Teledyne Geospatial

a Business Unit of Teledyne Imaging Ltd.

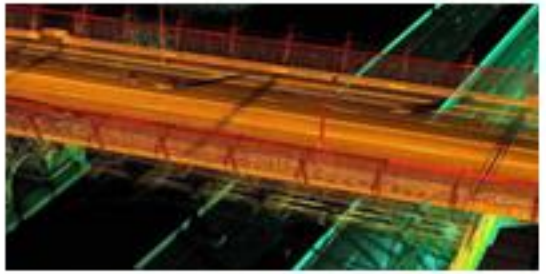
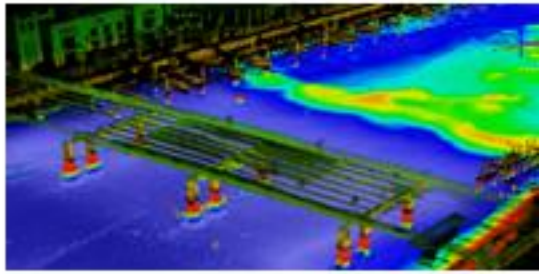
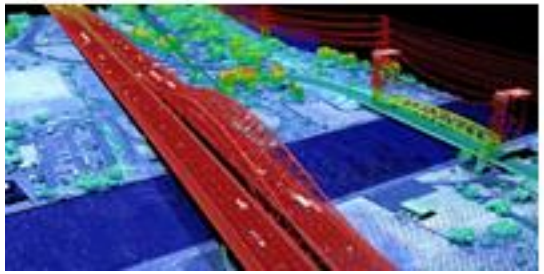
MAP the world in 3D…

REVEALING the past

RESPONDING to the present

SHOWING THE WAY to the future

Accurate 3D Mapping Solutions

Geospatial

Imaging Solutions for Land and Water

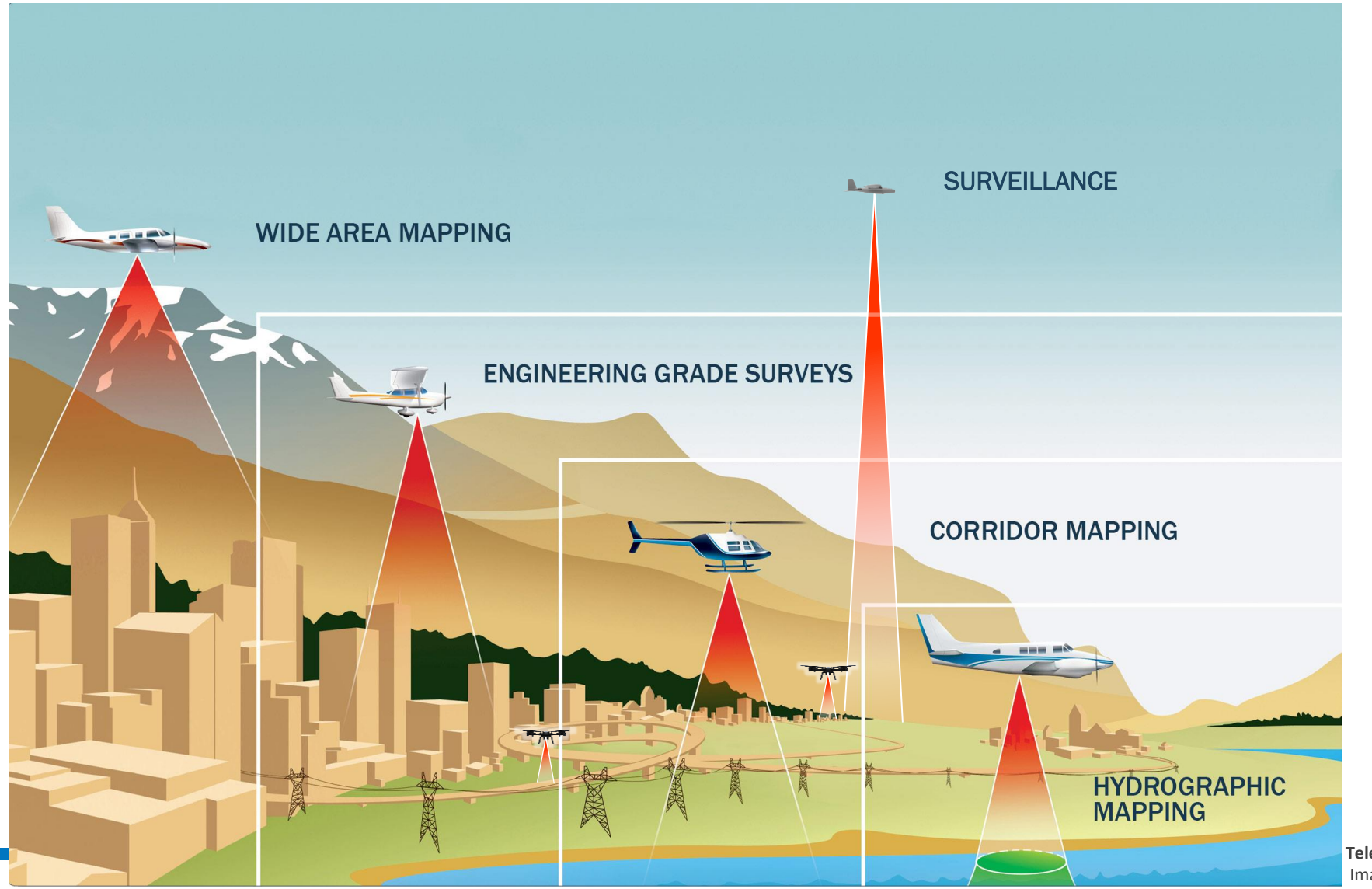
Teledyne Geospatial

CARIS Software

Teledyne Geospatial

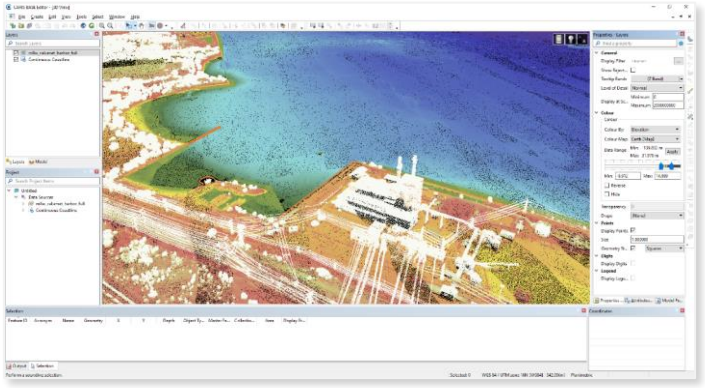
Optech Lidar

Optech Lidar Range



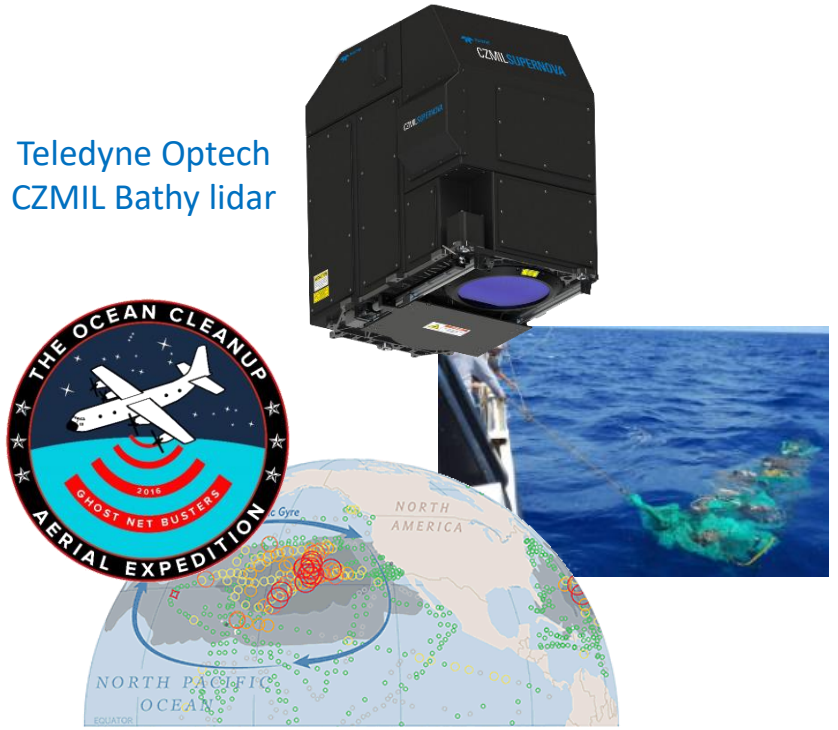
Bathymetric Lidar

- Meets IHO survey specifications
- Large coverage in limited time
- Fast deployment to area of interest
- Land and sea (red + green laser)
- Reaches beyond 75m depths
- Also for object detection
  - Classify objects in the water column
  - Including surface objects detection



Topo Bathy point cloud in CARIS

Teledyne Optech
CZMIL Bathy lidar

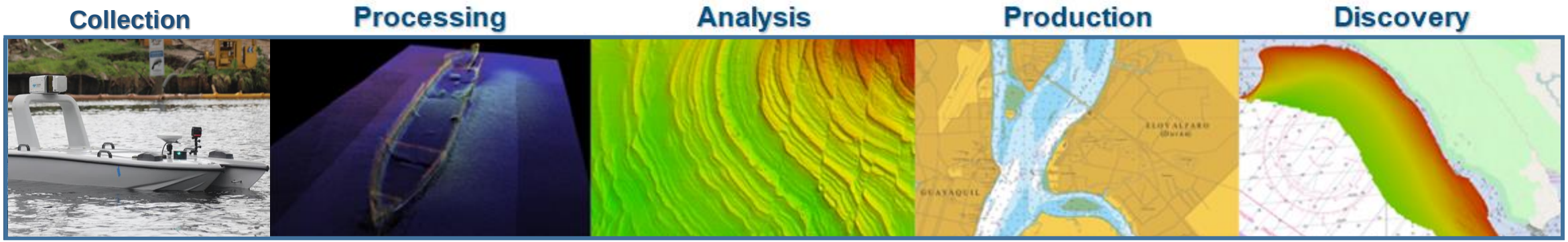


CARIS Geospatial Software

The most trusted Solution for Ocean Mapping and Submarine Charting

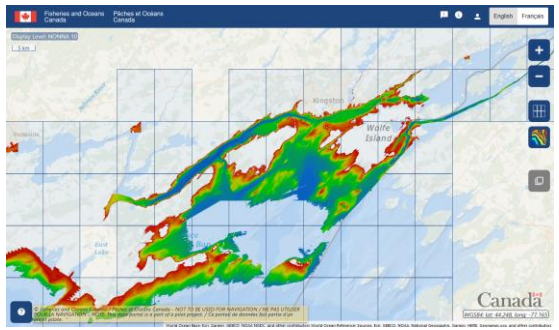
CARIS is the only organization able to offer the marine community a complete and streamlined software solution from Ping-to-Chart

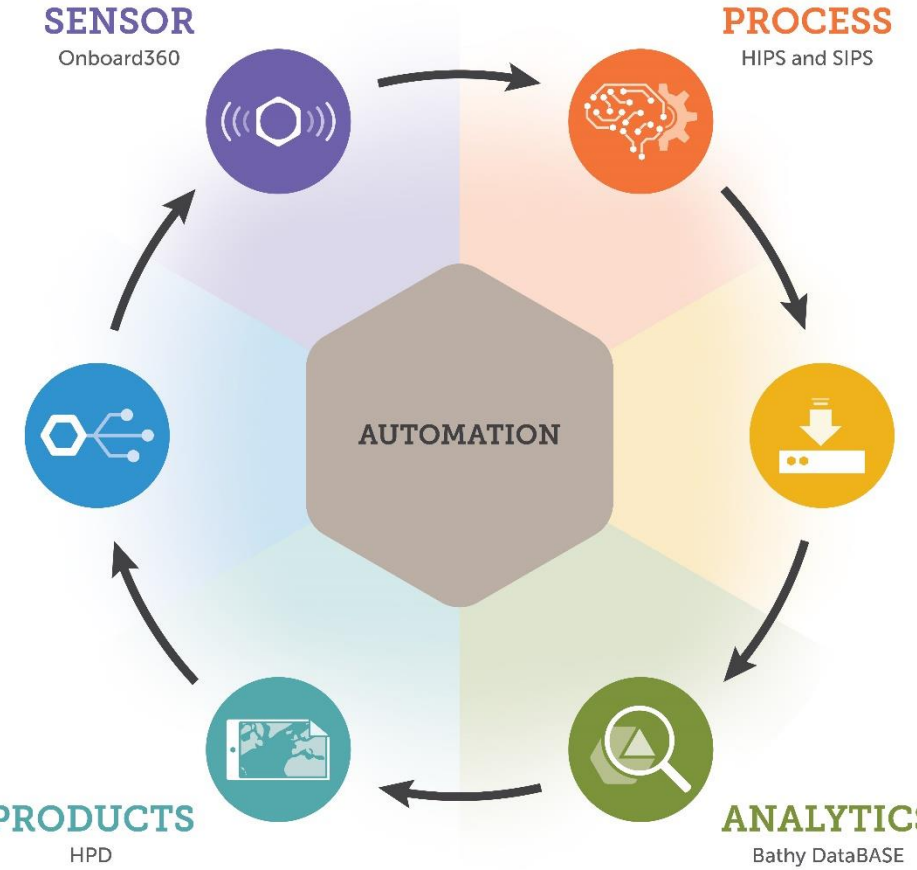
- Data collection and processing and management, through to chart production and internet distribution of marine information and chart products

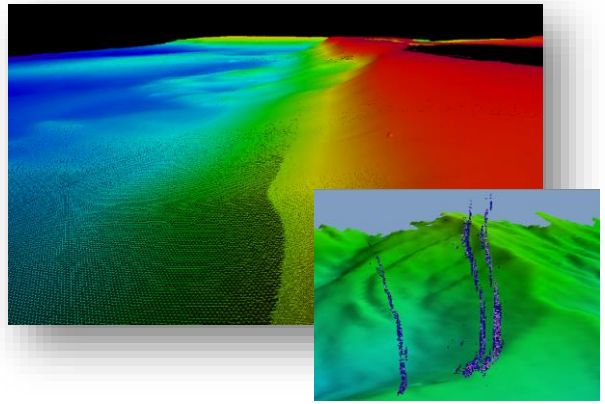


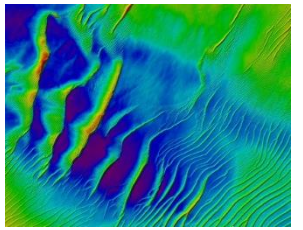
CARIS Geospatial Software

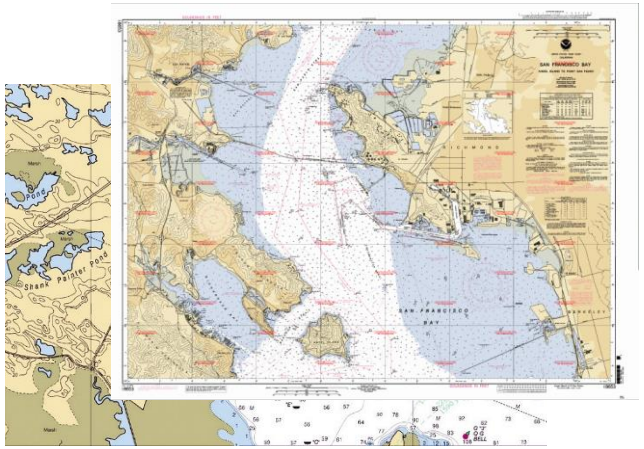
Ping-to-Chart Workflow

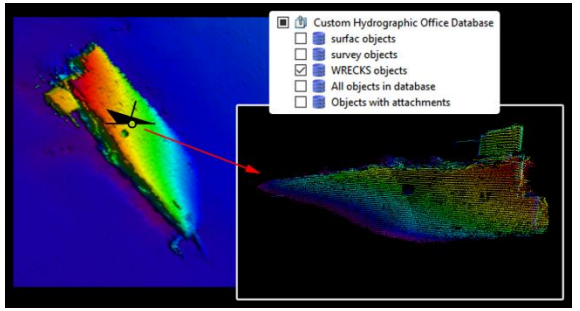












Enabling S-100

CARIS has S-100 support for more than a decade

- CARIS team actively participates in IHO work on S-100 development
  - Providing expert contributions
  - Early adoption of new S-100 specifications
- Full set of tools to create and maintain S-100 products and services
  - Including conversion of existing data to S-100
- Support for the latest version S-100 specifications
  - CARIS supports latest edition of S-100 (Edition 5)
  - Continuous software updates to support of latest S-100 specifications

Product Specification

The Product Specification Register is a repository of published S-100 based Product Specifications.

Each Product Specification includes metadata and downloadable components including Product Specification.

Documentation (Annexes as required for Data Classification and Encoding Guide (DCEG), Application Schema, Validation Checks and Encoding Format); Feature Catalogue; and Portrayal Catalogue. Sample or test datasets may also be included.

※ To register a Product Specification in the Register, Product Specification developers are requested to submit an application to the IHO GI Registry Manager.
The form can be downloaded here

Domain ALL Status Published Category product ID

Idx	Product ID	Name	Version	Status	Domain	
194	S-100	Universal Hydrographic Data Model	5.0.0	Published	IHO Hydro	
195	S-101	Electronic Navigational Chart	1.1.0	Published	IHO Hydro	
199	S-102	Bathymetric Surface	2.2.0	Published	IHO Hydro	
198	S-104	Water Level Information for Surface Navigation	1.1.0	Published	IHO Hydro	
178	S-111	Surface Currents Product Specification	1.2.0	Published	IHO Hydro	
177	S-121	Maritime Limits and Boundaries	1.0.0	Published	IHO Hydro	
73	S-122	Marine Protected Areas	1.0.0	Published	IHO Hydro	
74	S-123	Marine Radio Services	1.0.0	Published	IHO Hydro	
181	S-124	Navigational Warnings	1.0.0	Published	IHO Hydro	
175	S-127	Marine Traffic Management	1.0.0	Published	IHO Hydro	
192	S-128	Catalogue of Nautical Products	1.0.0	Published	IHO Hydro	
176	S-129	Under Keel Clearance Management Product Specification	1.0.0	Published	IHO Hydro	
201	S-130	Polygonal Demarcations of Global Sea Areas	1.0.0	Published	IHO Hydro	
193	S-131	Marine Harbour Infrastructure	1.0.0	Published	IHO Hydro	
200	S-201	Aids to Navigation (AtoN) Information	1.1.0	Published	IALA AtoNs	
189	S-240	DGNSS Station Almanac	1.0.0	Published	IALA AtoNs	
180	S-401	Inland ENC Product Specification	1.0.0	Published	Inland ENC	2020-11-24
185	S-421	Route Plan	1.0.0	Published	IEC	2021-07-02
191	S-98	Data Product Interoperability in S-100 Navigation Systems	1.0.0	Published	IHO Hydro	2022-05-23

Ask the CARIS Customer Service Team how to enable the production and services of these S-100 products

CARIS supports, or will support, most, if not all, of those published

Plus, others still not published
E.g. S-125 Navigational Service

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KHOA Acknowledgements

Enabling S-100

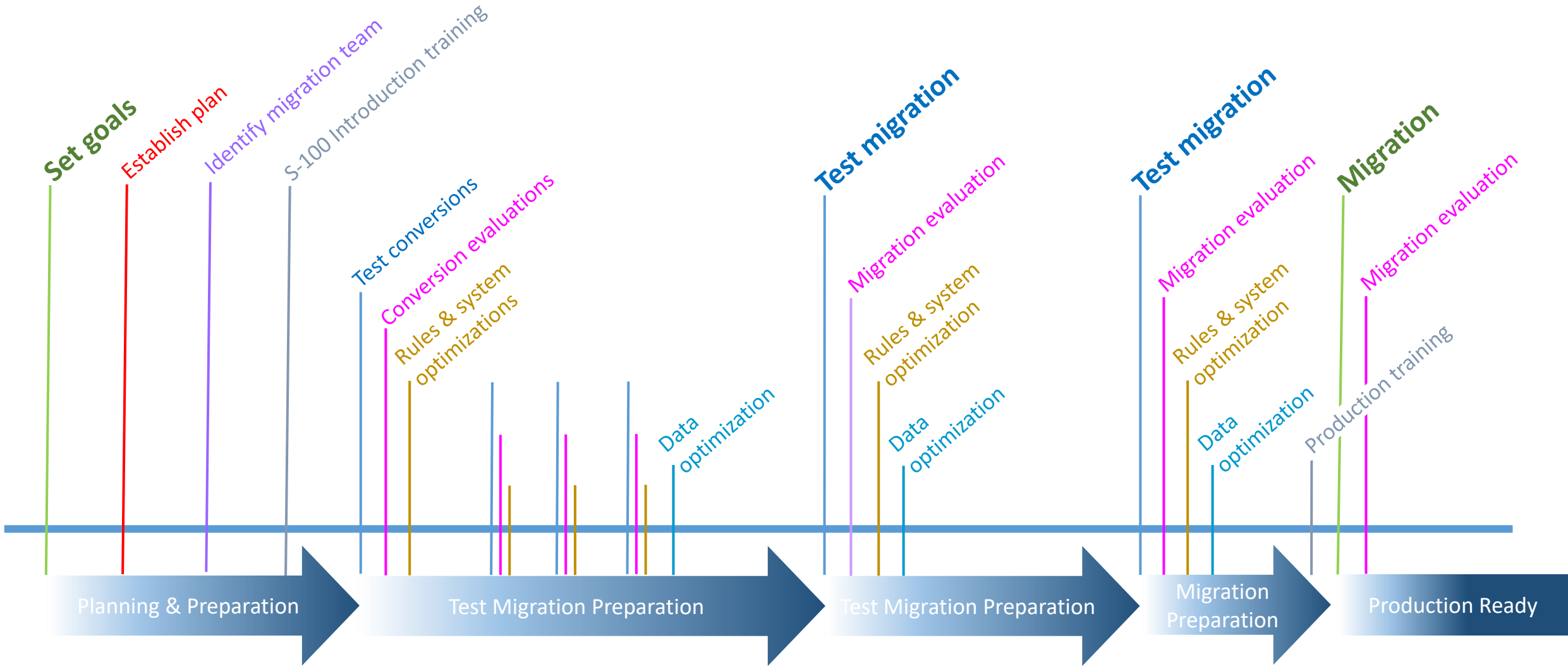
From scratch or migrating existing

Moving to S-100

Planning and preparation is essential

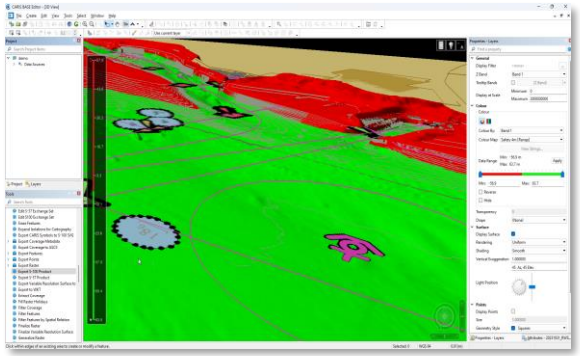
- What is the current situation?
  - What data is currently available, and who are the stakeholders?
- Set goals
  - S-100 products to be enabled, and by when
- Prepare
  - Start early, and ensure knowledge transfer

S-100 Migration Planning



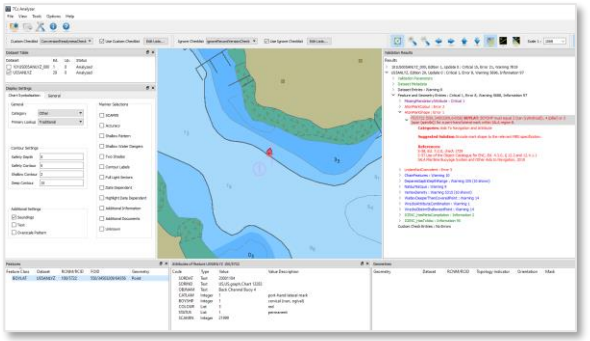
S-100 enabling tools are available

- Production and maintenance
- Conversion of existing data
- Validation of data and products
- Optimization through Automation

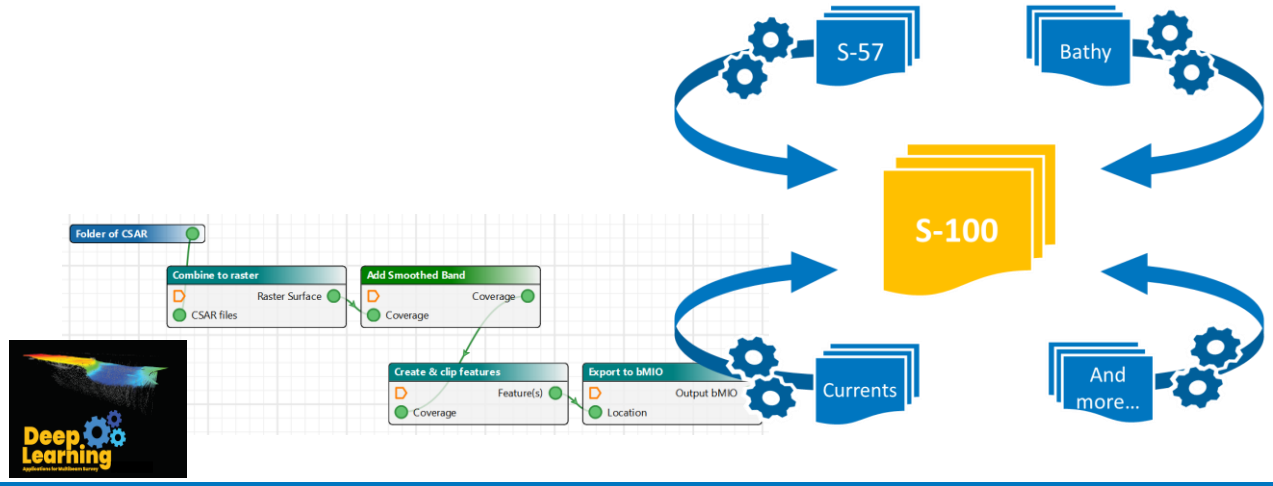


CARIS editor - S-102 overlay on ENC in 3D view

Red/Green colour override to illustrate safety depth at certain draft



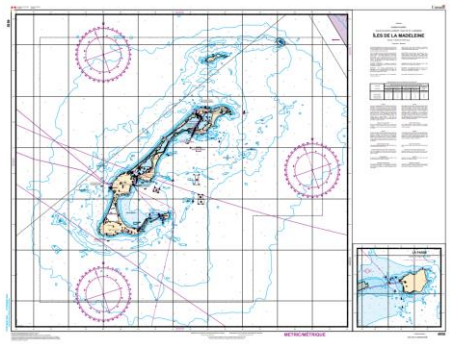
7Cs Analyzer validation of S-101



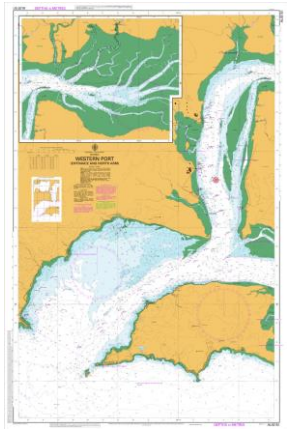
Paper Chart Automation

Automated production of paper charts

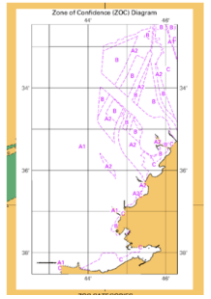
- Allows existing paper chart catalogue to be maintained
- Maintaining existing (INT1) portrayal/style
- Integrate with CARIS Cloud Chart Data Service to facilitate dissemination of paper charts to end-users



Automated chart example



Automated chart example

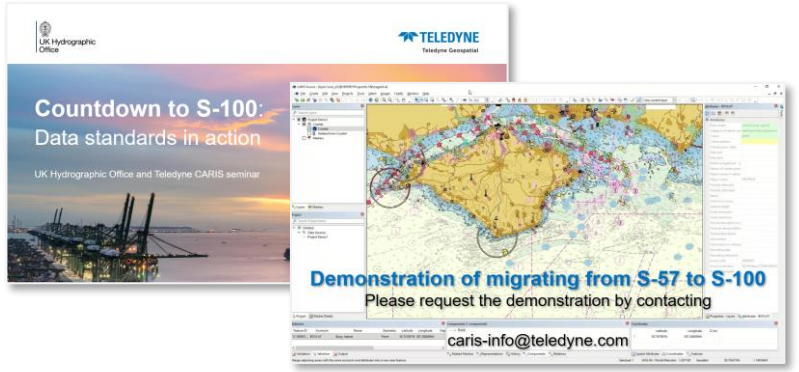


Automatic ZOC diagram creation

S-100 Domain knowledge and experience is available

- S-100 Training catalogue available
  - From introduction to advanced
- S-100 Consultancy services available
  - From planning to execution
  - Migrating existing data and enable new
- S-100 Knowledge sharing
  - Including experiences from others

The CARIS team is available in-person and online



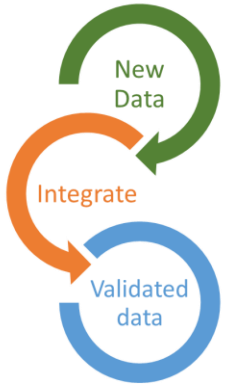
Countdown to S-100: Data standards in action

Joint UKHO and Teledyne CARIS session at 2023 IHO Assembly

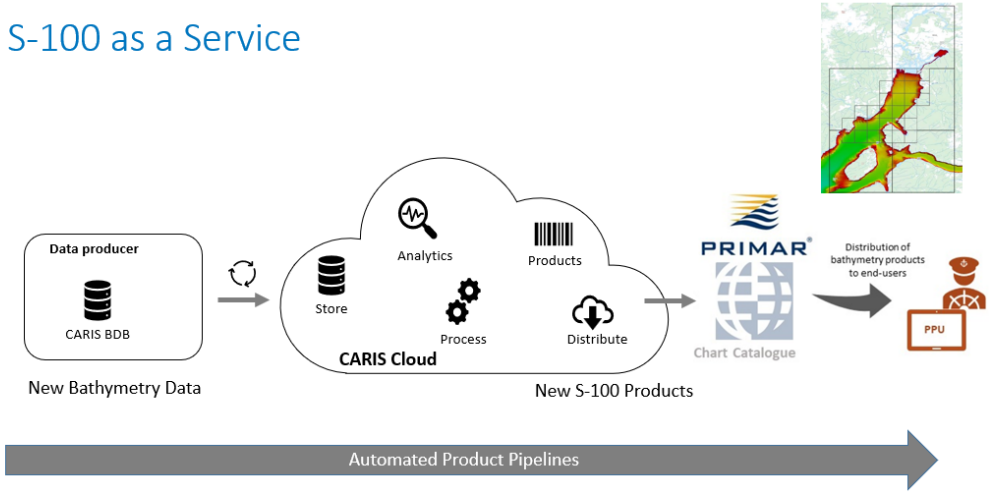
Services and users are available

Examples of existing services and users

- Both S-101 and S-102 services are in use today



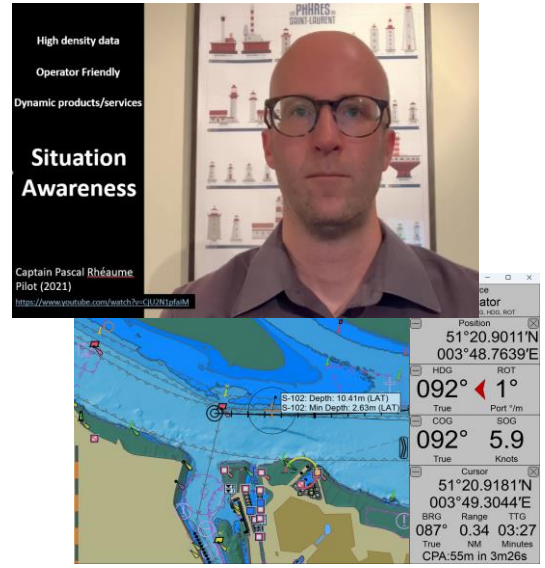
S-100 as a Service



Automated S-100 Service

Canadian Hydrographic Service, PRIMAR and Teledyne CARIS

Canadian Pilot using S-102



ENC with S-102 overlay

SEAiq Portable Pilot Unit

Teledyne Geospatial

a Business Unit of Teledyne Imaging Ltd.

Vinaka

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