



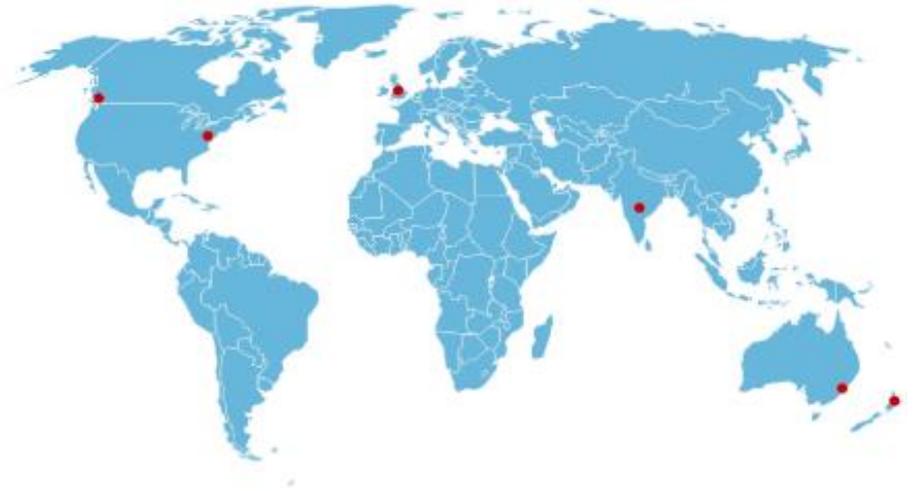
EMBRACING IHO S-100 HYDROGRAPHIC DATA FRAMEWORK

Ed Kuwalek

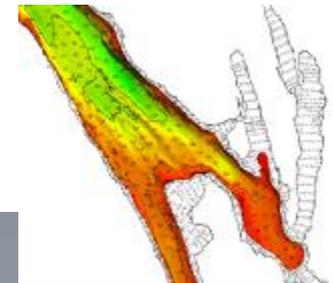
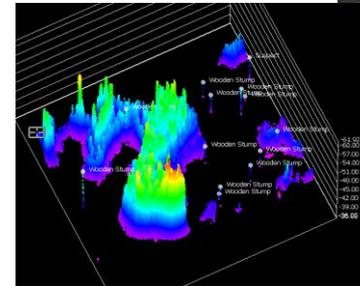
Mar-22-2023

- IIC Technologies Brief Overview
- Supporting S-100 Framework Development
- Supporting National S-100 Implementations
- S-100 Solutions
- Implementation Challenges
- Conclusions

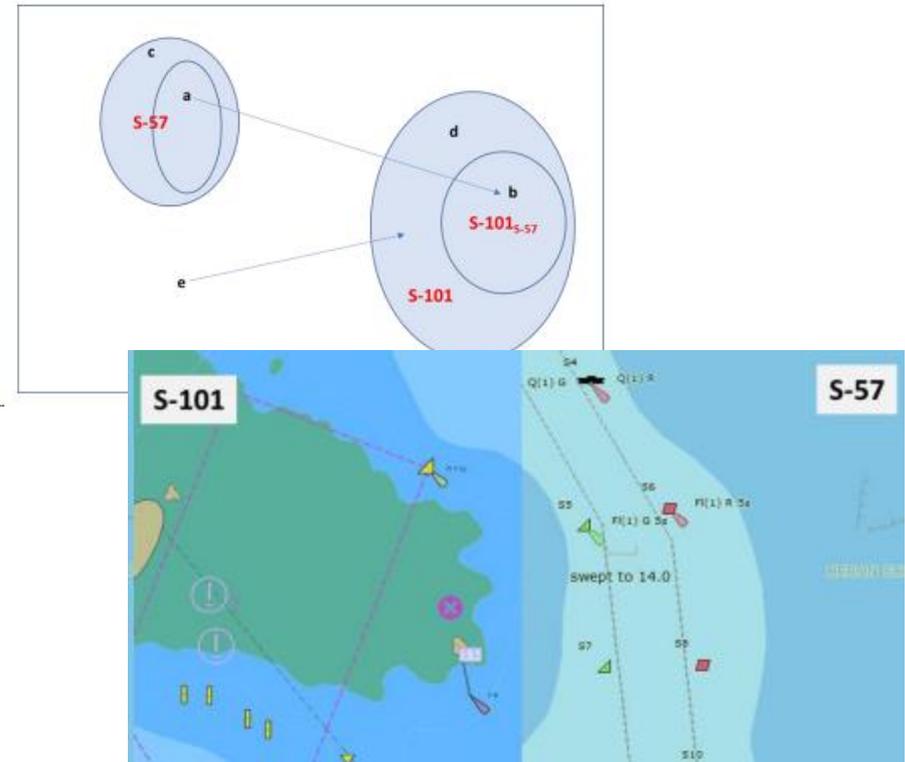
- Established in 1993
- Full-Spectrum Geospatial Services and Solutions Provider
- Dedicated Innovation Center (R&D and software solutions)
- Global presence
- 1000+ geospatial specialists



- Full range of services:
 - bathymetric surveys
 - data processing
 - product generation
 - ongoing product maintenance
 - specialized software solutions
 - training
- Trusted service provider to 30+ national hydrographic agencies
- Active industry expert contributor to IHO and OGC standard development: S-52, S-57, S-58, S-64, and S-100 series
- Over 40 projects supporting S-100 development



- S-98 Development
- S-57 to S-100 Conversion Studies
- S-100 Portrayal Catalogue Builder Support
- S-100 Test Data Set Analysis and Report
- S-100 Metadata and S-100 Security Schema
- S-100 Streaming Data Support
- S-57 and S-100 Dual Fuel ECDIS
- S-100 Governance Policy
- S-101 Test Datasets Production
- S-164 Ed 1.0.0 Development and Management

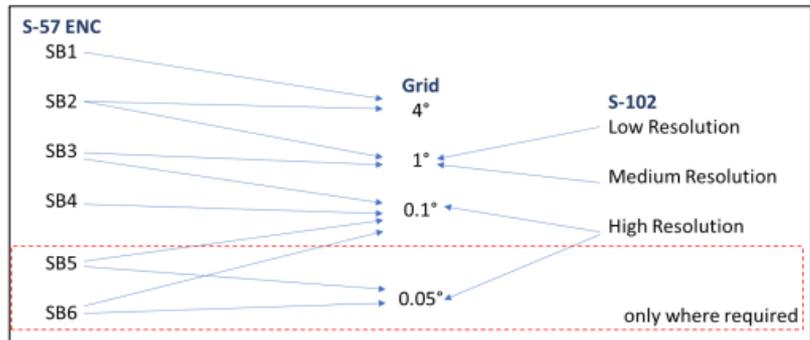
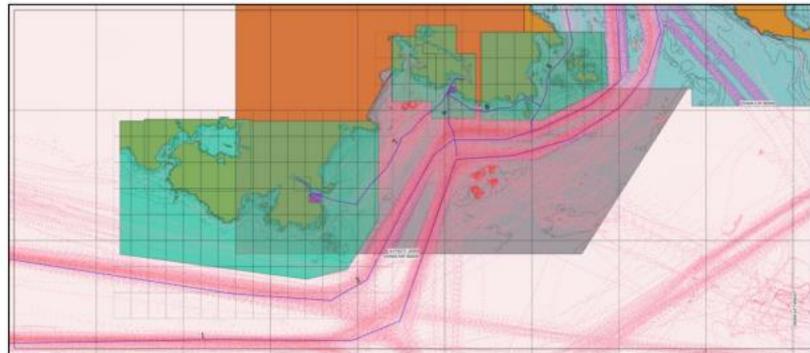
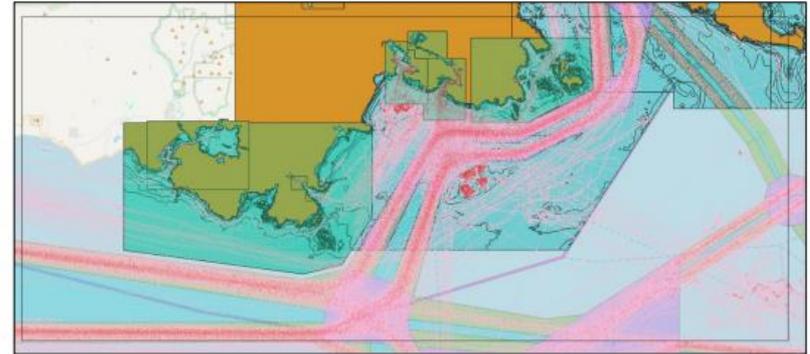
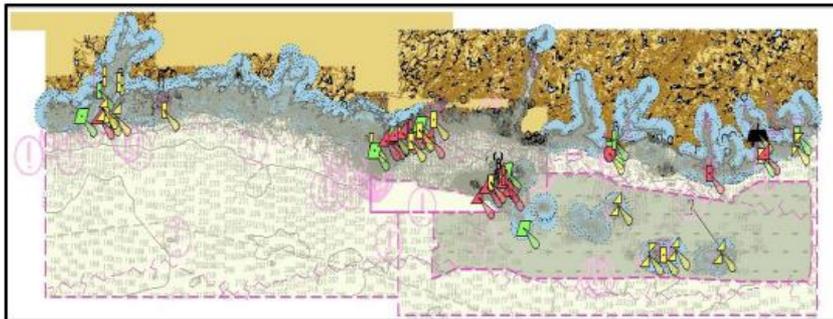


- S-98 Interoperability Catalogue Design
- Streamlining S-100 ECDIS Portrayal
- S-100 Testing Infrastructure
- S-102/S-104/S-111 Testing Rules
- S-98 IC V2 Authoring

CHS S-100 HPD Restructuring



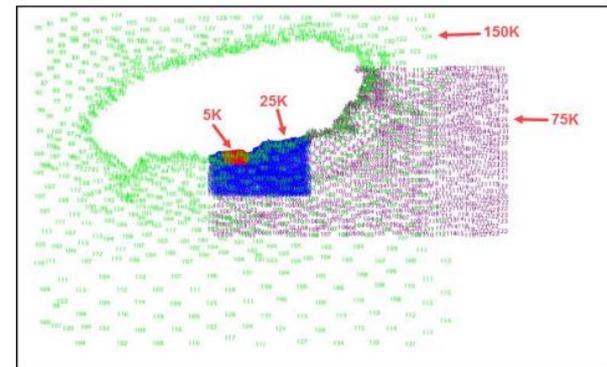
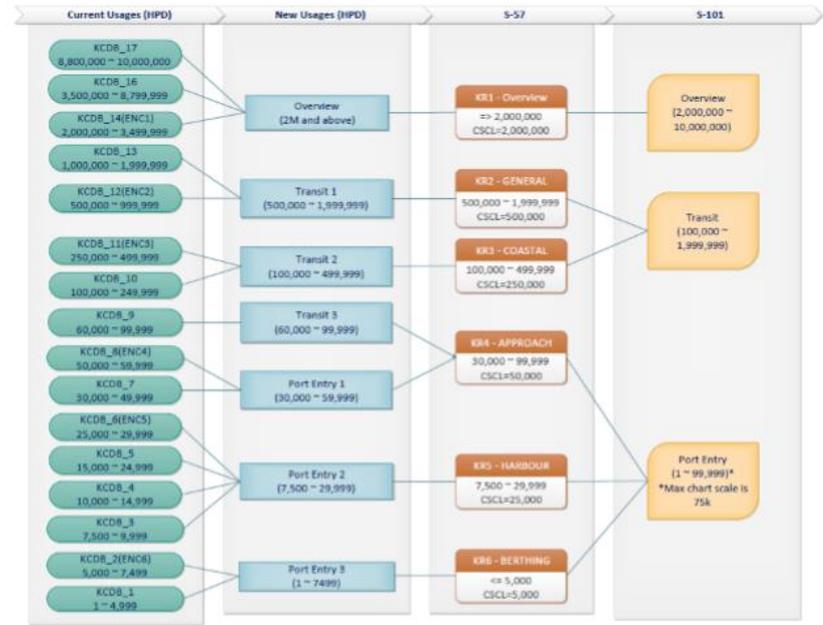
- General Assessment
- Grid Scheme Analysis
- Optimal Grid Sizing
- Cell Naming
- Paper Chart Restructuring
(separate project)



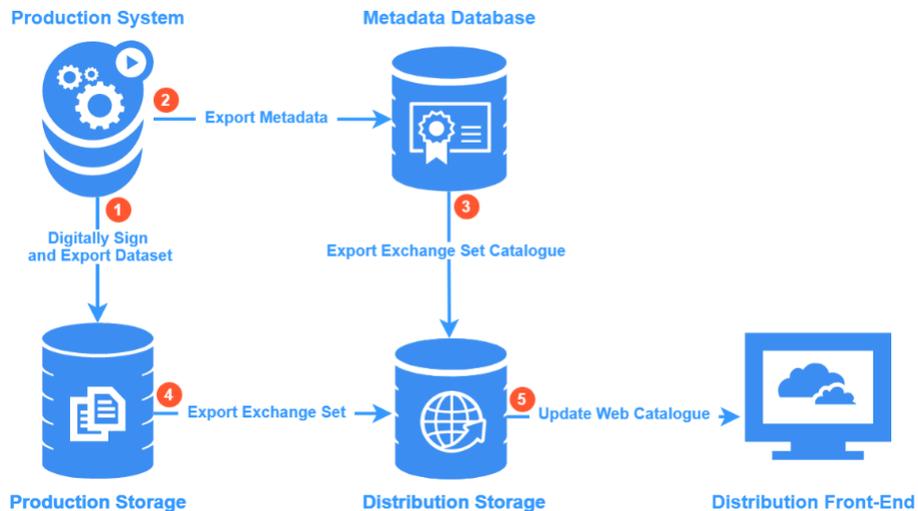
KHOA S-100 HPD Restructuring



- New source DB structure
- New scaleless approach
- Production processes for source data and products
- Production test run
- Production training



NOAA S-100 Metadata DB



- 01 Exchange Catalogue Metadata**
Information about the Exchange Catalogue
- 02 Dataset Discovery Metadata**
Information about the individual dataset(s) included in the Exchange Set
- 03 Feature Catalogue Metadata**
Information about the Feature Catalogue(s) included in the Exchange Set
- 04 Portrayal Catalogue Metadata**
Information about the Portrayal Catalogue(s) included in the Exchange Set
- 05 Interoperability Catalogue Metadata**
Information about the Interoperability Catalogue(s) included in the Exchange Set

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Metadata Editor

Product Lines

Product Lines: S-102

Area of Interest: CPS

Datasets:

DSD	Exchange Catalogue	File Name	Description	Edition Number	Status
3	3	S102US_OA01_0001101_1A0	Chesapeake Bay S-102	2	✓

Showing 1 to 1 of 1 entries

Form View

- S102_ExchangeCatalogue
- S102_DatasetDiscoveryMetadata-DSID-3
- filename: S102US_OA01_0001101_1A0
- filepath: /S102/OA01/0001101_1/
- description: Chesapeake Bay S-102
- dategeneration: True
- protectionScheme: S102qs3k.0.0
- digitalSignatureReference: dsa
- digitalSignature: 302C021432796C647CC1C35A67DC72FA7C68157A6594B2B0214503708B4F3A84BA1
- copyright: unrestricted
- classification: unclassified
- purpose: new edition
- editionNumber: 2
- issueDate: 2018-05-15
- issueTime: 19:21:15Z
- optimumDisplayScale: 10000
- maximumDisplayScale: 2500
- minimumDisplayScale: 100000
- horizontalDatumReference: EPSG
- horizontalDatumValue: 4326

XML View

```
<?xml version="1.0" encoding="UTF-8"?>
<S100NC:S100_ExchangeCatalogue xmlns:S100NC="http://www.noa.gov/s100nc/" xmlns:dsig="http://www.w3.org/2000/09/xmldsig#">
  <S100NC:Identifier>
    <S100NC:Identifier>S102_3020049_12018_01</S100NC:Identifier>
    <S100NC:editNumber>S100NC:editNumber</S100NC:editNumber>
    <S100NC:date>2018-05-15</S100NC:date>
  </S100NC:Identifier>
  <S100NC:contact>
    <S100NC:organization>NOAA Office of Coast Survey/S100NC:organization</S100NC:organization>
    <S100NC:phone>
      <cit:number>
        <cit:numberType>
          <cit:IC_telephoneTypeCode codeList="https://standards.iso.org/iso/31113/resources/CodeList">
            <cit:numberType>
              <S100NC:phone>
                <cit:de:1veryPrintes>

```

Error View

- Error occurred in S-102(Dataset: 3)-Error! Code: ValidationError, Message: ('IssueDate')

Data Exchange Systems

NTM to HPD ▾

HPD4 Logout

NTMS

Start Date :

End Date :

NTM Type : Information ▾

Edition Number : ⓘ

CARIS HPD

Object Acronym :

Project Name :

Usage Name :

S-100

Object Acronym : ▾

Project Name : ▾

Usage Name : ▾

NTMS

<input type="checkbox"/>	Hang Number
<input type="checkbox"/>	+ 201902900631
<input type="checkbox"/>	+ 201902900630
<input type="checkbox"/>	+ 201902900629
<input type="checkbox"/>	+ 201902900628
<input type="checkbox"/>	+ 201902900627
<input type="checkbox"/>	+ 201902900626
<input type="checkbox"/>	+ 201902900625

Transfer

HPD Features

<input type="checkbox"/>	Features
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Transfer

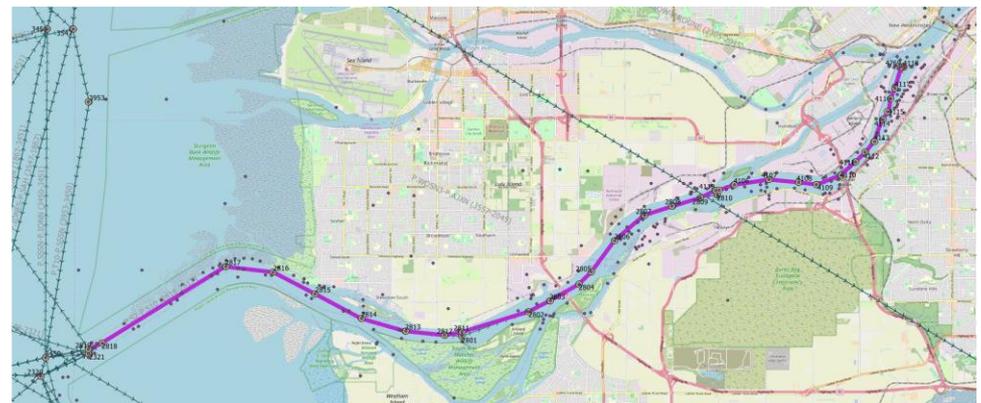
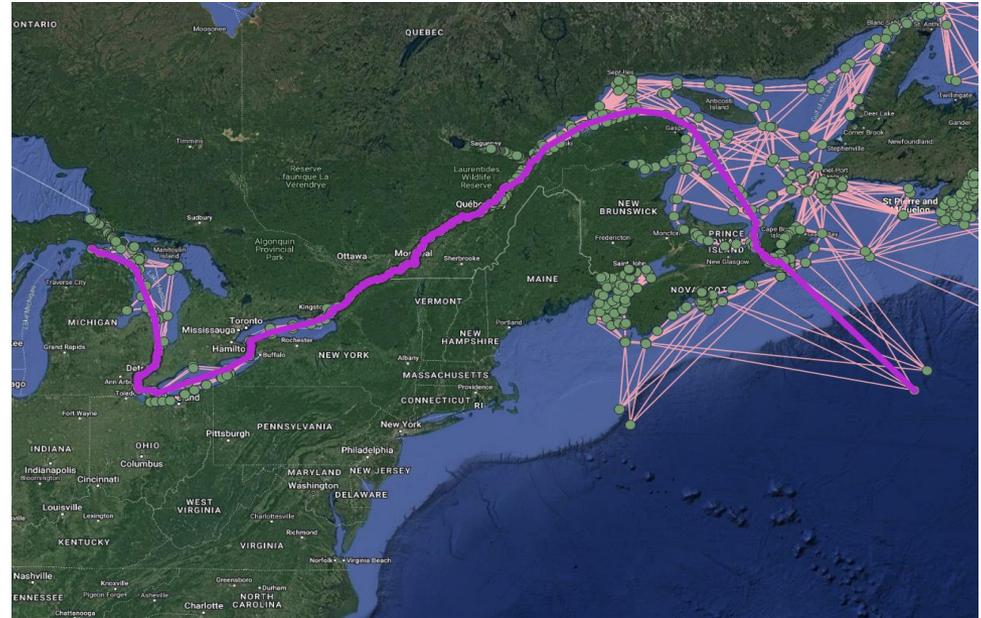
S-100 Features

<input type="checkbox"/>	Features
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CCG S-100 Projects



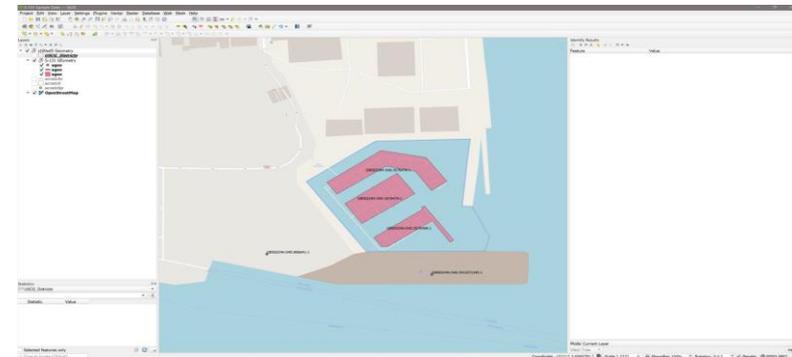
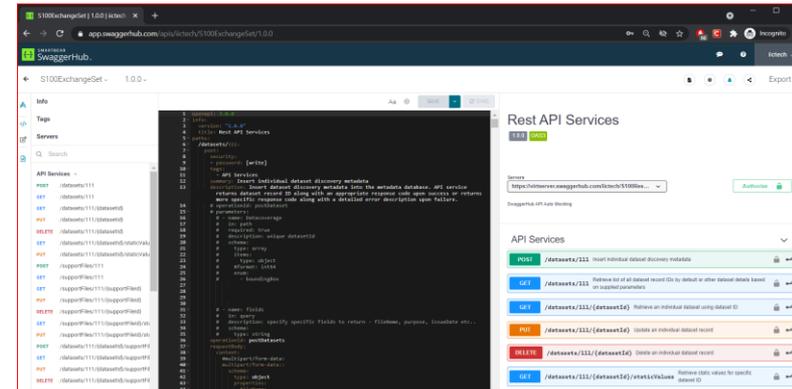
- S-129 UKC Policy Review
- S-127 Data Production for Canada
- S-100 Metadata Proposal Development
- S-100 Training Materials Development
- AtoN DB Conversion Roadmap
- S-123/S-127 Portrayal Development
- S-100 Workflow Visualizations
- S-421 Sample Data Production
- S-123 and S-127 Geoserver Data Visualization
- AtoN DB Sample Conversion
- UKC Safety Analysis



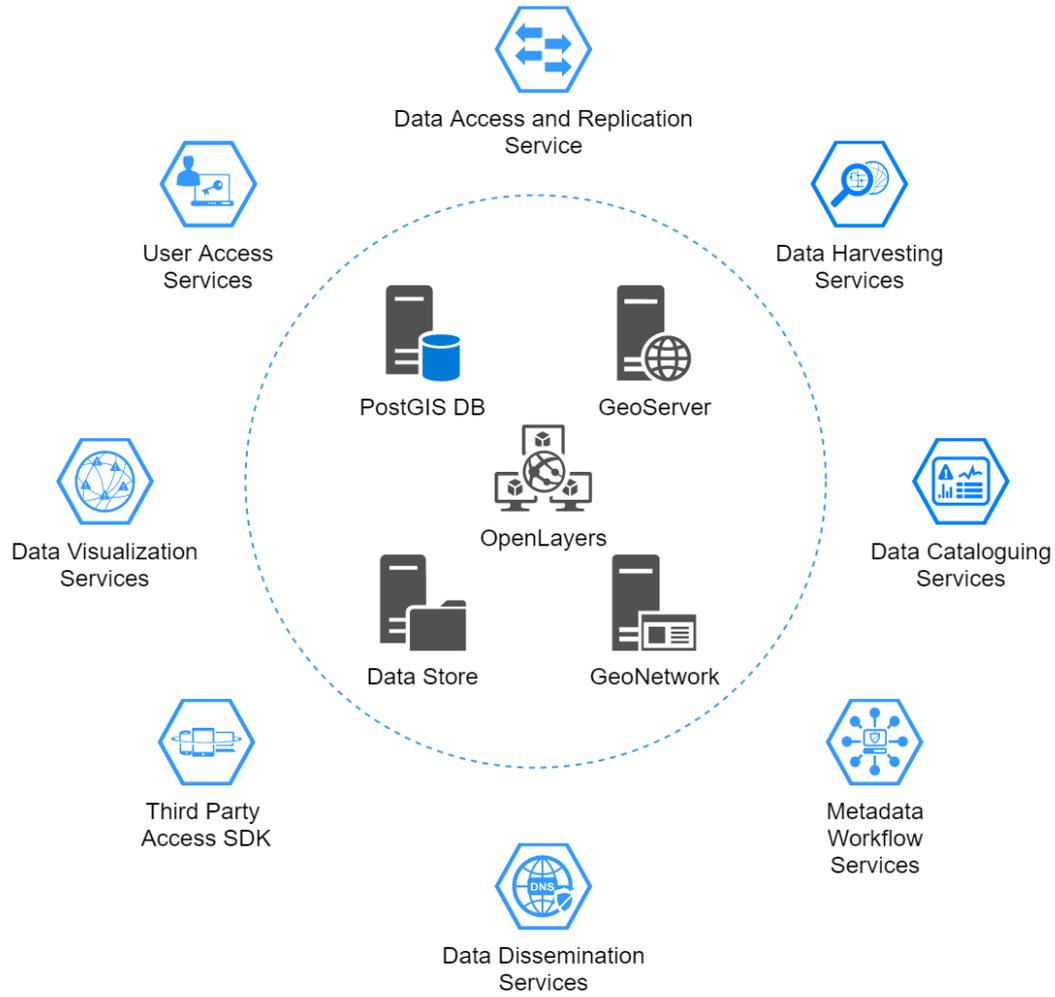
Other S-100 Projects



- OGC S-121
- UKHO S-100 Grid
- GeoNovum S-100 OGC API
- UKHO S-100 Exchange Set Toolset Development
- CHC S-100 Multi-language Metadata Support Design
- CHS S-131 Database API Software Development
- Canada's Ocean Supercluster S-100 Dissemination System Development



IIC's S-100 Nautilus Cloud



IIC's Production Tools



The screenshot displays three main components of the IIC's Production Tools:

- KHDA S-100 Viewer 1.0.12:** A GIS application showing a map of a coastal region with various colored polygons and red circular markers. The interface includes a toolbar with navigation and editing tools, a Layer Manager, and a Current Selection table.
- featureBuilder v5.7:** A tool for managing metadata. It features a 'Data' tab with a table of features and their values. The table includes columns for Features, Value, Type, Gid, and Comment.
- demostrazione della parte quindici firme digitali:** A digital signature tool window. It contains fields for Directory, Data File, Private Key, PubKey, and Certificate. It includes a 'Sign' button and a 'Verify' field. The Certificate field contains a large block of Base64-encoded data.

Features	Value	Type	Gid	Comment
Certificate	ID1	I [N]		
Certificate	ID3	I [N]		
issuer	NOAA	TEXT [1-1]		
subject	NGA	TEXT [1-1]		
signedPublicKey	23905843205982095823509...	TEXT [1-1]		
DatasetMetadata	ID0	F [N]	1272C7196113591EC.GML	
productName	S-127	TEXT [1-1]		
edition	1	INTEGER [1-1]		
issueDate	2022-01-10	DATE [1-1]		
filepath	/	TEXT [1-1]		
signature		Complex [0-1]		
id	1	TEXT [1-1]		
issuer	IIC	TEXT [1-1]		
signatureValue	2394023840962390482	TEXT [1-1]		
signatureType	Data Signature	ENUMERATION ...		
dataType	unencrypted	ENUMERATION ...		
description	Production version of S-12...	TEXT [1-1]		
fileLocator	1272C7196113591EC.GML	TEXT [1-1]		
producerCode	IIC	TEXT [1-1]		
version	3.0	TEXT [1-1]		
horizontalDatum		Complex [1-1]		
horizontalDatumRe	EPSG	TEXT [1-1]		
horizontalDatumVal	4326	TEXT [1-1]		
SupplementaryFile	ID2	F [N]	README.TXT	
Catalogue	ID4	F [N]		
categoryOfCatalogue	Feature Catalogue	ENUMERATION ...		
filepath	CATALOGUE_FILES/	TEXT [1-1]		
producerCode	IHO	TEXT [1-1]		
version	1.1.0	TEXT [1-1]		
fileLocator	S-127-FC_Jan2022.xml	TEXT [1-1]		
DatasetMetadata	ID6	F [N]	1272C7196116031B0C.gml	
DatasetMetadata	ID7	F [N]	1272C7196112851STL_NL.GML	
DatasetMetadata	ID8	F [N]	1272C7196113901SARNIA.GML	

- Complexity
- Learning curve
- Maturity
- Software tools
- Services

- IHO S-100 Universal Hydrographic Data Model supports several highly anticipated innovations
- Firm commitment from all stakeholders including IHO and IMO
- Considerable work is still required to turn S-100 vision into reality
- Implementation challenges do exist but they are solvable
- S-100 Implementation Decade is already well underway!

Thank You!

Questions or Comments

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