data and content discovery, visualization and analytical capabilities that brings geospatial, statistical and tabular data together to address user needs and priorities. Therefore, the platform will need to continue providing a computing infrastructure that is interoperable and API-enabled ensuring best practice industry standards are used allowing for the level of integration, scale and access envisioned for WESR. OGC standards are currently being applied.

The initial focus for WESR should be to make the platform as robust as possible such that it enables easy access to the data and content and enables a systems approach through interoperability, APIs and web services such that data and analytics can be consumed by other applications and new applications can be built “on top” of this infrastructure by not only UNEP, but also by a community of developers, scientists and entrepreneurs.

The following recommendations provide some guidelines:

Cloud Computing. The cloud offers efficiency, flexibility and scale depending on the level of data storage and computing needed as the WESR platform develops and the user base grows. To provide a secure environment, to build trust with member countries and other stakeholders, and to protect from any potential intellectual property issues, it is best to utilize the functionality of the UN Cloud based on Microsoft Azure. However, it has been noted by the WESR Team that using the UN Cloud in the past has had security and access issues that needs resolving.

Robust API Management Framework. WESR will need to source and manage data from multiple sources and allow for easy ingestion and consumption through the data system. A robust API

management framework will be needed for building APIs, making them accessible, analyzing usage, reporting performance metrics and securing access. APIs are essential for building flexibility in modern software development and enabling data “to talk” to one another allowing visualizations to be automatically updated as the data sourced at the API endpoint is updated. A trusted framework for API management should be established incorporating best available open standards.

OGC Web Services. WESR should continue its compliance with the Open GIS Consortium (OGC) web services framework for WMS, WMTS, WPS and WCS for geospatial data.

Metadata Explorer. Datasets being made available in the WESR platform should be accompanied by the appropriate metadata standards including Dublin Core, ISO, STAC or others depending on the type of data or content being made available. The metadata should describe, at a minimum, information related to custodian, time period, quality, use constraints, resolution or scale, and other fields that allow the users to understand how the data was created, by whom, for what time period, and any underlying assumptions in how it should and should not be used.

Search Functionality. A robust search engine allows for content-based searches on the WESR platform, incorporates semantics and ontology libraries for intelligent results, and allows for search based on geography.

Developer Documentation. WESR should enable an ecosystem of developers to consume available data to create their own applications and tools based on the underlying APIs and web services. To do so, a clear set of documentation and guidelines should be made available that empower users to effectively use the platform.

5.3 Services

The services that WESR makes available should be based on the demand-driven, engagement approach to better understand the specific use cases required by users to then make applications, tools and products available that meet those requirements. Currently, this is the area of WESR that is undefined. While demonstration projects and use cases have been discussed, there is still additional buy-in that is required to develop services in a format that is useful to end-users both internally and externally to UNEP. In the Use Cases section identified above, several options are given, and as the roadmap will articulate, taking a very pragmatic approach to creation of services will only lead to the further success of WESR.

Services provided by WESR will be the applications, visualizations and other tools built based on user needs. The platform will enable these services to be shared and delivered, and further, enable users to not only ingest those provided by UNEP, but to create their own. The latter is an important principle in the design of WESR in that the burden of creating services should not only be on UNEP. Rather, as a convening organization, UNEP should create mechanisms that allow users to “convene” around WESR as a foundation for building out an environmental digital system for the world. Previous sections on

engagement, co-design, Agile development, and so on are all important steps for creating services that are fit-for-purpose. Components and functionality that can be considered include the following:

WESR User Interface. The WESR site will be the initial point of entry for all users. It is important to conduct user experience testing on the UI to ensure that users can find the data and content they are looking for, that integration of related platforms is working well, and that users are able to conduct the types of analysis they hope to do. User experience is incredibly important in this regard as this is how platforms live or die. Ensuring that the UI is providing good experience will be very important and is highly recommended that WESR incorporate user experience studies as it further evolves.

Mapping Interface. Currently, MapX is being utilized for the mapping environment for WESR. This should continue as is. Interoperability should allow users to ingest data into the mapping environments with which they are most familiar.

Analytical Environment. Providing multiple analytical environments for geospatial and statistical data will be important for end users. This can incorporate Jupyter notebooks for those that are skilled in programming languages like Python, or more UI driven analysis environments like those already available in MapX or through new tools and applications that are built based on specific user requirements. Integration of functionality available through STRATA and its Earth Blox components can also be considered as a method for providing a more UI driven approach to analysis as opposed to coding. In short, the WESR Team want users to be able to interrogate data and information made available through WESR through tools and services made available directly through the platform, or through interoperability that allows interrogation of these data in the platforms that users use on a regular basis and with which they are comfortable. WESR should be viewed as an enabler.

Github Repositories. Github is a code hosting platform for version control and collaboration. Code associated with the development of the WESR platform and related tools and applications should be made available on Github to further embrace the open-source aspirations of the initiative and to further develop a community around WESR enabling more innovation.

5.4 Policies and Standards

While policies being shared by the Secretary General's Office are being aligned to including those related to data strategies and digital transformation, how these are implemented internal to UNEP is still lacking. Policies related to data sharing and coordination on technology development are needed. It is suggested that this issue be taken up by the Data and Digital Governance Group as a priority to save from further fragmentation of data and technology across the organization.

It is suggested that a stock taking exercise be conducted to better understand what standards and policies are already in place across UNEP, how they are being used and their effectiveness. This will allow for an understanding of what is and is not working, the lessons learned, better understanding what gaps exist, and what additional policies and standards are needed.

5.5 Open Source and Commercial Technology

The issue on whether a product should be developed using open source or commercial technology has been long debated within the non-profit, NGO and international organization domain. There is no doubt that using open-source approaches is extremely useful and should be promoted, but it should also be recognized that each approach comes with its own cost and benefits. Just because something is open source does not mean that it will be free, lead to better outcomes and success, or not cost as much as a commercial solution in the long-term. On the other hand, implications of long-term licensing costs are real considerations, and WESR management does not want to be locked down into any one vendor or solution set. Nevertheless, commercial solutions do offer long-term support, updates and a stability that sometimes are not always available or difficult to achieve through open-source endeavours.

The aim here is to not suggest one or the other, but rather a balanced approach and perspective, which is something the WESR team is already doing in this regard. The UN system, including UNEP, has a procurement process that makes it very difficult to engage with the private sector on any contracts or agreements. At the same time, UNEP has several licenses that take advantage of commercial software. Strategically, moving forward, the Data and Digital Governance Group should take guidance from Technical Advisory Group on the latest innovations and trends that should be incorporated into WESR and a balanced view on how open source and commercial technology is adopted. It does not have to be one or the other, and often, a hybrid approach is utilized. Commercial providers today are also embracing open source and making many of their solutions available on GitHub.

5.6 Platform Integration

A survey was conducted of platform managers across UNEP to better understand their perspectives on integration with WESR. Those that responded included the following:

- Freshwater Ecosystem Explorer
- STRATA
- SCP-HAT
- SDG Scorecard
- InforMEA
- Global LCA Data Access
- ARIES for SEAA
- ENCORE
- Species+
- Protected Planet

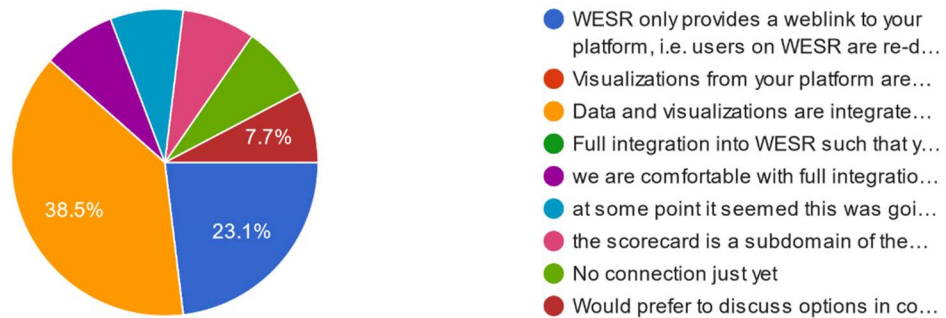
The main reason respondents identified as the value add for integration with WESR is the perceived increase in visibility for their work across a wider community of potential users. Managers wish to open their data to a new and broader audience, but doing so such that usage can be tracked through the APIs.

For example, the InforMEA managers would appreciate the opportunity have their data accessible through maps on WESR through semantic mapping and APIs under the condition that the data use is traceable to MEAs.

Opinions from respondents about WESR access varied; whereas some were interested in full interoperability, others stated that WESR should only provide a weblink to their platform, ie, a simple redirect. For example, the SDG scorecard manager saw little need for integration as the Scorecard is a stand-alone project. Over 60% of the respondents were only interested in integration at the level of data and visualizations integrated through APIs or web services, or only a web link to the platform being provided through WESR.

In regards to WESR, to what level of integration are you comfortable with?

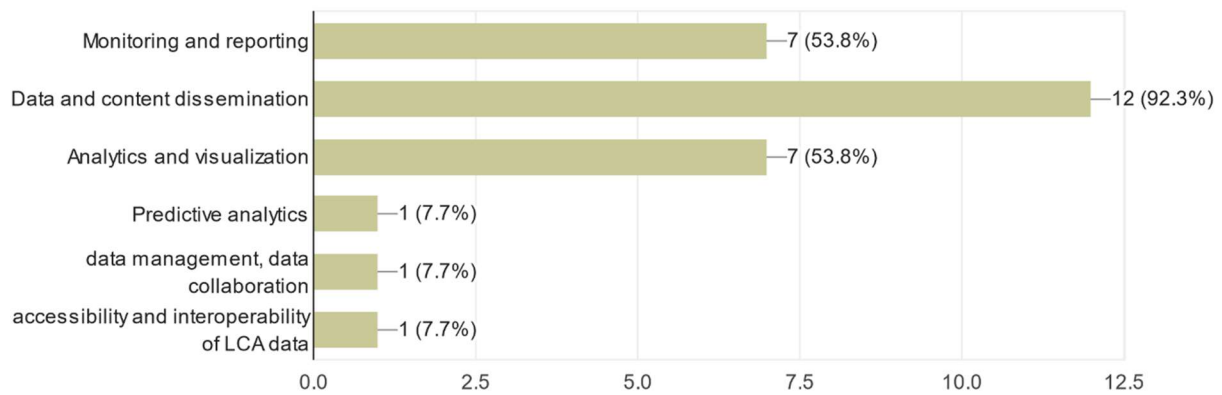
13 responses



While most platforms provided some level of data and content dissemination, few addressed predictive analytics or data management and collaboration:

What functional category does this platform support?

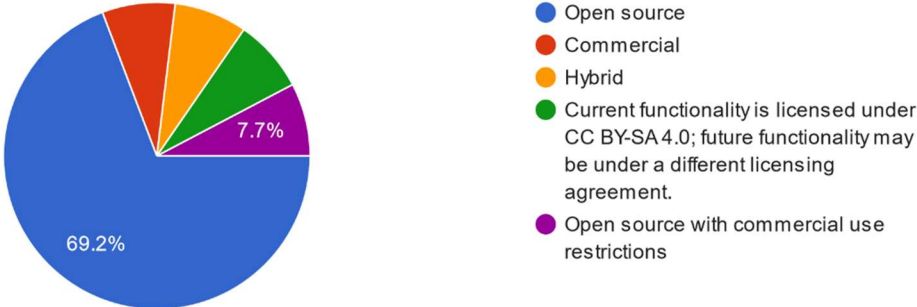
13 responses



Most platforms were considered open-source with 31% not considered a public good. Therefore, there is some variation when it comes to open-source and commercial use, and while there are some initiatives that are not public goods, there continues to be either the ambition to have it become public good or identify the right resources or process to make them public good. Overall, it is interesting that UNEP has experience across the spectrum, which can be good, but also point to a lack of clear policy and coordination when it comes to the development of these platforms.

Is the platform open source or commercial?

13 responses



Platform managers raised concerns about aligning with WESR, for example the simplification of dynamic complex systems, data updates and front/back-end maintenance. Other concerns were possible loss of user-friendly features, loss of analytical capacity, loss of power to continue and develop the platform if dependent on WESR. Other risks included loss of data flow due to lack of maintenance of APIs, confusion across users and where to access the platform, and non-current data in WESR can cause confusion with current data in other platforms.

In summary, the value proposition of WESR still needs to be better understood and the concerns raised should be addressed through a collaborative effort. This comes back to previous recommendations on the need for a strong engagement and communications process that builds trust with the broader community and where the technical capabilities and process are clearly understood such that other platforms clearly understand how their platforms can be integrated. Further documentation, workshops and outreach can be conducted with other platform owners to further clarify the approach and value. In addition, it would be useful to test the approaches and use it as a case study for other platform managers, as identified in the use cases section.

6 Institutional Context

This section covers the institutional factors that condition WESR’s development, including internal processes such as procurement, interdivisional cooperation, access to budget resources, incentives, accountability and staffing resources, and external factors such as Member State buy-in and political matters.

6.1 Procurement

Inefficient procurement of digital products and services has been cited by UNEP staff as an important risk factor to the successful implementation of initiatives such as DT, GEDS, or WESR and indeed most business processes.

As a positive step, the DTS features a range of policy measures to improve the procurement process. Measures being targeted include:

- a simplified one-stop shop to discover and contract digital service providers and expedite corporate Long-Term Agreements (LTA) that can service multiple projects.
- training of procurement officers to implement efficient and streamlined business processes
- digitalizing the project document approval process. This includes the workflow for project design, review, approval, and monitoring through Integrated Planning, Management and Reporting (IPMR).

As the success of streamlining business processes resides at the level of the overall DTS, the WESR project will greatly benefit from DT implementation. This interdependency further underlines the importance of the full integration of WESR with the DT sub-programme.

6.2 Interdivisional cooperation

Cooperation among UNEP Divisions is fundamental for the success of each of the DT/GEDS/WESR initiatives.

First, there is a need for UNEP Science Division management to increasingly accept and work fully with the overarching DTS framework and embrace the demand-driven approach. Although the Science Division is responsible for WESR development, it needs to accept a more cooperative approach across UNEP to build buy-in. Furthermore, even though WESR is currently delivering products, a change in approach to demand-driven is still needed.

Second, there is a need for the Programme and Planning Division management to fully recognize GEDS/WESR as the main vehicle for the DTS' environmental data delivery. Funds from the subprogramme should be allocated accordingly starting in 2022.

In conjunction with these first two points, there is a need for the Policy and Programme Division as well as Science Division Directors to cooperate on minimizing and managing the perception of competition. Both Divisions need to adopt common messaging, particularly to internal UNEP stakeholders. Without common messaging, platform managers may remain confused about the value or necessity of integrating into the WESR platform.

The Communications Division also plays a key role in messaging and communicating user needs, in particular with UNEP's external community. Guidance from Communications is needed for understanding which products and services from UNEP are in high demand, and which formats are most preferred by users. This guidance should be followed in WESR's evolution over the next two MTS periods.

There is a need for the Science Division to continue to reach out to other thematic Divisions for mutually defined benefits flowing from the WESR investment, including more visibility and access to the various platforms, and opening the door to new applications arising from the interoperability of platform holdings. This sharing of benefits may imply a sharing of budget resources for WESR as the service provider. Sharing of benefits should align to the engagement processes identified previously such that needs, priorities and use cases are specifically defined, a co-design approach is implemented, and there is Divisional representation in the governance framework.

Finally, UNEP managers need to set milestones and KPIs within the WESR roadmap and business plan to capture the improvement in interdivisional cooperation.

6.3 Intellectual property

Given the aspiration to transform into a digital organization, knowledge about how intellectual property (IP) is handled will become increasingly in demand. Already, there have been several instances around IP ownership issues between UNEP and partnership organizations developing technology. Legal expertise within UNEP will need to address these types of arrangements, agreements and contracts such that where the IP resides is clearly defined. This will apply to how data, algorithms, and applications, including the code, are treated and where these assets are stored and made available via the cloud.

In the example where UNEP develops an agreement with a partner institution which then subcontracts to another entity to perform the services, stipulations in the agreement, including IP related issues, may not pass through to the third party. This is related to overcoming procurement barriers as it is very difficult for UNEP to get into an agreement with a private sector company. Therefore, it will work through a non-profit or academic institution where that institution will then subcontract to the company. At one level, procurement processes within UNEP need adjustment so that this mode of operation does not continue as the norm, and private sector agreements can be more readily created. Secondly, how stipulations and IP related issues pass through to the third party should be clearly defined.

6.4 Financial and Human Resources

The forthcoming roadmap and business case will dive into resource requirements for WESR and the related options and scenarios. The section which follows is illustrative of the kind of arrangements that will be made.

Financial Resources

Through the Medium-Term Strategy (2022-2025), which becomes operational on 01 January 2022, the WESR should receive budget resources through the Science Division and/or the science/policy and newly launched DTS.

Resources will flow to the WESR from several sources:

- Environment Fund (EF), which covers staff positions and a baseline of operations
- Extra-budgetary (XB), which covers project staff salaries and project activities such as those for implementation of country-level engagement activities.

It is expected that there will be internal cost sharing across the various divisions having a role in WESR implementation.

Through the WESR Federation, other resources will become available. These include in-kind contributions from members of the WESR Federation, which could include staff time, IT resources (server access), access to partners' data and analytics expertise

Also, funding will be sought from interested philanthropic foundations which share the WESR mission of bringing environmental data for global good.

Estimates of budget requirements will depend on to what extent UNEP chooses to support national efforts in accessing and using environmental data for planning and report. The WESR roadmap and business plan will explore these options.

Human Resources

Strengthening UNEP's capacity to implement the WESR will depend in a large part on its human resources, including contributions from DTS.

UNEP will need to adopt a staffing profile over time, for example, mapping to 3 phases 2022-2023, 2024-2025 and 2026-2030. The staffing profile will cover evolving needs in environmental data analytic, IT platform management, etc.

A staffing profile will be developed for the Roadmap and Business Plan.

6.5 Political Engagement – UN Agencies and Partners

The level of political engagement for WESR required will depend on several factors. Prime among these is how ambitious UNEP will be when providing country level support for access to environmental data and information. As UNEP is a global and regional UN agency, and because it does not have experience

working at the country level other than for implementing selected project activities, it must rely on its relations with other UN agencies and organizations to define entry points and to build networks with national institutions.

Key UN agencies include UNDP, FAO, UNESCO, Regional Commissions, WHO, WMO, etc.

This constellation of partners takes on increasing importance for country level initiatives, particular with those that have a national presence and for whom access to environmental data is part of their daily workflows. This political engagement must feature in the WESR strategy. Similarly, political engagement with users within relevant national ministries, research institutions, NGOs, and citizen groups must be prominent. The Strategic Advisory Group can serve as one key function to garnish political support and buy-in through Member Country and influential regional organization representation.

Furthermore, if country level work is undertaken, bilateral funding agencies should be solicited for capacity building support. One approach would be to work simultaneously with MS representation in their respective capitols and with their country representation to develop initiatives based on user demand.

Whereas these engagements focus on UNEP's country level work and would be pursued mostly outside of Nairobi, UNEP Member State political support is required to take this path.

7 Roadmap and Business Plan

The following provides a phased approach for enhancing WESR through the 2030 timeframe.

The roadmap is presented according to three phases: 1) setting the foundation by improving the strategic and operational mechanisms for WESR; 2) increasing capacity and usage by further engaging, developing the platform and its use cases, and enabling uptake; and 3) getting to a data ecosystem with networked data, users and applications enabling users to create their own innovations. Each phase is meant to build on the previous as the federated system continues to advance and curate the delivery of data, information and knowledge based on identified needs and priorities from the user community.



For each phase, there are 2 options that are presented:

1. Normative – this approach is where UNEP continues to develop WESR in support of its priorities and those of the broader UN System, while continuing engagement with Member States through the CPR process.

2. Increased Country Engagement – where UNEP will invest at scale to engage with countries at the ministerial level to ensure products and services made available by WESR are based on needs and priorities at the country level, fit-for-purpose and capacity development at the country level is supported through regional and national partners. This does not imply that UNEP will work directly in all 193 member countries, but rather scale up the delivery of products by working with pilot countries through regional entities.

While earlier discussions with UNEP Leadership on a shorter version of this document meant for the purposes of UNEA and UNEP@50 events indicated a reluctance to move forward with option 2 (increased country engagement) at this point in time, both options remain in this forward-looking strategy document so that this option can still be considered in the future.

To reiterate, increased country engagement does not imply that UNEP will need to work in all Member Countries. The intent is to develop regional and national partnerships and partner with other UN agencies that have presence at the country level to increase alignment, capacity and usage related to WESR and the broader agenda around how environmental data, information and knowledge can be applied to better decision-making, policy and action at global, regional and national levels.

Furthermore, the roadmap suggests that increased country engagement option is added to the existing normative function of UNEP. Phases are not meant to be linear in nature. It is expected that there will be overlap between each phase where activities will roll over into subsequent phases. For example, the need to build capacity, engage with users and provide leadership through governance are consist across phases.

7.1 Roadmap

Phase I (2022-2023): Setting the Foundation.

The goal of Phase I is for UNEP to leverage the work to date on the WESR prototype and build the strategic foundation that allows WESR to become fully operational.

Activities	Normative	+ Increased Country Engagement
1	Further iterate on development of the core infrastructure and integrate data, content and services across UNEP	Develop tools for each upload/download and integration of country level data
2	Establish enhanced governance structure for decision-making and transparency inclusive of external expert guidance	Include national institution representation on external governance mechanisms to build country level buy-in, support and alignment
3	Evaluate existing partnerships, develop partnership model, and create agreements	Create partnerships with regional and national entities that can support implementation

4	Develop a communications, engagement and outreach strategy to build an active user community	Establish structures, mechanisms and partnerships to engage with countries at the ministerial level
5	Create key impact metrics and KPIs, which are easy to measure on a regular basis.	Identify metrics for impact at the country level related to decision-making, policy and action
6	Focus on the development of 2-3 prioritized use cases based on governance feedback	Identify 2-3 representative countries per region as pilot countries and conduct needs assessment to identify priority use cases; create a users' group and co-design
7	Develop capacity development tools and resources	Understand what capacity is needed at the country level and develop resources and partnerships accordingly
Outcomes	Normative	+ Increased Country Engagement
1	An integrated operational WESR platform that serves the needs of UNEP and the broader UN System	An operational WESR platform that further supports country level needs and priorities
2	Increased buy-in across UNEP as an organization-wide initiative with international, multi-stakeholder support	Decisions on what tools, products or services WESR develops is guided by what countries need most
3	The value proposition of WESR is understood by UNEP leading to better coordination and cooperation within UNEP and the UN System	The value proposition of WESR is better understood by member countries leading to more engagement, relevancy and buy-in
4	Focused and impactful partnerships to support data, technology, implementation and domain expertise	Scalability, mandate and alignment at the country level through regional and national partners
5	A robust monitoring and evaluation framework to understand what is working and what needs improvement	An understanding on how a global data platform is making impact at the country level
6	Increased integration of existing UNEP platforms, WESR driving the data backbone of GEO, more countries reporting on SDGs, increased ability for foresight analysis, CCAs are informing UN processes	Countries using WESR to support data needs for national development priorities and SDGs, scalable products at the regional level, countries are contributing to and using CCAs for their own decision making
7	Increased ability within UNEP and the UN System to use WESR and understand their roles	More engagement, uptake and usage at the country level

Phase II (2024-2025): Increasing Capacity, Uptake and Engagement

The goal of Phase II is to further develop the WESR infrastructure, products and services but focus on engagement, building trust and building capacity to ensure uptake and usage.

Activities	Normative	+ Increased Country Engagement
1	Conduct training workshops, webinars, and online training and education resources	Create a holistic capacity development approach that provides training and outreach to the general public, technical user, journalist and decision-maker
2	Primarily use conferences and online materials for external capacity development	Develop ‘train the trainers’ programs and conduct capacity development workshops at the country level through regional and national partners
3	Continue to increase UNEP staffing for WESR design, development and deployment as well as partnerships based on demand	Evaluate regional and national partnerships and iterate on operational model
4	UNEP will create a sustainability plan for WESR based largely on donors and philanthropy as some well as internal cost recovery	Align sustainability model to value proposition and country/regional level investment
5	Continue to build and iterate on the core infrastructure and identify 4-5 additional use cases	Leverage skills and knowledge at selected local level, co-design and develop additional use cases to meet country demand
Outcomes	Normative	+ Increased Country Engagement
1	The number of users engaging with WESR across UNEP and the UN System is increasing	There is greater awareness and trust at the country level with UNEP, increased users and case studies demonstrating impact in countries
2	Broader awareness of WESR among users globally	A scalable approach to developing capacity at the national level
3	WESR is fully operational; staffing at UNEP HQ and regional offices optimized; and a network of supporting partners in place	As part of that network, UNEP has built strong relationships with regional and national entities
4	A plan to financially sustain WESR is in place, but dependent on availability of funding	A more holistic approach to sustainable financing is in place leveraging regional and national entities and mechanisms
5	WESR is enhancing the science-policy interface and there is improved reporting against the SDGs and MEAs; Integrated data is easily findable and WESR is	Countries are finding data they need to solve for the environmental SDGs, while also aligning SDGs to their national development plans; SoE reporting is

supporting Global Environment Outlook. A digital GEO report is fully operational	becoming more streamlined; Data is flowing in both directions
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Phase III (2026 - 2030): Establishing a Data Ecosystem

The goal of Phase III is for WESR to have the network of data, users, applications and knowledge in place where data is flowing bidirectionally across organizations and platforms creating a data ecosystem approach. Governments, private sector and civil society are not only using data, products and services provided by WESR, but creating their own innovations powered by WESR.

Activities	Normative	+ Increased Country Engagement
1	Create scalable, decision-ready products for mass consumption	Stakeholders at the country level support the co-design process to develop relevant, fit-for-purpose solutions
2	More deliberately engage the private sector in relation to CSR and ESG goals, and creating 3 rd party applications and new innovations	Create partnerships with private sector companies at the country level to increase entrepreneurship opportunities and use of WESR for creating new businesses
3	A physical World Environment Situation Room is established in Nairobi, and powering similar situation rooms to be established regionally	Engage with countries on how the Situation Room can be used to support policy and decision-making, outreach and education and capacity development
4	Data is normalized, data science is powering the user experience, datasets are combined from multiple sources	Work with national institutions, civil society and private sector to make more relevant local and national data available, standardized and useful
5	Create case studies and lessons learned on the impact on the SDGs, MEAs, SOE reporting, GEO, CCA	Create case studies on how WESR has supported decision-making, policy and action at the country level
Outcomes	Normative	+ Increased Country Engagement
1	Environmental data is streamlined into everyday business and political systems and applications driving impact on policy, decision making and action	Countries understand the value proposition of WESR and their role increasing usage and impact on policy, decision-making and action at local and national levels
2	The user base for WESR continues to grow with a true innovation and entrepreneurship spirit	WESR has had an influence on the development of new businesses, innovation and entrepreneurship opportunities within Member Countries further demonstrating its value

3	UNEP demonstrates its commitment to the Global South by developing and powering state-of-the-art situation rooms in Nairobi and beyond	WESR inputs and outcomes are “owned” by the Global South by demonstrating its innovation and relevance to local issues and priorities
4	Platforms and data are talking to one another adding efficiency and scalability in the seamless user experience for finding, accessing, managing and using environmental data	WESR facilitates trusted exchange of data and information between the UN and countries, while capacity across Member Countries increases to make better use of the data, products and services
5	There has been a marked increase in data, reporting and efficiencies across UNEP programs, initiatives and projects	Countries are using WESR to support their needs and priorities, there is clear evidence of impact on policy and decision-making, and Member Countries are fully supportive of WESR leading to its sustainability

7.2 Budget

The following provides an overview of the budget for the roadmap and options described above.

Summary

Phase	Unit	Normative	+Increased Country Engagement
I	Per Year	2.23M USD	3.46M USD
	Total	4.46M USD	6.92M USD
II	Per Year	2.26M USD	4.47M USD
	Total	4.52M USD	
III	Per Year	2.83M USD	4.80M USD
	Total	11.32M USD	19.20M USD
	Total for 8 Years	20.3M USD	35.1M USD

Detailed Budget

Phase I:

Major Activity	Salary / Cost	Phase I (2022-2023): Normative			Phase II (2022-2023): Increased Country Engagement		
		Count	Years FTE	Total	Count	Years FTE	Total
UNEP HQ Staffing							

Program Management, Strategy and Operations							
Director (D-1)	\$152,000	1	2	\$304,000	1	2	\$304,000
Project Manager (P-5)	\$131,000	1	2	\$262,000	1	2	\$262,000
Senior Programme Officer (P-5)	\$131,000	1	2	\$262,000	2	2	\$524,000
Administrative Support (P-1)	\$55,000	1	2	\$110,000	2	2	\$220,000
Monitoring and Evaluation Expert (P-5)	\$131,000	1	2	\$262,000	1	2	\$262,000
Subtotal				\$1,200,000			\$1,572,000
Plus Contingency (20%)				\$1,440,000			\$1,886,400
WESR Platform, Infrastructure and Products and Services							
Software Developers (P-3)	\$90,000	1	2	\$180,000	1	2	\$180,000
Software Developers (P-5)	\$131,000	1	2	\$262,000	1	2	\$262,000
Subtotal				\$442,000			\$442,000
Plus Contingency (20%)				\$530,400			\$530,400
Communications and Outreach							
Communications Officer (P-4)	\$110,000	1	2	\$220,000	1	2	\$220,000
Communications Officer (P-2)	\$72,000	0	0	\$0	1	2	\$144,000
Subtotal				\$220,000			\$364,000
Plus Contingency (20%)				\$264,000			\$436,800
Training and Mentoring							
Senior Program Officer (P-5)	\$131,000	1	2	\$262,000	2	2	\$524,000
Subtotal				\$262,000			\$524,000
Plus Contingency (20%)				\$314,400			\$628,800
Travel and Logistics							
Program Management	\$10,000	3	2	\$60,000	3	2	\$60,000
Technical Development	\$10,000	3	2	\$60,000	3	2	\$60,000
Communications, Outreach and Engagement	\$10,000	3	2	\$60,000	10	2	\$200,000
Capacity Development	\$10,000	2	2	\$40,000	5	2	\$100,000
Subtotal				\$220,000			\$420,000
Plus Contingency (20%)				\$264,000			\$504,000
Total				\$2,812,800			\$3,986,400
Partner Support							
Cloud computing storage and Compute							
Cloud computing storage and Compute	\$500,000	0	0	\$0	0	0	\$0
Plus Contingency (20%)				\$0			\$0
Technical Staff							
Software Developers	\$150,000	3	2	\$900,000	3	2	\$900,000
Partner Institutions	\$100,000	2	1	\$200,000	4	2	\$800,000
Capacity Development	\$100,000	1	2	\$200,000	5	1	\$500,000
Subtotal				\$1,300,000			\$2,200,000
Plus Contingency (20%)				\$1,560,000			\$2,640,000
Travel and Logistics							
Technical Development	\$5,000	3	2	\$30,000	5	2	\$50,000
Communications, Outreach and Engagement	\$5,000	3	2	\$30,000	10	2	\$100,000

Capacity Development	\$5,000	2	2	\$20,000	10	2	\$100,000
Subtotal				\$80,000			\$250,000
Plus Contingency (20%)				\$96,000			\$300,000
Total				\$1,656,000			\$2,940,000
Grand Total				\$4,468,800			\$6,926,400
			Per year	\$2,234,400		Per year	\$3,463,200

Phase II:

Phase II (2024-2025): Normative					Phase II (2024-2025): Increased Country Engagement		
Major Activity	Salary/Cost	Count	Years FTE	Total	Count	Years FTE	Total
UNEP HQ Staffing							
Program Management, Strategy and Operations							
Director (D-1)	\$152,000	1	2	\$304,000	1	2	\$304,000
Project Manager (P-5)	\$131,000	1	2	\$262,000	1	2	\$262,000
Senior Programme Officer (P-5)	\$131,000	1	2	\$262,000	2	2	\$524,000
Administrative Support (P-1)	\$55,000	1	2	\$110,000	2	2	\$220,000
Monitoring and Evaluation Expert (P-5)	\$131,000	1	2	\$262,000	1	2	\$262,000
Subtotal				\$1,200,000			\$1,572,000
Plus Contingency (20%)				\$1,440,000			\$1,886,400
WESR Platform, Infrastructure and Products and Services							
Software Developers (P-3)	\$90,000	2	2	\$360,000	4	2	\$720,000
Software Developers (P-5)	\$131,000	2	2	\$524,000	2	2	\$524,000
Subtotal				\$884,000			\$1,244,000
Plus Contingency (20%)				\$1,060,800			\$1,492,800
Communications and Outreach							
Communications Officer (P-4)	\$110,000	1	2	\$220,000	1	2	\$220,000
Communications Officer (P-2)	\$72,000	1	2	\$144,000	2	2	\$288,000
Subtotal				\$220,000			\$220,000
Plus Contingency (20%)				\$264,000			\$264,000
Training and Mentoring							
Senior Program Officer (P-5)	\$131,000	1	2	\$262,000	2	2	\$524,000
Subtotal				\$262,000			\$524,000
Plus Contingency (20%)				\$314,400			\$628,800
Travel and Logistics							
Program Management	\$10,000	3	2	\$60,000	3	2	\$60,000
Technical Development	\$10,000	3	2	\$60,000	3	2	\$60,000
Communications, Outreach and Engagement	\$10,000	5	2	\$100,000	10	2	\$200,000
Capacity Development	\$10,000	5	2	\$100,000	5	2	\$100,000
Subtotal				\$320,000			\$420,000
Plus Contingency (20%)				\$384,000			\$504,000

Total					\$3,463,200			\$4,776,000
Partner Support								
Cloud computing storage and Compute								
Cloud computing storage and Compute	\$500,000	0	0	\$0	0	0	\$0	
Plus Contingency (20%)				\$0				\$0
Technical Staff								
Software Developers	\$150,000	1	2	\$300,000	3	2	\$900,000	
Partner Institutions	\$100,000	2	1	\$200,000	5	2	\$1,000,000	
Capacity Development	\$100,000	2	1	\$200,000	5	2	\$1,000,000	
Subtotal				\$700,000			\$2,900,000	
Plus Contingency (20%)				\$840,000			\$3,480,000	
Travel and Logistics								
Technical Development	\$5,000	3	2	\$30,000	8	2	\$80,000	
Communications, Outreach and Engagement	\$5,000	10	2	\$100,000	20	2	\$200,000	
Capacity Development	\$5,000	5	2	\$50,000	30	2	\$300,000	
Subtotal				\$180,000			\$580,000	
Plus Contingency (20%)				\$216,000			\$696,000	
Total				\$1,056,000			\$4,176,000	
Grand Total				\$4,519,200			\$8,952,000	
			Per year	\$2,259,600		Per year	\$4,476,000	

Phase III

Phase III (2026-2030): Normative					Phase II (2026-2030): Increased Country Engagement		
Major Activity	Salary/Cost	Count	Years FTE	Total	Count	Years FTE	Total
UNEP HQ Staffing							
Program Management, Strategy and Operations							
Director (D-1)	\$152,000	1	4	\$608,000	1	4	\$608,000
Project Manager (P-5)	\$131,000	1	4	\$524,000	1	4	\$524,000
Senior Programme Officer (P-5)	\$131,000	2	4	\$1,048,000	3	4	\$1,572,000
Administrative Support (P-1)	\$55,000	2	4	\$440,000	3	4	\$660,000
Monitoring and Evaluation Expert (P-5)	\$131,000	1	4	\$524,000	1	4	\$524,000
Subtotal				\$3,144,000			\$3,888,000
Plus Contingency (20%)				\$3,772,800			\$4,665,600
WESR Platform, Infrastructure and Products and Services							
Software Developers (P-3)	\$90,000	3	4	\$1,080,000	5	4	\$1,800,000
Software Developers (P-5)	\$131,000	2	4	\$1,048,000	2	4	\$1,048,000
Subtotal				\$2,128,000			\$2,848,000
Plus Contingency (20%)				\$2,553,600			\$3,417,600
Communications and Outreach							
Communications Officer (P-4)	\$110,000	1	4	\$440,000	1	4	\$440,000

Communications Officer (P-2)	\$72,000	1	4	\$288,000	2	4	\$576,000
Subtotal				\$440,000			\$440,000
Plus Contingency (20%)				\$528,000			\$528,000
Training and Mentoring							
Senior Program Officer (P-5)	\$131,000	1	4	\$524,000	2	4	\$1,048,000
Subtotal				\$524,000			\$1,048,000
Plus Contingency (20%)				\$628,800			\$1,257,600
Travel and Logistics							
Program Management	\$10,000	3	4	\$120,000	3	4	\$120,000
Technical Development	\$10,000	3	4	\$120,000	3	4	\$120,000
Communications, Outreach and Engagement	\$10,000	5	4	\$200,000	10	4	\$400,000
Capacity Development	\$10,000	5	4	\$200,000	5	4	\$200,000
Subtotal				\$640,000			\$840,000
Plus Contingency (20%)				\$768,000			\$1,008,000
Total				\$8,251,200			\$10,876,800
Partner Support							
Cloud computing storage and Compute							
Cloud computing storage and Compute	\$500,000	0	0	\$0	0	0	\$0
Plus Contingency (20%)				\$0			\$0
Technical Staff							
Software Developers	\$150,000	1	4	\$600,000	3	4	\$1,800,000
Partner Institutions	\$100,000	2	4	\$800,000	5	4	\$2,000,000
Capacity Development	\$100,000	2	4	\$800,000	5	4	\$2,000,000
Subtotal				\$2,200,000			\$5,800,000
Plus Contingency (20%)				\$2,640,000			\$6,960,000
Travel and Logistics							
Technical Development	\$5,000	3	4	\$60,000	8	4	\$160,000
Communications, Outreach and Engagement	\$5,000	10	4	\$200,000	20	4	\$400,000
Capacity Development	\$5,000	5	4	\$100,000	30	4	\$600,000
Subtotal				\$360,000			\$1,160,000
Plus Contingency (20%)				\$432,000			\$1,392,000
Total				\$3,072,000			\$8,352,000
Grand Total				\$11,323,200			\$19,228,800
				Per year \$2,830,800			Per year \$4,807,200

7.3 Business Plan Options

The following section provides options for various business models that WESR can undertake. These options are not dependent on the country-level engagement option as described above. Given that WESR is an outward facing, public good, the business options presented here apply equally at the normative or country-engagement level, however, the latter will better inform the partnerships and services that can be made available through WESR.

Option 1: A free and open public good.

Given the mission of UNEP, its mandate and the countries it serves, WESR, at its core, needs to be a free and open public good. This means that the core data, products and services provided by WESR will be free and open to a broad range of users. There remains some discussion on what constitutes a core service versus a 'value-added' service. Core data are those that have minimal manipulation based on its original form and source. For example, a pipeline of Sentinel-2 satellite data in analysis-ready format, air quality observations or structured environmental statistics could be considered as core data. Value-added would take these data and create a derived product or service such that each dataset or the combination of datasets provides additional insights. For example, an indicator of water quality and stress, a deforestation alert system or carbon accounting capabilities are value-added.

As part of its public good offering, value-added services in terms of analytics and insights will be made available. As previously described, what gets produced should be directed by the governance structure for WESR. This public-good offering should be maintained and is something that can only be made sustainable by proving the value proposition of WESR through uptake, usage and impact from its data, product and services. Therefore, as a public-good offering, WESR will need to rely on donor funding and Member Country support.

The Environment Fund should cover the core operations and development of the WESR capabilities, products and services. In some cases, countries or other stakeholders may make special requests that translate into project-specific activities for WESR, which should be accommodated in the Extra Budgetary fund.

Option 2: Pay-for Value Added Services

If there is an intent for UNEP to create a cost-recovery model that supports the sustainability of future operation for WESR, a model could be created where value-added services that provide specific business intelligence or specialized service can be a pay-for service. There is a distinction between 'product' and 'service' in this regard. A product is a standalone product for a specific period of time. A service is more dynamic that continually updates based on the underlying data and has an increased level of support. Therefore, one can expect a user to pay for this added level of insight and support.

However, pay for service requires a strong user engagement, an Agile approach to product development, and resources in place to provide the level of support needed given that users are now paying for a service. Decisions will also have to be made through the governance structure as to which value-added services remain free and which come at a cost to users.

Option 3: Club Model

Similar to Option 2, a club model can be developed where members pay a subscription fee for access to value-added services. Services that are designated as those that can be a 'pay-for'

model can be bundled into a member section where those users provide login-in information to gain access to these services. Like option 2, this will require added support and attention to detail to ensure these services are maintained and working properly in order to provide value for cost.

Option 4: Marketplace

As the roadmap outlines, by Phase III, WESR should be supporting the development of an ecosystem approach where 3rd party applications are being developed using the WESR data infrastructure. The development of these applications can be supported by WESR staff where they provide capacity, training and additional mechanisms for product development including hackathons, challenges and mentoring.

As these 3rd party applications become available, WESR could create a marketplace that allows for the distribution of these applications. UNEP, and likely the governance function for WESR, would have to create a process to ensure these applications are trusted and provide a WESR “seal of approval” for its availability on the WESR Marketplace.

To have applications placed in this marketplace, vendors would pay a transaction cost based on a percentage rate of net proceeds to UNEP. This would likely be in the 10% range and any funds generated from the Marketplace would go directly into the operational costs for continuing to run WESR.

It is not clear whether UNEP would be able to create this type of model, but only provided as one suggestion for cost recovery, while also developing an incentive for further innovation and entrepreneurship. It is possible that UNEP could also partner with another private sector entity to manage the marketplace concept.

Option 5: Private Sector Pays for Cloud Compute

Depending on the analytical capabilities developed with WESR, there will be a cost associated with the resources required to run computations on the cloud. As a free and open infrastructure, these costs will need to be considered in the operational budget for WESR, but it does raise the question if all sectors should get the same compute privileges. One model that can be considered, and the size of the company likely matters also, is that private sector companies who want to access compute capabilities in WESR pay for that service. In many cases, companies will have access their own cloud computing capabilities and credits that can be used rather than relying on WESR, but this would ensure that there is some cost-recovery on compute resources.

8 Risk - PG/AA

A summary of Risks for the WESR strategy is provided in Table 8.0.

Table 8.0: Risk matrix for the WESR strategy

Risk	Mitigation	Risk Level
A partner organization is given too much control over WESR development	Expectations to be made explicit by Science Division management with oversight by the DDGG.	H
Procurement processes too onerous and impede WESR implementation	It is expected that digital transformation will alleviate some of this pain, however such systemic issues must be addressed at Senior Management level.	H
Recruitment process too onerous	<p>Work closely with HR to expedite as possible.</p> <p>Use consultant option.</p> <p>Explore hiring through another organization.</p> <p>Partner with Federation members on recruitment, networking and potential secondments.</p> <p>Create higher grade positions to stay competitive with salaries in the private sector.</p>	H
WESR development becomes slowed due to organization culture and practice	Work closely with Digital Transformation subprogramme to adapt and grow into new culture. Change management required	M
Level of bureaucracy within UNEP limiting progress	<p>UNEP Leadership drives change and provides an incentives and accountability framework in support</p> <p>The DTS program can be a key vehicle for cultural change.</p>	M

Risk	Mitigation	Risk Level
WESR is viewed as a competitive program with other ongoing initiatives	<p>Be clear that WESR is not replacing anything, is meant to be complementary, and is based on interoperability.</p> <p>Work with other Federation members to ensure alignment and understanding.</p>	L
Strengthened governance framework for guidance and decision making	<p>See text</p> <p>Empower cross divisional structure with advisory function on budget allocations.</p> <p>Seek advice from Member States through informal structures (Friends of WESR, UNEP@50 opportunities, <i>inter alia</i>).</p>	M
Sustained funds for period through 2030	<p>Continue conversations for funding sources through DT S-P</p> <p>Deliver value on products and services that are indispensable to countries and UNEP’s scientific assessments.</p> <p>Develop and execute against a strategy for Member State political buy-in.</p>	H
There is no clear way to identify WESR impact limiting possibilities for sustained funding or country ownership.	<p>As part of the communications and outreach and capacity building functions of WESR, ensure a mechanism is put into place to track how the data is used and influence on policy and decision-making.</p> <p>Identify a set of country success stories that the UNEP’s regional offices work closely with.</p> <p>Create a forum and platform that allows users to share stories and case studies online and at events.</p>	L

Risk	Mitigation	Risk Level
<p>The value proposition WESR is not well understood with decision-makers limiting its uptake within Member States.</p>	<p>Develop and execute against a strategy for high-level political buy-in.</p> <p>Develop communications and outreach materials that further convey the importance and value of WESR coupled with user stories.</p>	<p>L</p>