Integrating IEC and ISO information models into the S-100 Common Maritime Data Structure

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Integrated operations laboratory

Towing tank

MARINTEK
Norwegian Marine Technology Research Institute

NTNU
Norwegian University of Science and Technology

Energy and engine laboratory

Ocean basin

Cavitation tunnel

Structural testing
- Route plan exchange VTMIS-Ship
- Integration with onboard data networks (IEC 61162)
- Possibly exchange of other operational information (ISO 28005)
Premise

The Common Maritime Data Structure (CMDS) is a common information model for e-navigation, all its maritime service portfolios and the five prioritized e-navigation solutions.

- **S1:** improved, harmonized and user-friendly bridge design;
- **S2:** means for standardized and automated reporting;
- **S3:** improved reliability, resilience and integrity of bridge equipment and navigation information;
- **S4:** integration and presentation of available information in received via communication equipment; and
- **S9:** improved Communication of VTS Service Portfolio (not limited to VTS stations).

However, there are other international standards already in use – also by IMO.
We want to use and support the CMDS. What issues do we have to think about?

- How do we incorporate the different domains (what domains)?

- S-100 is a geographic information system (GIS) type information modelling framework: How can it be used for operational data (and what is operational data)?

- How to integrate existing information models (IEC 61162, ISO 28005) into CMDS?
What domains do we need to consider?

- Electronic Nautical Charts and static/dynamic overlays
- Ship reporting (FAL, SOLAS, Bulk loading/unloading, Waste...)
- Ship automation systems (engine, energy...)
- Onboard Bridge Data Networks
- Ship safety systems (fire, ballast, cargo...)
- Commercial and technical operations (noon at sea, port reports, voyage orders...)

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Problem: Semantics change between domains!

Electronic Nautical Charts and static/dynamic overlays

Ship reporting (FAL, SOLAS, Bulk loading/unloading, Waste...)

Onboard Bridge Data Networks

Ship position:
1. Reporting: One "rough" position is enough: Simple object
2. ENC: Position is an attribute and may need reference point and ship size in addition
3. Network: Any number of positions with different properties: Many objects
We may need meta-models?
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Operational data?

- Several different information domains, not all geospatial in nature
- Links to even more domains outside e-navigation/e-maritime

ISO 19848 NP Machinery data

OASIS, GS1 …
What do we do in the area of ship reporting?

• FAL Convention issued in 1967 – Paper FAL forms
• FAL Compendium issued in 2001, covering EDIFACT based ship clearance
• New edition of FAL Compendium in 2014, also referencing ISO 28005 XML format
• WCO takes on editorial responsibility for Compendium in 2015
In the direction of a normalized information model

- Each object has stand-alone semantics as far as possible
- Standard representation (syntax)
- Reuse objects in different report types, adding more specific semantics in each

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</table>
Product specification could be "Mandatory Reporting"
No obvious portrayal?

- Individual objects may have portrayals.

- Reporting requirement (24h, 72h, line) could be rendered in ENC as point on voyage.

- Product specification would specify how a certain reporting message can be assembled from CMDS elements.
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IEC 61162 in S-100 (in IEC 61162-460 configuration)

- Reporting to and from shore.
- Transfer to and from other ship systems.
- Describe internal data exchanges.
Issues that can cause problems

- Streaming data vs. files
- Levels of detail in semantics

<table>
<thead>
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<th>Streaming</th>
<th>Semantic details</th>
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<td>Network internal</td>
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Semantic details

System configuration context

Usage context (time sequence ...)

Sentence context (formatter, talker ...)

Data object
- Attribute
- Attribute

Data object
- Attribute
- Attribute

- Full context may not be known: Dependent on system configuration and usage

- Complex context: Position fix is dependent on source, integration, time of acquisition, quality of signal, antenna position etc.
Existing data model integration in CMDS

- The ISO 28005 ship reporting case is relatively straightforward. However, semantic compatibility and mapping may be an issue.

- IEC 61162 is more complex:
  - Much data is operational and not geographic (as ISO 28005).
  - Network context is complex and not necessarily known by gateway.
  - Attribute/object structure may not lend itself easily to a standard structure.
  - Streaming data is an issue also here.
IEC TC80 has established WG17 to look at these issues

- Will start with route exchange message from IEC 61174.
- May concentrate on ship-shore exchanges.
- Will investigate more complex methods.
- ISO TC8 will take up results and methods.
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Sorry: Only the problems and no clear solutions!

Thank you for your attention!