

S-102 Bathymetry Data as a Service

IHO-MSDIWG10

Busan, Republic Of Korea (4 – 5 March 2019)



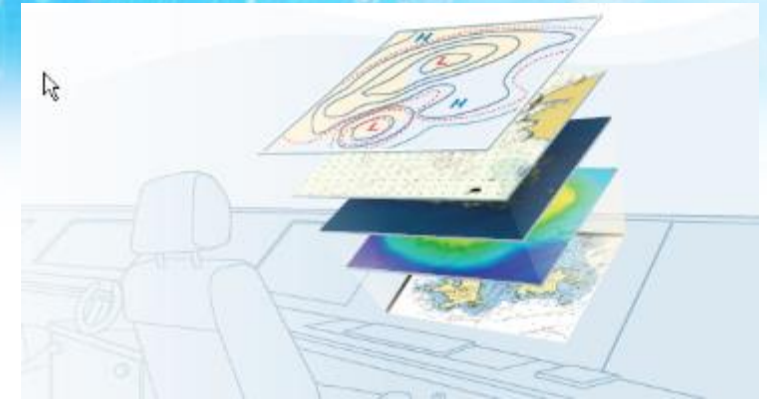
INTRODUCTION

- Forward thinking hydrographic office are moving from product centric to data centric workflows and services
- A project has been conducted with the CHS to implement an innovative bathymetry data service that will demonstrate the value of the evolving IHO S-100 data standards
- The Project Team is made up of CHS (HO), Teledyne CARIS (geospatial software) and PRIMAR (ENC distributor)
- It will focus on the latest technological approaches to leverage some key opportunities for tomorrows hydrographic industry



KEY OBJECTIVES

- **What problems are we trying to solve?**
 - The survey turn-around time
 - Efficiency and complexity of meeting the needs of multiple stakeholders
 - Operational preparedness for e-Navigation and autonomous shipping
 - Data integrity and security



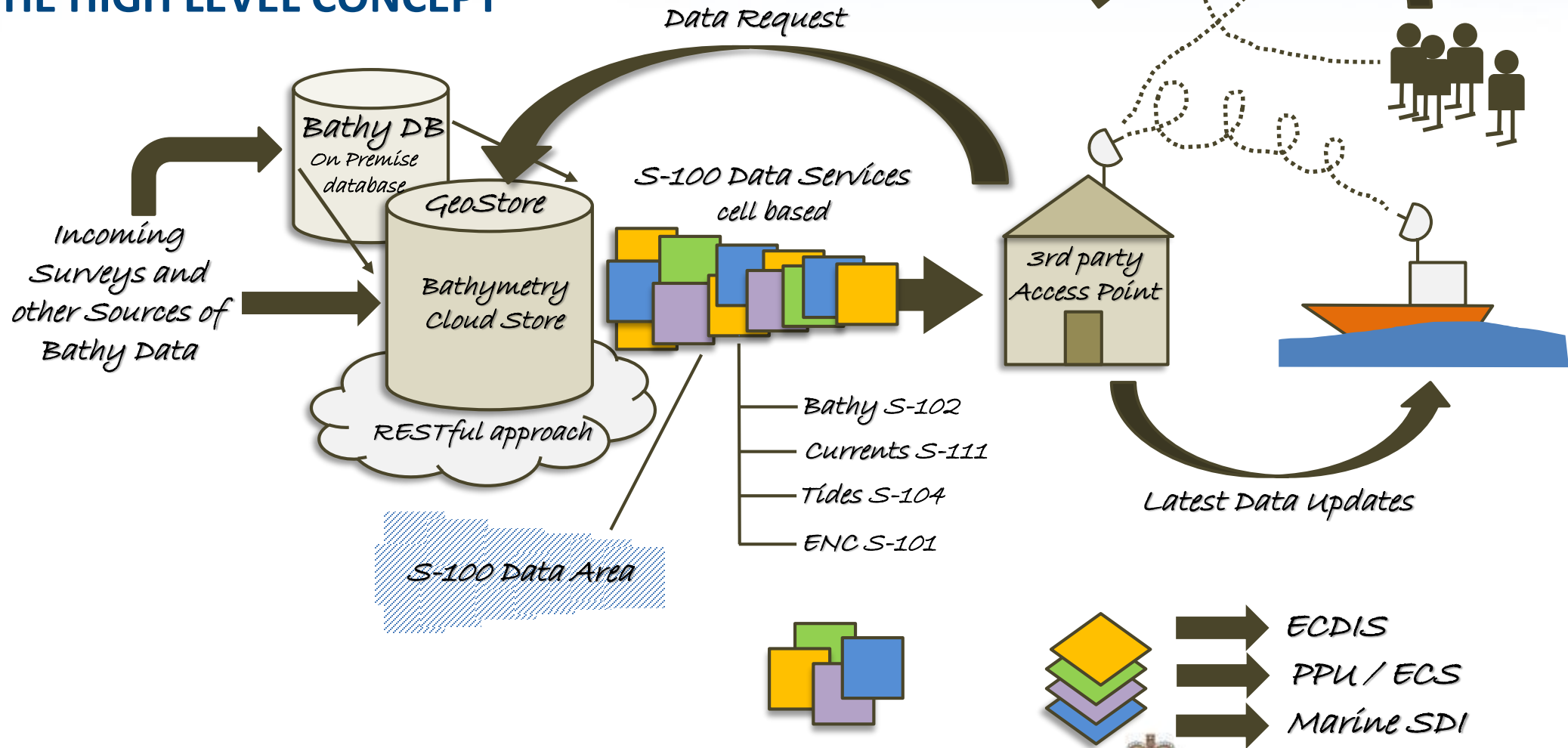
KEY OBJECTIVES

- **What approaches are required for success in the market place?**
 - Service orientated
 - Cloud based
 - Bathymetry focused then charts
 - Latest open geospatial approaches
 - Latest computing techniques



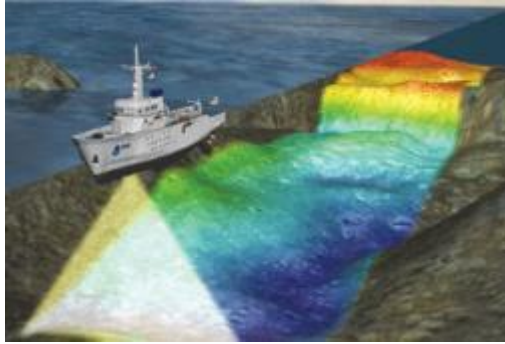
THE HIGH LEVEL CONCEPT

Subscribe to data

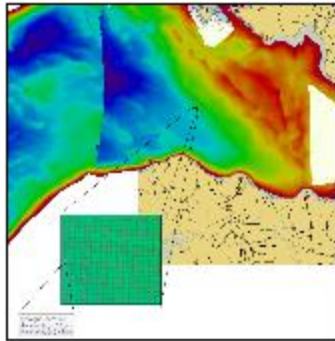


S-102 VALUE CHAIN

Data collection by
HO or Contractor



Data processing and
S-102 production in
CARIS software



PRIMAR provide
channel to market



Commercial
and National
Distributors

Sales

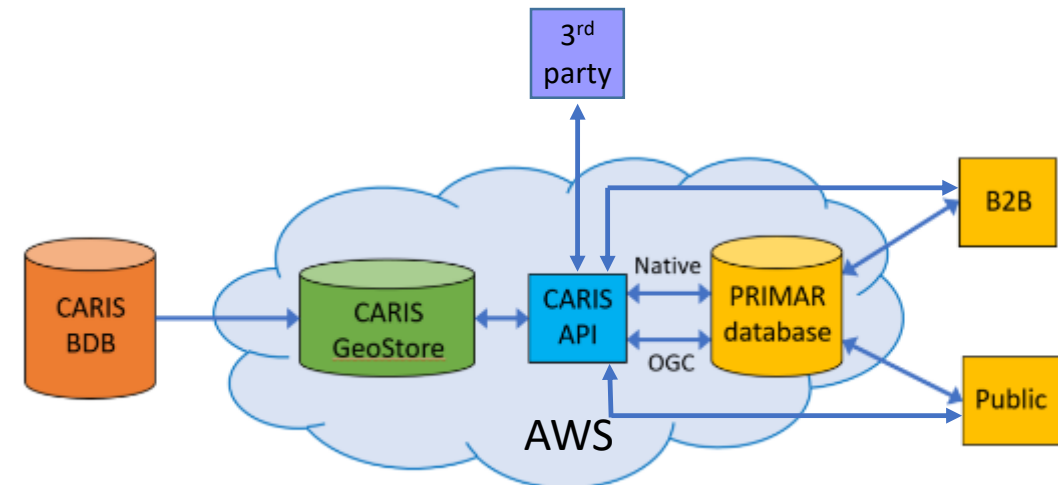


End-users



PILOT PROJECT OVERVIEW

- This pilot will allow CHS, Teledyne CARIS and PRIMAR to demonstrate its ability to provide a service that consumers of bathymetry data can subscribe to
- The bathymetry data will be available as S-102 products at 3 different resolutions and also OGC Web services
- Teledyne CARIS has developed cloud data store and cloud processing tools
- Teledyne CARIS has developed a rich API providing 3rd party access to the datastore
- PRIMAR has expanded its existing store front to allow users to subscribe to their area of interest as S-102 bathymetry products and OGC web services



PILOT PROJECT OBJECTIVES

- Garner support from potential stakeholder groups e.g. hydrographic offices, ports, pilots, other government agencies, global mapping initiatives
- Show the hydrographic community the potential benefits of S-102 and bathymetry web services
- Explore potential for use of S-104 and S-111 standard for supplementary services
- Refine the cloud and service technology to work towards a robust and production ready service
- Determine the costs involved in offering cloud based storage and services
- Develop innovative business models to ensure customer adoption by providing value added benefits for stakeholders



TECHNICAL APPROACH - CARIS

- DATA INPUT

- CHS Bathymetry residing in a on-premise Bathy DataBase will be published to an Amazon S3 datastore
- New datasets will be published automatically to the cloud datastore and deconflicted

- DATA ACCESS - NATIVE

- Data access will be via REST API using JSON
- This API will be used by partners like PRIMAR for the purpose of building B2B solutions
- The following services are supported
 - Coverage, Feature, Object, Catalogue, Authentication

- DATA ACCESS - OGC

- This API will provide access to the data for broader uses through open standards
- It will translate from the Native API to standards based OGC services
- The following services will be supported
 - WCS, WFS, CSW



TECHNICAL APPROACH - CARIS

- CATALOGUE SERVICE

- The catalogue service can be used to discover bathymetry data
- Based on a geographic area of interest or data updated within a specific time period
- Or a combination of both requests
- client applications can then notify users what changed

- CLOUD STORAGE

- The data will be stored in a highly scalable S3 datastore
- The schema will use the OGC simple features model
- This is supported in the Bathy Database Server 5.0 software

- CLOUD SCALABILITY

- The system will be deployed using a micro-services based architecture
- Modern containerization technologies will be used to build a scalable and responsive system
- Load balancing and other features that are provided by the cloud platform will be utilized
- The combination of micro-services, containerization and load balancing will allow the system to adapt to the load
- Strategic use of caching will be used to achieve optimal performance



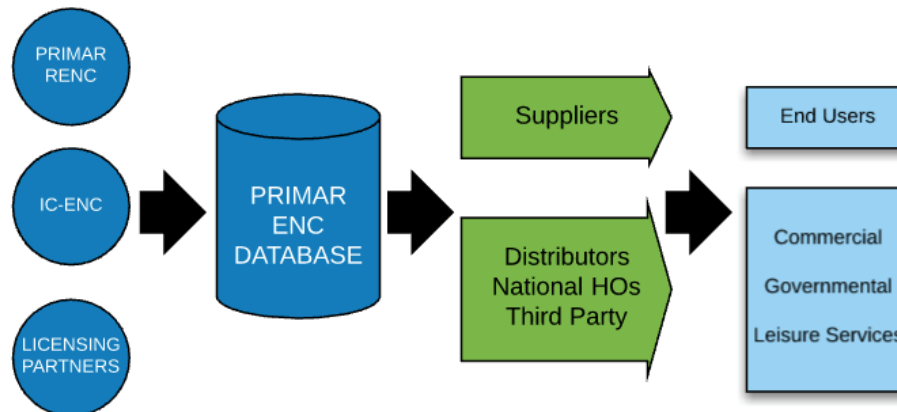
TECHNICAL APPROACH - PRIMAR

- PRIMAR DATABASE

- The current PRIMAR database consist of ENC's from PRIMAR RENC member nations (15,000 ENC's from 60 countries)
- The PRIMAR ENC database is continuously updated with new data and promptly released for users
- **The scope of the PRIMAR database will be expanded to support S-102 bathymetry**

- PRIMAR WEB APPLICATION

- PRIMAR has established various web applications with high availability and high level of self-service
- PRIMAR has B2B solutions for integrating a distributor's business systems with the PRIMAR ENC service
- The Virtual PRIMAR Network (VPN) technology is an internet based front-end service for Hydrographic Offices to manage their own ENC data
- **The scope of the PRIMAR Web applications will be expanded to support subscribing to a S-102 bathymetry service for areas of interest through an open API provided by CARIS**



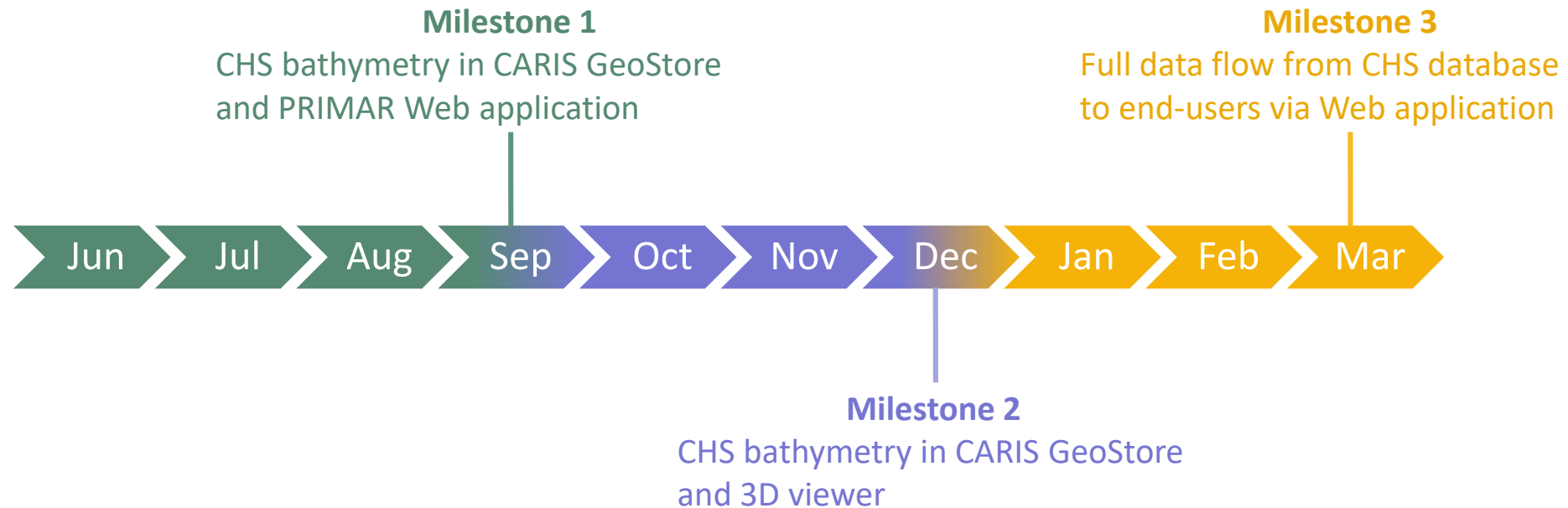
PROJECT DELIVERABLES

- Three demo will act as project milestones
- This will also enable all parties to discuss project progress with broader community
- **Demo 1** - Demonstration of CHS bathymetry via CARIS GeoStore in PRIMAR Web application
 - This will show how bathymetry in the datastore is available alongside ENC data for discovery
- **Demo 2** - Demonstration of CHS bathymetry via CARIS GeoStore in a 3D viewer
 - This is a compelling use case of S-102 data showing the potential for e-Navigation
- **Demo 3** - Demonstration of full data flow from CHS database to client facing Web application
 - This will show how new bathymetry in the CHS database is automatically uploaded to the datastore and is available for users who have subscribed to that area



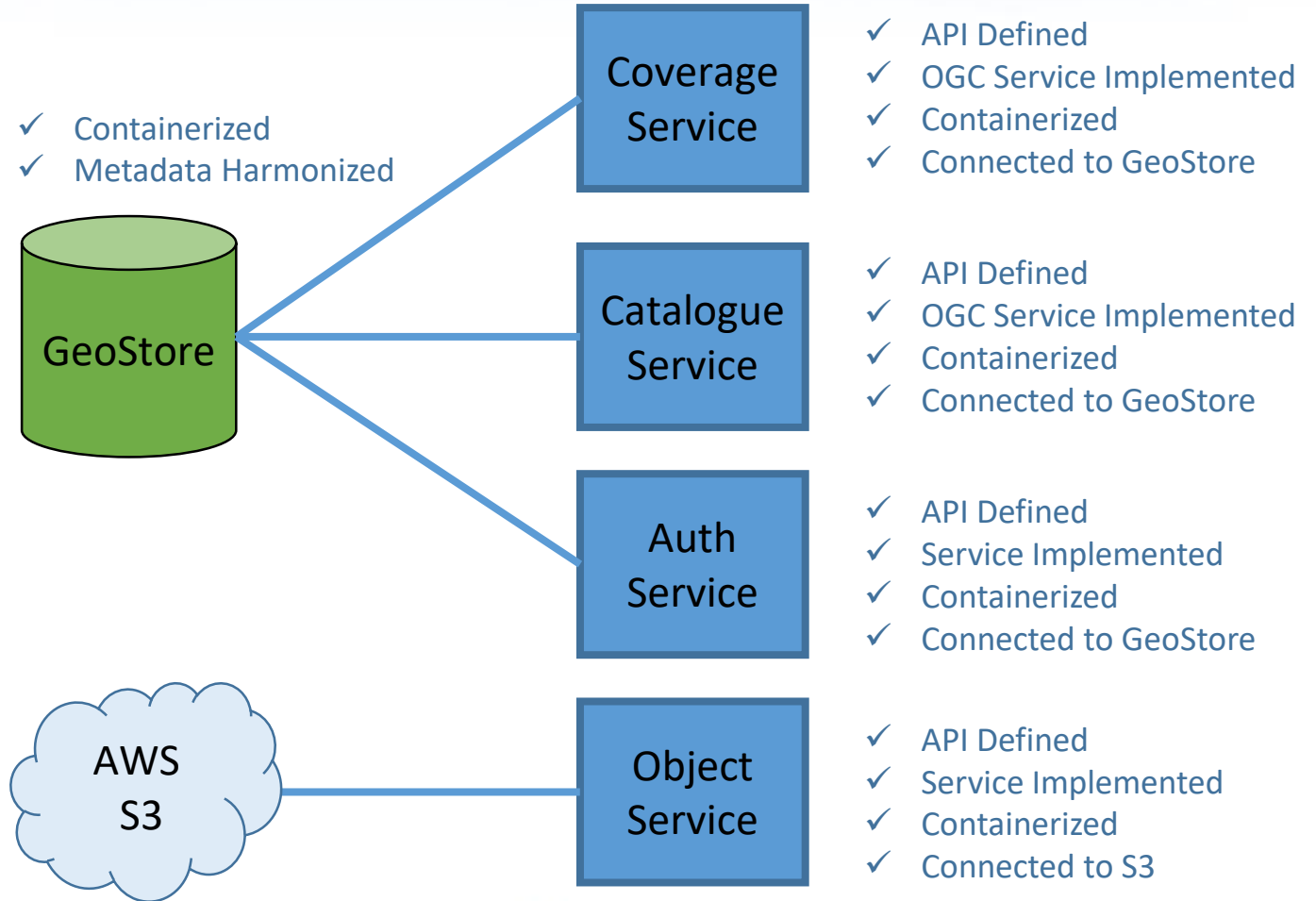
TIMELINE

Three milestones to demonstrate increasing capability of the bathymetry data service



CURRENT PROGRESS

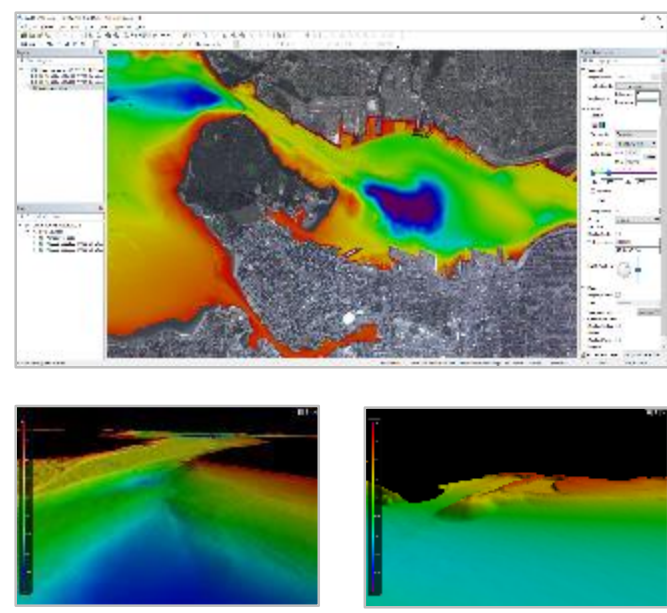
- Milestones 1 and 2 successfully cleared
- Pilot dataset loaded to CARIS cloud (1000 S-102 cells)
- Authorization service in the CARIS cloud
- Performance improvements in CARIS cloud and PRIMAR Map Viewer
- Demonstration scenario of Vancouver Harbour S-102 data in 3D
- Design for ordering and downloading data through PRIMAR's prototype S-102 service
- Work on Milestone 3 almost complete



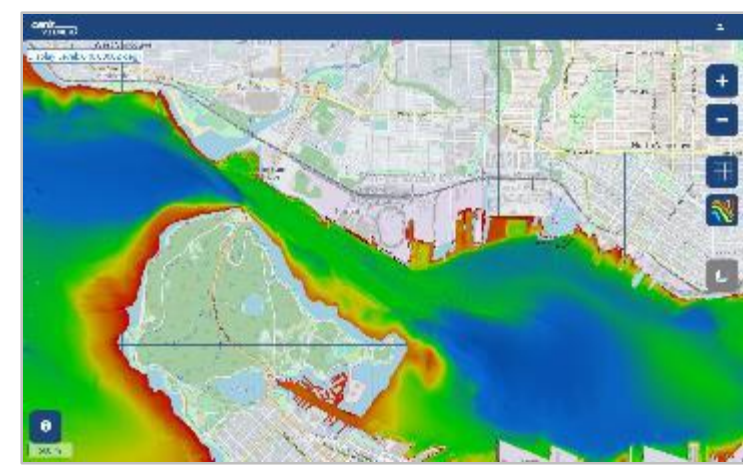
DEMONSTRATION SCENARIO – S-102 DATA AND THE POTENTIAL FOR e-NAVIGATION

Vancouver Harbour in Bathy DataBASE, CARIS Viewer and PRIMAR Map Viewer

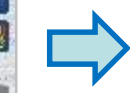
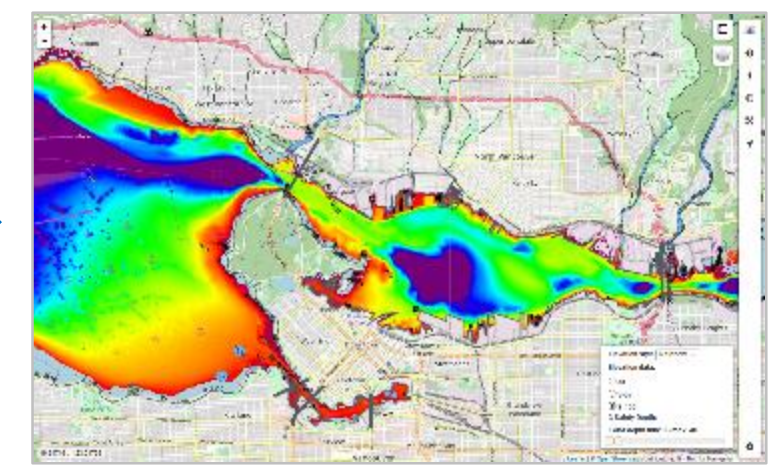
CHS bathymetry in
CARIS Bathy DataBASE



S-102 datasets in CARIS cloud



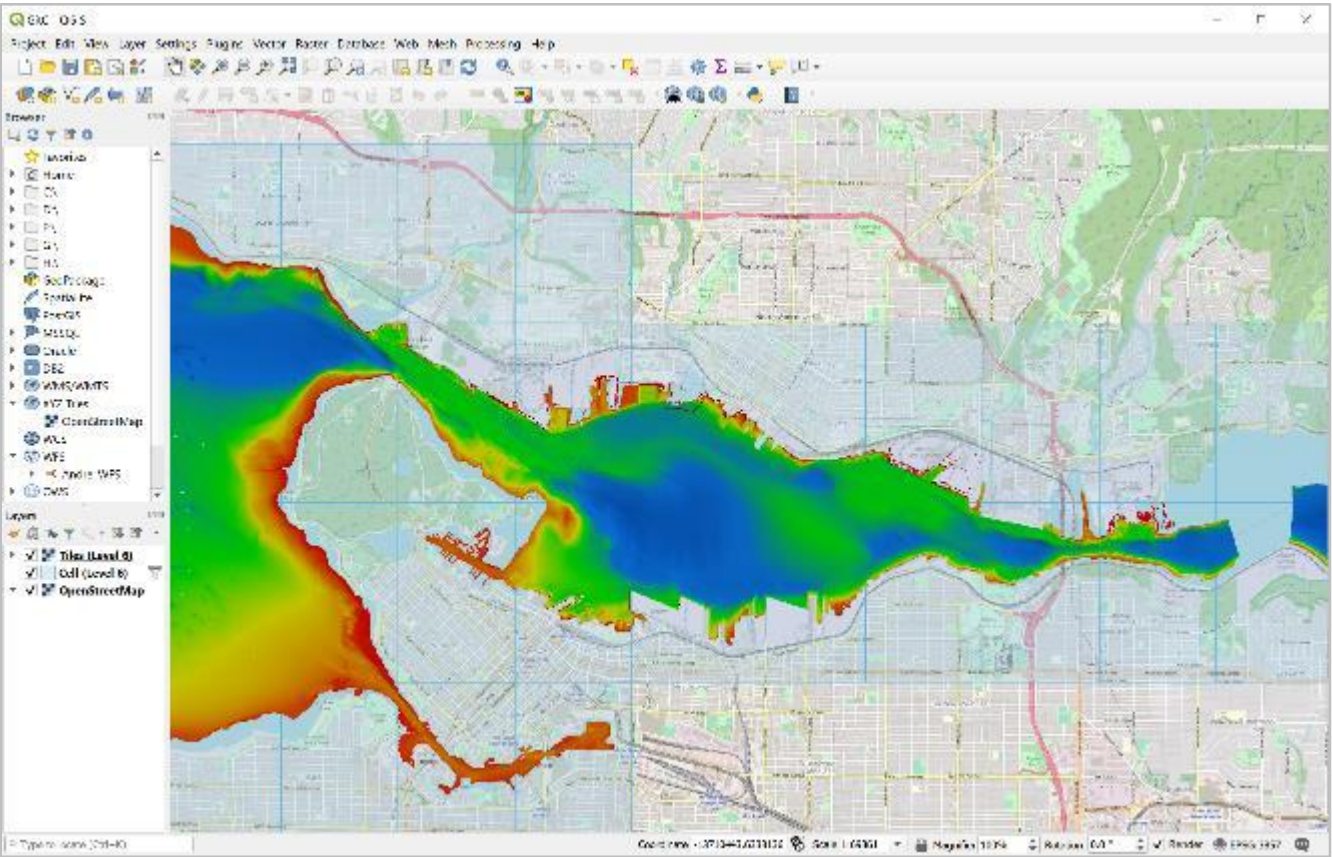
S-102 datasets in PRIMAR Map Viewer



DEMONSTRATION SCENARIO – S-102 DATA AND THE POTENTIAL FOR e-NAVIGATION

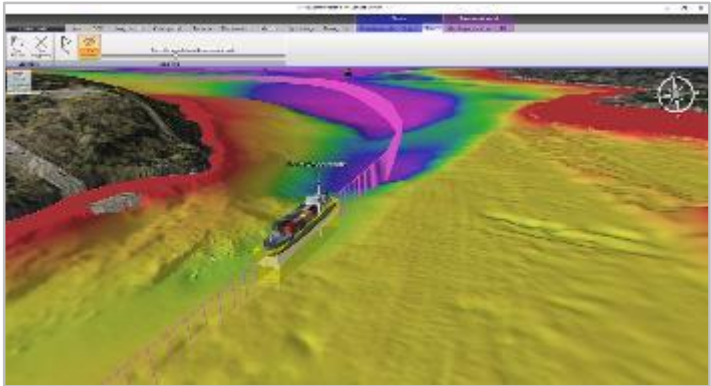
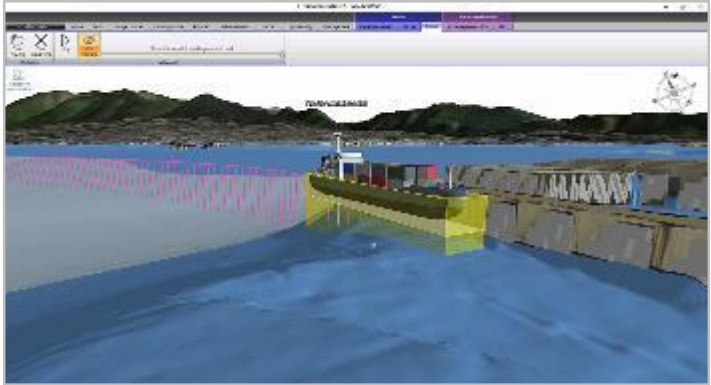
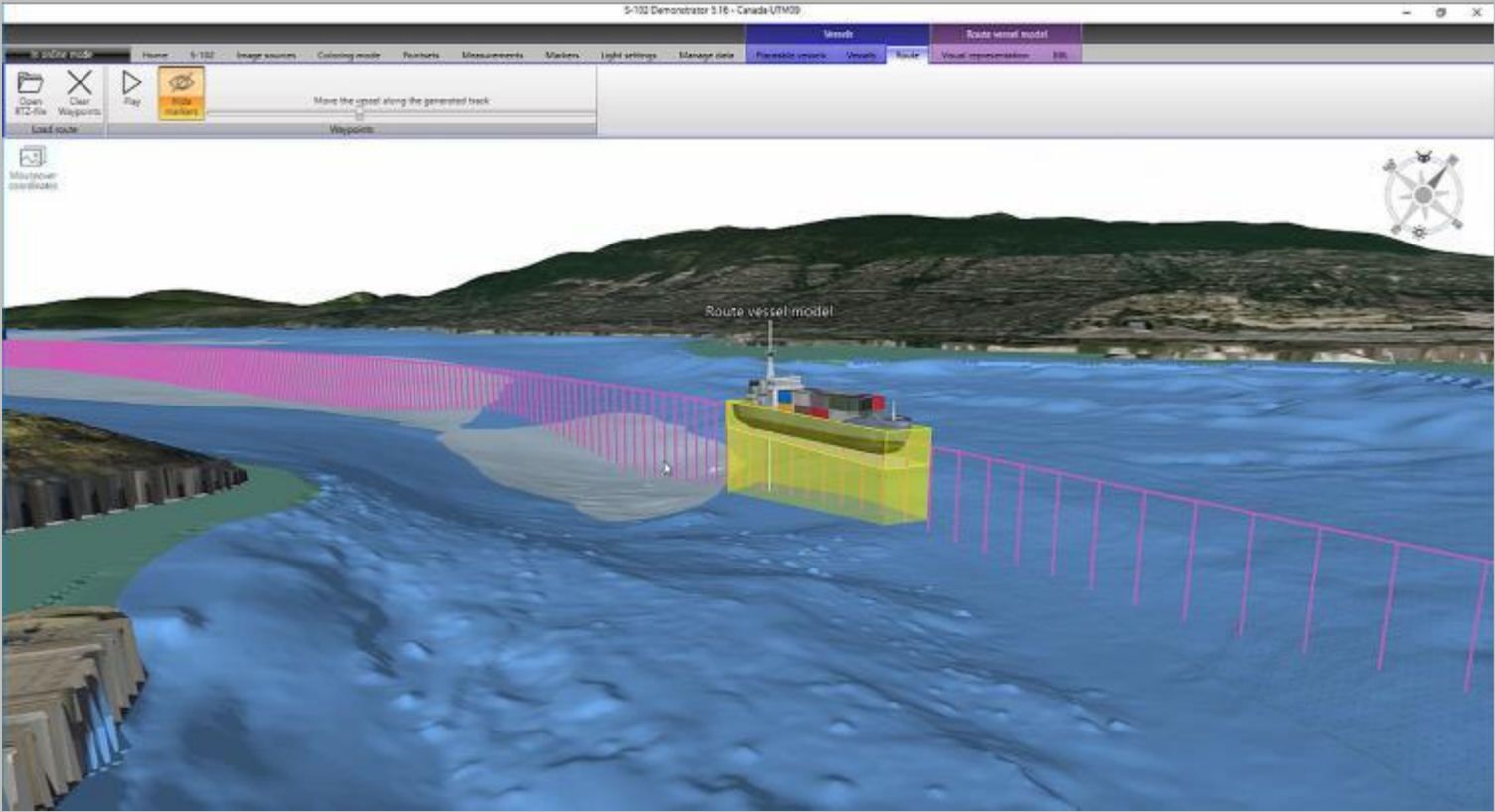
Vancouver Harbour in QGIS via OGC Web Services

- Web Feature Service (WFS)
 - 1.0.0, 1.1.0, 2.0.0
- Web Map Service (WMS)
 - 1.1.1, 1.3.0
- Web Coverage Service (WCS)
 - 1.0, 1.1, 2.0
- Catalog Service for the Web (CSW)
 - 2.0.2



DEMONSTRATION SCENARIO – S-102 DATA AND THE POTENTIAL FOR e-NAVIGATION

Vancouver Harbour in Kongsberg S-102 Demonstrator



OUTREACH

- Outreach is a key aspect of this pilot project
- This outreach will help all team members to determine the viability of moving from a pilot towards a commercial solution, feedback is needed and appreciated
- Papers will be presented at hydrographic conferences, e-navigation events and wider geospatial conferences
- Articles will be published in journals, trade press and through social media channels
- Progress will be reported be at IHO and OGC meetings
- We want other HO's to get involved



CLOSING SUMMARY

- *The combination of CHS, the project proponent, CARIS the principle supplier of geospatial software, and PRIMAR an internationally recognized and utilized ENC distributor, represents a great team with the necessary skill to achieve the goals of this pilot*
- *Together we want to help define the model for the future hydrographic products and services by using the latest geospatial approaches*

