



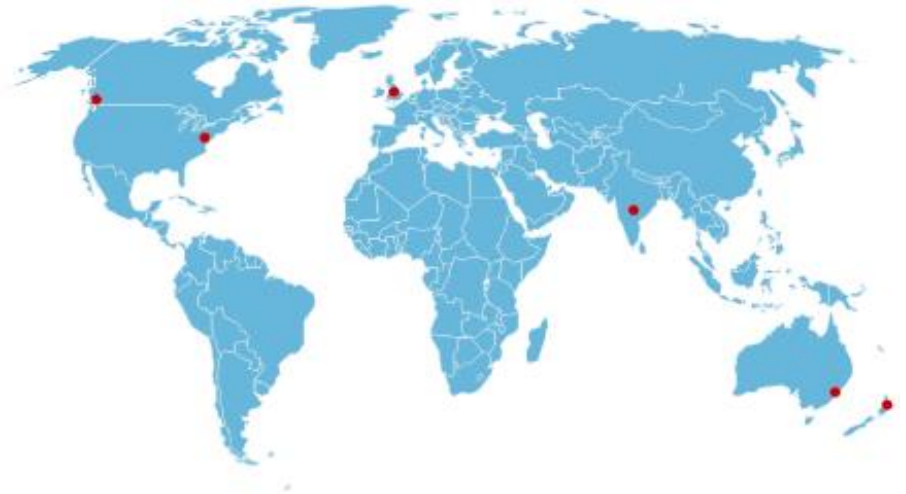
## EMBRACING IHO S-100 HYDROGRAPHIC DATA FRAMEWORK

Ed Kuwalek

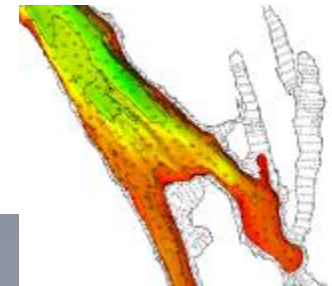
Mar-22-2023

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

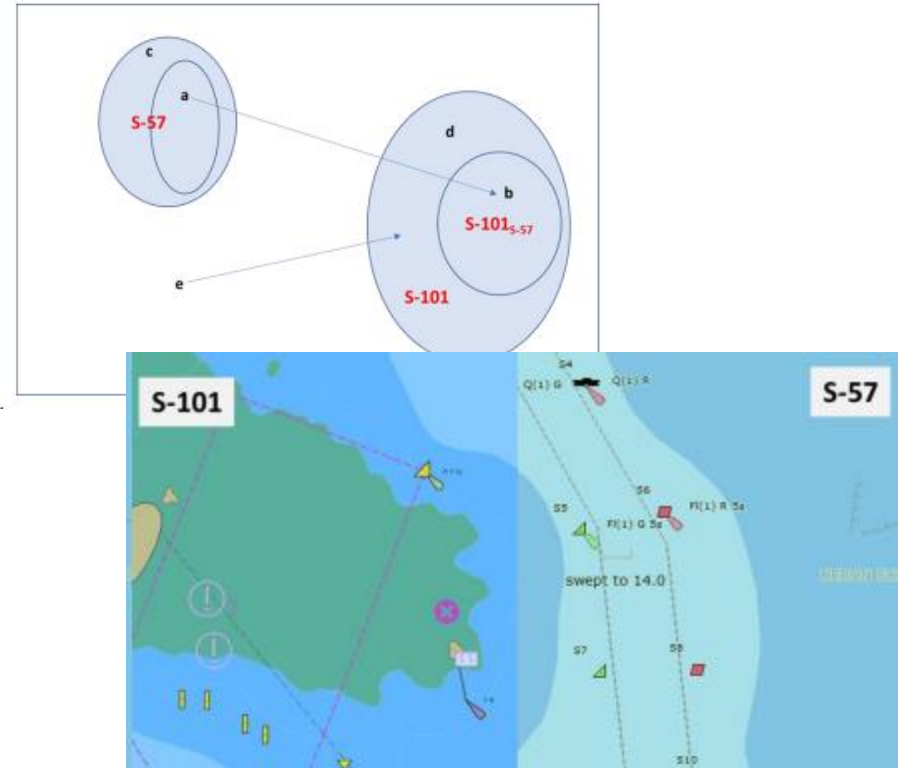
- Established in 1993
- Full-Spectrum Geospatial Services and Solutions Provider
- Dedicated Innovation Center (R&D and software solutions)
- Global presence
- 1000+ geospatial specialists



- 



- 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



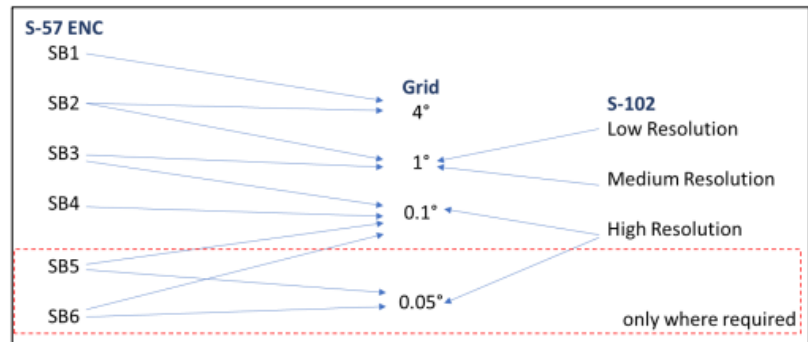
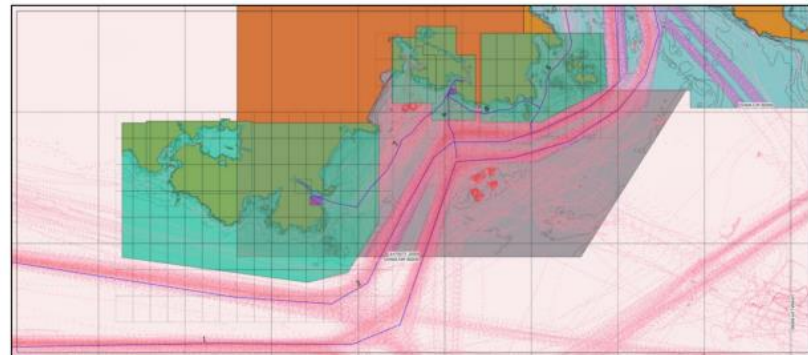
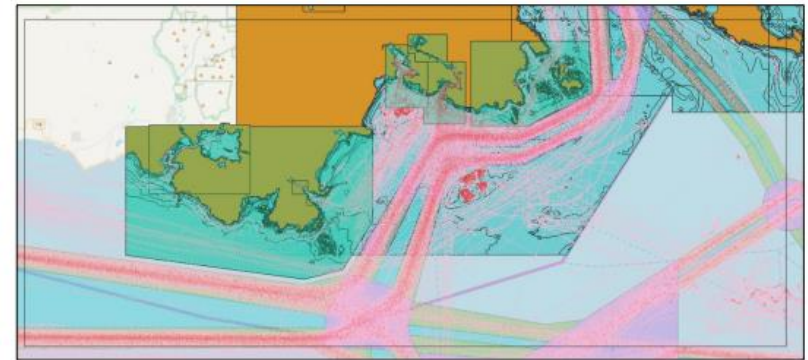
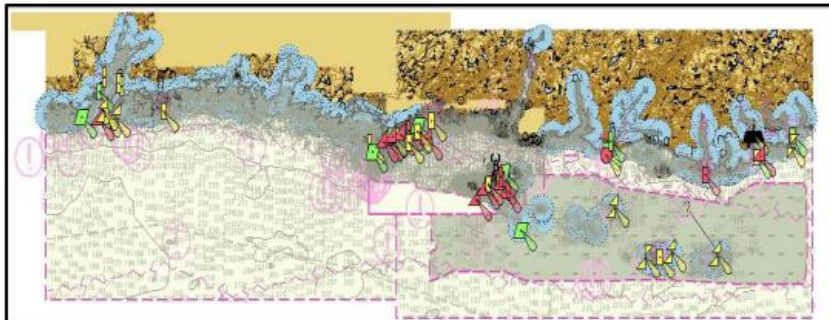
- S-98 Interoperability Catalogue Design
- Streamlining S-100 ECDIS Portrayal
- S-100 Testing Infrastructure
- S-102/S-104/S-111 Testing Rules
- S-98 IC V2 Authoring



# CHS S-100 HPD Restructuring

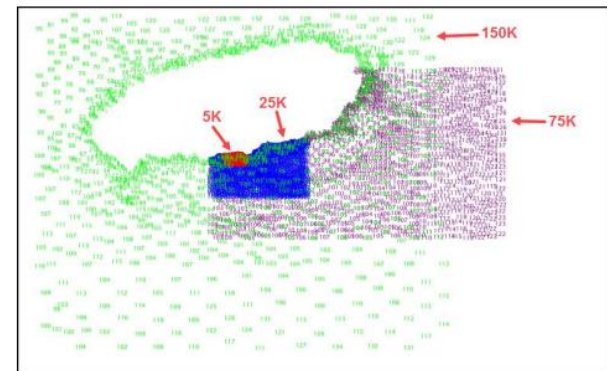
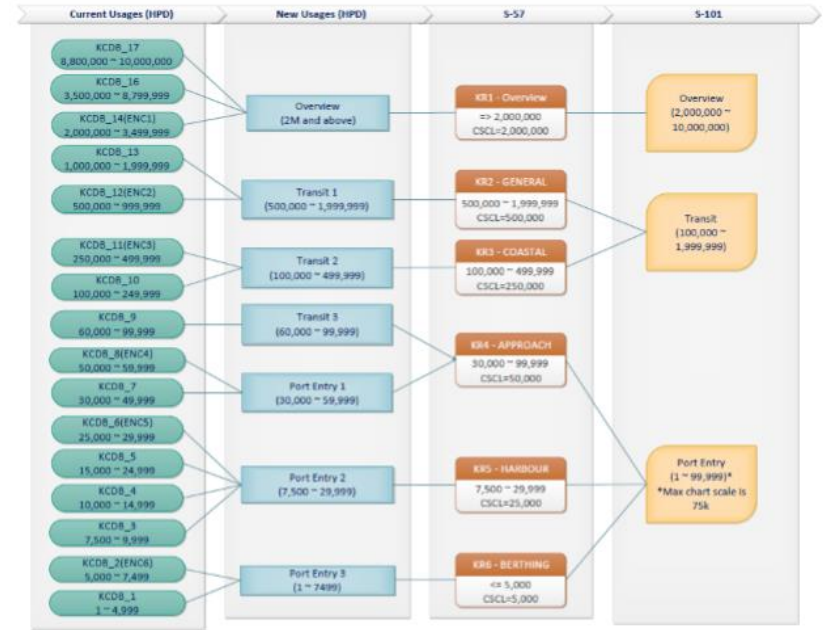


- General Assessment
- Grid Scheme Analysis
- Optimal Grid Sizing
- Cell Naming
- Paper Chart Restructuring  
(separate project)



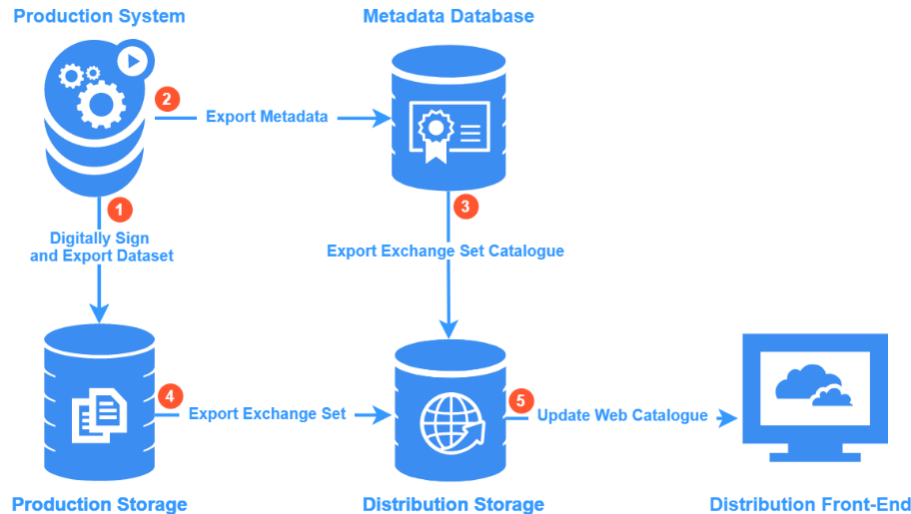
# KHOA S-100 HPD Restructuring

- 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: S-102

Area of Interest: OPS

Datasets:

DSID	Exchange Catalogue	File Name	Description	Edition Number	Status
S102US_OA01_0001101_1AS	S102US_OA01_0001101_1AS	Chesapeake Bay S-102		2	✓

Showing 1 to 1 of 1 entries

Form View

- S102\_ExchangeCatalogue
- S102\_DatasetDiscoveryMetadata-DSID-3
  - Filename: S102US\_OA01\_0001101\_1AS
  - Filepath: /S102/OA01/0001101\_1/
  - Description: Chesapeake Bay S-102
  - datapresentation: True
  - protectionScheme: S102US\_OA01
  - digitalSignatureReference: dia
  - digitalSignature: 302C021433796C647CC1C35A67C72F7A7C6157A6594E2B021420370B84F3A5A8A1
  - copyright: unrestricted
  - classification: unclassified
  - purpose: new edition
  - Harbor Navigation
  - editionNumber: 2
  - issuedate: 2018-05-15
  - issuetime: 19:21:10
  - optimumdisplayScale: 10000
  - maximumdisplayScale: 2500
  - minimumdisplayScale: 100000
  - horizontalDatumReference: EPSG
  - horizontalDatumValue: 4326

XML View

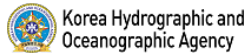
```

<?xml version="1.0" encoding="UTF-8"?>
<S102US_OA01_0001101_1AS xmlns="http://www.noaa.gov/schemas/s102" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <Identifier>
    <S102US_OA01_0001101_1AS/>
  </Identifier>
  <EditionNumber>2</EditionNumber>
  <DataPresentation>True</DataPresentation>
  <ProtectionScheme>S102US_OA01</ProtectionScheme>
  <DigitalSignatureReference>dia</DigitalSignatureReference>
  <DigitalSignature>302C021433796C647CC1C35A67C72F7A7C6157A6594E2B021420370B84F3A5A8A1</DigitalSignature>
  <Copyright>unrestricted</Copyright>
  <Classification>unclassified</Classification>
  <Purpose>new edition</Purpose>
  <HarborNavigation>
    <EditionNumber>2</EditionNumber>
    <Issuedate>2018-05-15</Issuedate>
    <Issuetime>19:21:10</Issuetime>
    <OptimumDisplayScale>10000</OptimumDisplayScale>
    <MaximumDisplayScale>2500</MaximumDisplayScale>
    <MinimumDisplayScale>100000</MinimumDisplayScale>
    <HorizontalDatumReference>EPSG</HorizontalDatumReference>
    <HorizontalDatumValue>4326</HorizontalDatumValue>
  </HarborNavigation>
</S102US_OA01_0001101_1AS>
  
```

Error View

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

# KHOA S-100 Middleware System



IIC MIDDLEWARE TOOL

## 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



**HPD Features**

<input type="checkbox"/>	Features
--------------------------	----------



**S-100 Features**

<input type="checkbox"/>	Features
--------------------------	----------

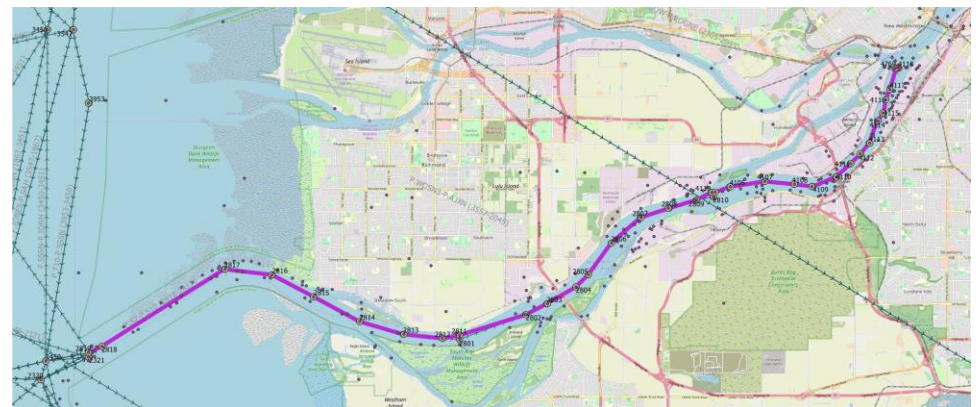
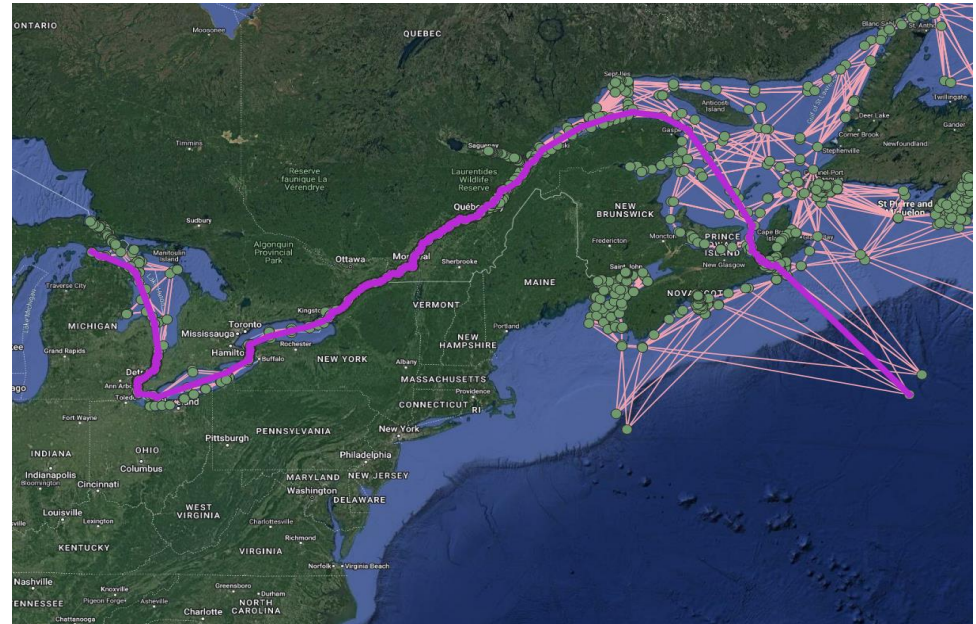
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NEW PATHS, NEW APPROACHES

# CCG S-100 Projects



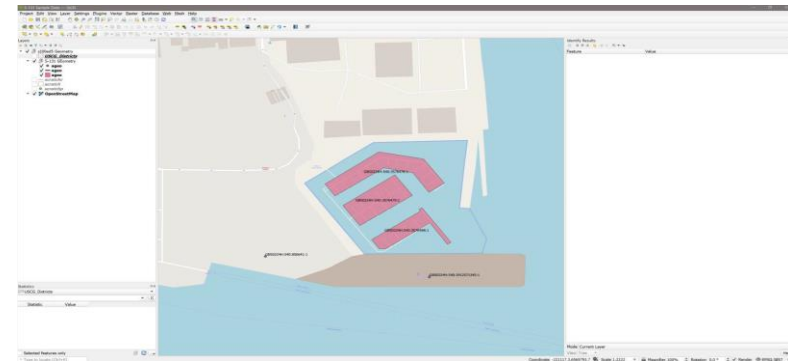
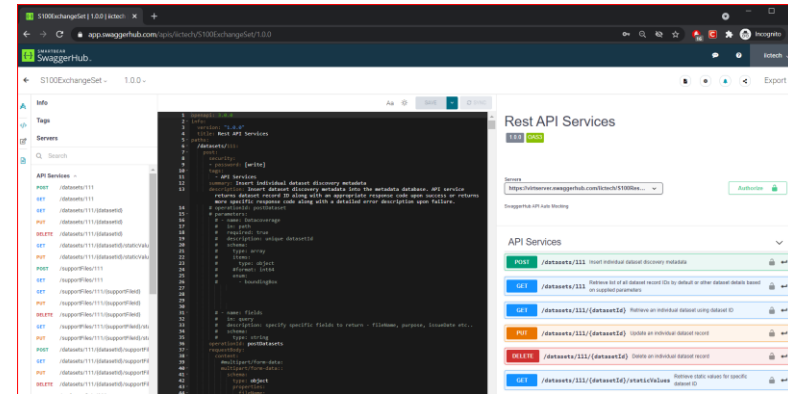
- S-129 UKC Policy Review
- S-127 Data Production for Canada
- S-100 Metadata Proposal Development
- S-100 Training Materials Development
- AtoN DB Conversion Roadmap
- S-123/S-127 Portrayal Development
- S-100 Workflow Visualizations
- S-421 Sample Data Production
- S-123 and S-127 Geoserver Data Visualization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



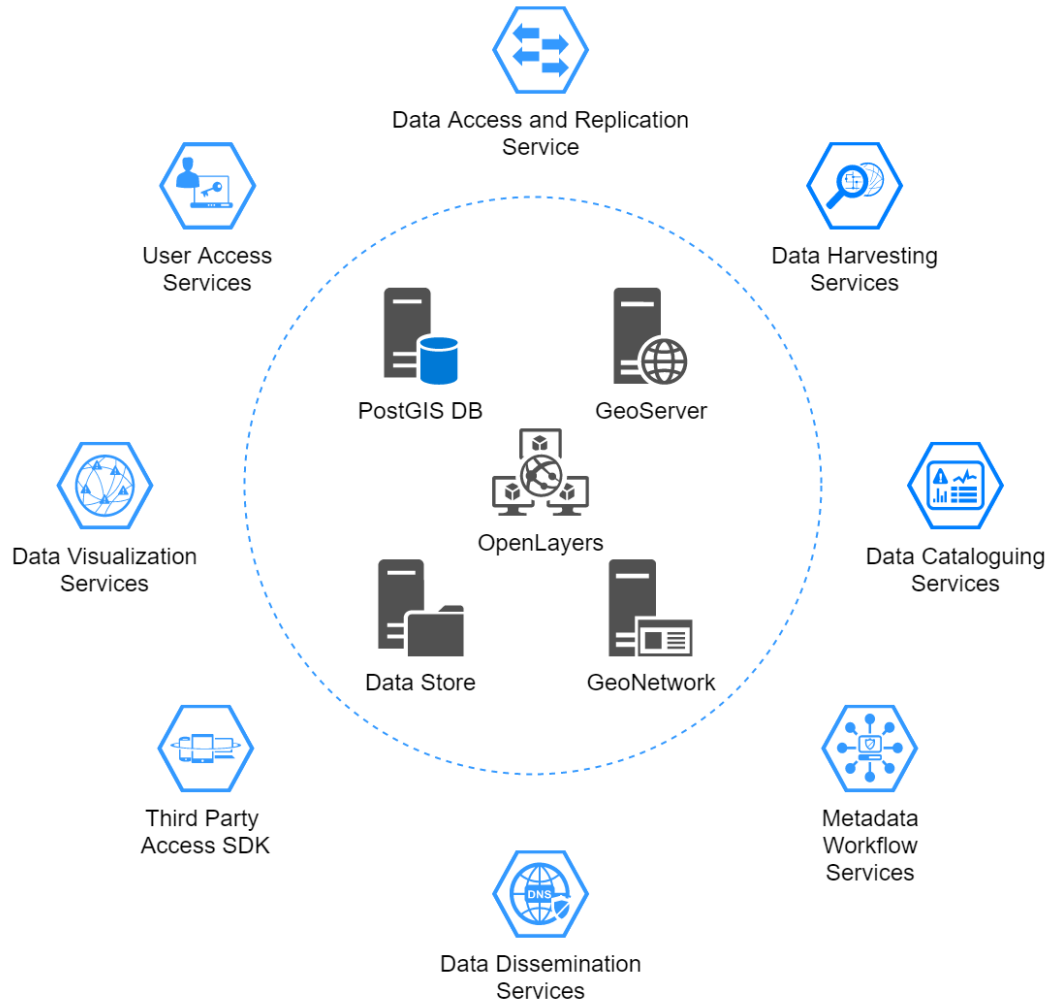
# Other S-100 Projects



- 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 overlapping windows from the IIC's Production Tools suite:

- FeatureBuilder v5.7:** A metadata management window with a table of features and their attributes.
- Map Viewer:** A window showing a map of a coastal area with various features and a layer manager.
- Digital Signature Tool:** A window titled "dimostrazione della parte quindici firme digitali" for creating and verifying digital signatures.

**FeatureBuilder v5.7 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..*]		
id	1	TEXT (1-1)		
issuer	IIC	TEXT (1-1)		
signatureValue	2394023840982390482	TEXT (1-1)		
signatureType	Data Signature	ENUMERATION ...		
data type	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)		
horizontalDatumRef	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]	1272C7196116031B8C.gml	
DatasetMetadata	ID7	F [N]	1272C7196112851STL_NL.GML	
DatasetMetadata	ID8	F [N]	1272C7196113901SARNIA.GML	

**Digital Signature Tool Fields:**

- Directory: C:\cygwin64\home\kusal\ca\7\S1\_1012C004X00000V1.000
- Data File: C:\cygwin64\home\kusal\ca\7\privkey.pri
- Private Key: C:\cygwin64\home\kusal\ca\7\pubkey.pub
- PubKey: C:\cygwin64\home\kusal\ca\7\cert.pem
- Certificate: xC71OG08a1+5u8KBydImCpB8B7y9A3eYKjg98vPvP6m46m+a8xCL4E8z4H99J0dC490HqJ78sk0aNOME4wRQYDVR0OBByFLa5i74MF6sQQj1ODLnu97hACHiBM8GAlUdIwQYBAFLa5i74MF6sQQj1ODLnu97hACHiBM8GAlUdEwQPMABAF8wCvY7YIZIAUWBACAAzAMC0CFQCA5DiER0Tag1pM81WRhdzco0g2jgiUeDjbn0SEN4+pqUphpx6P1UrvZw=
- Sign: -----END CERTIFICATE-----
- Verify: MCwCFB9zarKys8h9afGG36kd9DTJ8H7YAhRjk7HdbvM7MzCJR5J5DwOiu5WDA==
- ChSign: chaining (Hex Characters)
- CK1: 302C02141E9080A85DE2AF95992606858828D540281F95021428D0FC2AAE076E668AAB88E69D73A12E41A16676
- CK2: 302C02140C24F8C64DCFC3BE92FA1FEE86ED3F04CC3021452A08139C492C35C33996A84E036D558A0E093

NEW PATHS, NEW APPROACHES



- 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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