IHO S-100 Overlays: A Brave New World?

Lee Alexander
CCOM-JHC, University of New Hampshire

Cameron McLeay
CARIS USA
Marine Information Overlays (MIOs)

Chart and navigation-related information that supplement the minimum information required by IMO ECDIS

- Supplemental, non-mandatory
- Not covered by existing IHO standards (e.g., IHO S-57 or IHO S-52)
- The “everything else”
- Points, lines, areas, features, objects

Objects → Overlays
ECDIS COMPONENTS

Color Display

Nav Sensors (GPS, LORAN)
Gyrocompass
 Depthsounder

Computer

SENC

Radar/ARPA
AIS

ENC

Water level
Currents
Ice info

Updates

MIOs
Relationship of MIOs to Navigation-related Information
Goal for MIOs

• Supplemental information for “decision support”
  • Right information for task-at-hand
  • Voyage planning & route monitoring

• How displayed less important than data format and content
  • Accurate, timely, and “useable”
  • Provided in IHO S-57 data format
  • Capable of being used with ENCs in ECDIS
MIO Related Standards

IMO ECDIS Performance Standards

6.1 Radar information or other navigational information may be added to the display. However, it should not degrade the SENC information and should be distinguishable from the SENC information.

IMO Performance Standards for the Presentation and Display of Navigation-Related Information (MSC 19(79))

Sec. 1 (Purpose) “supplement and in case of conflict, take priority over presentation requirements of individual performance standards.”

IEC Publication 62288 – Methods of Testing & Required Test Results for IMO MSC 19(79)

IHO (24 May 2007)

Recommended Procedures for the Development of MIOs (Ed. 1.1)
General Content Specification for MIOs (Ed. 1.0)
HGMIO

- Harmonization Group on Marine Information Overlays (HGMIO)

- Subsidiary of two committees:
  - IHO CHRIS
    - TSMAD (IHO S-57 objects/attributes, ENC Prod Spec)
    - C&SMWG (IHO S-52 Colours and Symbols)
  - IEC TC80
    - WG 7 (ECDIS)
    - WG 13 (Navigation Display)

- Established in 2001, but was “retired” in 2008.
MIO Website:  www.hgmio.org

One-stop gathering place for info on MIOs

- articles/papers
- PP Presentations, videos
- examples of MIOs
- specifications
- Freeware

Established and maintained by CARIS & CCOM/UNH
Two basic types of MIOs

**Static**
- Bathymetric (gridded data)
- Geophysical data (seismic, gravity, magnetic)
- Seafloor classification/physiography
- Archeological (wrecks, heritage sites)
- Critical Habitats (coral reefs, nesting sites)

**Dynamic**
- Tides (predicted, real-time, forecast)
- Current flow (speed, direction, time of occurrence)
- Meteorological (wind speed/direction)
- Oceanographic (wave height/direction, salinity, temp)
- Ice Coverage (sea ice, icebergs, ice-free route)
- Marine Mammals (right whales)
Examples of MIOs

• Too many to show …
• But, can attend:

US Hydro 2015 Workshop
Information Overlays: Past, Present and Future
Thursday, 10:30am – 12:00noon
S-100 will support a greater variety of data sources, products and services.
S-100 and Product Specifications

... contains all the components to make different product specifications for all types of hydrographic data.
**S-100 - Status**

<table>
<thead>
<tr>
<th>Identity Need</th>
<th>Propose</th>
<th>Develop</th>
<th>Test</th>
<th>Implement</th>
<th>Transition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>New Standard</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposal phase</td>
<td>Development phase</td>
<td>Testing phase</td>
<td>Implementation phase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stakeholder feedback and collaboration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Existing Standard</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-57 Active Standard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **S-100 Active Standard**
- **S-57 Active Standard**
- **S-57 superseded but still valid**
- **Retirement Date**
- **Effective date**
- **1 Jan 2010**
Proposed S-101 Implementation Time-table for e-Navigation*

* Draft S-101 Value-added Roadmap
<table>
<thead>
<tr>
<th>No / N°</th>
<th>Title / Titre</th>
<th>Status / Etat</th>
<th>Edition (English version) (version anglaise)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-101</td>
<td>Electronic Navigational Chart (ENC) / Cartes électroniques de navigation</td>
<td>Under Development En cours d’élaboration</td>
<td>S-101 Information page See also Roadmap document</td>
</tr>
<tr>
<td>S-102</td>
<td>Bathymetric Surface / Surface bathymétrique</td>
<td>Published / Publiée</td>
<td>Ed 1.0.0 (April 2012)</td>
</tr>
<tr>
<td>S-10x</td>
<td>Tidal product for surface navigation</td>
<td>Under Development En cours d’élaboration</td>
<td></td>
</tr>
<tr>
<td>S-103</td>
<td>Sub-surface Navigation / Navigation sous la surface</td>
<td>Under Development En cours d’élaboration</td>
<td></td>
</tr>
<tr>
<td>S-111</td>
<td>Surface currents / Courants de surface</td>
<td>Under Development En cours d’élaboration</td>
<td>Working Draft 1.0</td>
</tr>
<tr>
<td>S-112</td>
<td>Meteorological and Hydrographic Data AIS Application-Specific Message Dynamic Water Level Data Product Specification</td>
<td>Under Development En cours d’élaboration</td>
<td>Working Draft 0.0.0</td>
</tr>
<tr>
<td>S-121</td>
<td>Maritime limits and boundaries / Limites et frontières maritimes</td>
<td>Under Development En cours d’élaboration</td>
<td></td>
</tr>
<tr>
<td>S-122</td>
<td>Marine Protected Areas / Aires marines protégées</td>
<td>Under Development En cours d’élaboration</td>
<td></td>
</tr>
<tr>
<td>S-123</td>
<td>Radio Services / Services radio</td>
<td>Under Development En cours d’élaboration</td>
<td></td>
</tr>
<tr>
<td>S-124</td>
<td>Navigational warnings / Avertissements de navigation</td>
<td>Under Development En cours d’élaboration</td>
<td></td>
</tr>
<tr>
<td>S-125</td>
<td>Navigational services / Services de navigation</td>
<td>Planned / Prévu</td>
<td></td>
</tr>
<tr>
<td>S-126</td>
<td>Physical Environment / Environnement physique</td>
<td>Planned / Prévu</td>
<td></td>
</tr>
<tr>
<td>S-127</td>
<td>Traffic Management / Gestion du trafic</td>
<td>Planned / Prévu</td>
<td></td>
</tr>
<tr>
<td>S-1xx</td>
<td>Marine Services / Services maritimes</td>
<td>Planned / Prévu</td>
<td></td>
</tr>
<tr>
<td>S-1xx</td>
<td>Digital Mariner Routeing Guide / Guide numérique du navigateur sur l’organisation du trafic</td>
<td>Planned / Prévu</td>
<td></td>
</tr>
<tr>
<td>S-1xx</td>
<td>Harbour Infrastructure / Infrastructure portuaire</td>
<td>Planned / Prévu</td>
<td></td>
</tr>
<tr>
<td>S-1xx</td>
<td>S-1xx (Social/Political) / (Social / Politique)</td>
<td>Planned / Prévu</td>
<td></td>
</tr>
</tbody>
</table>

http://www.iho.int/iho_pubs/standard/S-100_Index.htm
<table>
<thead>
<tr>
<th>Product Specifications being developed by the <strong>International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)</strong> (Numbers S-201 to 299)</th>
<th></th>
</tr>
</thead>
</table>
| S-201 | Aid to Navigation Information / *Information sur les aides à la navigation*  
Under development / *En cours d'élaboration* |
| S-20x | Inter-VTS Exchange Format / *Format d'échange inter-STM*  
Planned / *Prévu* |
| S-20x | Application Specific Messages / *Messages d'applications spécifiques*  
Planned / *Prévu* |
| S-20x | Maritime Safety Information / *Renseignements sur la sécurité maritime*  
Planned / *Prévu* |

<table>
<thead>
<tr>
<th>Product Specifications being developed by the <strong>Intergovernmental Oceanographic Commission (IOC)</strong> (Numbers S-301 to 399)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product Specifications being developed by <strong>other Organizations</strong> (Numbers from S-401)</th>
<th></th>
</tr>
</thead>
</table>
| S-401 | Inland ENC (Inland ENC Harmonization Group [IEHG])  
ENC intérieures (Groupe d'harmonisation des ENC intérieures [IEHG])  
Under Development / *En cours d’élaboration* |
| S-411 | Sea Ice (WMO-IOC Joint Technical Commission for Oceanography and Marine Meteorology [JCOMM])  
Glace de mer (Commission technique mixte OMM-COI pour l’océanographie et la météorologie marine [JCOMM])  
Under Development / *En cours d’élaboration*  
*Draft Ed 1.1.0, (June 2014)* |
| S-412 | Met-ocean forecasts (JCOMM)  
Prévisions météo-oceanographiques (JCOMM)  
Under Development / *En cours d’élaboration* |
Future Challenges/Opportunities

1. For the foreseeable future, IHO S-57 ENCs will continue to be used with an IMO type-approved ECDIS.
   • After mandatory ECDIS carriage completed in 2018, 5-10 years before widespread use of S-101 ENCs in next type-approved ECDIS.

2. ECDIS is a component of a broader concept of operation – e-Navigation.
   • ECDIS not a stand-alone system. Interoperability with other systems and equipment is crucial.

3. Continued reluctance to recognize that ‘overlays’ are supplemental information, and not intended to replace what is contained in the ENC.
   • At HSSC6 (Nov 2014) a paper was introduced on the “Relevance of information overlay services” with respect to IHO standards.”
Recommendations

1. Determine what types of supplemental information could/should become ‘overlays’.
   - Overlays supplement – not replace – the information contained in the ENC (e.g., what is now or has changed?)

2. There is no need to re-invent the wheel.
   - Overlay information content should be based on other international standards (e.g., IMO, IALA, WMO, etc.)

3. Learn from the past experience of others.
   - “Those that don’t know history are doomed to repeat it.”

4. Just be come something is technically possible, does not mean it becomes operationally available.
   - Needs to be a commitment to establish an infrastructure and service (research project → testbed . . . . . → established/reliable service)
Looking Ahead

1. Trend in maritime navigation caused by e-Navigation:
   - Increasing amounts of information will be available
   - More data formats dealing with time-varying information
   - Simultaneous display of chart and other navigation-related information

2. Realization that the real benefit of ‘overlays’ involves decision support.
   What, how, and when used depends on three things:
   1. Current situation (route planning or route monitoring)
   2. Task-at-hand (grounding or collision avoidance)
   3. Preference of the user (minimum or maximum amount of information)

3. What is actually needed is best decided not by the provider, but by the user – Mariners.