

Marine Spatial Data Infrastructure

Hydrographic Workflows and Standards

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November 2008





Why an “M”SDI

- **Incorporation of marine spatial data types into a NSDI or GSDI**
- **Hydrographic Offices (HO’s) are one example of agencies that manage spatial data of a marine type**
- **An MSDI offers the following benefits to HO’s**
 - Provides robust data management for the costly data resources that have been recorded or created
 - Will ensure valuable Metadata is captured for this data
 - Will allow easy data discovery so that others in the agency can find the data
 - Will allow inter-agency data exchange

MSDI Example: Hydrographic Office

- **Types of Marine Data**

- Bathymetry

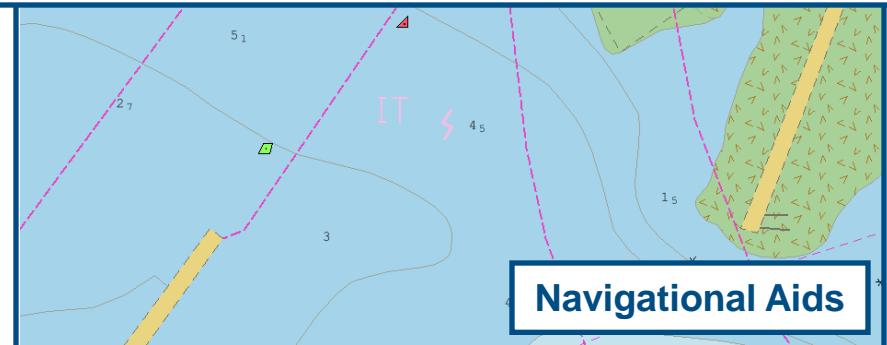
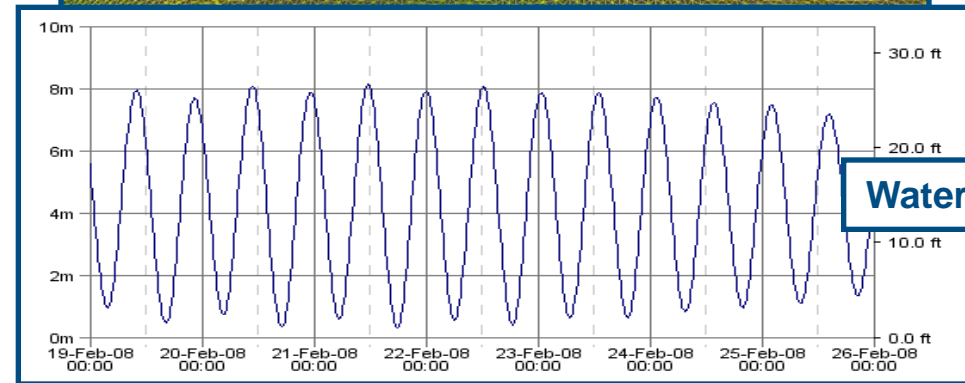
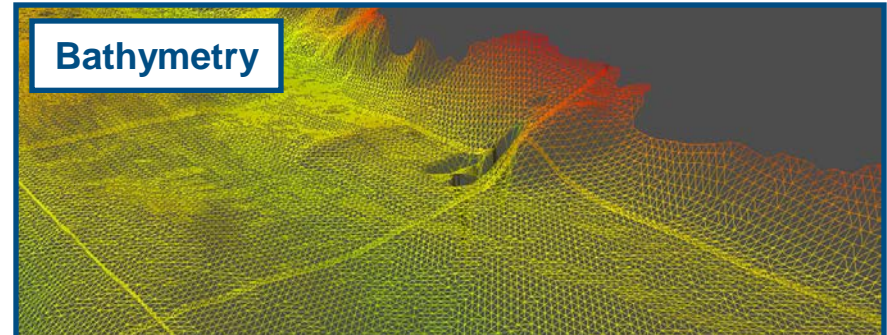
- Multibeam Sonar
- Single Beam Sonar
- LiDAR
- Legacy data

- Navigational Aids

- Buoys
- Lights
- Shipping lanes

- Tides

- Primary Stations
- Secondary Stations

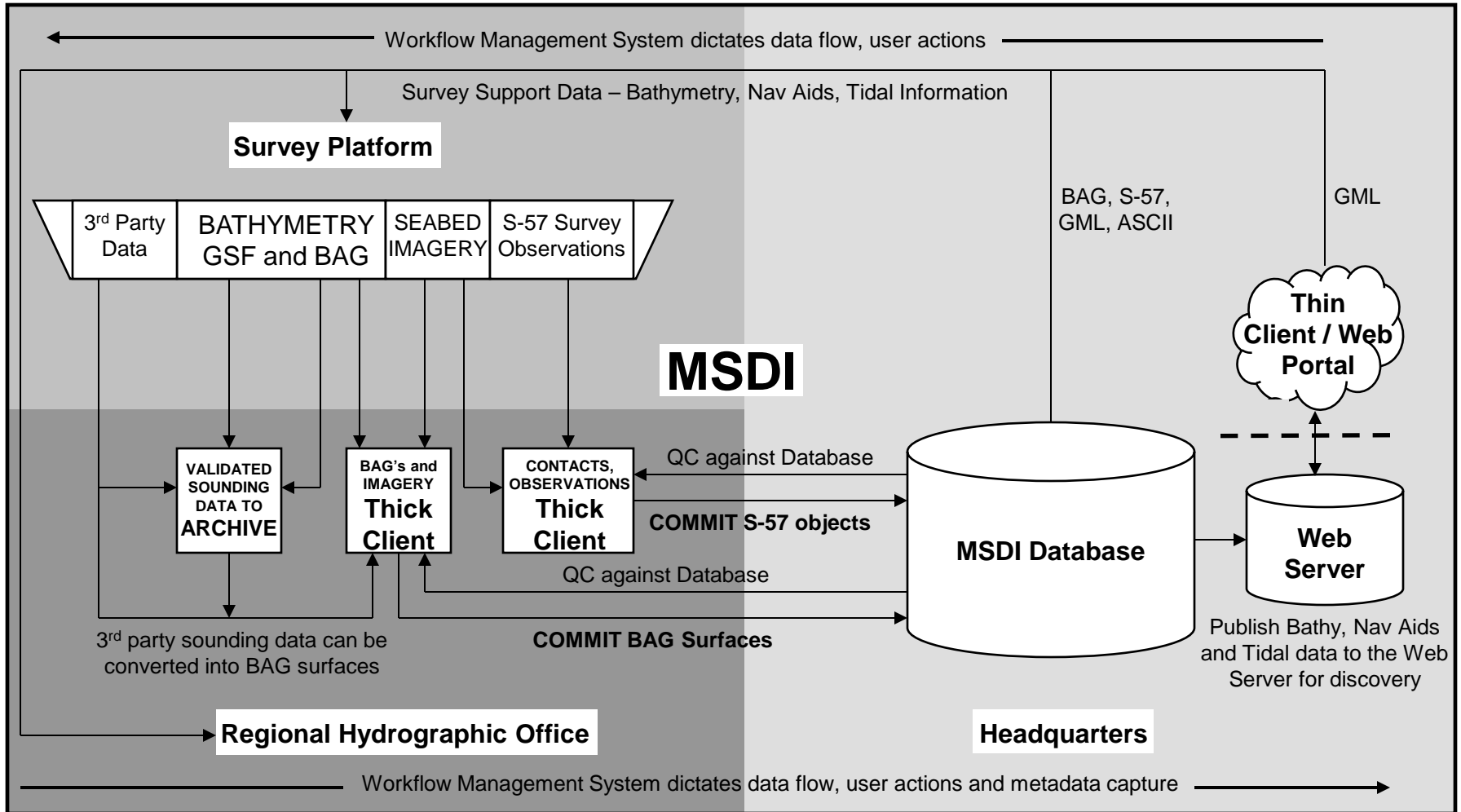




Users of a Hydrographic Office MSDI

- Survey Platforms
 - Ships, Aircraft, AUV's
- Regional Offices / Branches
 - Responsible for the quality of data in their region
- Hydrographic Office Headquarters
 - Responsible for the quality of all hydrographic data
 - Supplier of data to military
 - Supplier of charts to shipping
- Other Agencies
 - Other HO's, National Mapping Agency, Cadastre, Science
- Public
 - Awareness / general interest
 - Leisure chart products

Hydrographic Office MSDI Workflow





MSDI data for Survey Platforms

- Survey Platforms need data for mission planning and safe survey execution
 - Data in the mission area would be discovered through a textual or graphical metadata catalogue search
 - *Bathymetry from previous surveys would give an indication of water depth to determine survey run lines*
 - *Charted Navigational Aids will give visible location context and also assist in determining survey run lines.*
 - *Tidal Information will allow safe navigation and allow new bathymetric measurements to be vertically adjusted.*
 - Data would be transferred to the Survey Platform via digital media or high speed internet connection





Data from Survey Platforms

- Data Deliverables from Survey Platforms include

- *Bathymetric Data*

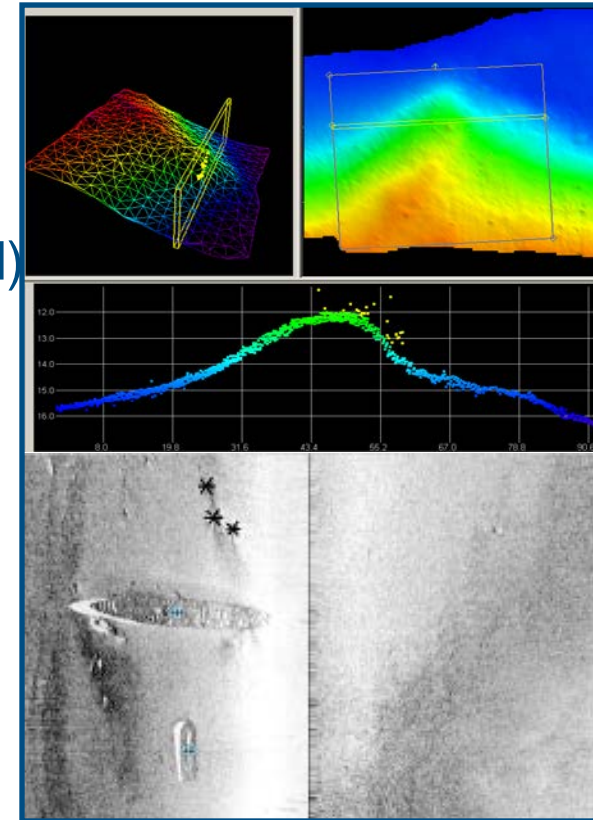
- Full density processed bathymetry in ***.GSF** format (Generic Sensor Format)
- Optimal density bathymetric DEM in ***.BAG** format (Bathymetry Attributed Grid)

- *Seabed Targets / Contacts*

- Targets digitized from seafloor sonar imagery data in ***.000** format (**IHO S-57**)

- *Navigational Aids*

- Bouys, Lights etc. validated against existing charted features, new positions digitized and attributes encoded in ***.000**





Survey Data to Regional Offices

- Data from the Survey Platforms can be incorporated into MSDI by Regional Offices / Branches
 - ISO 19115 Metadata is captured for all data entering the MSDI
 - *Bathymetry*
 - Optimal density BAG files are imported into MSDI Database
 - Full density GSF files are archived
 - *Seabed Targets / Contacts*
 - S-57 objects are imported into MSDI Database
 - Navigational Aid Observations
 - S-57 objects are imported into MSDI Database
- Regional Office QC's Survey Platforms data before loading into MSDI
 - Comparison between current database content and new data
- Workflow mgmt. tools can control business process



Example of Bathymetric Metadata

Project Level

- Project name
- Vertical datum
- Projection
- Time frame
- Authority
- Agencies
- Sensors used

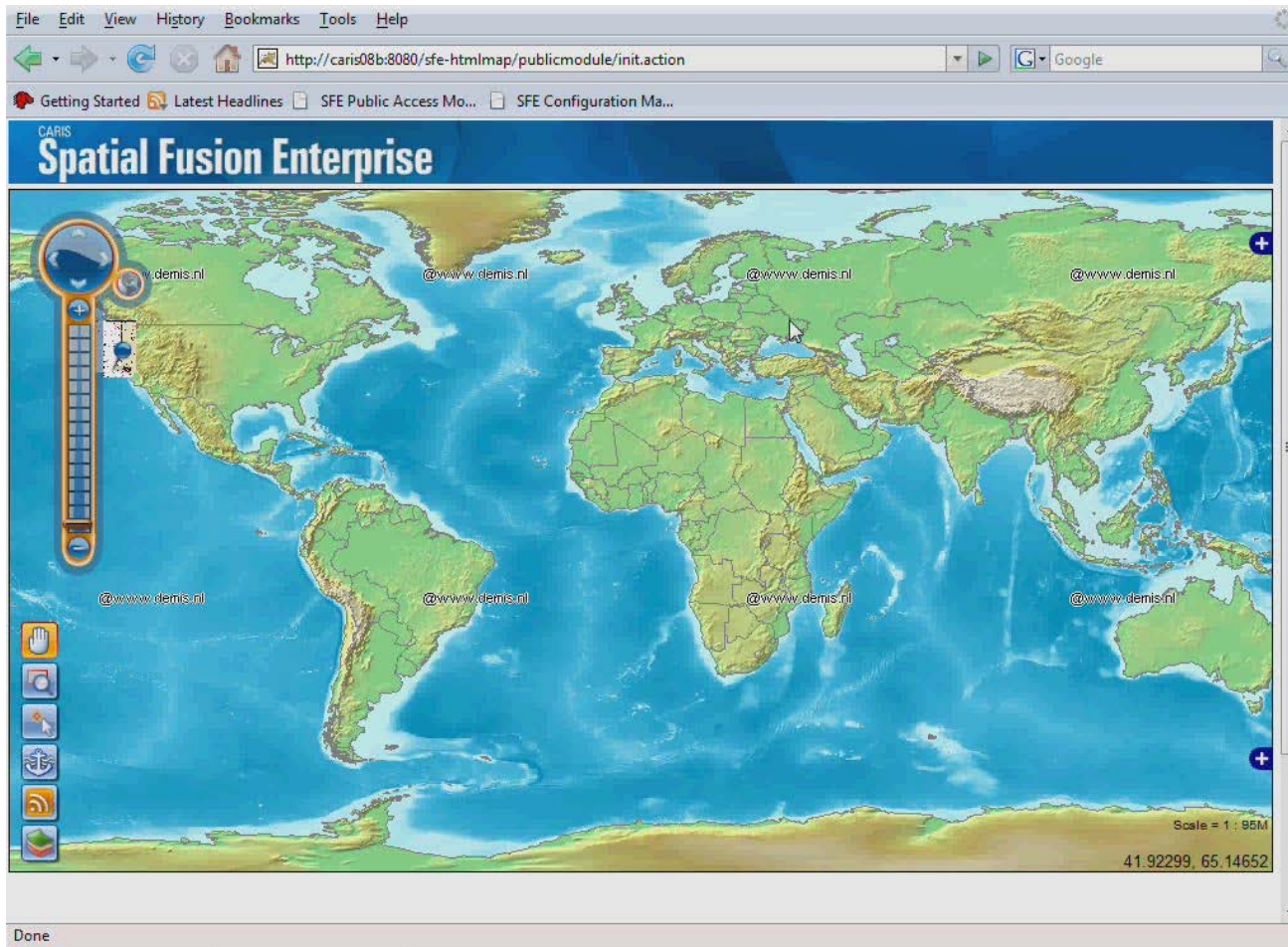
Survey Level

- Project name
- Vertical error
- Horizontal error
- Ship / Surveyor
- Type of Sensor
- Resolution

Feature Level

- Project name
- Designated
- VERDAT
- SOUACC
- POSACC

Example of Hydrographic Data Discovery





Hydrographic Office Headquarters

- New data has to be validated in the MSDI database before being published for subsequent discovery
 - Bathymetric data can be served as an OGC WMS for spatial discovery
 - Navigational Aids can be published for spatial discovery and also be exported to GML
 - Data can be found using catalogue searches



Summary of Data types and standards used in this MSDI

- BAG: For Bathymetric DEM's
- GSF: For full density bathymetric data
- IHO S-57: For Navigational Aids
- IHO S-57: For Tide Stations
- ISO 19115 / 19139 Metadata for all data types
- WFS / GML: For export of navigational aids
- WMS: For Bathymetric discovery
- WCS: For Bathymetric DEM extraction



Acknowledgement

- Service Hydrographique et Océanographique de la Marine (SHOM) is an agency who is adopting an MSDI approach to data management and discovery.
- SHOM is the agency responsible for hydrographic and oceanographic data in France and is working with CARIS, a Geospatial Software Solutions provider, to implement an MSDI for its hydrographic data

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