S-100 and NOAA's Precision Navigation Services

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S-100 – the IHO building blocks

- *Provides the **data framework** for the development of the next generation Electronic Navigational Charting products, as well as other digital products required by the hydrographic, maritime and GIS communities*

Who is developing S-100 product specifications

ENC
Bathymetry
Water Levels
Surface Currents
MPAs
UKC

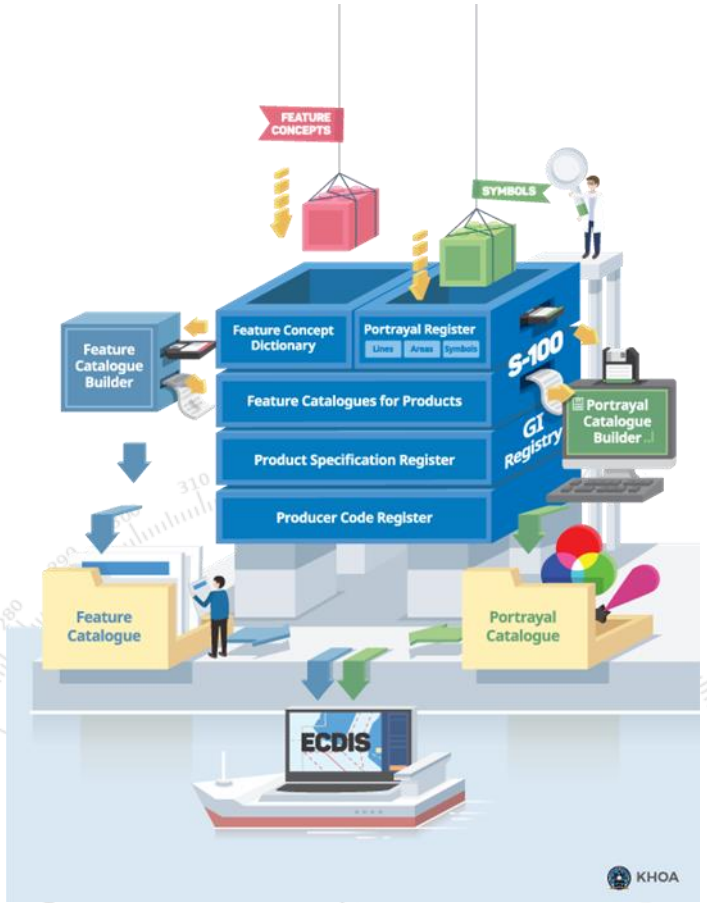
S-20x

S-421 – Route Exchange

S-411 - Ice
S-412 - Weather

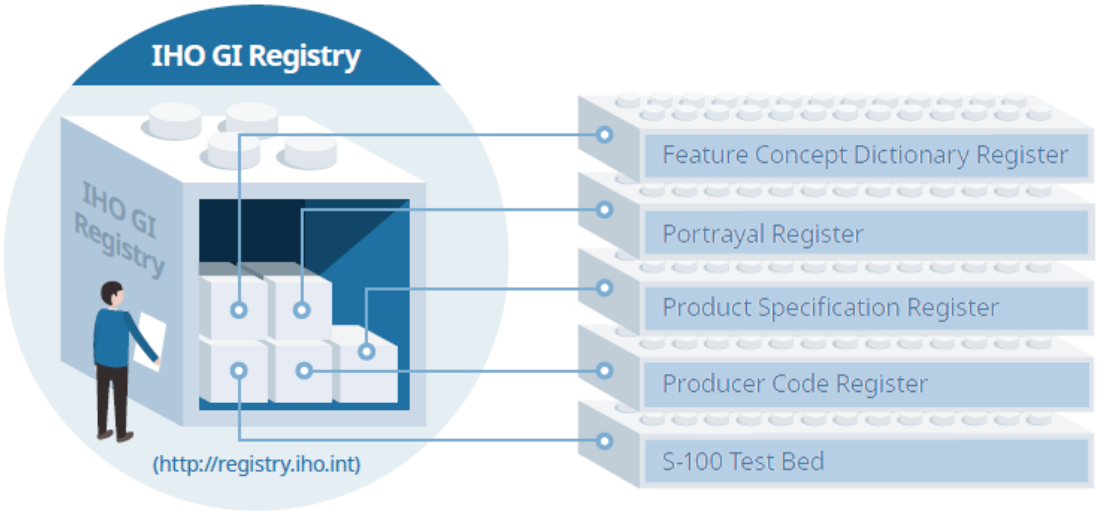
What does S-100 mean for the Maritime Community?

- Leads to a global consistency of products
- Specifies encoding formats based on product type
  - ISO 8211
    - S-101 ENCs
  - HDF5
    - S-102 Bathymetry
    - S-111 Surface Currents
    - S-104 Water Level Information
    - S-412 Gridded Weather Information
  - GML
    - S-412 Vector Weather Information
    - S-122 Marine Protected Areas
- Moves to machine readable catalog mechanism
  - XML Based Catalogues

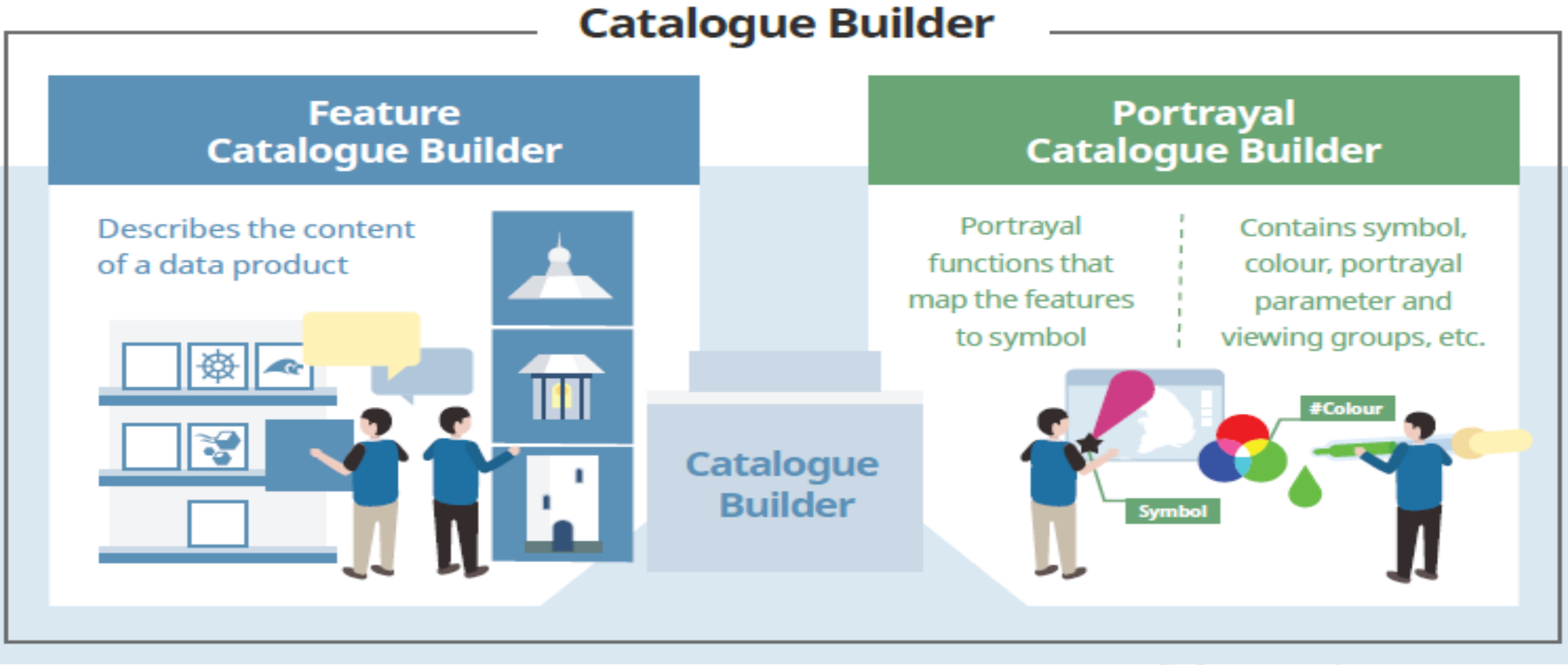


S-100 Backbone – Geospatial Information Registry

- Contains a collection of harmonized information divided into a series of registers
  - Feature Concept Dictionary – subdivided into different domains
    - Hydro
    - IALA
    - WMO
    - IEC
  - Portrayal Registers



S-100 Backbone – Catalogue Builders



S-100 Based Feature Catalogues

- Machine Readable .xml catalogue
- Binds features and attributes
- Ties in spatial primitives – Point, Curve and Surface.

```
<S100FC:S100_FC_SimpleAttributes>
  - <S100FC:S100_FC_SimpleAttribute>
        <S100FC:name>Application Profile</S100FC:name>
        <S100FC:definition>name of an application profile that can be used with the online resource (ISO 19115)</S100FC:definition>
        <S100FC:code>applicationProfile</S100FC:code>
        <S100FC:alias>APPPRF</S100FC:alias>
        <S100FC:valueType>text</S100FC:valueType>
    </S100FC:S100_FC_SimpleAttribute>
  - <S100FC:S100_FC_SimpleAttribute>
        <S100FC:name>Beacon shape</S100FC:name>
        <S100FC:definition>The shape a beacon exhibits</S100FC:definition>
        <S100FC:code>beaconShape</S100FC:code>
        <S100FC:alias>BCNSHP</S100FC:alias>
        <S100FC:valueType>enumeration</S100FC:valueType>
      - <S100FC:listedValues>
          - <S100FC:listedValue>
                <S100FC:label>Stake, Pole, Perch, Post</S100FC:label>
                <S100FC:definition>An elongated wood or metal pole, driven into the ground or seabed, which serves as a navigational aid or a
```

S-100 Based Portrayal Catalogues

- Machine Readable set of symbols and portrayal rules
- S-100 defines two types of portrayal mechanisms
  - LUA – used for S-101 portrayal and best for portrayal rules that need to use external conditions to generate the portrayal (ship's draft)
  - XSLT – simplified rules based on XML style sheets
- Navigation Systems MUST implement both

S-100 Discovery Metadata – Information Exchange

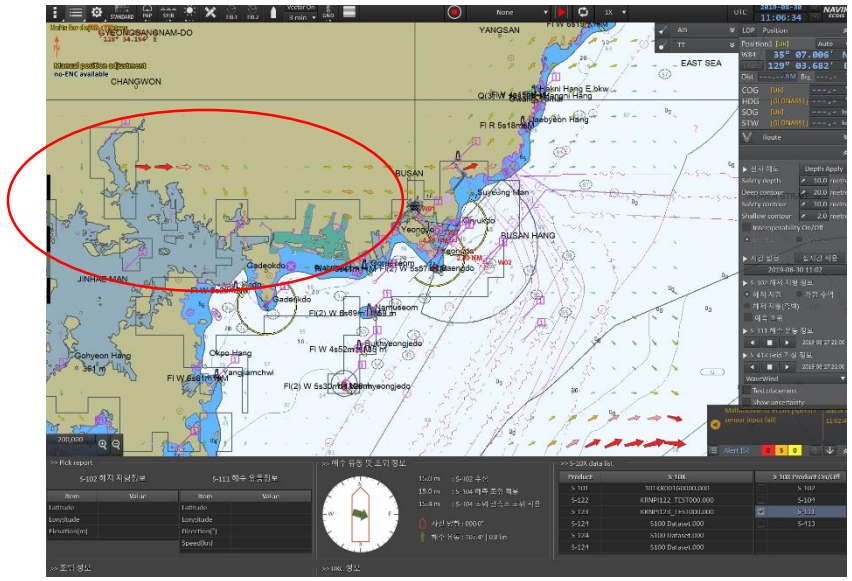
- Implemented utilizing XML exchange catalogues
- Contains:
  - Metadata about the overall exchange catalogue
  - Metadata about the individual datasets
  - Metadata about the support files that make up the package
- At the S-100 level most everything is optional
  - Restrictions may occur at the product specification level
  - Not every specification uses every field

Discovery for Dissemination

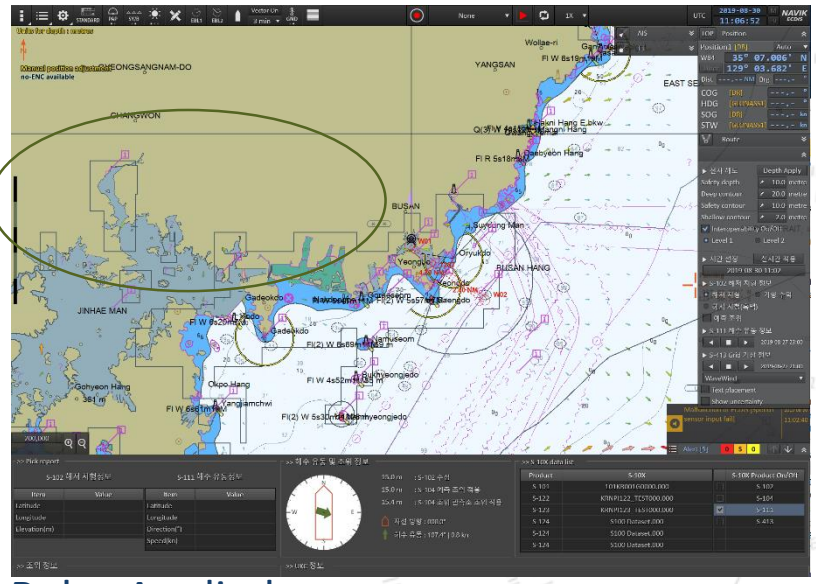
- Building out a central metadata database to handle the dataset metadata
- XML allows for discovery:
  - When new data is released
  - Where the data is stored
  - Where the data is geographically
  - What type of data it is
  - Who produced the data

S-98 – S-100 Interoperability for Navigation Systems

- Framework for capturing interoperabity rules for use in ECDIS and “front of bridge” systems
- Machine readable mechanism for rules
- Harmonized graphical presentations of S-100 data products



No Rules Applied



Rules Applied

Key Takeaways

- Standards are the building blocks to Precision Navigation
  - Harmonization of data
  - Improved interoperability
  - But …. They do take time
- If data producers move to leveraging consensus based standards it can lead to lower implementation costs for the manufacturer
  - Can lead to lower cost for the consumer
  - Can lead to increased uptake of the product

The World of S-100

KHOA