GPML

Global Partnership on Marine Litter

Concept Document

Global Partnership on Marine Litter Digital Platform

A Multi-stakeholder Platform

Working document for user and partner consultations

UN environment programme 50 1972-2022

SCIENCE POLICY BUSINESS FORUM

Revised on February 2022

Concept Document

1. Introduction and Scope of the Document

1.1. The purpose of the Concept Document is to offer a general overview of the forthcoming Global Partnership on Marine Litter (GPML) Digital Platform (herein referred to as "the Digital Platform"). This is a draft external document for consultation and may be shared with any interested party. The document describes the project's objectives, rationale, timeline, and progress to date, identifies key partners and stakeholders, and articulates a range of requirements.

1.2. The development of the Digital Platform builds on existing initiatives led by UNEP and partners, such as the GPML and the UN Science Policy Business Forum (UNSPBF). Additionally, the Digital Platform's components will be technically linked to the World Environment Situation Room (WESR) and align with UNEP and UN-wide strategies for data and digital transformation.

2. Background

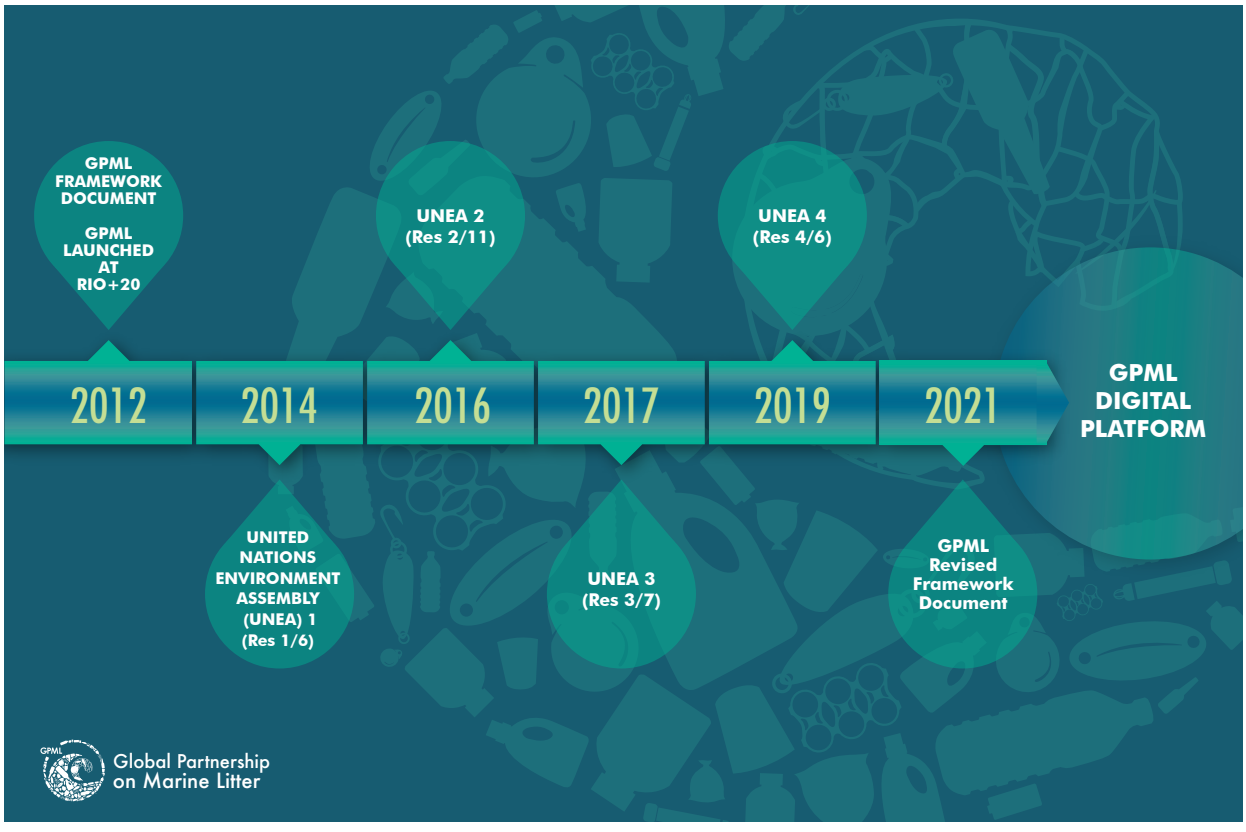
2.1 **Vision.** To be the go-to, multi-stakeholder Digital Platform that successfully enables coordination and informs all actors working to address the global problem of marine litter and plastic pollution.

2.2 **Objectives.** The Digital Platform is multi-stakeholder and partly open source, compiling and crowdsourcing different resources, integrating data and connecting stakeholders to guide and coordinate ad hoc and regular action. It offers a single point of access for current, accurate data and information on marine litter and plastic pollution and related topics and it provides a wide range of materials to support stakeholders' needs, ranging from scientific research to technological innovation and public outreach, in order to inform decision-making, educate and raise awareness, facilitate target setting, and advance stakeholders' cooperation and coordination.

2.3 **Policy Rationale.** The United Nations Environment Assembly (UNEA) decided in resolution UNEP/EA.4/Res.6 operative paragraph 3: "to strengthen coordination and cooperation by establishing, subject to the availability of resources and building on existing initiatives, a multi-stakeholder platform within the United Nations Environment Programme to take immediate action towards the long-term elimination, through a life-cycle approach, of discharges of litter and microplastics into the oceans". Additional information on the objectives and policy rational is provided in **UNEP/AHEG/4/INF/4**, prepared for the fourth meeting of the ad hoc open-ended expert group on marine litter and microplastics (AHEG-4). In addition to UNEP/EA.4/Res.6, the Digital Platform further aims to support the implementation of multiple operational paragraphs from UNEA resolutions 1/6, 2/11, 3/7 and 4/6.

2.4 Aligning with United Nations (UN), United Nations Environment Programme (UNEP), and GPML Strategies.

- In response to the three planetary crises outlined in the UNEP Medium Term Strategy (MTS) 2022-25, the Digital Platform seeks to support transformative, multi-stakeholder actions that target the causes of marine litter and plastic pollution towards a pollution-free planet, where pollution is prevented and controlled and good environmental quality and improved health and well-being are ensured for all. Overall, the work of the GPML will support UNEP's MTS by supporting countries to deliver on their environmental commitments under international agreements.
- The Digital Platform aligns with key tenets of the **UN Secretary-general's Data Strategy** and UNEP's Data Strategy, as outlined in Annex A of this document.
- In light of the **UNEP Private Sector Engagement Strategy** the Digital Platform seeks to support multi-stakeholder collaborations with industry towards the long-term elimination of marine litter and plastic pollution. It provides all private sector stakeholders an opportunity to strengthen the collaboration between public-private sector, catalyse action, share data, promote transparency, and improve sustainability by measuring progress towards environmental indicators.
- Outlined vision and objectives closely align with the GPML's purpose and mandate as outlined in the **GPML Framework Document**.
- It supports **Regional Nodes** implementation of Action Plans in their region in accordance with the **Terms of Reference for Regional Nodes**.
- Lastly, its innovative approach aims to align with the emerging digital ecosystem for the environment[1], and to support UNEP's digital transformation journey, including as a building block for the World Environment Situation Room (WESR).

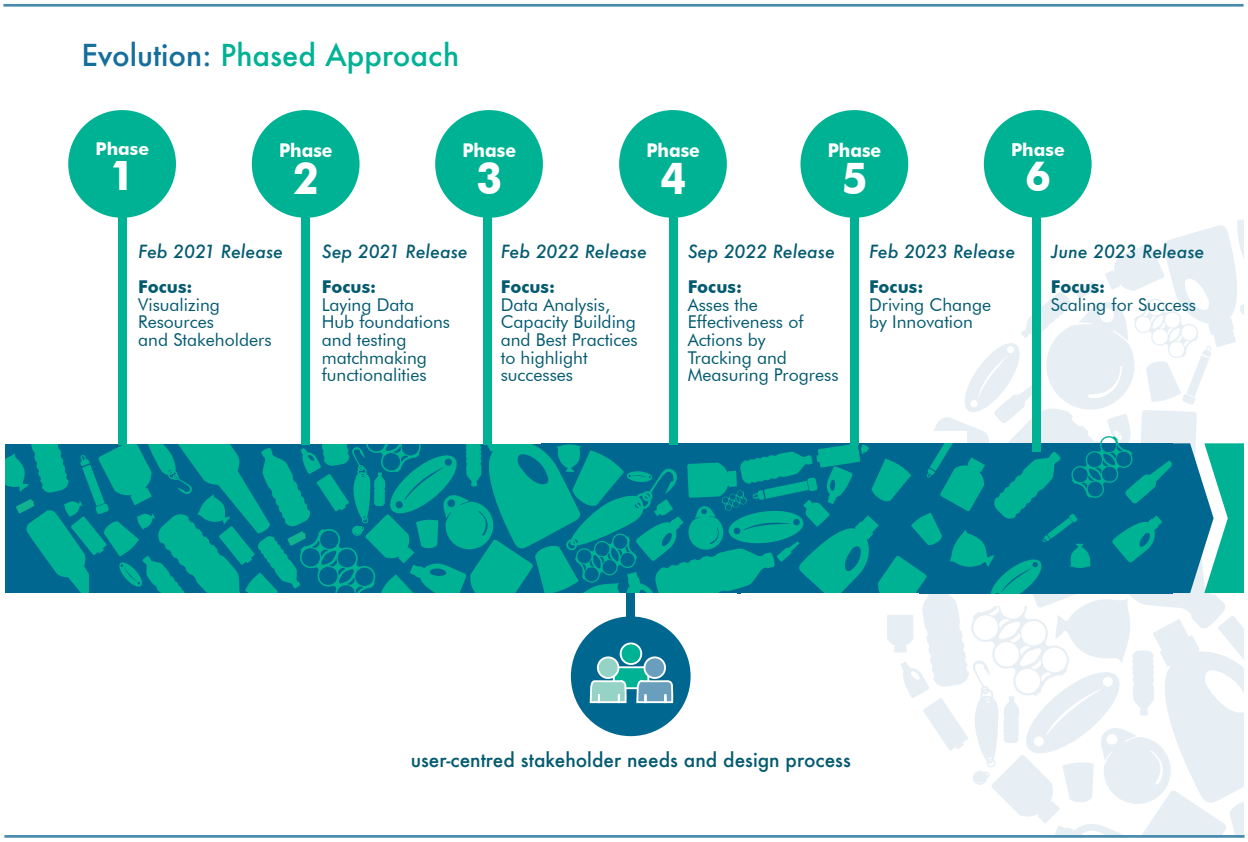


[1] https://www.unep.org/resources/case-study/case-digital-ecosystem-environment

2.5 **Early Progress.**

Development of the proof-of-concept of the Digital Platform was initiated in early 2020. During this time, pilots were conducted with partners including IBM to explore how innovative technological approaches, including data science and Artificial Intelligence (AI), can support the Digital Platform's objectives. These pilots also included:

- The creation of a prototype that demonstrated how modelling and analytics can help establish a baseline for measuring progress against United Nations Sustainable Development Goal (SDG)14.1.1 b[2], which assesses the health of the Oceans and macroplastic pollution as measured by beach litter collected and classified during citizen science clean-up campaigns. Initial analysis estimating the baseline density for the worldwide coastline was conducted using Bayesian Inferential Modelling. This project was done in collaboration with data collected through Earth Challenge 2020[3], a citizen science consortium led by EARTHDAY.ORG, the Wilson Centre, and the United States Department of State. In 2021 the citizen science data was used to report to the SDG at a regional and global level.
- An exploration of how intelligent organization and AI can change the way data, analyses and insights are accessed. This included the development of Sam and Bella, virtual assistants (or "digital humans") capable of offering access to materials hosted on the Digital Platform through a voice-enabled interface. Sam and Bella were created to test how users could interface with the Digital Platform through natural conversations, and whether this could foster an emotional connection between the user and the issue of marine litter and plastic pollution.



[2] SDG 14.1.1b Plastic debris density

[3] Earth Challenge dataset is a combined dataset for the National Oceanic and Atmospheric Administration's Marine Debris Monitoring and Assessment Project (MDMAP), Ocean Conservancy's Trash Information and Data for Education and Solutions (TIDES) clean up database, and the European Environmental Agencies Marine Litter Watch (MLW) dataset.

Some of these pilots were presented on 8 June, 2020 at a preparatory forum for UNEA-5.1. Others were presented at various meetings held around UNEA-5.1.

The release of an initial minimum viable product (MVP) ("Phase 1") took place in February 2021 where a beta version of Phase 1 of the Digital Platform was made available. Phase 1 focused on providing a single interface for bringing together internal and external resources to enable knowledge exchange and developing basic functionality to support key tasks such as user registration and resource sharing. A second release ("Phase 2") was made publicly available in September 2021. This version focused on establishing an MVP of the Data Hub component, which included a Geographic Information Systems (GIS) portal and a pilot Application Programming Interface (API)-enabled data catalog.

2.6 **Timeline.** A series of additional phased releases will culminate in a full-fledged final version, to be launched in June 2023. Interim versions of the Digital Platform will enhance existing features and develop new ones in preparation for key events, including the UNEA-5.2 dialogue planned for 2022, the 7th International Marine Debris Conference (7IMDC) planned for 2022, and UNEA-6, expected to be held in early 2023. Throughout the development of the Digital Platform, an iterative, user-centred design approach is using techniques such as interviews, surveys, and workshops to collect feedback from users to inform new versions of the Digital Platform.

3. Partners

UNEP will work with a variety of partners specialised in different areas to collect and develop resources for the Digital Platform. Initial engagements include a series of "discovery calls," presentations at formal and informal venues, and multi-stakeholder workshops. Partnership engagement opportunities include:

a. **Strategic Partners.** These include partners working on independent projects which might be featured on the Digital Platform, as well as partners who wish to co-develop various components of the Digital Platform, and/or provide funding to support the initiative.

b. **Technology Partners.** These include partners who can offer advanced or innovative technologies to support the development of the Digital Platform. Technology partnerships may lead to implementation of one or more systems (see Functional Requirements below) or provide cross-cutting solutions. Many technology partners may offer in kind support.

c. **Data Partners.** These include partners who wish to collaborate by sharing open data and other resources on marine litter and plastic pollution, or other complementary information for analysis and access. While some data partners may elect to share a single data set or a handful of data assets, others—such as Centers of Excellence—may also play a strategic, technology, or knowledge sharing role (Annex A). Data collected will focus on the entire lifecycle taking a source to sea approach.

d. **Knowledge Partners.** These include partners willing to share knowledge products that are currently hosted on external platforms. Relevant knowledge products may include guidelines, case studies, peer reviewed publications, interactive media, outreach and communication material, related campaigns materials and other information products.

Along with institutional partners sharing strategic assets, technology, data, or knowledge, UNEP is looking to engage with a wide range of stakeholders involved in marine litter and plastic pollution to help advise on, and guide the development of, key aspects of the Digital Platform. A framework for five interrelated "Action Tracks" will provide a formal structure for bringing experts together in a collaborative approach similar to frameworks such as Working Groups (WGs).

Additionally, the Digital Platform will be developed and implemented in close alignment with the strategies and activities led by GPML's Regional Nodes, in accordance with the Terms of Reference for Regional Nodes[4], to promote a common centralised vision as well as regional ownership. The participation of regional bodies is considered essential for the successful implementation and uptake of the Digital Platform on a regional basis. Regional Nodes provide key coordination functions and are composed by different bodies to support the implementation of regional, sub-regional, or national Action Plans and other relevant regional frameworks, which are tailored to address their specific environmental challenges.

4. Stakeholders

Stakeholders of the Platform include:

a. **Governments (Local, National)**. TThese may include ministers, other formal representatives, policy makers, and others who work to help governments take immediate action towards solutions, particularly the long-term elimination (through a life-cycle approach), of discharges of marine litter and plastic pollution into the oceans.

b. **Scientific and Technological Community and Academia.** These may include all actors contributing to the generation of scientific or technical knowledge on the topic, including professional scientists and other researchers, as well as those educating and promoting awareness, such as university professors, other educators, and their representatives.

c. **Business, Industry and Private Sector.** These may include a variety of players ranging from private actors, producers, retail and consumer goods business, recycling and waste management actors, as well as data and technology companies, banks, investors and insurance companies.

d. **Non-Governmental Organizations (NGOs) and Foundations.** These may include those involved in programs that act within various related issues, raise visibility over the marine litter and plastic pollution issue, or seek to bring together relevant data and other information on these topics.

[4] https://drive.google.com/file/d/1S_0ZiLOYOyMxjyzrVFrreaeiw29m0K-e/view

e. **Intergovernmental Organizations (IGOs)**, promoting coordination, identification of emerging issues, and facilitating the measurement of progress in relation to activities, programmes, the implementation of decisions, resolutions, and other activities.

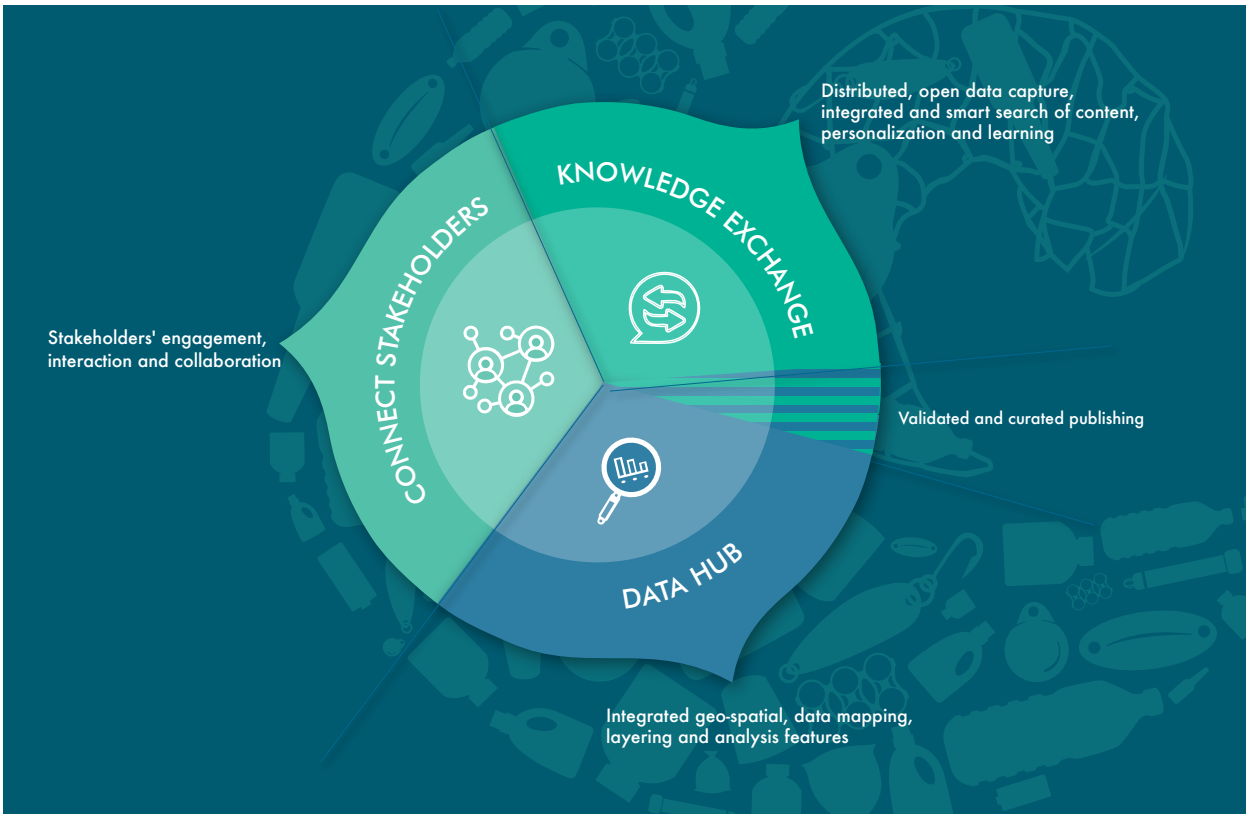
f. **All Actors Participating in Global/Regional Multilateral Processes,** including at a global and regional level.

g. **Other Major Groups and Stakeholders.** These may include but are not limited to UNEP's current list of **major groups and stakeholders**.

h. **Private Citizens.**

5. Components

5.1 **Overview.** Features of the Digital Platform are made available via internal and external resources shared through a virtual quarterdeck. The Digital Platform conceptual architecture supports interlinkages between the different components to ensure a user-friendly experience and access to all functionalities and resources through links to internal and external databases and datasets. UNEP will also offer opportunities for users to share their own content to be published on the Digital Platform pending a review process, including resources for knowledge exchange and the data hub. In addition, the Digital Platform will connect not only to external datasets, but also directly to key partner platforms hosting a range of data, such as World Environment Situation Room (WESR). A full overview of each component is provided below.



This conceptual architecture supports three primary components for knowledge exchange, a data hub, and to connect stakeholders.

5.2 **Knowledge Exchange**

Key Features: *crowdsourced with validated/curated publishing, integrated searching (Phase 1), smart searching, and personalised dashboarding and learning (future phases)*

- Through a mapping interface, a wide range of resources are made available and searchable via a search engine and navigation options.
- All individuals can register and request to upload new resources that meet basic quality requirements.
- In future phases, all individual users will have the option to associate themselves with different resources. In future phases, users will benefit from a customised experience based on their preferences, allowing them to make use of a personalised dashboard.

- In future phrases, strategic and knowledge partners will help enrich and validate the current resources available. Please note that current resources are not representative of all existing resources worldwide. Instead, the Digital Platform promotes all stakeholders to contribute to additional resources.
- The Knowledge Management Strategy (Annex B) provides a detailed overview of the key knowledge management aspects of the Digital Platform.

Existing knowledge exchange resources to address marine litter and plastic pollution include:

- **Initiatives** – document a wide range of actions ranging from legislation advocacy to behaviour change initiatives, and including education, training, events, new technologies, and monitoring and analysis tools. Existing initiatives aim to reduce marine litter and plastic pollution towards long-term elimination of discharge into the oceans. Collection of information on initiatives started from December 2019 via an online survey for voluntary inputs and includes narrative submissions and scientific initiatives. Initiatives are linked to a Dashboard to visualise key attributes, such as type of lead organisation and lifecycle phase (source to sea), and enables comparisons on country/regional level.
- **Technical Resources** – include scientific and technical resources and mechanisms collected through research that is based on publicly available information. Examples of technical resources on marine litter and plastic pollution range from guidance resources, assessments, calculation model and tools policy recommendations, operational and technical guidelines, toolkits for decision-makers, best practices, manuals and more.
- **Financing Resources** – resources and mechanisms collected through research that is based on publicly available information as well as interviews with experts, and inputs received through the Initiatives' submission process. These resources include grants, loans, investments, blended finance, crowdfunding and donations among others, provided by multilateral or bilateral donors, governments, private not-for-profit and for-profit organizations, or individuals. Sources include The World Bank, The International Monetary Fund, Regional and sub-regional development banks, The United Nations system (including Multilateral Environmental Agreements), and The Global Environment Facility. Other relevant sources, including national sources, as well as information from the private sector, including for-profit institutions, non-profit foundations, and capital markets, are also included.
- **Action Plans** – resources include a guidance document for developing Action Plans and an inventory of international, regional, national and local action plans.
- **Policies**[5] – include those sourced from the InforMEA platform, the FAOLEX Database and the UNEP Law and Environment Assistance Platform (UNEP-LEAP). They have been collected by the UNEP Law Division as part of their effort to create a toolkit for the newly launched UNEAP-LEAP platform.
- **Events** – feature information on upcoming capacity building activities and events on marine litter, plastic pollution and related topics.

[5] Additional guidance documentation used for the creation of the Policy Toolkit includes **UNEP's Environmental Law Making and Oversight for Sustainable Development: A guide for Legislators**, a **Marine litter legislation: A toolkit for policymakers**, and **Legal Limits on Single-Use Plastics and Microplastics: A Global Review of National Laws and Regulations.**

- **Technologies** – a collection of technology solutions and of environmentally sound technologies, which identifies commercial solutions for the prevention of marine litter following a lifecycle approach, from source to sea, with a focus on both land-based and near-shore (litter capturing) technologies.

During phase 3 the Digital Platform development will focus on creating and gathering sufficient capacity building material to support action. Examples of resources:

- **Trainings** – a range of learning resources including the Massive Open Online Course (MOOC) on Marine Litter available in 10 languages.
- Targeted education and capacity building resources to expand the list of current initiatives, to include masterclasses, resources for training of trainers on monitoring and assessment of marine litter and plastic pollution, and lessons learned/best practices/case studies. A section of the Digital Platform dedicated to training, targeted education, and capacity building will also support linkages across the different Digital Platform components to support creation of new resources, including Action Plans.

5.3 **Data Hub**

Key Features: *Mapping, visualizing, data layering, cataloguing (Phase 2 and 3), Distributed open data capture and data analysis features to support actions such as prioritizing, predicting, scenarioizing, tracking, measuring progress (future phases)*

- This component will leverage data publication and analysis to help prioritize and measure progress towards goals and indicators including the United Nations Sustainable Development Goals (SDGs), and other policy targets, including those associated with national policy and regional conventions.
- Data mapping, layering and visualizing functionalities will enable access to data from both internal and external sources, as well as data analysis and interpretation through Geographic Information Systems (GIS) tools. Relevant data will be findable and accessible through an API-enabled data catalog.
- Additional resources, including models and decision support tools, will be developed or integrated to support decision-makers to conduct analysis on key metrics, summarizing high risks and key opportunities for intervention.

The Data Strategy (Annex A) provides a more detailed view of the key data aspects of the Digital Platform. Existing data hub resources to address marine litter and plastic pollution include:

- A GIS platform capable of supporting visualization and select analysis of a range of data layers hosted as an ArcGIS Hub site. In addition to offering data visualization capabilities, the ArcGIS Hub site also demonstrates the value of data catalog features that will be expanded on in future phases.

- Twenty-two global and regional data layers that correspond with SDG goals 6, 11, 12, and 14. Key layers share data on topics including macroplastic freshwater pathways (SDG 6)[6]; the performance of municipal solid waste management facilities (SDG 11)[7]; the proportion of waste exported for recycling out of total waste generated (SDG 12)[8]; and, data on beach litter density collected through citizen science cleanup campaigns (SDG 14)[9]. Complementary data to support different analysis, such as a data layer on gridded population density for 2020.

Future phases of the Digital Platform will focus on:

- Selecting additional high-value data layers based on the best available scientific and technical knowledge, including as documented in a forthcoming whitepaper led by the Group on Earth Observations (GEO)'s Blue Planet Initiative.
- Prioritizing links to data partners responsible for different types of data curation, including through National Source Inventories and Digital Platform Centres of Excellence.
- Enabling the submission, editing, and eventual publication of user-generated data, including through a framework for determining which data set to include in which areas of the data hub (e.g., data catalog and/or GIS platform).

Additional efforts to advance standardized knowledge practices, including through work on a marine litter and plastic pollution ontology; standardized methods, including through work on citizen science monitoring practices; and, community building and networking, including at the individual and platform levels.

5.4 **Connect Stakeholders**

Key Features: *Finding relevant individuals and entities, sharing (Phase 1), collaborating (phase 3) matchmaking (a pilot in phase 2), and interacting (future phases)*

- In addition to compiling and sharing knowledge and data resources, the Digital Platform will be a place for stakeholders to connect.
- Features will be developed to facilitate coordination and collaboration between users, including a match-making component to foster engagement among stakeholders, and different functions to support interacting and collaborating, particularly to help coordinate action and the co-development of solutions, on a regular or ad hoc basis.

Initial mechanisms to connect stakeholders interested in topics related to marine litter and plastic pollution include:

- The ability to find stakeholders by searching for entities and individuals from the map view and the stakeholders' tab.
- Functions for bookmarking resources

[6] SDG 6, Clean water and sanitation.
[7] SDG 11, Sustainable cities and communities.
[8] SDG 12, Responsible consumption and production.
[9] SDG 14, Life below water.

- Shared event calendar providing opportunity to network
- The initial convening of different groups collaborating to support different aspects of Digital Platform development, including a community of practice (CoP) to facilitate data interoperability.

Future phases of the Digital Platform will focus on:

- Enabling functionalities for all stakeholders to matchmake, network, coordinate, interact, and collaborate, including social features.
- Enhancing the level of interaction each user can have with other Knowledge Exchange and Data Hub components of the platform. For example, social features may include functions for online events and meetings, breakout room discussions, an enhanced community directory, smart matchmaking capabilities, and a discussion forum.

5.4 **Workspace to support National Sources Inventories and Action plans**

Lastly, a cross-cutting experience will be created in the Digital Platform to support Action Plans and National Sources Inventories creation, implementation, reporting and updating. The Digital Platform should enable regional and other personalised experiences to help users access the most relevant resources and data, to measure progress over set goals and indicators at national and regional levels, and to facilitate the creation of Actions Plans providing clear linkages between policy approaches and data and analysis capabilities. Additionally, as expertise may be dispersed within a country or region, it is key to promote knowledge exchange and sharing at the different levels, including by supporting a network of actors to facilitate cooperation and address identified or emerging priorities or needs. In addition, it can also facilitate the accessibility to capacity building opportunities by tailoring these activities to cultural and languages needs.

6. Values

Development and management of the Digital Platform will be guided by three high-level, overarching values.

a. **Openness and Accessibility**. The Digital Platform will prioritize ease of access and user interface by creating an open, pleasant, and consistent experience. The Digital Platform will create a unified experience of existing databases relevant to both sea-based and land-based sources of marine litter and plastic pollution, from source to fate, including issues related to the SDGs and other policy targets. In accordance with the FAIR (Findable, Accessible, Interoperable, and Reusable) principles, all information and data should be findable, accessible, interoperable, and reusable. In addition to technical dimensions of accessibility, the Digital Platform will seek to provide select content in different languages with additional resources provided in the native language of the creator or curator. Plans to make the Digital Platform available in the 6 UN languages are in the roadmap.

b. **Trustworthiness and Quality.** Guidance will be developed to achieve quality assurance/ quality control (QA/QC), and various review process for different types of content offered through the Digital Platform will be put in place. Eventually, all partners and stakeholders of the Digital Platform will be able to submit new information to a wide range of Digital Platform databases, including projects, technologies, policies, events and trainings, financing, and technical resources, via a template form. Following the Phase 3 release, partners and stakeholders will also be able to submit data. Note that content already subject to recognized review methods, such as peer assessment through an academic process, or review through established policy channels, will trigger more lightweight approval processes then content that has not been subject to external review.

c. **Action-oriented and measurable.** Knowledge must drive engagement, which will lead stakeholders to take immediate action towards the long-term elimination, through a life-cycle approach, of discharges of litter and microplastics into the oceans. Resources developed for the platform, such as tools for tracking and measuring progress, should be linked to the Digital Platform's data portal, to ensure that collected information can be used to measure progress towards voluntary commitments and more. Subsequent versions of this strategy will include key performance indicators (KPIs) related to metrics to identify knowledge needs to ensure gains are met. To ensure the continued utility of the Digital Platform, periodic evaluations will be conducted to evaluate whether return on investment (ROI) is demonstrated, and partner needs are met.

In addition to these high-level principles that apply to all aspects of the Digital Platform, its data strategy will follow additional principles, as described below.

7. Contact Information

unep-gpmarinelitter@un.org

ANNEX A: Data Strategy

Background and Overview

1. Significant data gaps exist. As much as 68% of the environment-related SDGs do not have sufficient data at the global level to track progress.[10] But despite lags in official reporting, there is a wealth of underutilized information produced at a range of scales. Additionally, innovative technologies—including Earth observations, citizen science, and artificial intelligence (AI)—offer the promise of data at resolutions not achievable before. In this ecosystem, a primary challenge is curating existing resources and otherwise adding value.

2. The goal of the Digital Platform's data hub is to offer a coordinated point of access for data and information across the full plastic lifecycle, from source to fate, to enable discovery, access, and effective decision-making by stakeholders, on global, regional, national, and local scales. **Key objectives include** *curating existing information, investing in standards and consistent methodologies, adding value through analysis and decision support tools, and supporting and networking communities.*

3. These goals and objectives will be realized through development of the technical data hub, which will contain two interlinked platforms: A data catalog, including a metadata repository and Application Program Interface (API) management platform, and a Geographic Information Systems (GIS) platform.

Achieving Key Objectives

4. **Curating existing information.** Hundreds of potentially relevant data sets exist, including textual, numerical, and geospatial data. The data hub will support a federated data ecosystem, which recognizes local control and autonomy over different data sets, while providing a coordinated, single point of access for data on marine litter, plastic pollution, and related topics.

   Federated data systems are characterized by several common elements.[11] First, rather than mandating that all data are hosted in a central location, federated data systems recognize the need for distributed hosting, which allows users to simply visit a central location and perform queries on internal or external data that is retrieved on an as-needed basis. This requires standardized practices for knowledge documentation and exchange, along with common policies for data access. APIs enable data retrieval and, in some cases, enforce data access permissions. Federated approaches are increasingly

[10] https://wedocs.unep.org/bitstream/handle/20.500.11822/30672/SDG_Brief_008.pdf?sequence=1&isAllowed=y

[11] World Economic Forum (2019). Federated Data Systems: Balancing Innovation and Trust in the Use of Sensitive Data. https://www3.weforum.org/docs/WEF_Federated_Data_Systems_2019.pdf

recognized as good practices, and are being implemented in several projects and platforms, including the Group on Earth Observations System of Systems (GEOSS).[12]

Within the Digital Platform, the API-enabled data catalog will provide a one-stop-shop for stakeholders to search across a range of sources to find relevant information. While some data may be hosted directly by UNEP, APIs will provide access to additional data sets presented in Open Geospatial Consortium (OGC) standard formats. Providing a data catalog allows GPML partners to list a wide range of potentially relevant resources, including slightly different versions of similar data assets (e.g., more granular and more aggregated data). In addition, a selection of curated, high-value data layers will be directly accessible through the GIS platform. Example: The Alliance to End Plastic Waste is a non-profit organization and GPML member that hosts the Plastics Recovery Insight and Steering Model (PRISM) platform. PRISM serves as a harmonized source of information on topics related to waste management, including plastic consumption and collection, plastic waste generated and leaking into the environment, and management and recycling solutions. In a federated data system, partners like PRISM may host select data directly on the Digital Platform and/or make data available through the GIS platform. Partners may also register a much wider range of information in the data catalog to facilitate discovery and access through APIs.

Effective curation requires recognizing an already-existing federated data system with numerous actors collecting and sharing information on marine litter and plastic pollution. Curation should also take into account internal resources hosted in other areas of the Digital Platform. Creating links between resources hosted on the data hub, knowledge exchange, and connect stakeholders components will support an open science ecosystem of data presented along with related information such as peer-reviewed publications, information on policy initiatives, and profiles of scientific researchers. Example: A data layer on plastic flow accessible through the data hub may be linked to an open access publication accessible through the knowledge exchange component and linked to the profile of an individual researcher accessible through the connect stakeholders component.

Finally, curation requires presenting information in ways that align with different audience needs. The GIS platform will publish data and consider how information on methods and education or outreach materials can add value to data and make information more accessible. Example: United Nations Habitat Settlement Programme (UN-Habitat) is collaborating with the University of Leeds on a methodology to forecast marine litter and plastic pollution hotspots based on data on municipal solid waste, local meteorology, and other factors. In addition to a data layer published in the data catalog and made available through the GIS platform, this partnership might contribute information on the new methodology by publishing an ArcGIS Story map on the GIS platform.

[12] Max Craglia, Jiri Hradec, Stefano Nativi & Mattia Santoro (2017) Exploring the depths of the global earth observation system of systems, Big Earth Data, 1:1-2, 21-46, DOI: 10.1080/20964471.2017.1401284

5. **Investing in standards and consistent methodologies.** Success requires fostering good data practices, including ensuring that data and information are Findable, Accessible, Interoperable, and Reusable (FAIR). In the short term, efforts should be made to document existing sources of data and information more effectively. These efforts include the standardization of marine litter and plastic pollution terms and common vocabularies (semantics). For example, work is underway for the development of a Marine Litter and plastic pollution Ontology and Glossary of key terms. Efforts towards semantic interoperability leverage existing resources, including ontologies for environmental data such as ENVO[13] and the Sustainable Development Interface Ontology (SDGIO). While led by UNEP, this work is conducted in collaboration with a range of ontology experts, and includes a multi-stakeholder process for the identification of initial terms of interest to include, and the peer-review of draft resources prior to finalization.

   Work on semantic interoperability will help enhance the discovery and value of resources hosted on the data hub. It also presents a framework for sharing knowledge with other partners and repositories. Example: The SeaDataNet pan-European infrastructure for ocean and marine data management also identifies common terminologies, metadata attributes, data schemes and models to uniformly populate the EU EMODnet Chemistry marine litter database as required to implement the Marine Strategy Framework Directive (MSFD). Once work on a necessarily targeted Marine Litter and plastic pollution Ontology and Glossary advances, a necessary next step will be cross-walking key terms with other projects, such as the collection of initiatives under SeaDataNet.

   While the Marine Litter and plastic pollution Ontology and Glossary may contain hundreds or even thousands of key terms, a subset of standardized fields are required for the data catalog. Fields selected for the data catalog should reference key terms from the Marine Litter and plastic pollution Ontology and Glossary and should easily map to metadata already used in the Digital Platform and data hub. These fields should also correspond with general metadata standards, including Dublin Core metadata terms,[14] and selected with awareness of catalog standards published by organizations including the Open Geospatial Consortium (OGC)[15] and World Wide Web Consortium (W3C).[16] Example: the following fields could be used to describe data catalog entries:

Data Catalog Field Name	Description	Type and Source	Related Term[17]
Title	A name given to the resource. May correspond to the name of the resource on the GIS platform.	Free text string, User or GPML	DC: Title
UID	A unique identifier.	Free text string, GPML	DC: Identifier
Tags	One or more standardized tags. Controlled vocabularies may designate relevant policy frameworks, including the SDGs and MEAs, or link to a broader list of terms included in the ontology and glossary.	Controlled vocabulary (multiple terms), User	DC: Subject

[13] **https://sites.google.com/site/environmentontology/**
[14] https://www.dublincore.org/specifications/dublin-core/dcmi-terms/#section-3
[15] https://www.w3.org/TR/vocab-dcat-3/
[16] https://docs.opengeospatial.org/is/12-168r6/12-168r6.html
[17] Many catalog standards include a mapping to Darwin Core (DC). For this reason, Darwin Core terms are primarily offered, unless another standards offers more specific terms. In this case, terms from both Darwin Core and the other standard are offered.

Data Catalog Field Name	Description	Type and Source	Related Term
Summary	A general description of the dataset.	Free text string, User	DC: Description
Language	The language of the resource. May consider implementing as a controlled vocabulary corresponding to the six UN languages.	Controlled vocabulary (multiple terms), User	DC: Language
Format	The format of the data set or other resource available for download.	Free text or controlled vocabulary (multiple terms), User	DC: Format
Date	Date the resource listing was last updated in the data catalog.	Date-8601, User or GPML	DC: Date
Geographic Coverage	The geographic coverage of the resource. Terms include global, transnational, national, sub-national.	Controlled vocabulary, User (single term)	DC: Coverage
Owner	Organization that the data belongs to and/or entity responsible for making the resource. Option to look through a list of existing Digital Platform entities or add an entity.	Free text string, User	DC: Creator
Partners	One or more partner organizations, or entities responsible for making contributions to the dataset. Option to look through a list of existing Digital Platform entities or add an entity.	Free text string, User	DC: Contributor
Source	A related resource, in this case, an access point for the data set. The access point may be internal or external to the Digital Platform.	Free text string, User	DC: Source
Related Resources	Links to related resources hosted on other areas of the Digital Platform	Free text string, User	DC: Relation
Data License	A designated open data license, other license, and/or open-source designation.	Free text string, User	DC: Rights

To enable interoperability with a range of resources, the fields recommended above correspond to 13 of the 15 terms included in the Dublin Core metadata standard. For one remaining Dublin Core term, "type," it can be assumed that the value for all data sets is equal to "Dataset." For the second remaining Dublin Core term, "publisher," it can be assumed that the value for all data sets is equal to "Digital Platform." If these values are used, the list of recommended fields is fully compatible with Dublin Core. Additional terms can be included in the metadata documentation accompanying each data resource.

In addition to standardized practices for knowledge exchange, UNEP can also invest in standardized methodologies for coordinated data collection and analysis. Example: In December 2020, UNEP co-hosted a workshop with IIASA and the Ocean Conservancy on "Citizen Science for SDG 14.1.1.b." The goal of this workshop was to understand how a specific methodology—citizen science data collected through beach clean-up campaigns—could effectively contribute to SDG reporting across projects and monitoring activities. A broader partnership with Ocean Conservancy is underway to create a how-to manual that will enable any interested citizen science project to collect data in accordance with 14.1.1.b requirements.

Building on established high-level principles,[18] an open data policy will be developed to enable contributors to legally and ethically share their data with UNEP and make it available for broader reuse. The use of open licenses to promote open data has been endorsed by UNEP through the Principles Governing International Statistics Activities,[19] but can be difficult to realize in practice. Within the data catalog, the inclusion of a field for designating a standardized open data license, other license, and/or open-source designation can help drive current practices closer to ideals. To protect UNEP, GPML Partners, Digital Platform users, only appropriately designated open data will be published through the GIS platform.[20] UNEP may also work with partners to identify a set of preferred licenses that enable content sharing under a range of conditions, including attribution. Example: Partners seeking republish their data through the Digital Platform may leverage the Creative Commons Suite, for example selecting a license like CC BY, or a public domain designation (CCO).[21]

6. **Adding value through analysis, education and decision support tools.** The data hub will feature several data layers, including observational data with varying degrees of detail, as well as "combined" data layers bringing together multiple data sets, and "analyzed" data layers displaying the results of modeling or other analysis. While a range of data resources can be made available through the data catalog, combined data layers and analyzed data layers will be prioritized for inclusion on the GIS platform. Users will also use the GIS platform to access education and outreach materials, for example informal article- or blog-style content that complements scientific and technical reports. Examples: The Global Earth Challenge data set is a combined data layer that brings together information from three citizen science initiatives. Florida State University offers an analyzed data layer that presents the results of a Global Ocean Litter Model calculated using state-of-the-art Lagrangian ocean analysis tools. ArcGIS Story maps deliver lightweight content to audiences that may not need in-depth scientific and technical resources.

   In addition to sharing and elevating existing activities, UNEP will collaborate with partners on pilot data collection or analysis projects. Some of these projects may be designed to test the value of a new data collection or analysis approach; others, may create tools to support better decisions, for example through the creation of new combined data layers or through data analysis. These projects may unfold through traditional agreements, or through other mechanisms, such as a challenge competition

[18] Common open data principles include: Machine readability; non-proprietary format; download options; metadata availability; and, free/unrestricted terms of use.
[19] https://unstats.un.org/unsd/ccsa/principles_stat_activities/endorse.cshtml
[20] UNEP may elect to establish a similar open access policy for data sets listed in the data catalog.
[21] https://creativecommons.org/

for stakeholders to analyze one or more data sets offered through the Digital Platform. Example: A challenge competition could invite university students to create a data layer that advances our understanding of a research question such as, *"What is the relationship between two grand environmental challenges—biodiversity loss, and plastic pollution—and what can be done to mitigate harmful effects?"*

Public analysis tools will enable any stakeholder to analyze open data. The Digital Platform will also develop workflows for linking the API-enabled data catalog and GIS platform to external data tools and analysis platforms, for example for machine learning. Example: The Digital Platform may link to several partner platforms for big data analytics and processing to facilitate the analysis of remotely sensed Earth observation data.

7. **Supporting and networking communities.** The Digital Platform is a collaborative resource, and the data hub recognizes that stakeholders are already producing, publishing, and aggregating relevant data. UNEP will create a range of mechanisms to recognize leaders working towards the long-term elimination of marine litter and plastic pollution, including through Communities of Practice, Centers of Excellence, and by aligning with emerging National Source Inventories. The Digital Platform will also bring together experts through the Action Tracks framework.

   Communities of Practice (CoPs) and Centers of Excellence (CoEs) are two models for structured collaboration. CoPs are relatively informal groups of stakeholders who meet regularly to discuss good practices or contribute to a specific project under the guidance of two or more co-chairs. They may be bound together by a common goal, or through a slightly more formal mechanism, such as a community charter. CoPs may bring together experts working in a particular geographic area, on a particular topic, or on a cross-cutting issue, such as standardized knowledge representation. For example, in Summer 2021, UNEP launched a Community of Practice to support ontology and glossary efforts.

   Some, but not all, entities supporting CoPs may evolve into more formal Centers of Excellence. Traditionally, CoEs have been defined as organizational environments that strive for and help develop high standards of conduct in a particular field.[22] In addition to advancing excellence in research, CoEs engage in significant capacity building, such as human resource development through training, or institutional development through creating or advancing legal or governance frameworks. In the context of the Digital Platform's data hub, CoEs will be formal entities responsible for establishing and promoting good practices; contributing to the development and enforcement of data governance practices; and, for CoEs who produce or aggregate data, creating technical links to the Digital Platform. CoEs may include geographically focused, Regional Centers of Excellence, and topically focused, Research Centers of Excellence.

   The National Source Inventories approach is a framework for national-level coordination around statistics on plastic production, import, and lifecycle; waste statistics; monitoring of freshwater and wastewater; and, monitoring of costal and marine waters.[23] Like Centers of Excellence, early partners hosting National Source

[22] Hellstrom, T. 2018. Centres of excellence and capacity building: From strategy to impact. Science and Public Policy, 45(4), 543-552.
[23] **https://wedocs.unep.org/bitstream/handle/20.500.11822/31825/COBSEA_NSI.pdf?sequence=1&isAllowed=y**

Inventories can support the data hub by coordinating inputs to the data catalog and GIS platform while respecting data governance policies. In turn, the data hub will offer National Source Inventories resources for data documentation and exploratory analysis through the provision of technical tools.

Five GPML dedicated "Action Tracks," still being scoped, will bring together a range of experts to support the collaborative design of key elements of the Digital Platform and consider crosscutting issues. One dedicated action track will focus on standards, harmonization and guidelines, including data standards and industry standards. This action track will bring together interested experts from (for example) GPML, members of the former Ad Hoc Expert Group (AHEG), the Group on Earth Observations (GEO), the Ocean Best Practices Symposium (OPBS), along with private sector entities. Coordination between the five action tracks will help ensure that the data hub can help meet the needs of a range of stakeholders, for example by responding to the demands established by the Science Policy Action Track and the National Action Plans Action Track.[24]

Quality Assurance, Quality Control, and Validation Strategy

8. Important elements of data and information quality management include quality assurance (QA) and quality control (QC). Quality assurance requires providing confidence that data and information quality requirements will be met. Quality control designates the steps taken to implement quality assurance requirements and, in some cases, improve the quality of existing information. As part of a larger validation strategy, UNEP will implement a QA/QC framework for data and other information made publicly available through the data hub. Key steps will include:

    a. **Establishing basic guidelines.** As a baseline, all resources must demonstrate strong alignment with the Digital Platform's mission. Two sets of additional guidelines, or "inclusion criteria," may be developed to help ensure mission alignment and appropriateness for the data catalog and GIS platform. For example, inclusion criteria for the data catalog might include a requirement that the data owner is an entity registered with the Digital Platform, and a requirement that a public access point exists. Inclusion criteria for the GIS Platform may be more stringent, for example by requiring that data are global, trans-national, or national in scale, and requiring an open data license, other open license, and/or public domain designation. Additional data quality requirements for the GIS platform may include (at a minimum) the requirements set by other UNEP platforms, including WESR. Both sets of inclusion criteria should be established by UNEP in partnership with expert groups.

    b. **Beginning with good data documentation.** All data partners will complete a webform to share information about their data. Information from the webform will be published in the data catalog, included in the metadata record, and leveraged in review processes. This approach allows the Digital Platform to deliver quality assurance by collecting and documenting the information required for a stakeholder to assess the fitness of data for their desired use. For example, information documented in the data catalog may include geographic scope, whether the data

[24] The additional two Action Tracks will address Sustainable Innovative Financing, and Access for All.

have gone through a government assessment or academic peer review process, whether the data resulted from observational data collection or modelling, and whether the data are derived from a single source or represent an aggregated resource.

c. **Establishing an initial review strategy.** Once data are documented an initial review can ensure that inclusion criteria are met and check for accuracy and completeness. For internal partners, external partners working through formal agreements, and strategic partners such as Centres of Excellence, the successful completion of this initial review can lead to publication in the data hub.

d. **Expanding QA/QC efforts as needed over time.** Over time, the focus on quality assurance may be augmented with efforts to ensure quality control. For example, groups of experts working within a topical area or geographic region may implement additional quality requirements and review processes for data under their jurisdictions, electing to share only a subset of reviewed data with the Digital Platform. UNEP may also institute a lightweight peer review process, for example enabling users to comment on a data set.

e. **Helping data partners navigate QA/QC and validation processes.** To begin, UNEP should publish the inclusion criteria guidelines through the data hub and broader Digital Platform. In addition, UNEP may establish a virtual "help desk" to answer questions potential data partners may have on inclusion criteria and documentation requirements.

f. **Establish timelines for on-going and periodic review.** Content will be published on an on-going basis to ensure that new knowledge can be made available with minimal delay. Additional review processes conducted by UNEP on an annual basis will ensure that all content remains accurate and up to date, and each resource featured in the data hub remains in line with the Digital Platform's mission and stakeholder needs.

A Phased Approach

9. Like the broader Digital Platform, the Data Hub will be developed through a phased approach shaped by a multi-stakeholder, user-centered design process. While subject to change, key milestones in the Data Hub's development may include:

   a. **Initial proof-of-concept.** The objective of a proof-of-concept demonstration was to show the value of bringing together diverse data and information in one central place. Following the Phase I release of the broader Digital Platform, a proof-of-concept of the data hub was launched as part of the Phase II release, in September 2021. The proof-of-concept included a GIS platform and data catalog demonstration hosted on an ArcGIS Hub. Twenty-two data layers showcased information across SDSs 6, 11, 12, and 14. The proof-of-concept data hub also featured educational information shared through ArcGIS Storymaps.

   b. **Expanding key data and technical resources.** Scientific publications will help inform the selection of additional assets to include in the data hub. A landmark assessment, From Pollution to Solution: A *Global Assessment of Marine Litter and Plastic Pollution*[25] was launched in October 2021. A complementary technical report

[25] https://www.unep.org/resources/pollution-solution-global-assessment-marine-litter-and-plastic-pollution

led by GEO Blue Planet, *A Global Data and Information Platform for Monitoring Marine Litter and Informing Action*, will be published in time for UNEA 5b. Both documents provide a strong scientific basis for selecting additional data to share through the data hub, and UNEP will work with the lead authors of both publications to understand what data to include. Technical expansion of the data hub may seek to incorporate new elements, for example by leveraging CKAN for data documentation and management, and enhance existing elements, such as the ArcGIS platform.

c. **Embracing platform level partnerships.** Relying on expert curation and scientific guidance is insufficient to allow the data hub to scale. While some curated resources will continue to be added as new knowledge becomes available, shifting an emphasis to platform level partnerships will help the data hub mature. As described earlier, the Centers of Excellence model and National Source Inventories provide important structures for working with new partners already engaged in data aggregation and leadership.

d. **Enabling a range of user-generated content**. As a final milestone, the data hub will help foster an open, scalable ecosystem of knowledge production and sharing. A wide range of partners will be encouraged to share their resources, either indirectly—including through Centers of Excellence, National Source Inventories, and various monitoring and assessment processes—or directly, assuming additional QA/QC and validation processes are put into place. These efforts will result in a vibrant, co-created federated data ecosystem and supporting infrastructure that continues to grow and thrive.

Alignment with External Principles

10. In addition to the broad principles recognized by the Digital Platform, the data hub will endorse the same overarching principles as the Global Environmental Data Strategy:

    a. **Long-Term Vision.** As described earlier, the data hub will follow a user-centered design process with a staggered, multi-phase release. This approach will help ensure that the data hub takes a long-term perspective that respects established and emerging stakeholder needs. It will also help promote alignment with UNEP and UN-wide strategies for data and digital transformation. The data hub could serve as a use case for UNEP's digital transformation efforts.

    b. **Simplification.** The data hub will prioritize ease of access and usability. Transparent access to environmental data will be enabled by fields listed in the data catalog, particularly the "data license" field. UNEP will also promote simplification by working with partners to harmonize monitoring methodologies and, in some cases, data, for example through the production of combined and analyzed data layers.

    c. **Rationality.** Recognizing the existence of a federated data system, the data hub will offer a central point of access to high-quality data on marine litter, plastic pollution, and related topics. This will leverage partnerships with a range of stakeholders, build on existing efforts, help avoid duplication, and ultimately identify gaps to be filled.

    d. **Cost-Effectiveness.** For technical components including the data catalog and GIS platform, Requests for Proposals (RFPs) may solicit contributions from open-source platforms and other cost effective, already-existing vendors. In kind contributions and small-scale funding agreements with existing UNEP or GPML partners will also be considered and encouraged.

e. **User-Centered.** The broader concept document establishes the user-centered approach to developing the Digital Platform. In addition, the data hub will leverage a collaborative approach to prioritizing assets for inclusion, and for ensuring quality assurance and quality control.

f. **Impact.** As work continues, the Digital Platform and data hub will develop key performance indicators (KPIs) related to metrics including ease of access, usability, quality, and added value. Using KPIs to assess impact on an annual basis will enable GPML and UNEP to continue to invest in new data hub functions in ways that are responsive to stakeholder needs.

g. **Partnerships.** The Digital Platform and data hub will leverage partnerships supported by GPML, SPBF, and others to broker collaborations with stakeholders including businesses and NGOs. The value of partnerships with civil society will be recognized through data from citizen science and other forms of community-based research (such as Environmental Justice, Traditional Ecological Knowledge (TEK), and many more).

h. **Capacity Building.** The data hub will provide several resources to support capacity building and education. Providing informal how-to guides along with formal, detailed methodological guidelines will ensure that a range of stakeholders can understand how data layers were collected or analyzed. Different formats, including ArcGIS Story maps and technical whitepapers or peer-reviewed publications, will help meet the needs of different audiences. Developing a range of related resources also provides the opportunity for users to self-educate by beginning with a simpler resource and progressing to a more technical or scientific one.

Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis

11. Work on the data hub is conducted with awareness and analysis of various strengths, weaknesses, opportunities, and threats (SWOT). This initial list will be evaluated on an ongoing basis and discussed with a range of GPML partners.

    a. **Strengths.** The Digital Platform is backed by a strong policy mandate, found in UNEP/EA.4/Res.6 operative paragraph 3. Subsequent policy guidance has built upon this initial commitment to demonstrate strong and ongoing support. Data and information on marine litter and plastic pollution is at an ideal state of maturity; a wide range of (potentially) relevant information exists, but while de facto Communities of Practice and Centres of Excellence are emerging, so is the need for global leadership, coordination, and direction. Creating the Digital Platform under the Global Partnership for Marine Litter provides the authority and governance framework required to bring the necessary stakeholders together. To date, implementation of the Digital Platform has followed a thoughtful, multi-phase, user-centred approach that maximizes the value of early investments.

    b. **Weaknesses.** The vision for the Digital Platform and data hub is necessarily ambitious and recognizes the urgency and complexity of the problem at hand. Implementing this vision requires significant resources, including finance and human capital with expertise in strategic and policy leadership, scientific research, and strong technical capabilities. However, unlocking different types of resources may

prove difficult on targeted timelines with a moderate budget. For example, while many private sector "best in show" technologies could provide significant support the Digital Platform, UNEP is often limited by lengthy procurement cycles that may not match project timelines, and budgetary requirements that do not align with private sector needs. In addition, the innovative nature of the Digital Platform and data strategy means that hurdles ranging from interoperability to intellectual property will emerge as "business as usual" is continually disrupted.

c. **Opportunities.** With a new Medium-Term Strategy for 2022-2025 that emphasizes the value of environmental data, UNEP appears primed for change. Design and development of the Digital Platform is also conducted within the context of a larger strategy for Digital Transformation, and a commitment to implement a Global Environmental Data Strategy.[26] The data hub seeks to capitalize on this opportunity by demonstrating alignment with a range of emerging UNEP initiatives. For example, the Digital Platform's data hub can offer a technical home and coordinated point of access for information shared through National Source Inventories. There is a second, equally significant opportunity to demonstrate how the data hub can coordinate with other stakeholders and digital platforms within and outside UNEP. The Digital Platform can become a model for how networked data and digital transformation can create the structures for better data governance, in and beyond the environmental domain.

d. **Threats.** Other important platforms exist and are emerging. Within UNEP, WESR is an example of a digital platform for the environment with a broader but overlapping mandate. External entities including IMDOS also have potentially overlapping goals, and present opportunities for collaboration. Recognizing a federated data ecosystem can help mitigate potential threats posed by other platforms by providing a framework for a range of partners to maintain agency and assume leadership and community management roles. Partner development and coordination will be key to the Digital Platform's future.

Summary Recommendations

1. Finalize an initial quality assurance/ quality control (QA/QC) framework.
   a. Publish guidelines, or inclusion criteria, that state requirements for resources in (1) the data catalog and (2) the GIS platform.
   b. Use a webform to collect information that can be shared through metadata records and the data catalog, allowing stakeholders to evaluate fitness for various uses.
   c. Leverage the inclusion criteria and data documentation to create a lightweight review process for trusted partners. Expand this process as needed over time.
2. Incorporate existing tools for standardized knowledge documentation and exchange.
   a. Use the Dublin Core metadata standard to document records in the data catalog.

[26] https://wedocs.unep.org/bitstream/handle/20.500.11822/29753/Item%204%20UNEP_UNEA4_Monitoring_Ministerial_Declaration-Thu-12-Sep-2019.pdf?sequence=1&isAllowed=y

3. Continue to develop domain specific tools for knowledge documentation and exchange, including the marine litter and plastic pollution ontology and glossary of key terms.
    a. Leverage the ontology and glossary to tag different resources on the data hub, knowledge exchange, and connect stakeholders components of the platform. Creating cross-links between related resources will help support a holistic open science ecosystem.
    b. Crosswalk the ontology and glossary with other ontologies and vocabularies to facilitate cross-platform knowledge exchange.
4. Expand the data hub's collaborative development approach.
    a. Continue to use Communities of Practice (CoPs) and similar structures to support informal collaborations. Consider creating charters or terms of reference for the Ontology CoP and other CoPs that emerge.
    b. Pilot test the Centres of Excellence (CoE) model with two topical or geographic Centers.
    c. Consider the use of prize and challenge competitions to encourage innovative analysis.
    d. Consider creating a virtual help desk to help stakeholders share resources with the Digital Platform and data hub.
5. Fully enforce the open access policy.
    a. Require documentation of an open-source license or other designation before data are published on the data hub.
    b. Work with GPML partners to collaboratively identify a preferred set of licenses, for example from the Creative Commons suite.
6. Continue to expand the data hub through a phased approach.
    a. First, expand curated content. Leverage two assessments, *From Pollution to Solution: A Global Assessment of Marine Litter and Plastic Pollution* and *A Global Data and Information Platform for Monitoring Marine Litter and Plastic Pollution and Informing Action*, to identify new content.
    b. Second, embrace platform level partnerships with other data aggregators, including through the CoE and National Source Inventories frameworks.
    c. Third, allow any GPML member or partner to submit content to the data hub after the QA/QC process is finalized.
    d. During all phases, continue to publish data, analysis, information on methodologies, and education and outreach materials.
7. Document lessons learned for UNEP, GPML, and broader communities.
    a. Demonstrate leadership and elevate impact by presenting at key meetings, conferences, and other venues.
    b. Propose the Digital Platform and data hub as a use case to showcase the value of UNEP's Digital Transformation efforts.

[26] https://wedocs.unep.org/bitstream/handle/20.500.11822/29753/Item%204%20UNEP_UNEA4_Monitoring_Ministerial_Declaration-Thu-12-Sep-2019.pdf?sequence=1&isAllowed=y

ANNEX B: Knowledge Management Strategy

Knowledge Management, Collaboration and Outreach Outputs

1. This Knowledge Management Strategy outlines an approach to create, identify, codify, and share knowledge to maximize knowledge access, collaboration and outreach activities.

Knowledge Management Activities and Outputs

2. **Identification of Stakeholders and Needs.** To understand which knowledge is relevant and to build effective technologies implementation, we must first identify users of knowledge. We will be conducting regular user consultations during the development phases of the Digital Platform to ensure user needs are gathered and included in the platform development cycles. Additionally, surveys and another feedback mechanism will be put in place to identify of gaps and opportunities and to understand motivations and behaviours of stakeholders' groups using the Digital Platform. Key Performance Indicators (KPIs), aligned with the overall goals of the platform, will identify trends e.g., view/download of most popular resources, social media engagement and channels sentiment. Partners involved in the creation of platform is equally important, for this reason we will work closely with Digital Platform partners to collect their feedback, technical inputs and recommendations.

3. **Identification of Knowledge Sources and creation of Knowledge Products.** Knowledge management is concerned with the creation, identification, codification, usage, dissemination, and management of knowledge in its many forms to achieve a full knowledge cycle implementation. The Digital Platform will allow for access to a wide range of knowledge products (resources types) from documentation, including reports, guidelines, policies, national documents to digital learning and searching experience (e.g., e-learning libraries) to create an integrated seamless experience for existing digital platforms and tools. Existing databases include projects, technologies, policies, events and trainings, financing, and technical resources. Additionally, identification of relevant existing ontologies and the creation of a taxonomy strategy is key to enable streamlined access and sharing of information.

4. **Outreach Activities and Community Engagement.** These activities include Events, Webinars, Trainings, Workshops, Collaborations, Campaign alignments and more. Many of these activities will foster capacity building, education, and training linking the academic and scientific communities with practical field-based activities. All Digital Platform outreach activities will be directly aligned with the GPML communication and UNEP strategies, including the social media multi-channel strategy and communication guidelines. All these activities will promote the GPML partnership membership as well as direct engagement from stakeholders. Development of the Digital Platform should

be coupled with community management mechanisms and user-friendly design to incentivize use of the platform.

5. **Multi-stakeholder Forum and network of experts.** The GPML is a multi-stakeholder partnership that brings together all actors working to prevent marine litter and plastic pollution. By providing a unique global platform to share knowledge and experience, partners are able to work together to create and advance solutions to this pressing global issue. A database of experts and other stakeholders will enable users to find others with relevant expertise to strengthen cooperation and coordination, share ideas, knowledge and experiences, identify gaps and emerging issues, and ultimately harnessing the expertise, resources and enthusiasm of all to make a significant contribution to the achievement of the 2030 Agenda, in particular SDG 14. The GPML Action Tracks along with other informal Communities of Practice (COPs) will facilitate networking, promote knowledge exchange, and encourage partnership with the GPML and other Digital Platform users.

6. **Establishment of "Action Tracks" as formal working groups.** Action Tracks will be established to bring together stakeholders with shared interests to share and discuss problems and opportunities encompassing all the lifecycle phases. Activities will be organised to facilitate communication and coordination among existing members, but also additional self-organised activities will be driven by members of these groups to transform knowledge and expertise into evidenced-based suggestions and activities. Creation of new communities may not be needed if active communities already exist, in which case the Digital Platform activities and digital capabilities can strengthen their engagement. To the greatest degree possible, the contributions of existing communities will be recognized and elevated through the Action Tracks framework.

7. **Digital Innovation.** Along with the features of the Digital Platform innovative approaches will be explored further to enable digitalization of marine litter, plastic pollution and related topics, including the potential big data, artificial intelligence, blockchain, virtual reality, Internet of Things (IoT), and other emerging technologies.

Digital Platform Features Enabling Knowledge Cycle

The Digital Platform's digital capabilities will support the full knowledge cycle. Key Digital Platform features include:

8. **Searching and Navigation.** Users will be able to retrieve information by navigating and browsing the Digital Platform through a search engine, as well as other search modalities, using a bot, digital human/virtual assistant, voice search and more. A Knowledge repository will make accessible all resources available in the platform through advanced searching options.

9. **Knowledge Visualization tools.** All Users will have the ability to submit inputs to existing UNEP databases which include information on projects, technologies, policies, events and trainings, financing, and technical resources, via a template form. All existing resources will be visualized through geographical mapping, data layering,

knowledge maps…etc. to create an interactive engagement with the resources. Digital Platform visualizations should also help promote engagement e.g., shared event calendar view, stakeholders and resources association path maps, interactive story telling…etc.

10. **Matchmaking, Interacting and collaborating.** Through matchmaking capabilities users will be able to connect with experts and other stakeholder including those sharing similar interests, in the same location, and findable by other similar features. Additionally, stakeholders will be matched with existing resources and data that is available to them. The Digital Platform will facilitate engagement among stakeholders to promote coordinate action on a regular or ad hoc basis, and co-development of solutions via chat like functionalities and digital channels. As part of the long-term vision, we wish to help seed a social network and provide a digital forum for discussing marine litter, plastic pollution and lifecycle management amongst stakeholders.

11. **Personalisation via Dashboard.** Users of the Digital Platform will receive a customized experience based on their preferences, allowing them to make use of key functionalities from a personalized dashboard and customisable dashboard card view. While an immediate use case for personalization is the presentation of locally relevant information aligned with the GMPL Regional Nodes, in the long term users should be able to access content based on a range of affiliations and preferences.

12. **Learning Platform.** A variety of resources from static to interactive will be provided to foster learning including, MOOCs, events, trainings, and webinars. Ultimately, an online e- learning platform, designed to be light, and scalable based on learning standards in the world, will help users get educated on various topics supporting various languages and providing access to a wide range of resources from self-based, live classrooms, virtual classrooms, webinars, courses and certifications.

13. **Content Management and Ontology.** A content management system will be created for an administrator of the platform to support data maintenance. Additionally, the Digital Platform ontology will be refined via the feedback shared by domain experts and through the adoption of a flexible tags driven strategy (user input based) and supported by automated knowledge graphs using Natural Language Processing (NLP) technology.

ANNEX C: Validation Workflow

A key objective of the Digital Platform is to provide access to curated data and resources on marine litter and plastic pollution. To achieve this objective a well-defined validation workflow of resources, data and stakeholders is required.

Together with the Digital Platform stakeholders, the GPML Team is currently working towards developing a comprehensive validation scheme. Outline in this Annex are initial thoughts on the validation of stakeholders and resources. Once fine-tuned, we will be rolling out a more comprehensive version of the validation workflow.

1. Stakeholders Validation

The Digital Platform is public and allows for Individuals and Entities (organizations and governments) to sign up. The Validation of individuals is currently carried out internally by UNEP staff. Once approved the stakeholder's profile is featured in the directory of stakeholders in the Connect Stakeholders component of the digital platform.

Individual Stakeholders can hold different roles:

- **Admin:** An individual with the rights to publish and decline submissions, assigning different user roles and perform all other defined user actions. This role is reserved for UNEP staff members.
- **Submitter:** An individual that has added a resource to the Digital Platform but is not the actual owner to the resource.
- **Owner:** An individual or entity that owns a resource in the Digital Platform or has been assigned ownership rights to a resource.
- **Resource editor:** An individual that has been assigned to a resource in the Digital Platform and will have the rights to edit the resource.
- **Entity Focal Point:** An individual responsible for managing an entity's profile and resources.
- **Reviewer/ Expert:** An individual considered expert and who can add reviews to the comment section of a resource.

Criteria for Identification of Experts

The proposal is to work with regional seas to identify individuals whose expertise in marine litter and plastic pollution has been regionally or globally recognized. Additionally, the GPML could put out periodic calls for experts within certain domains. The submissions would then be vetted and once an expert is accepted, they would appear in the pool of experts. Based on their expertise the reviewer would be assigned to resources or datasets for their review. To ensure impartial reviews, a reviewer cannot be assigned to a resource belonging to an organization they are affiliated with.

Once approved entities can have the status of:

- **GPML Member:** An entity that has registered as a stakeholder and has been approved to join the GPML. The entity profile will have a membership badge.
- **Non-GPML Member:** An entity associated with a stakeholder profile or whose resources exist on the platform but has not been registered as a stakeholder of the GPML.
- **Trusted Source:** An entity that is accredited by a UN entity. For example, **the UNEP list of accredited organizations**.
- **Centre of Excellence:** An entity that is considered an expert a particular topic such as microplastic or a particular region such as Southeast Asia.
- **Sponsor and Donor:** An entity that has provided financial support towards the development of the Digital Platform.
- **Partner:** An entity that has a contractual obligation to provide strategic, data, resources or technical support towards the development of the Digital Platform.
- **Contributor:** An entity that has shared its data or resources without requiring a contract.

Criteria for Identification of Trusted Sources

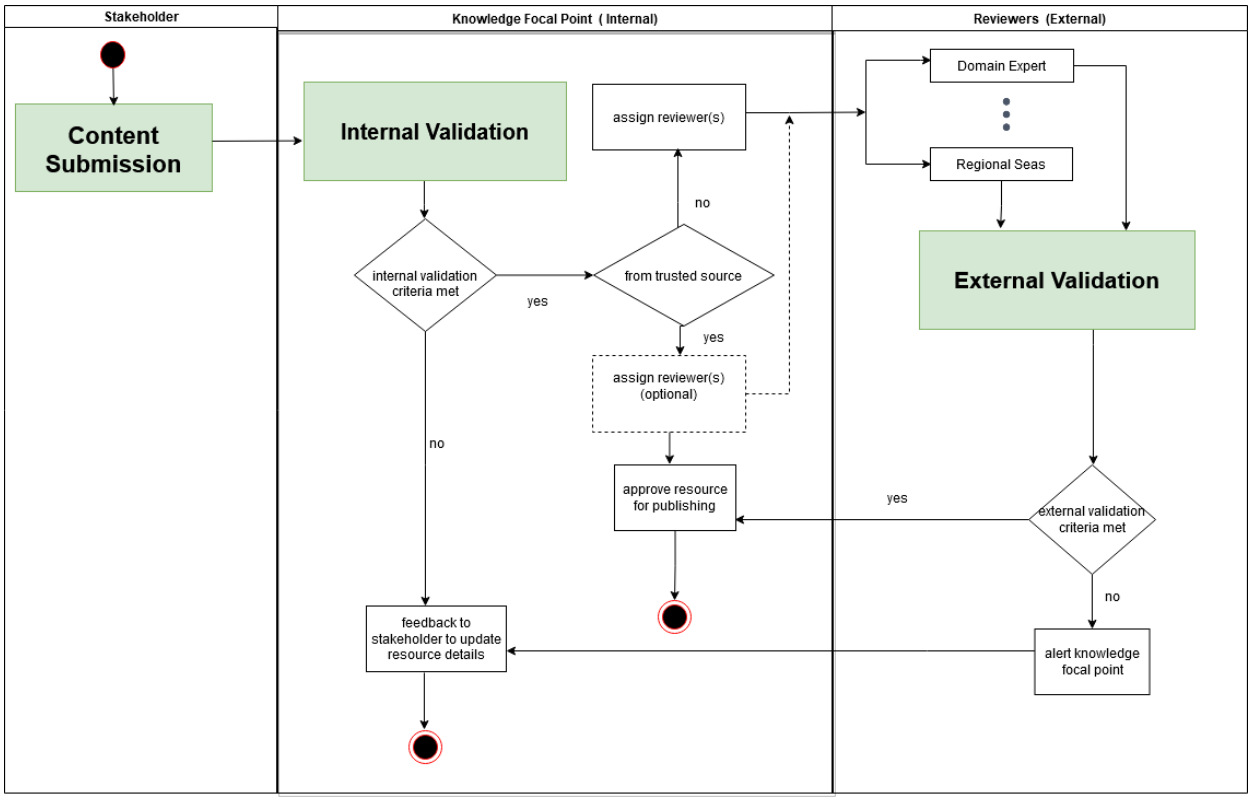
Trusted sources will comprise of accredited organization by a UN entity. Data/ resources belonging to the entity are up to data, cover the most recent insights and have complete metadata.

Criteria for Identification of Centres of Excellence

The proposal is to start by working with regional seas to identify entities whose expertise in the different domains related to marine litter and plastic pollution has been regionally or globally recognized.

2. Content Validation Process Overview

The proposed validation process can be broken down into internal validation and external validation. The purpose of the internal validation is to ensure that data and information submitted is complete, correct and in line with UNEPs vision regarding marine litter and plastic pollution while that of external validation is to ensure that content provided is accurate, comprehensive, and usable.



Criteria for Internal Validation

Internal validation will serve as the first data quality check, and it is to be carried out internally by GPML team members. Criteria for internal validation include.

- criteria for completeness:
  - All mandatory fields of the entry form are filled out
  - Information is easily understandable
  - Spelling is correct
  - Provided URLs (Uniform Resource Locator) are valid and refer to the right web page
- criteria for correctness:
  - Data/ Resource is attributed to the correct Source
  - The content is factually correct and up to date

Criteria for External Validation

External validation will focus on a community validation approach where registered Stakeholders should be able to like/rate and comment on published resources. This way stakeholders can continue to improve the quality of their resources based on stakeholders' feedback. The goal is to have at least experts review each submission.

- Criteria for Accuracy and comprehensiveness
  - scope, goals, and content are easily understood
  - content is relevant in the context of marine litter and plastic pollution
  - content is factually correct
    - ~ content is up to date and covers recent insights
  - information about the content is comprehensive
- Criteria for usability
  - the resource is easy to use.

Find out more: https://digital.gpmarinelitter.org/
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