



# Motivation behind Singapore's MSDI Effort - Data Discovery & Driver for Interoperability

# CONCERNS WITH SOCIO-ECONOMIC ENVIRONMENTAL IMPACTS OF THE DECLINING STATE OF OUR OCEANS SYSTEM

## An algae bloom devastated sea mammals last year: LA wants to improve its rescue efforts

by Caroline Petrow-Cohen, Los Angeles Times



[Los Angeles Times, 2024](#)

## Southern Ocean acidification could double by the end of the century

by Mirjana Binggeli | Jan 17, 2024 | Antarctica, Archive, Climate change, Science

[Polar Journal, 2024](#)

**MSDI** can help us better understand and protect our Waters!

## There are 21,000 pieces of plastic in the ocean for each person on Earth

And plastic pollution has been doubling every six years



By [Michael Birnbaum](#)

March 8, 2023 at 2:05 p.m. EST

[The Washington Post, 2023](#)

Over half of plastic leakage into the oceans could come from just five Asian countries, but its drivers and impacts are inherently transboundary and a lack of coordinated, determined global action will mean the wave of pollution will continue unabated.

Tom Gammage, ocean campaigner, Environmental Investigations Agency

[Eco-Business, 2022](#)

World Africa Americas Asia Australia China Europe India Middle East United Kingdom

## Ocean heat hit another record high in 2022, fueling extreme weather



By [Ivana Kottasová, CNN](#)

Published 9:31 AM EST, Wed January 11, 2023

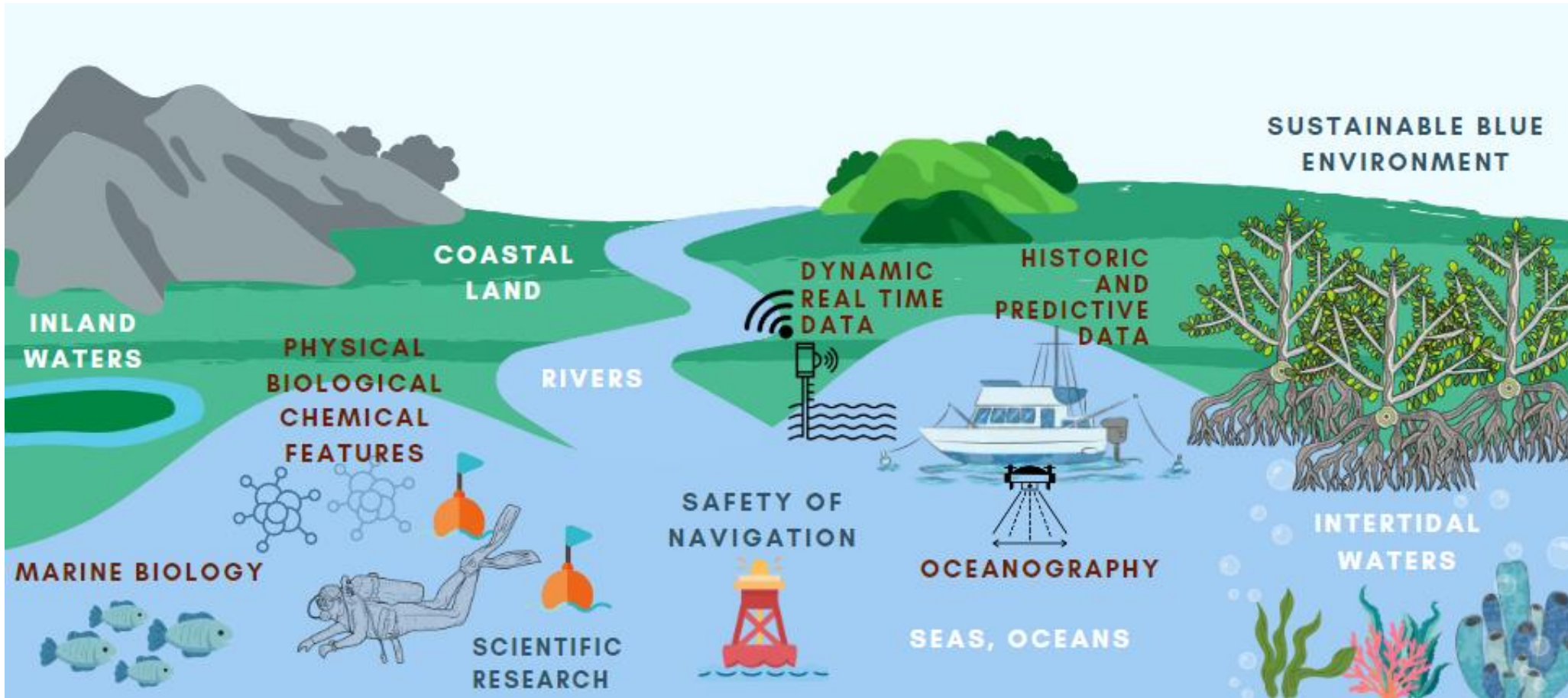
[CNN, 2023](#)

## China drought causes Yangtze to dry up, sparking shortage of hydropower

Nationwide alert issued with south-west especially badly hit, as major companies forced to suspend work

[The Guardian, 2022](#)

# GOING BEYOND HYDROGRAPHIC DATASETS TO BETTER UNDERSTAND OUR MARINE ENVIRONMENT



# REFERENCING UNECSO OCEAN DECADE DATA AND INFORMATION STRATEGY

## 3.2 Objective #2 - Improve data discovery and usability across the ocean digital ecosystem

Enormous amounts of ocean data, information and other digital resources are already available, and even larger amounts are being produced with the expansion of observing, analytical, and modelling capacities. These data are a vital resource to meeting the Decade's Challenges. However, it often remains difficult to discover and use relevant data and information to develop solutions and inform decision-making.

As expressed in the FAIR Principles (see Annex 4 for description), once data and information are available and accessible online (ref. Objective #1), steps must be taken to make it easily **discoverable** (findable), openly **available** (accessible) and readily **usable** (interoperable, reusable, also machine-to-machine). To make this happen, participants in the digital ecosystem should have clearly defined internal data management plans, policies, procedures, and architectures for the generation, management, licensing, and sharing of data.

With the Ocean Decade, we have a unique opportunity to change the current, inefficient way of discovering, using and understanding ocean data and information. Given the proliferation of data sources, we need to transform how we think about using, managing and sharing data. In tackling the complex issues of today, datasets have limited value when analysed in isolation. Their value and potential impact multiply when used in the context of the broader data ecosystem.

### Key considerations for objective #2

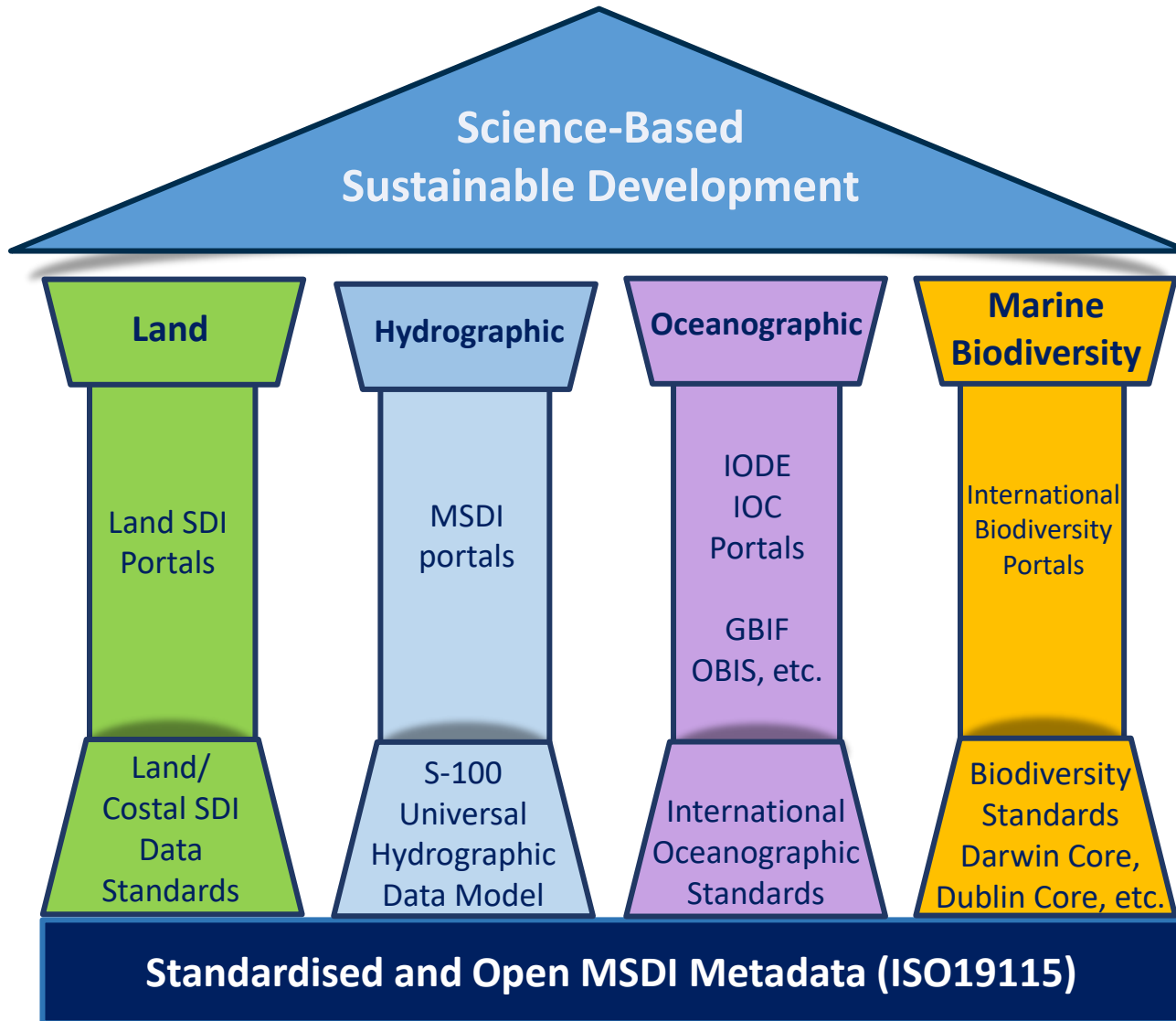
Fundamentally, making data and information readily discoverable and usable across the ocean digital ecosystem requires continuous alignment and integration of both social and technological conventions across all partners. Any data system in the ecosystem should be able to pass on requests to other, independent data systems and receive actionable responses back, such that they can combine data outputs (with clear credit and provenance metadata) and give a user a meaningful response. The user should not have to go to many different portals; rather, portals should be able to discover and talk to each other to give a response wherever they are. Key strategic considerations include:

### Note on data and metadata:

Metadata refers to data about data. It does not include the data it refers to but may describe the content of the data and provide information about its usage, permissions and provenance. For example, metadata from a wave buoy could include a time and date stamp, purpose of the data collection, and location. Well-structured metadata is important for improving data findability and availability; metadata can do this while also protecting data privacy and sovereignty because it can be shared without sharing the underlying data. Data should always be provided with metadata, but some contributors may choose to provide only metadata to the ocean digital ecosystem. For this reason, we refer to 'data' to encompass both scenarios.

1. **Unlocking existing data:** implement actions to search and uncover existing, hidden or locked datasets in both public and private sector organisations, including citizen science data, making them openly accessible, preferably through existing local/national/regional long-term curated data repositories.
2. **Proactive data management planning:** ensure clearly defined internal plans, resources, procedures, and/or architectures for generating, managing, licensing, and sharing data and metadata from the outset.
3. **Data sharing and interoperability:** share data and metadata externally using a defined set of conventions and/or standards used in the digital ecosystem:
  - a. For data that are protected, confidential, or otherwise sensitive, metadata should be shared - as far as possible - which describes data holdings without compromising privacy, security, cultural heritage, and so on (see also Annex 4 on the CARE Principles).
  - b. Licences and terms of use should be explicitly defined for all data shared in the digital ecosystem, including reference to national laws and requirements (e.g. the Creative Commons licences, the European Union's General Data Protection Regulation).
4. **Conventions and policies:** explore opportunities to develop conventions and policies to encourage more comprehensive data sharing.
5. **Machine to machine interoperability:** make data available through open-source, interoperable and community agreed machine-to-machine (M2M) protocols, such as APIs; tools and training should be developed to support this.

# STANDARDISATION OF METADATA TO ACHIEVE INTEROPERABILITY



Referencing C-17:

**F**



**Findable:** Describe (meta)data fully and unambiguously to make them **discoverable** for both humans and machines

**A**



**Accessible:** How can (meta)data be **accessed**, including **authentication** and **authorisation**

**I**



**Interoperable:** Move from non-cooperating resources to **readily integrate** between systems

**R**



**Reusable:** Well-described (meta)data to be **replicated and combined** in **different settings**

**T**



**Traceability:** **Lineage** of data to assess the **accuracy, reliability, quality, and suitability** of the data

**L**



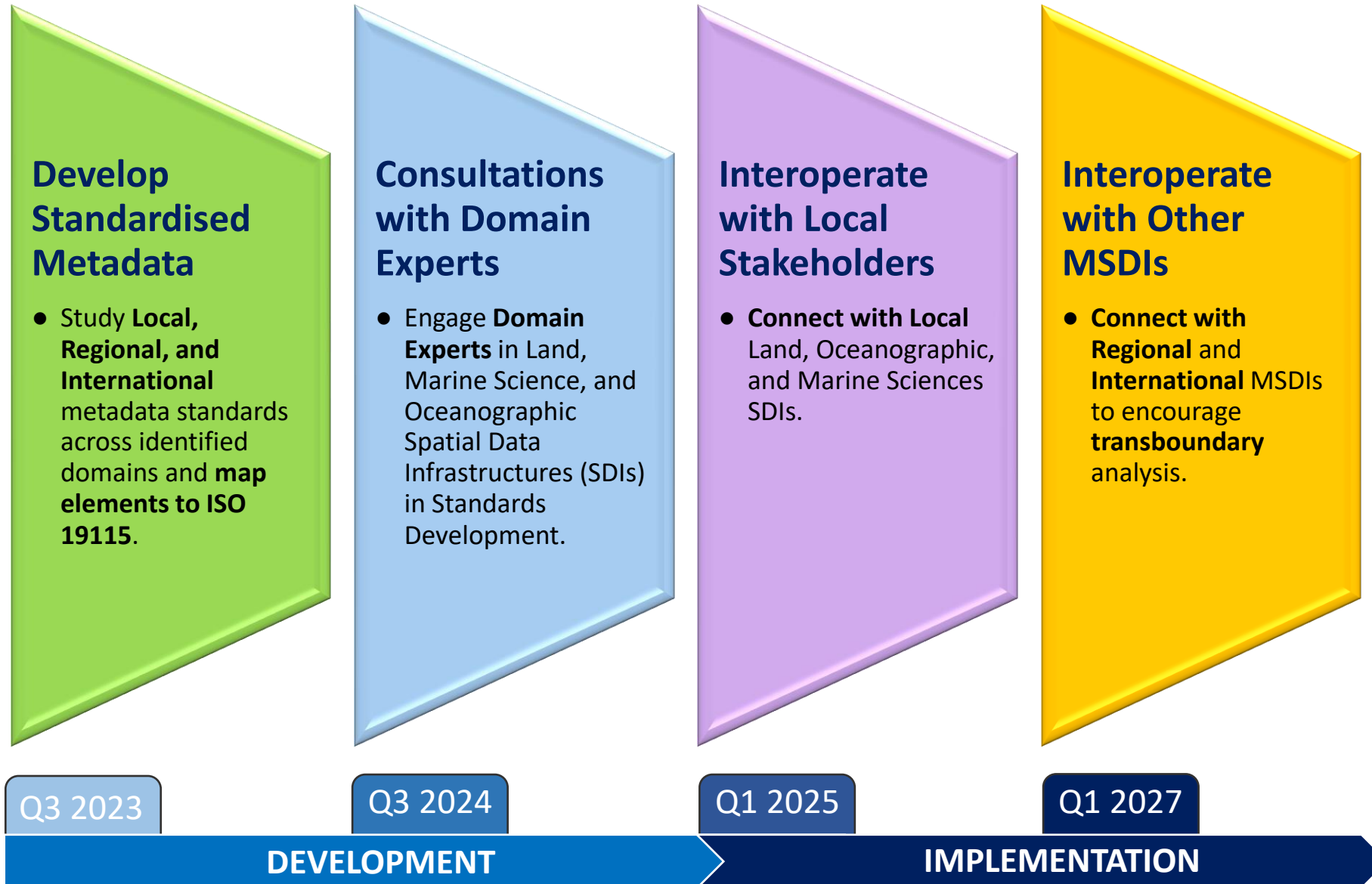
**Licensure:** How digital resources can be **accessed, re-used, and redistributed** by end users

**C**



**Connectedness:** Making digital assets inherently more **usable, integrated, connected, and linked**

# ROADMAP OF STANDARDISATION OF MSDI METADATA



## SUMMARY:

- **MSDI Metadata can support marine science-based sustainable development initiatives** beyond maritime navigation.
- **MPA is leading development of an Open and Standardised MSDI Metadata** relevant for use at the national level, in accordance with IHO standards.
- Adopt **UN-GGIM IGIF-H** and **FAIR-TLC Data Principles** by using **Open and Standardised Metadata** to enable **interoperability** and **sharing of datasets**.

### For IHOMSDIWG Discussion

- To **identify other domains**:  
(Identified Domains: Hydrography, Oceanography, Marine Sciences, Inland Waters, Land).
- To **suggest** Relevant Local/Regional/International **Metadata Reference Standards**.
- To **feedback** on the potential of a holistic MSDI Metadata at local, regional or international level



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