Maritime Collaboration in the 4th Age

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Esri - National Government Business Development (APAC)

The Fourth Age

• Change is accelerating
  • Faster changes in the next 50 years than in the past few hundred
  • a new “Seaconomics” era
  • GDP and cargo volumes are decoupled
• Change creates new opportunities – new technologies
• A Digital Vision ➔ powered by Data (in time and space)
Key technological factors

- Big Data
  - Volume, Velocity and Variety
- Internet of Things (IoT)
- Artificial Intelligence (AI)

We can see their effects: Autonomous Ships

Fast developments around the world

Bigger, more efficient, more complex: new machine readable products
Smart Ports

- Maasvlakte2 terminal in the Port of Rotterdam
- Unmanned electric AGVs
- Remote operated unmanned cranes

E-Navigation and MSPs
Maritime Services Portfolios

- As part of the improved provision of services to vessels through e-navigation;
- The means of providing electronic information in a harmonized way

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<thead>
<tr>
<th>No.</th>
<th>Identified Service</th>
<th>Identified Responsible Service Provider</th>
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<tbody>
<tr>
<td>MSP1</td>
<td>VTS Information Service (IS)</td>
<td>VTS Authority</td>
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<tr>
<td>MSP2</td>
<td>Navigational Assistance Service</td>
<td>National competent VTS Authority/Coastal/Port Authority</td>
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<tr>
<td>MSP3</td>
<td>Traffic Organization Service (TOS)</td>
<td>National competent VTS Authority/Coastal/Port Authority</td>
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<tr>
<td>MSP4</td>
<td>Local Port Service (LPS)</td>
<td>Local Port/Harbor Operator</td>
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<td>MSP5</td>
<td>Maritime Safety Information Service (MSI)</td>
<td>National competent authority</td>
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<tr>
<td>MSP6</td>
<td>Pilotage Service</td>
<td>Pilot Authority/Pilot Organization</td>
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<tr>
<td>MSP7</td>
<td>Tugs Service</td>
<td>Tug Authority</td>
</tr>
<tr>
<td>MSP8</td>
<td>Vessel Shore Reporting</td>
<td>National competent authority, Shipowner/Operator/Master</td>
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<tr>
<td>MSP9</td>
<td>Tele-medical Assistance Service (TMAS)</td>
<td>National Health Organization/dedicated Health Org.</td>
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<tr>
<td>MSP10</td>
<td>Maritime Assistance Service (MAS)</td>
<td>Coastal/Port Authority/Organization</td>
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<td>MSP11</td>
<td>Nautical Chart Service</td>
<td>National Hydrographic Authority</td>
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<td>MSP12</td>
<td>Nautical Publications Service</td>
<td>National Hydrographic Authority</td>
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<tr>
<td>MSP13</td>
<td>Ice Navigation Service</td>
<td>National competent authority</td>
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<td>MSP14</td>
<td>Meteorological Information Service</td>
<td>National Meteorological Authority/WMO/Public Institutions</td>
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<td>MSP15</td>
<td>Real-time Hydrographic and Environmental Service</td>
<td>National Hydrographic and Meteorological Authorities</td>
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<td>MSP16</td>
<td>Search and Rescue</td>
<td>SAR Authorities</td>
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Foundation: Marine Spatial Data Infrastructures (MSDIs)

- SDI is “the relevant base collection of technologies, policies and institutional arrangements that facilitate the availability of and access to spatial data.”
- Processes that integrate technologies, policies, standards, organizations and people;
- Structure of working practices and relationships across data producers and users for access, sharing and analyzing geospatial information across government and commerce;
- **Hardware, software and system** components necessary to support the processes
Enterprise GIS Transforms Organizations
Focusing on end-use, decision support and insights

An Enterprise GIS empowers a Maritime Community
Connecting People, Processes and Data

Enterprise GIS Supports Multiple Types of Systems
- Foundation Production
- Imagery Libraries
- Structured Observations

System of Engagement
- Visualization
- Event-based Alerting
- Pattern Detection
- Predictive Analysis

System of Record
- Analyst Contributed Content
Web GIS Is Driving Digital Transformation
Interconnected Information, Processes, and Workflows . . .
. . . All Happening at the Same Time

Sequential Workflows

Creating Smart, Dynamic Organizations
Changing How Organizations as a Whole . . .
. . . Do Their Work

Interconnected Information, Processes, and Workflows . . .
. . . All Happening at the Same Time

Creating Smart, Dynamic Organizations

Using the Power of Location to Integrate Everything

Using the Power of Location to Integrate Everything
How Do We Take the Next Step?
Embrace Digital Transformation . . .
. . . and Leverage The Science of Where

Envision a Better Future

Foundation: Marine Spatial Data Infrastructures (MSDIs)
NMSDI Conceptual Model
A Platform for supporting the Maritime Community

ArcGIS at the foundation of MSDI

At all levels of the organization
ENC Viewer

Real-time Situational Awareness

Maritime Chart Service

Maritime Denial-Awareness Dashboard

Protected Areas

- Bodega Bay National Wildlife Refuge
- Point Reyes National Seashore
- Channel Islands National Marine Sanctuary
- Santa Cruz Island National Marine Reserve
- San Francisco Lightship Reef

In Protected Areas

- Vessel Type: Fishing
- Vessel Name: DUNCAN
- Latitude: 38.7032
- Longitude: -123.1314
- Speed: 8.5
- Course: 323
- Depth: 150

Weather Conditions:

- Wind: Light
- Visibility: Good
- Current: Moderate
- Sea: Calm

President Information:

- Time: 12/3/2021 16:37
- Condition: Fair
- Note: None
Dynamic Briefing Products

The data has revealed features on the sea floor that were not visible in the previous satellite imagery. This remote area of the Indian Ocean has a variety of sea floor features, including vast seamounts 1500 metres high and kilometres wide, deep canyons and underwater landslides of sediment that travel for kilometres along the sea floor.

Select each dot to view a short video. For a larger view, select the "Full screen" option in the player.

Maritime Observations

Maritime Contact Collector Geoform

Maritime observations allow analysts to capture and record events pertaining to maritime interests.

1. Enter Information
   - Event
   - Type
   - Date
   - Description
   - Location
   - Duration
   - Notes

2. Select Location
   - Use the location tools to select the appropriate area on the map.
Oceanographic Data Analysis

MSDI in Action
NOAA nowCOAST

NOAA PORTS: Physical Oceanographic Real-Time System

How you ever wondered how that new-pot of candyshow arrived at your door? Or how thosefavor boxes got to your grocery store? Or how you just ordered a new book? Are any of these things ever behind the scenes? The answer is yes, and this holds true for even the most seemingly insignificant aspects of our daily lives. The U.S. marine transportation system consists of more than 100,000 miles of navigable waterways and the barriers for the movement of goods, services, and people throughout the nation and abroad. Large cargo ships transport goods through different ports across the country, but how do these operations occur? It is all under the radar, through various federal agencies. These ships use extensive information provided by NOAA's Physical Oceanographic Real-Time System (PORTS®), to make it happen. Find out more about how PORTS works and other oceanographic data are used for maritime commerce, emergency response, and coastal resource protection below.

PORTS® is an information system that provides real-time information about the ocean and its conditions, such as current speeds, wind, and wave activity. This information is critical for the operation of ships and other maritime activities. The system is used by mariners, industries, and government agencies to make informed decisions and ensure safety. The PORTS® system is maintained by the National Oceanic and Atmospheric Administration (NOAA) and is accessible through the NOAA PORTS® website.

https://arcg.is/1v14Dn
NOAA PORTS: Physical Oceanographic Real-Time System

Physical Oceanographic Real-Time System (PORTS®)

The United States maritime transportation system consists of over 25,000 miles of waterways, ports, and other navigable waters. It is the backbone for moving goods, services, and people throughout the U.S. and abroad. More than 90% of all U.S. trade moves some form of maritime transport, and ships move $1.6 trillion worth of products in and out of U.S. ports every year. Ship operators across the globe rely on accurate information about ocean conditions, including water levels, currents, and winds, so they can plan efficient shipping routes, maximize cargo on-board, and safely navigate narrow shipping lanes.

PORTS® is an integrated system of sensors concentrated in seaports that provide commercial vessel operators with accurate and reliable real-time information about environmental conditions. PORTS® measures and disseminates observations, predictions, and raw environmental data for water levels, currents, bridge air gap, salinity, and meteorological parameters (e.g., winds, waves, atmospheric pressure, visibility, air, and water temperatures). This data improves navigation safety by reducing grounding and collisions by up to 85% for commercial and recreational vessels and preventing oil spills. It can also increase shipping efficiency by reducing transit delays and allowing shippers to optimize their cargo load. Linesmen need these data, tools, and services to make critical navigation decisions, especially on significantly larger vessels traversing through U.S. ports because of the Panama Canal expansion.

NOAA CO-OPS PORTS

An example of the sensors that make up the Physical Oceanographic Real-Time System (PORTS®).

Tides & Water Levels

Harmful Algal Bloom Forecasts

Coastal & Great Lakes Conditions Forecast

Meteorological & Other Oceanographic Data

Sea Level Info

Contact Us

Currents

News

Web Services
HELCOM Map and Data Services

Baltic Marine Environment Protection Commission – Helsinki Commission

- Governing body of the Helsinki Convention
- Denmark, Estonia, The EU, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden;
- Established four decades ago;
- The 1992 Helsinki Convention entered into force on January 17, 2000;
- Eight main groups: Gear, Maritime, Pressure, Response, State & Conservation, Fish, Agri, Maritime Spatial Planning;
- Its vision for the future is a healthy Baltic Sea environment with diverse biological components functioning in balance, resulting in a good ecological status and supporting a wide range of sustainable economic and social activities.
Ecological Marine Units (EMUs)
EMU 3D Point Mesh Framework

- 52,000,000 points
- ¼ degree by ¼ degree in the horizontal
- Variable z depth (z thickness ranges from 5 m to 5,500 m)
- Data values represent the average of five “prominent decadal means”
- No temporal component related to seasonality
- The point mesh lives in ArcGIS Pro

They all come together for the future of Maritime...
A Platform for supporting the Maritime Community

MSDI in action, take a look!
- NOAA PORTS Storymap [https://arcg.is/1v14Dn](https://arcg.is/1v14Dn)
- Ecological Marine Units Project [https://arcg.is/00WTXn](https://arcg.is/00WTXn)