Marine Spatial Data Infrastructure

-- An Overview --

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Definition

**Spatial Data Infrastructure**

- Used to summarize:
  - activities
  - processes
- relationships
- physical entities
  - spatial data
  - information, and
  - services

- Promotes geospatial data sharing and facilitates data use
**Definition**

**Spatial Data Infrastructure**

- SDI provides infrastructure for digital data
  - Distributed across many repositories
  - Managed by different organizations
- Common set of standards and policies for
  - Data
  - Metadata
  - Data quality
- Provides for
  - Distribution
  - Coordinate transformation
What Constitutes an SDI

• **Policy**
  – Defines need to create information that is interoperable

• **People and Organizations**
  – Willingness
  – Cooperation

• **Essential building blocks**
  – Standards
  – Technology
  – Metadata

• **Information/Data**
Information in an SDI

Consistent Methodologies & Information Linking

Application Information

Associated Reference Info

Base Reference Info

Geodetic Referencing System

Source: DNF, 2004
Examples of Base Information

- Land Ownership
- Transportation
- Surface Waters
- Boundaries
- Elevation/Bathymetry
- Aerial Imagery
- Geodetic Control
Benefits of supporting a MSDI to Hydrographic Organizations

- Wider use of hydrographic data
- Reduce data acquisition duplication
- **SURVEY ONCE, USE MANY TIMES**
- Cost savings, effective use of funds
- Common reference data
- Facilitates cooperation with other information providers
- Improved decision making, such as...
Fisheries Management

Tracking of Fish Stocks/Marine Mammals

Killer Whale Tracks
Alternative Energy Development on the Outer Continental Shelf
Hazards Mapping

Post-Katrina Marine Debris Interactive Map
Oil Spill Tracking
Mapping Benthic Habitats

Habitat Maps

Ecosystem Monitoring
Challenges

• Developing joint policy approaches with other organizations
• Investing in improved business processes/information management
• Difficulty by non-marine community to understand marine SDI components
• Resources
• Gathering support for SDI activities from decision makers and budget managers
• Ensuring correct knowledge, skills, and training
Working Toward a MSDI

- Identify data holders/service providers
- Determine user requirements
  Used to determine formats for distribution, metadata required, data needs, areas for focus
- Develop road map for SDI implementation
- Develop policies
- Establish support and engagement
Working Toward a MSDI

Ensure necessary skills and knowledge available

- Identify existing data that you are authorized to distribute (focus on base data and digital data first)
- Capture non-digital data of interest by scanning or vectorizing at original scale
- Establish data access levels
  - Internal vs. external, Government vs. public
  - Cost vs. free of charge
  - Full data set vs. data thinning or gridding
Working Toward a MSDI

- Create metadata if doesn’t exist, ensure appropriate information included
  
  Characterize data, facilitate discovery, use standards to ensure interoperability

- Enable search of metadata on Website or through portal for spatial data

- Make data available
  - Initially could be by ftp, or mail on media
  - Preferably, via automated search and download
  - Later move to Web mapping/features services
Examples of MSDI at Work
ENC Direct to GIS

Download all or specified layers in .shp files and other user selectable formats.
CMSP Data Registry

Coastal and Marine Spatial Planning Data Registry
National Oceanic and Atmospheric Administration

Data Registry Help

NOAA's Coastal and Marine Spatial Planning (CMSP) Data Registry is a collection of Web-accessible NOAA geospatial data deemed essential for local, regional, or national level CMSP processes. Registry data sets are provided in a variety of formats accessible for download, and many can be easily previewed using ESRI’s new ArcGIS.com map viewer.

Mashup
Check off the box below for data mash-up

- Elevation, Bathymetry, and Shoreline
- Jurisdictional Boundaries and Limits
- Marine Transportation, Infrastructure, and Obstructions
- Living Marine Resources
- Human Uses (Commercial, Recreational, and Industrial)
- Coastal Population and Socioeconomic Data
- Ocean Observations Data

Data Registry Help

What does Mashup mean?
This button allows the user to view multiple registry datasets simultaneously in the ArcGIS.com viewer. Simply, check the checkboxes for the desired datasets, and click the "Mashup" button.

What does \_\_\_\_ mean?
This button takes the user to the Web mapping application for the dataset, if such an application exists.

What does \_\_\_\_ mean?
This button allows the user to view the dataset in the ArcGIS.com viewer. The ArcGIS.com Web site provides a gateway to your online GIS experience, and is intended be a useful destination for anyone, GIS professionals, Web developers, and those that want to view maps or create...
CMSP Data Registry

Selection from Map (multiple layers)
ESRI’s ArcGIS.com Map Viewer
REST Servers
Web Mapping Services
KML
Download Data
View Metadata

Raster Nautical Charts
Anchorage Areas
Marine Collision Regulation Lines
Precautionary Areas for Navigation
Restricted Areas
Dredge Disposal Areas Affecting Navigation
Shipping Lanes
Digital Elevation Models

Possible because of bathymetric/topographic datasets on consistent datums

DEM APPLICATIONS

- Inundation modeling for storm surge, tsunamis, and sea level rise
- Erosion, accretion, re-nourishment
- Analyzing storm impacts
- Determining setback lines
- Determining local, state, and national boundaries

- Navigation products and services
- Habitat restoration
- Shoreline change analysis
- Analyzing environmental and natural resources
- Permitting
Environmental Response Management Application (ERMA)

Web-based GIS system supporting environmental response efforts and operations

- developed by NOAA as pilot project in 2008
- expanded for use in Haiti after earthquake
- full operations for Gulf Oil Spill
Site Basics

**Incident Information**
- Trajectories
- Asset tracking
- Field team locations
- Shoreline cleanup and assessment data
- Sample collection & results

**Real-Time Feed**
- Weather, buoys, ship tracking, etc.

**Background Layers**
- Nautical charts
- Aerial, terrain, roads

**Resources at Risk**
- Shoreline information
- Local habitat and species datasets
- Fisheries Closures

**Document & Photo Links**
- Field Photos
- External links

Readily accessible via web browsers
Initially secure access, then expanded to public
Data from multiple federal agencies & academia
Overflight oil observations and photos uploaded
Subsurface monitoring data displayed
Newly acquired imagery printed with shoreline impacts

Something was needed for the general public
Public display of response asset locations and weather feeds

3.4 million hits first day of release
Resources

- **IHO SDI Guide for Hydrographic Offices**
  - Benefits
  - Definition
  - Getting ready for SDI
  - Making it happen
  - SDIs in perspective

- **Also Provides**
  - Frequently Asked Questions
  - Stakeholders List
  - Hydro Data Policy Best Practice Guidelines for HOs
  - SDI Awareness Training Course Template
Resources

- GSDI (Global SDI Association) – *The SDI Cookbook*
- INSPIRE (Infrastructure for Spatial Information in the European Community)
- FGDC (U.S. Federal Geographic Data Committee)
- IHO Baltic Sea Hydrographic Commission (Established Baltic Sea MSDI Working Group)
IHO Marine Spatial Data Infrastructure Working Group
Updated Terms of Reference

• Monitor national and international SDI activities (focus marine)
• Liaise with appropriate groups to discuss efforts
• Identify and recommend possible solutions to significant technical issues related to interoperability looking at:
  – Datum issues
  – S-100 interoperability
• Identify IHO capacity building requirements
IHO Web Site: www.iho.int
Standards and Publications C-17
Spatial Data Infrastructures
“The Marine Dimension”
Guidance for Hydrographic Offices
SDI Needs to Address Datum Transformations

There are many different vertical datums in use.

For elevation data sets to be blended together they must be referenced to the same vertical datum.
nowCOAST

NOAA Map-Based Web Portal to
Real-Time Coastal Observations & NOAA Forecasts

http://nowcoast.noaa.gov/

meteorological, oceanographic, & river observations
from national and regionally operated networks as well as NOAA (NOS & NWS) forecasts for U.S. coastal areas.