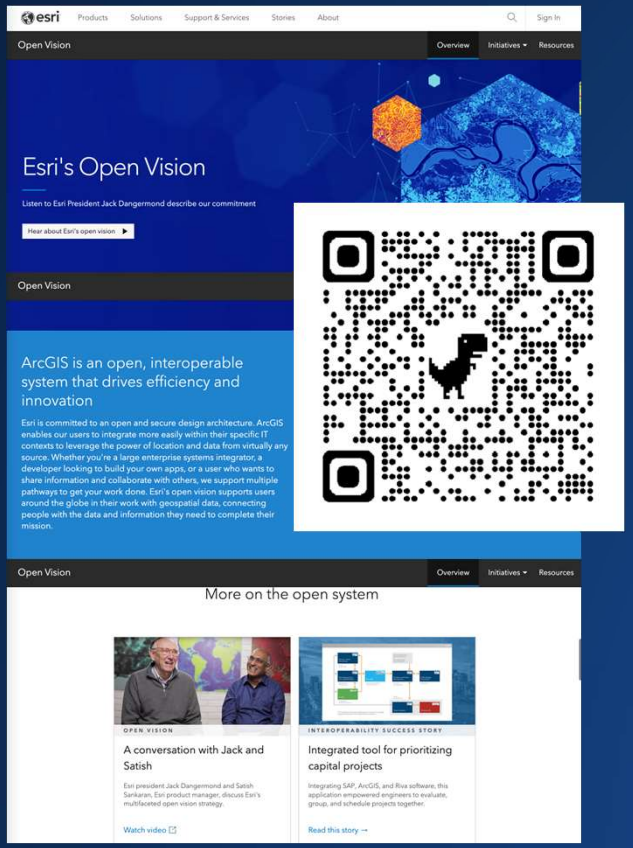
Marine Data Sharing and Collaboration:

The Keys for a Successful Hydrospatial Strategy Implementation

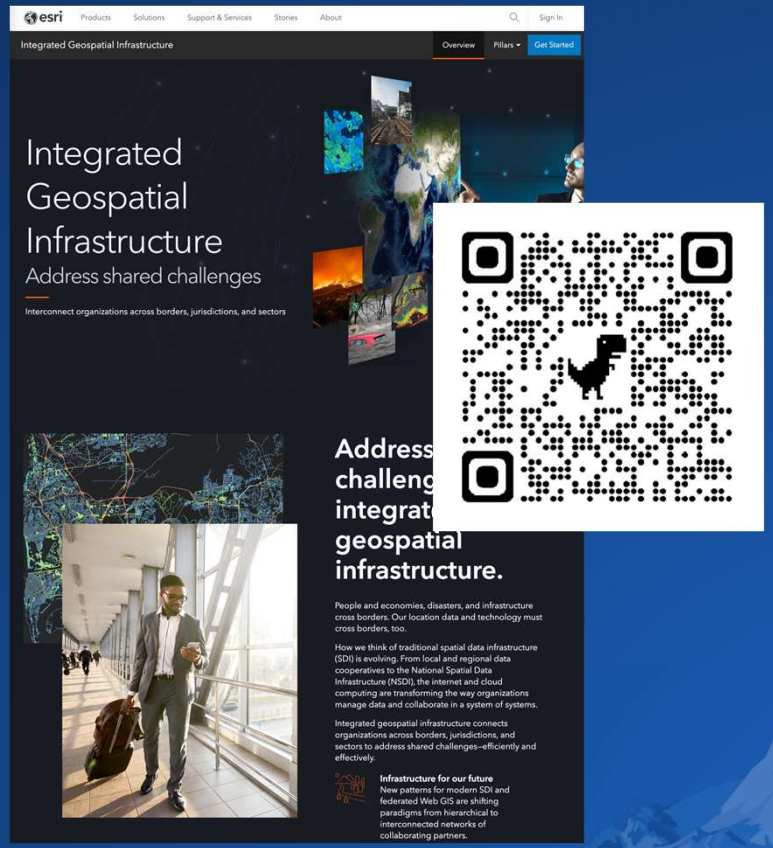
Session 8
"Coordinated and coherent integrated marine geospatial information management"
Singapore, May 12th, 2022

International Seminar on United Nations Global Geospatial Information Management

Open Vision & Geospatial Infrastructure Resources



https://www.esri.com/en-us/arcgis/open-vision



https://www.esri.com/en-us/arcgis/integrated-geospatial-infrastructure

Collaboration is key

What is Geospatial Infrastructure?

Geospatial infrastructure is a technology enabler of digital ecosystems

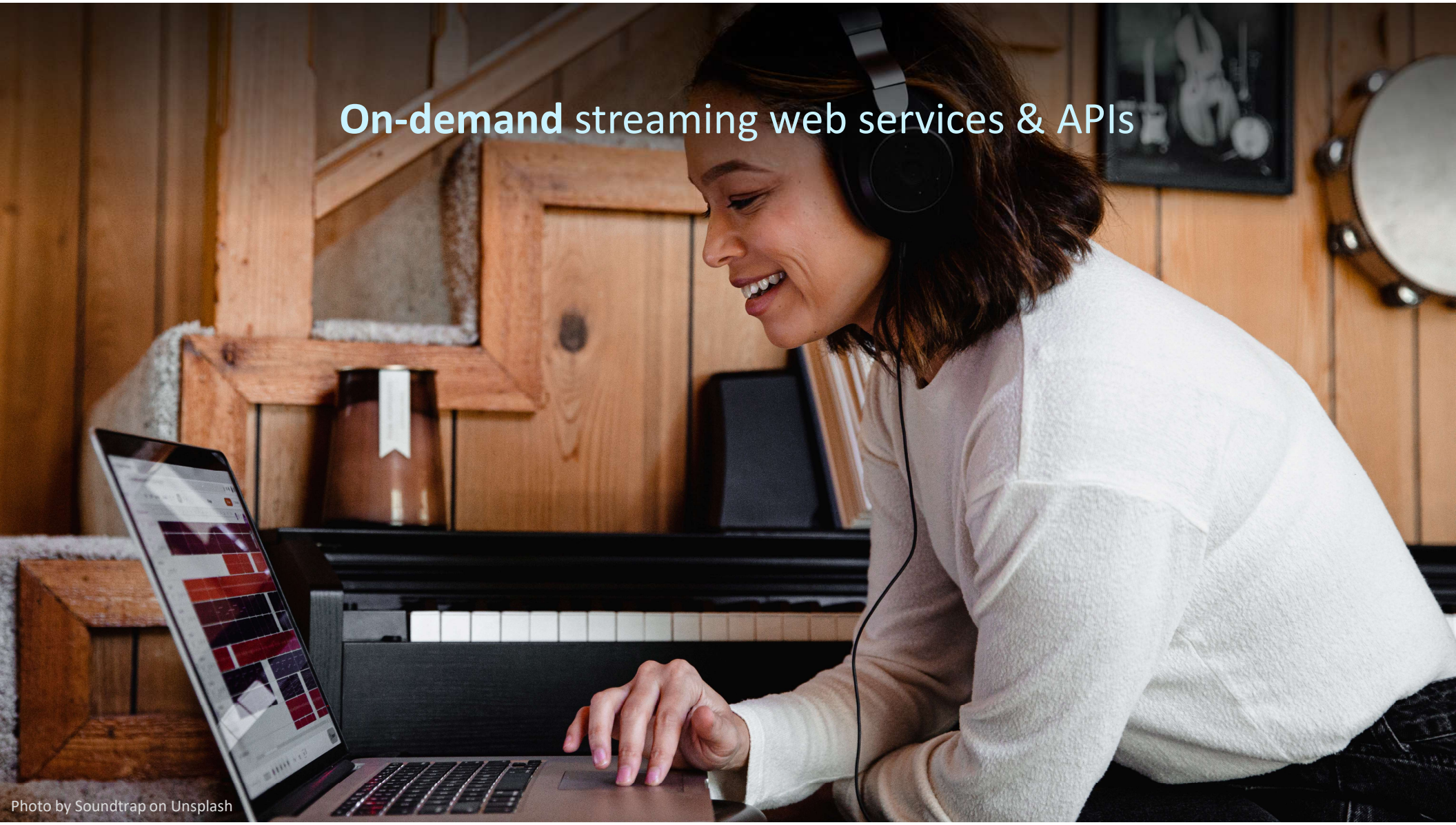
It provides:

- Security, privacy and accessibility
- Identity management
- Data sharing & Collaboration

Through:

- Open standards
- APIs
- Licenses
- Marketplaces

Photo by Untitled Photo on Unsplash


On-demand streaming web services & APIs
Photo by Soundtrap on Unsplash

Evolving SDI: **Integrated Geospatial Infrastructure**

Expanding beyond data to knowledge and understanding

Metadata catalogs

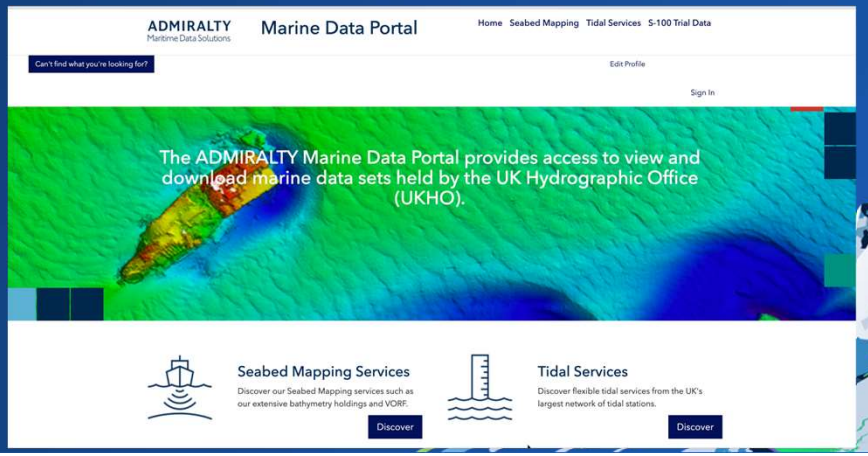
Federated portals

Digital ecosystems

Search & Discovery ⟶ Integration & Use

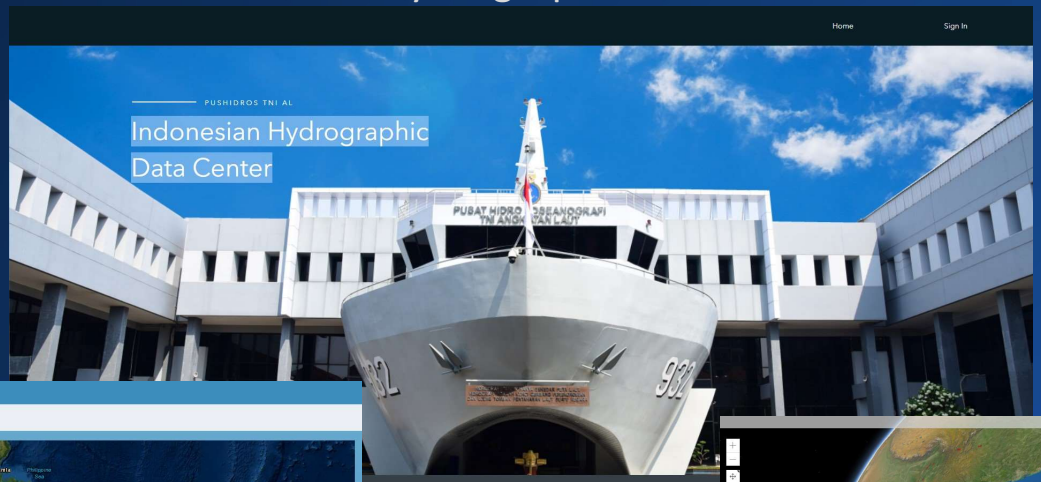
Modern SDI: Integrated Geospatial Infrastructure

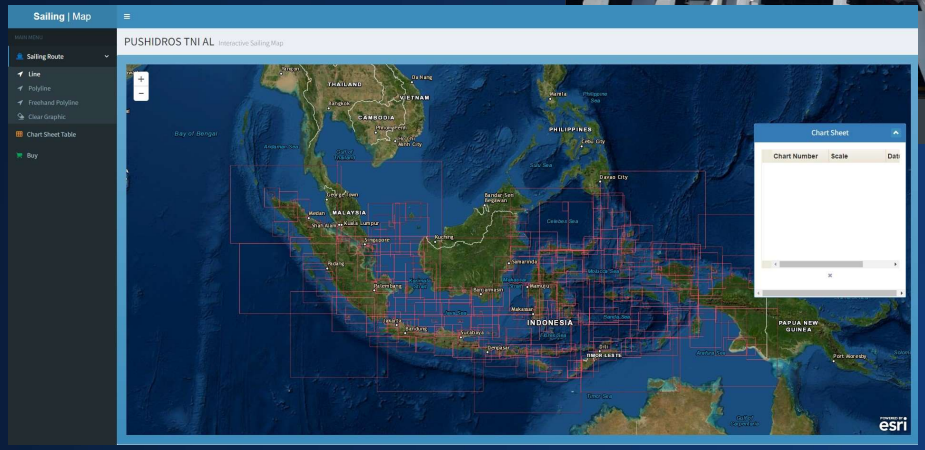
Connects organizations across borders, sectors, and jurisdictions

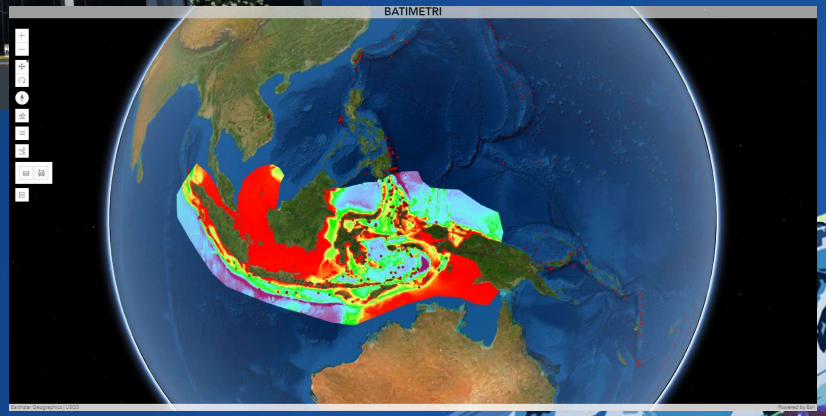


Modern SDI: Integrated Geospatial Infrastructure

Indonesian Hydrographic Data Center





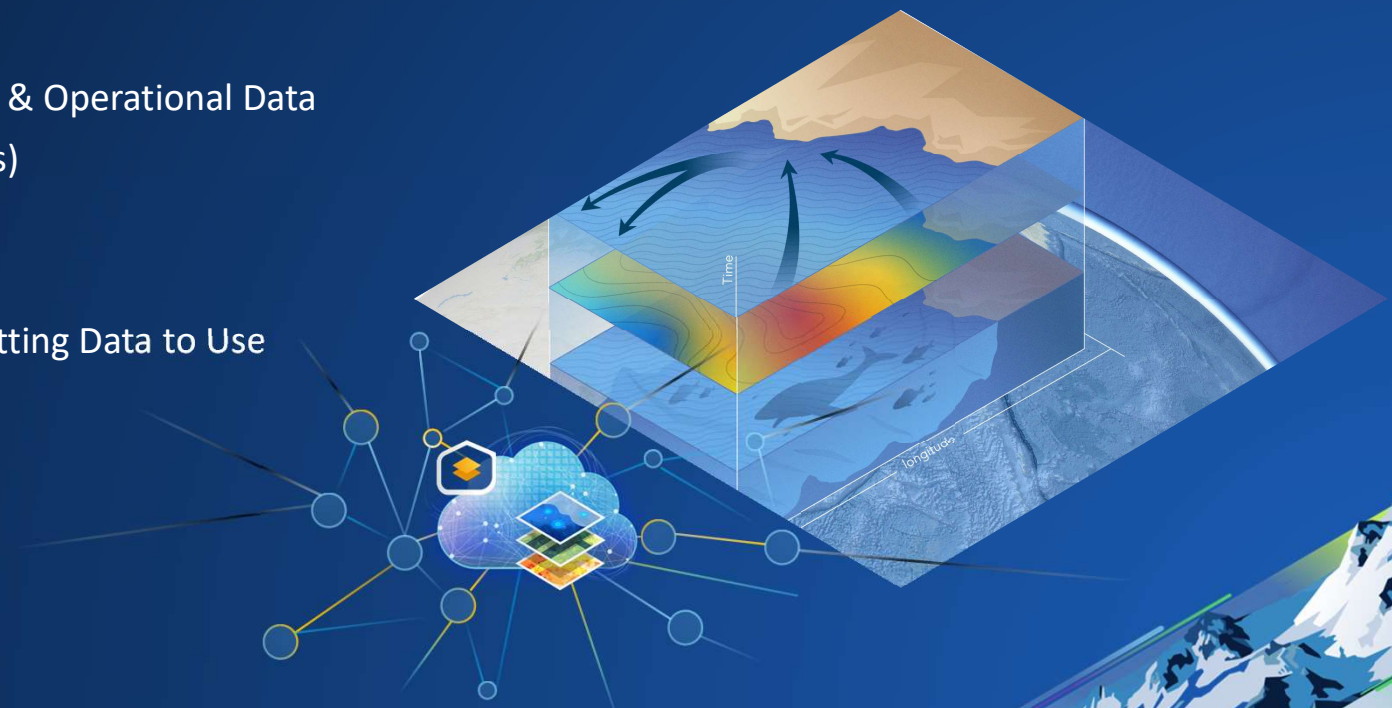


https://tinyurl.com/4fmyub2m

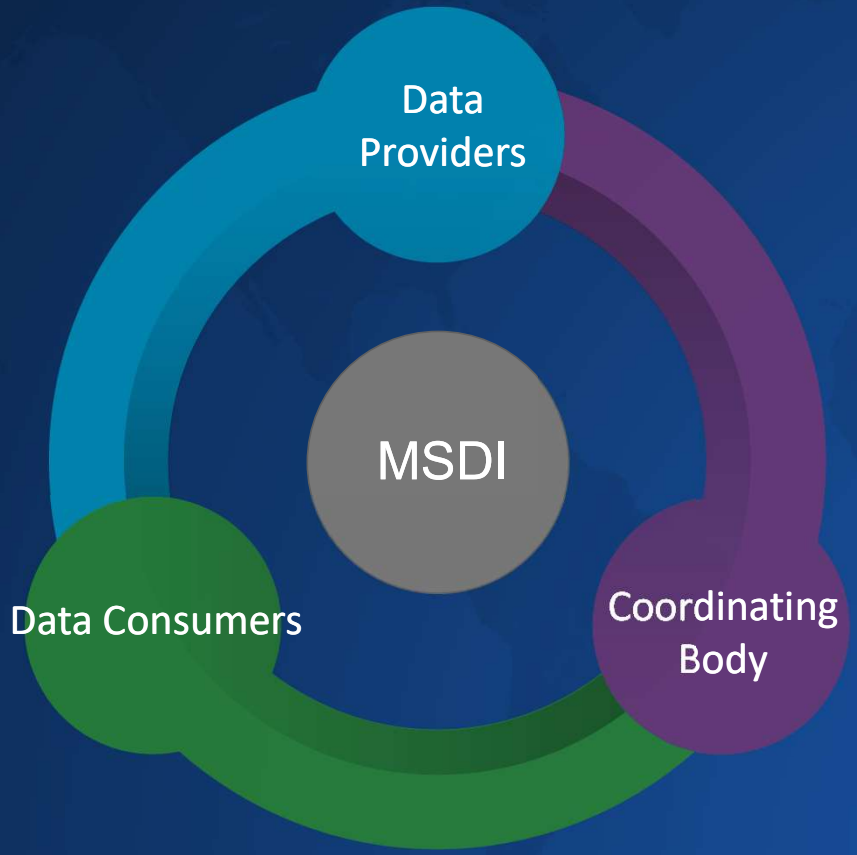
Modern MSDI: Integrated Geospatial Infrastructure

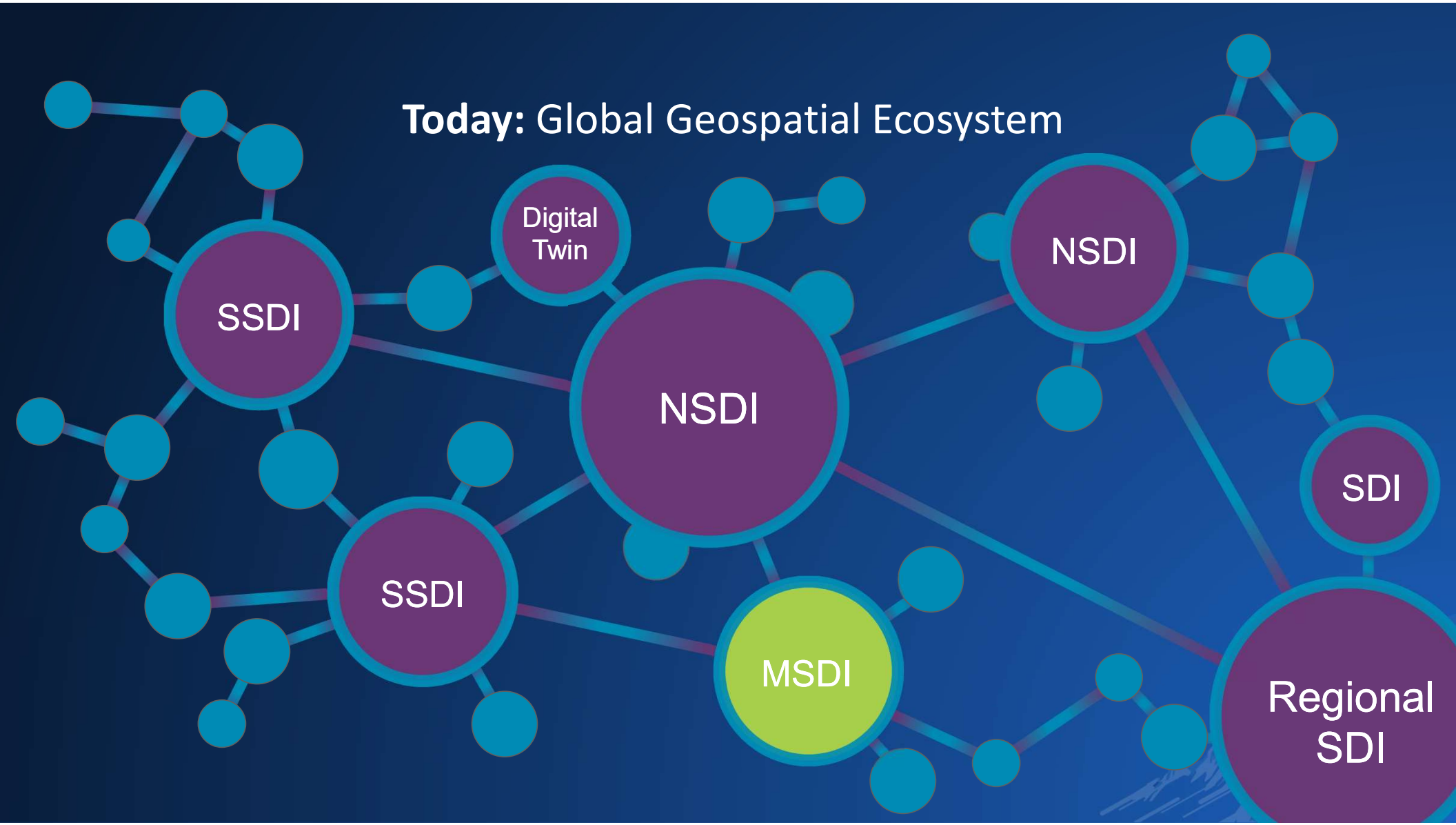
Whether we call it SDI, Open Data, Digital Twin, or otherwise…

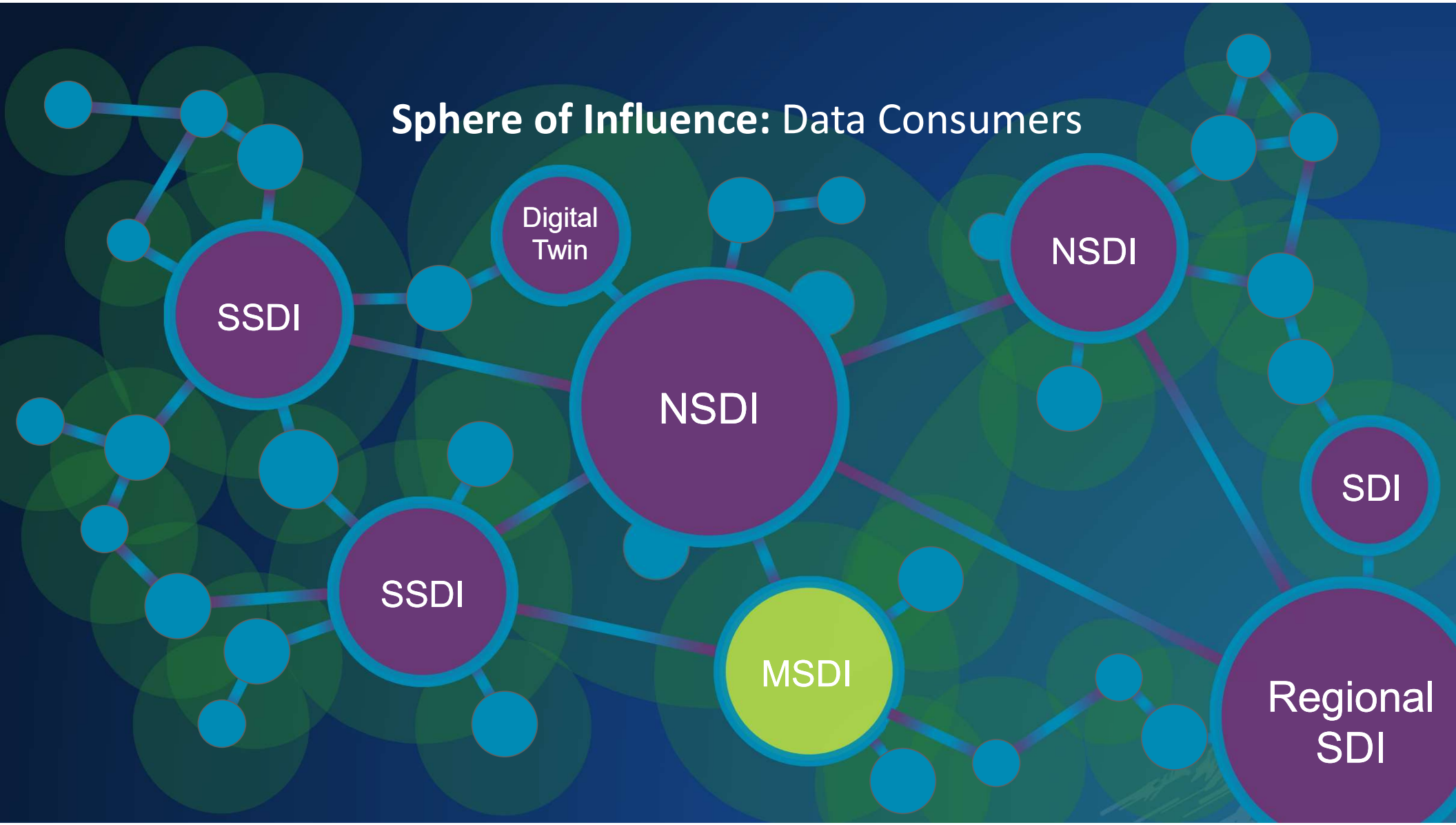
- Key characteristics:
  - Multi-organizational
  - Integrated Fundamental & Operational Data
  - Interoperable (standards)
  - Collaborative
  - Digital Ecosystem
  - Focus on End Users / Putting Data to Use

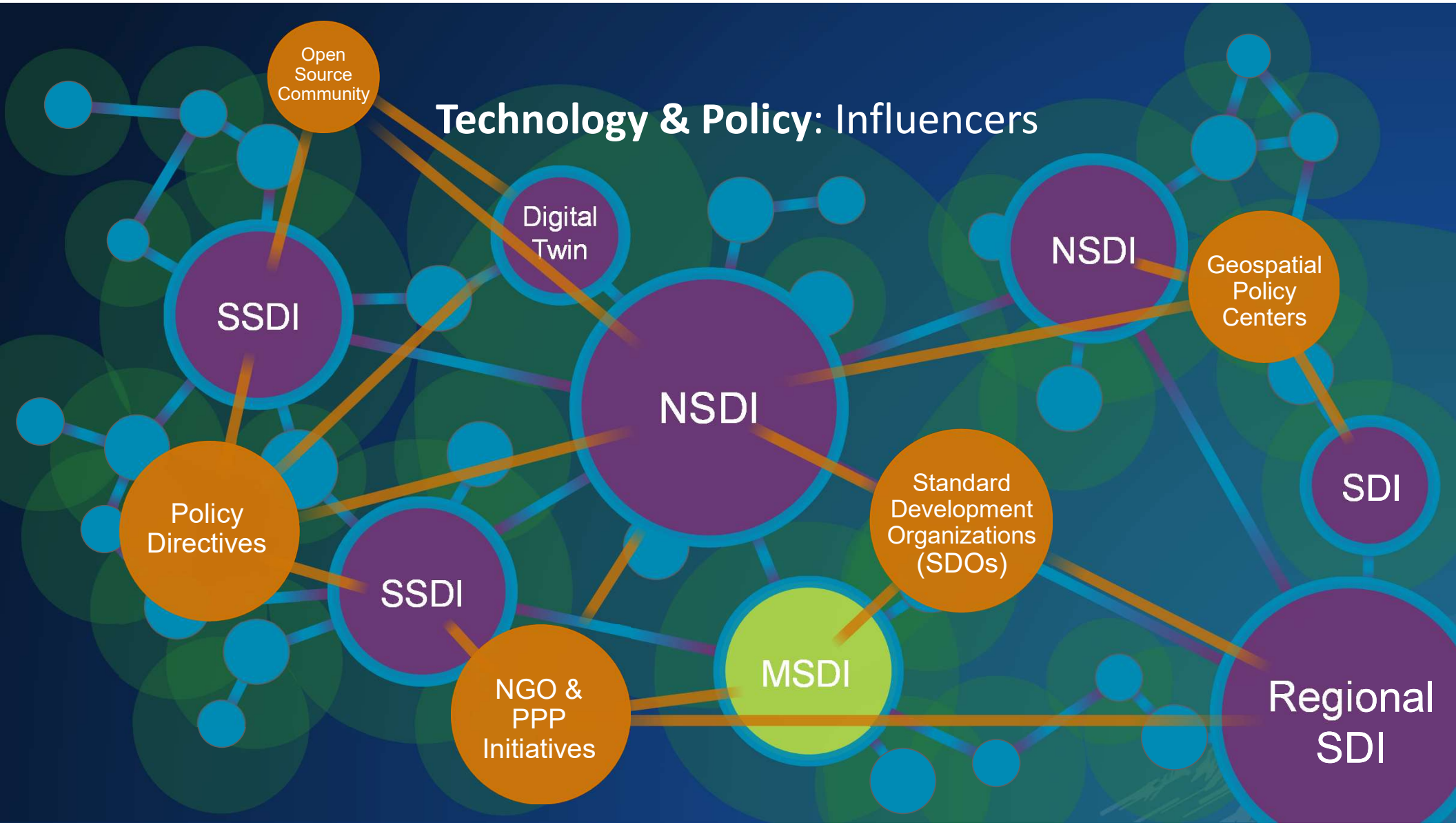


Digital Ecosystem: SDI Community of Practice




Today: Global Geospatial Ecosystem
Digital Twin
SSDI
NSDI
NSDI
SDI
SSDI
MSDI
Regional SDI


Sphere of Influence: Data Consumers
Digital Twin
SSDI
NSDI
NSDI
SDI
SSDI
MSDI
Regional SDI


Technology & Policy: Influencers
Open Source Community
Digital Twin
SSDI
NSDI
Geospatial Policy Centers
NSDI
Policy Directives
Standard Development Organizations (SDOs)
SDI
SSDI
NGO & PPP Initiatives
MSDI
Regional SDI

An open platform is essential

evolving, expanding, energizing the community

Integrated Geospatial Infrastructure & SDI

Green Deal

Horizon 2020

Open Data Directive

High value datasets

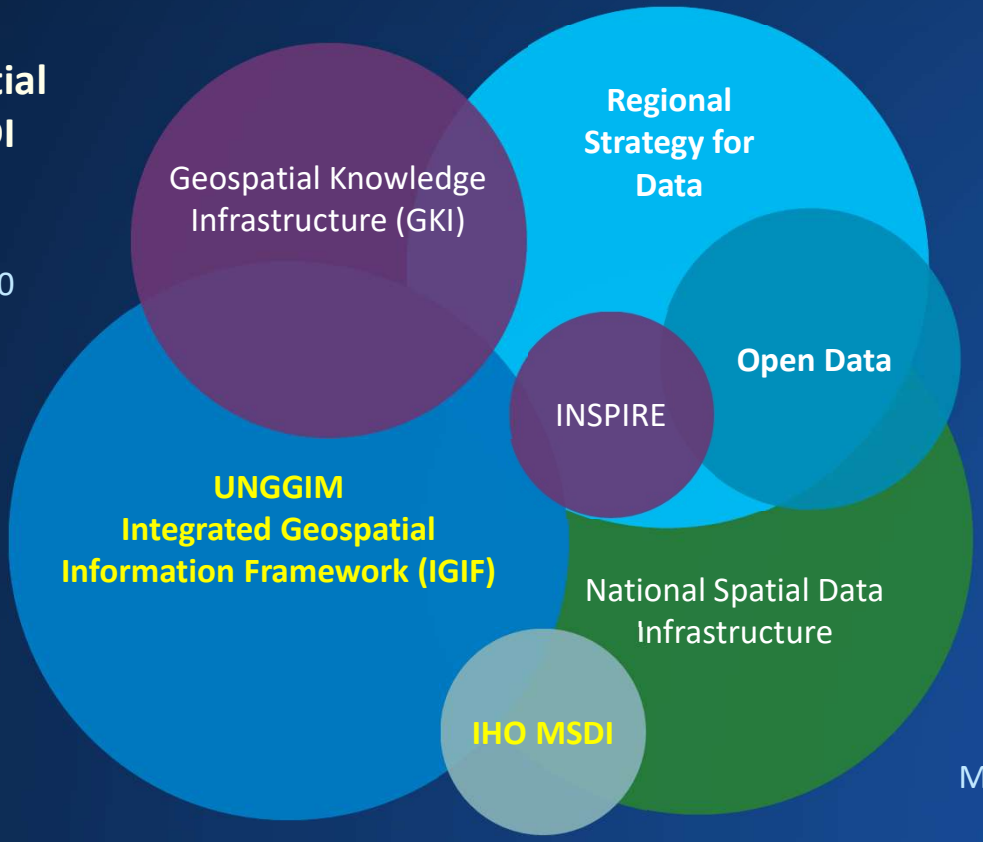
GEO / GEOSS

GAIA-X

Data Spaces

Digital Twins

SDGs



Standards Support

OGC IHO ISO

OGC APIs

Web Services

INSPIRE DCAT-AP

Domain/Industry Standards

Federated services

Federated catalogs

FAIR data principles

Open Data

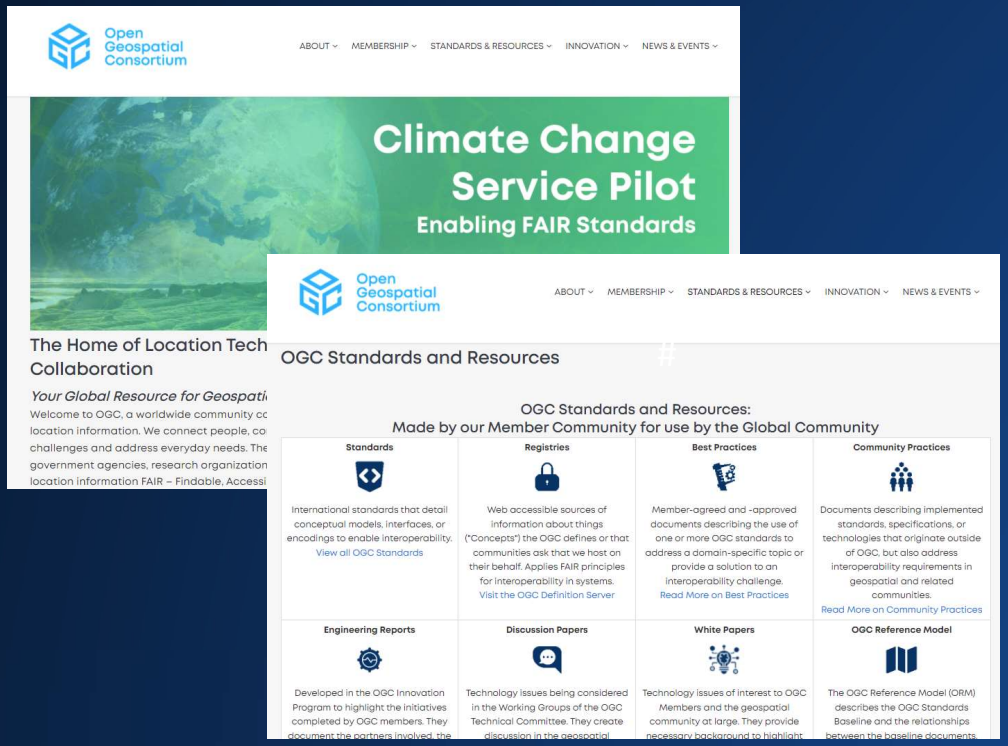
Open Science

Metadata & Search

Standards & Interoperability

Working in heterogeneous environments

Standards Development Organizations



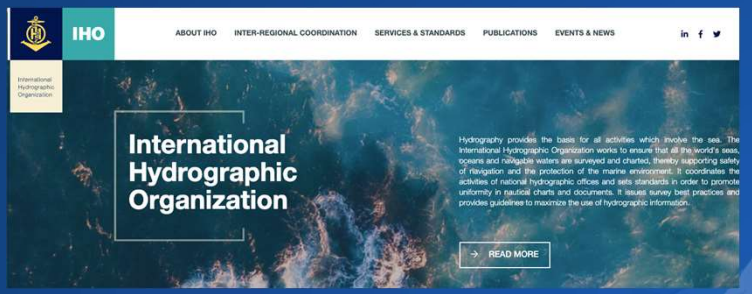
https://www.ogc.org/standards

Standards Listing : https://www.ogc.org/docs/is

https://committee.iso.org/home/tc211

88 : published ISO standards

24 : ISO standards under development



https://iho.int/

The New S-100 series

The IHO S-100 “Universal Hydrographic Data Model

How can these new series of standards help?

S-100 Derived Product Specifications | Types and domains

Electronic Navigational Charts
Nautical Publications
Surface Currents
Bathymetry
Tides

AIS
VTS
Aids to Navigation
Port Calls

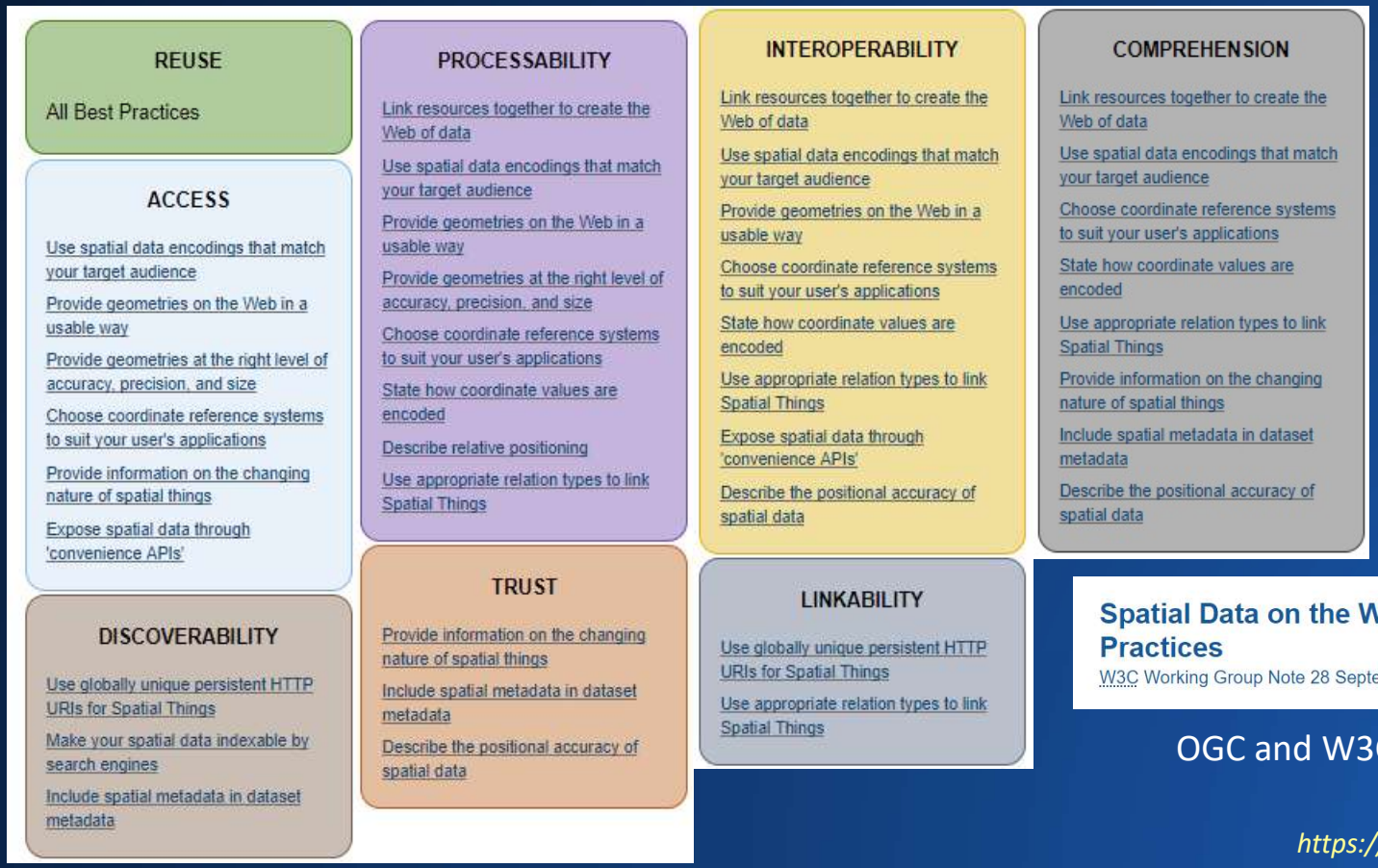
E-Navigation
CMDS
MSP

Ice Coverage
Weather layer

Route planning
ECDIS

Domain	Responsible
IHO Hydro	IHO
WMO ICE	WMO ETSI
WMO Weather	WMO ETMSS
Inland ENC	IEHG
Port ENC	
IALA AIS	IALA
IALA AtoNs	IALA
IALA VTS	IALA
AML	NATO GMWG
IEC	IEC

Best Practices: Spatial data on the Web



Spatial Data on the Web Best Practices

W3C Working Group Note 28 September 2017

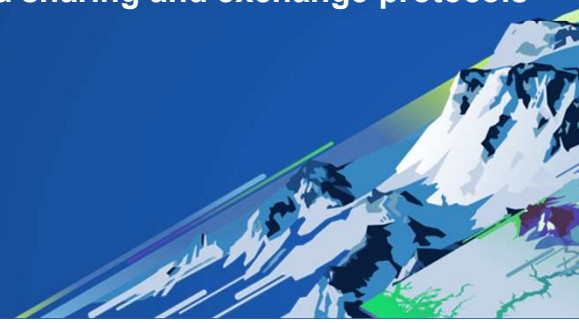
OGC and W3C joint initiative

https://www.w3.org/TR/sdw-bp/#toc

Where to start?

- Identify key stakeholders and their requirements
- Identify National and/or regional initiatives/legislation that support MSDI
- Identify appropriate IHO Committees and WGs to be involved with and participation at the RHC
- Consider participation at the IHO MSDI WG

- Identify data providers
  - Who they are and what is their data
  - How does that data complement that of the HO
  - Who are the key people in each organization to engage with
  - What do they expect from the MSDI
  - How will they interact with other organizations in the MSDI
  - What are their data sharing and exchange protocols



What datasets the National HO and related agencies could provide?

- ***Bathymetry*** (e.g. Digital Elevation Model, Triangulated Irregular Network, Grid, points);
- ***Coastline***;
- ***Tidal data*** (heights and streams);
- ***Oceanographic data*** (e.g. sound velocity, salinity, temperature, currents);
- ***Aids to Navigation*** (e.g. lights, landmarks, buoys);
- ***Maritime information and regulations*** (e.g. administrative limits, traffic separation schemes);
- ***Obstructions and wrecks***;
- ***Geographical names*** (e.g. sea names, undersea feature names, charted coastal names);
- ***Seafloor type*** (e.g. sand, rocks, mud);
- ***Constructions/infrastructure at sea*** (e.g. wind farms, oil platforms, submarine cables, pipelines);
- ***Shoreline constructions/infrastructures*** (e.g. tide gauges, jetties) and
- ***Practice and Exercise and /or Restricted areas***.

Modern SDI Patterns

Produce, **Publish**, Collaborate, Share, Use

Geospatial Infrastructure is emerging rapidly

Connecting organizations across borders, jurisdictions, and sectors

Authoritative Content

Distributed / Federated

Open & Secure

Easily Discoverable

Directly Usable

Portal

Portal

Hub

Hub

Curated catalogs

System-of-Systems

Standards

Metadata

APIs

Supporting FAIR principles

Findable Accessible Interoperable & Reusable

Resilience

Green Infrastructure

Disasters

Biodiversity

Economy

Mobility

Climate

Digital Twins

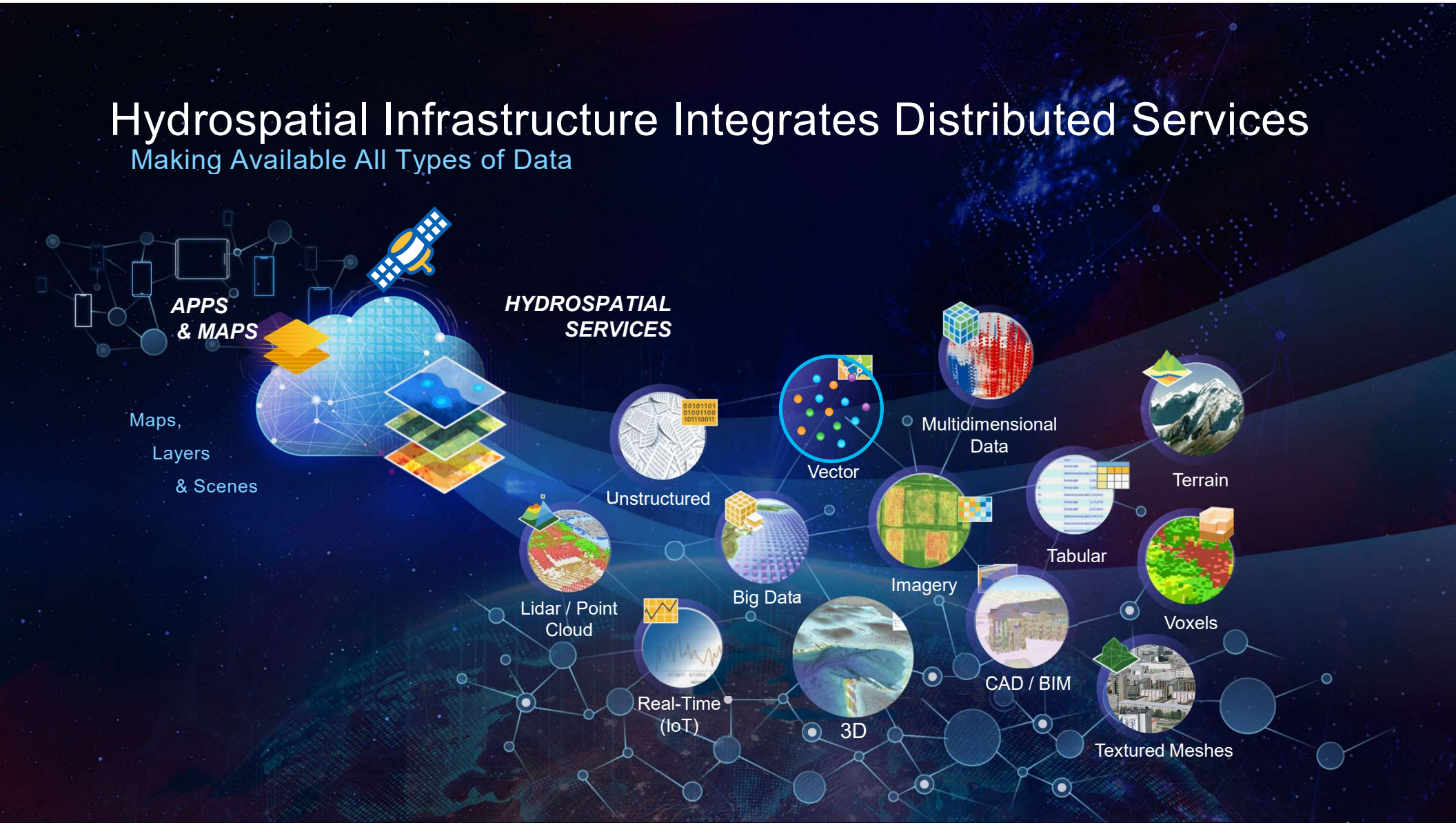
Regional Planning

Dynamically integrating content…

…enabling decision-ready information products

Hydrospatial Infrastructure Integrates Distributed Services

Making Available All Types of Data

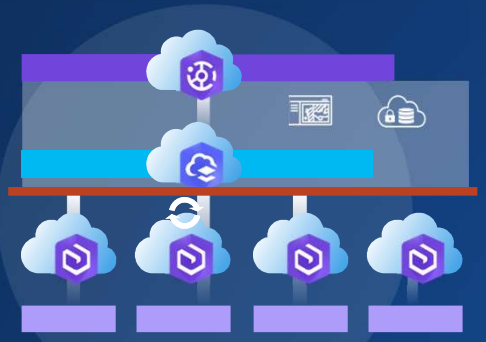


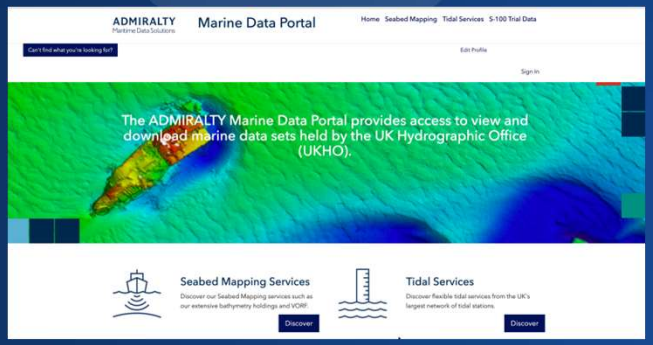
Produce, **Publish**, Collaborate, Share & Use

Hybrid

https://www.caribbeangeoportal.com/

Registered/Referenced





https://data.admiralty.co.uk/portal/apps/sites/#/marine-data-portal

Hosted

https://geoadriatic.hhi.hr/en/

The Big Picture

So what? What does this enable?

Ease of Sharing and Integration: US Marine Cadastre

https://marinecadastre.gov/

Regional and Multi-state Collaboration

Let’s Recap

- The **main take-aways** we want you to leave with:
  - Geospatial (Hydrospatial) Infrastructure powering modern MSDI
    - The future is bright: Technology enables the creation of a system-of-systems supporting modern MSDI
  - Supported by an open platform
    - Interoperability through open standards and specifications
  - Enabling new things!
    - These patterns support organizations and their local-to-global key initiatives

Thank you for your kind attention!

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- **Adam Martin** – Integration & Knowledge
- **Bruce Harold** – ArcGIS Data Interoperability

Connect with us and additional resources
https://www.esri.com/en-us/arcgis/open-vision/resources