TELEDYNE CARIS
Everywhereyoulook™

Trends in Hydrography & New CARIS Solutions

Charles de Jongh - Teledyne CARIS

13th SAIHC Meeting - Cape Town, South Africa – 30 & 31 August 2016

CARIS Ping-to-Chart Workflow

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CARIS Ping-to-Chart Workflow

INPUT

Raw Sonar Data

PROCESSING

- HIPS and SIPS
- Onboard

Processed Terrain Models & Point Clouds

ANALYSIS

- Bathy DataBASE
- BASE Editor
- Engineering Analysis Module
- LOTS

Contours & Features

PRODUCTION

- HPD
- S-57 Composer
- Paper Chart Composer

Nautical Chart

DISCOVERY

- Spatial Fusion Enterprise

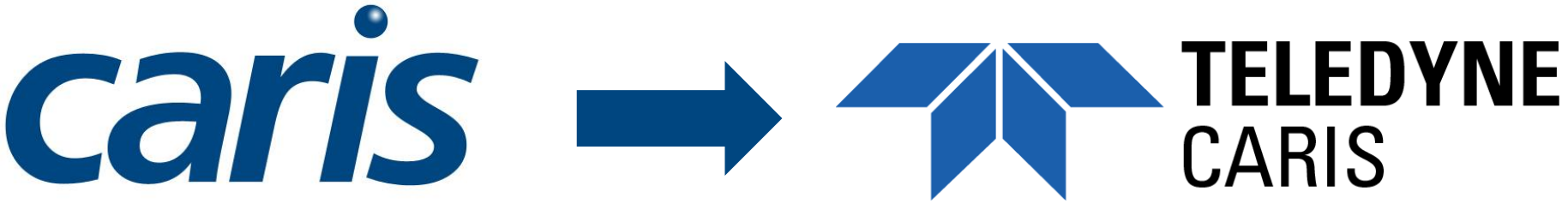
OUTPUT

Web Distribution

PROCESS AUTOMATION

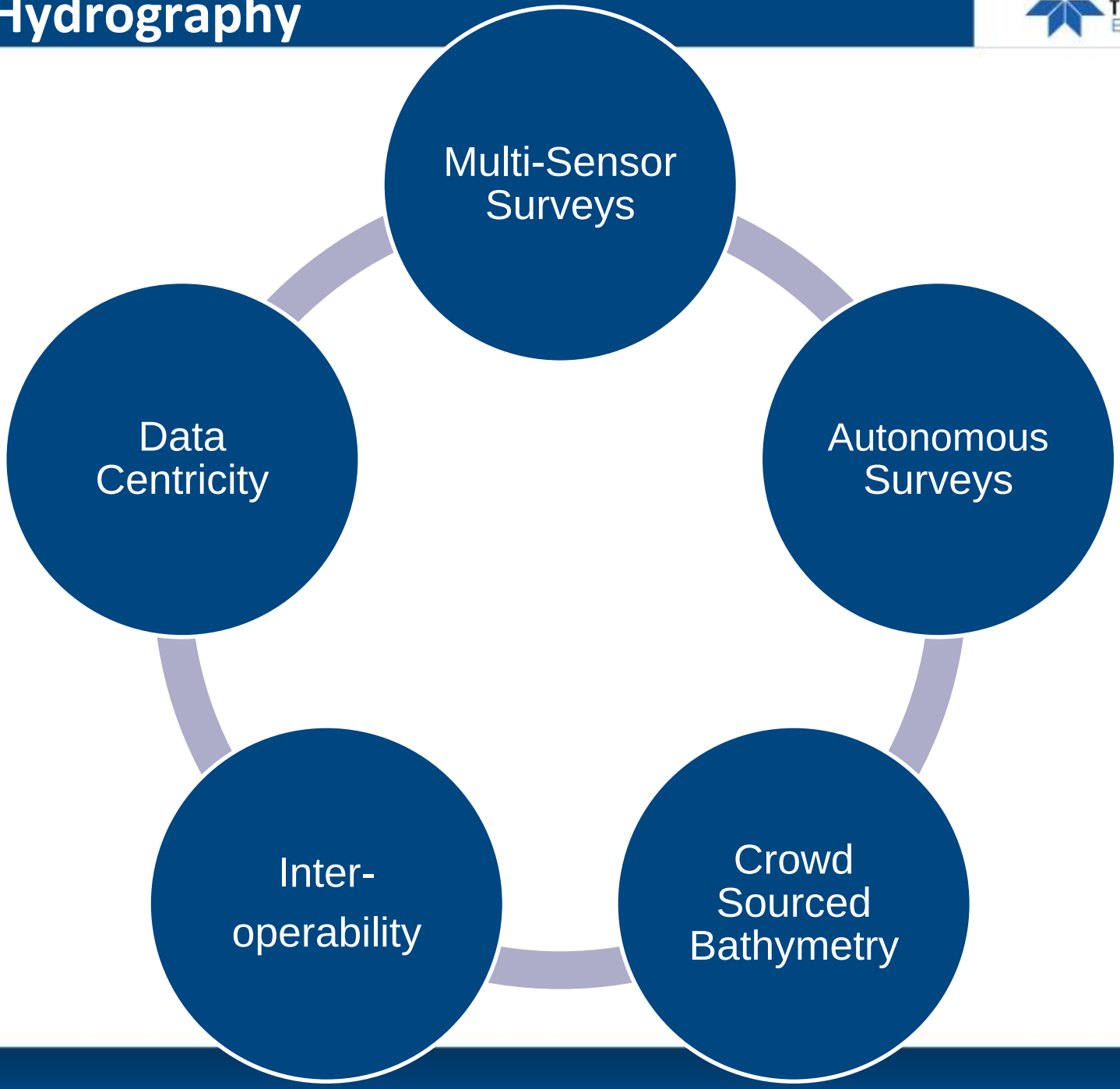
Fredericton – Canada • 's-Hertogenbosch – The Netherlands • Alexandria – United States • Milton – Australia

Teledyne acquired CARIS



- Teledyne Technologies acquired CARIS in May 2016.
- Teledyne CARIS will continue to support the entire hydrographic workflow.
- Teledyne CARIS will broaden its support for a wide range of sensor systems and data standards across the hydrographic industry.

Trends in Hydrography



Multi-Sensor Surveys

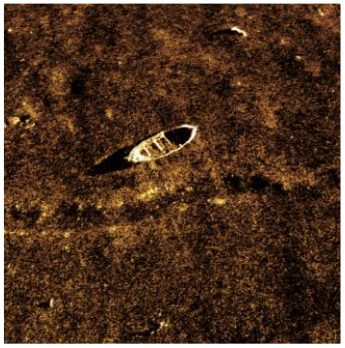
- The surveyors toolbox is constantly expanding & sensors are getting better

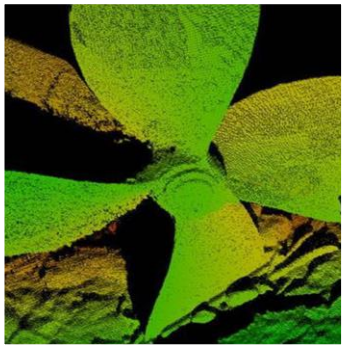
- Three categories of sensors: sound, light & location

- CARIS needs to be able to process, combine and analyze the data acquired by many different sensors.

Sound

- Multibeam
- Side scan
- SAS
- Imaging sonar





Light

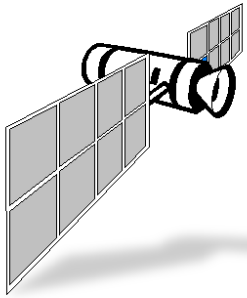
- Laser scanner
- LiDAR
- Camera
- Underwater laser

Location

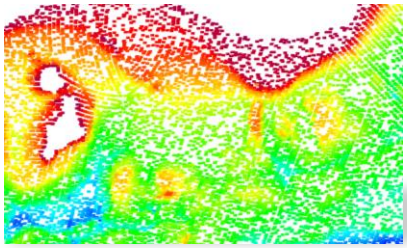
- GNSS
- INS
- USBL

Example - Combining Sensor Information

Mozambique TopoBathy Database (INAHINA, 2012)



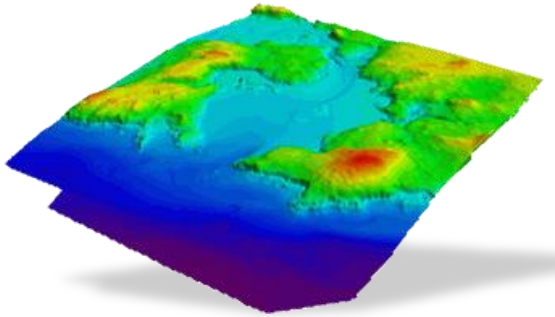
Satellite Data



Bathymetric & Topographic Data

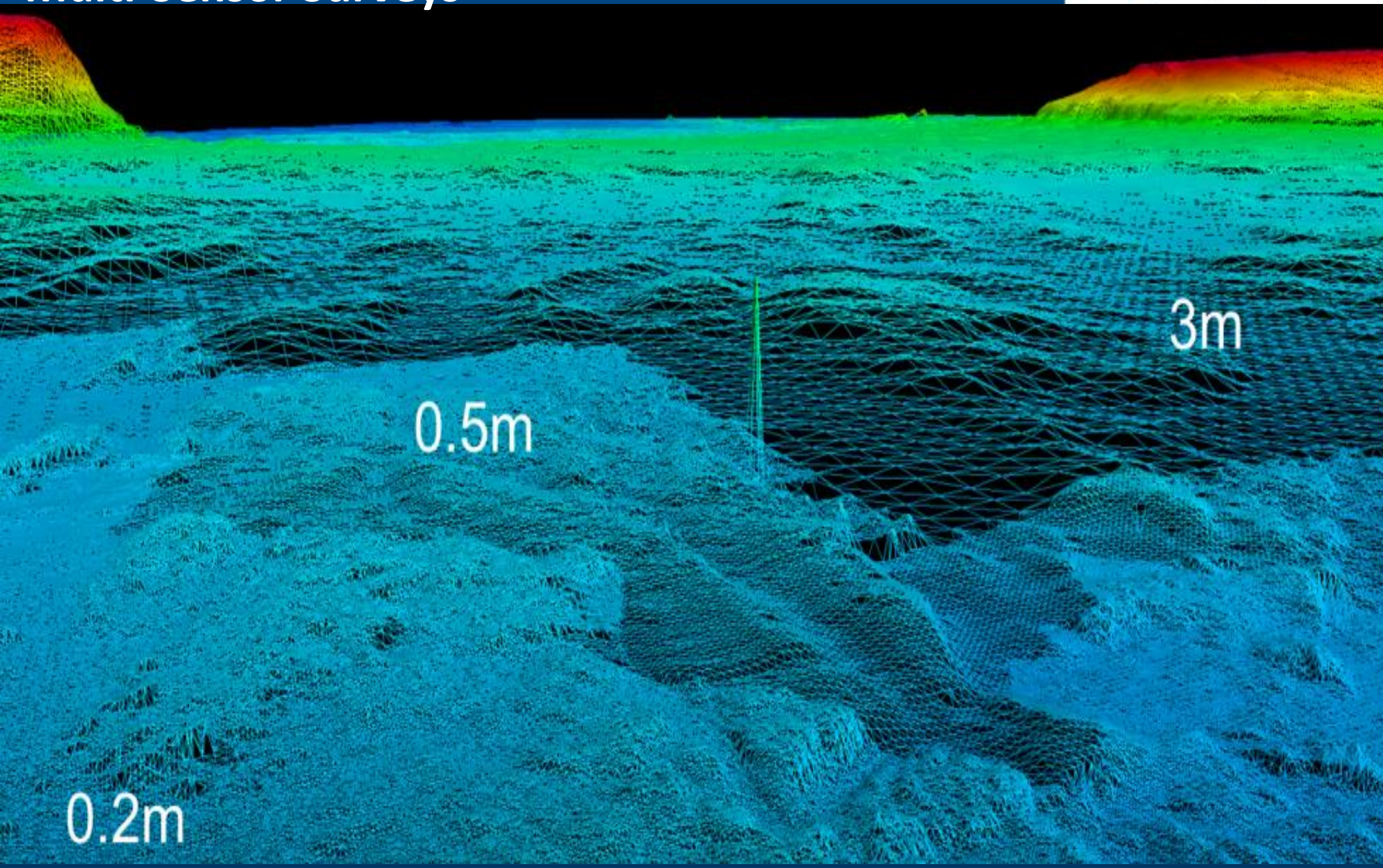
Topographic & Bathymetric Surveys

CARIS Bathy DataBASE

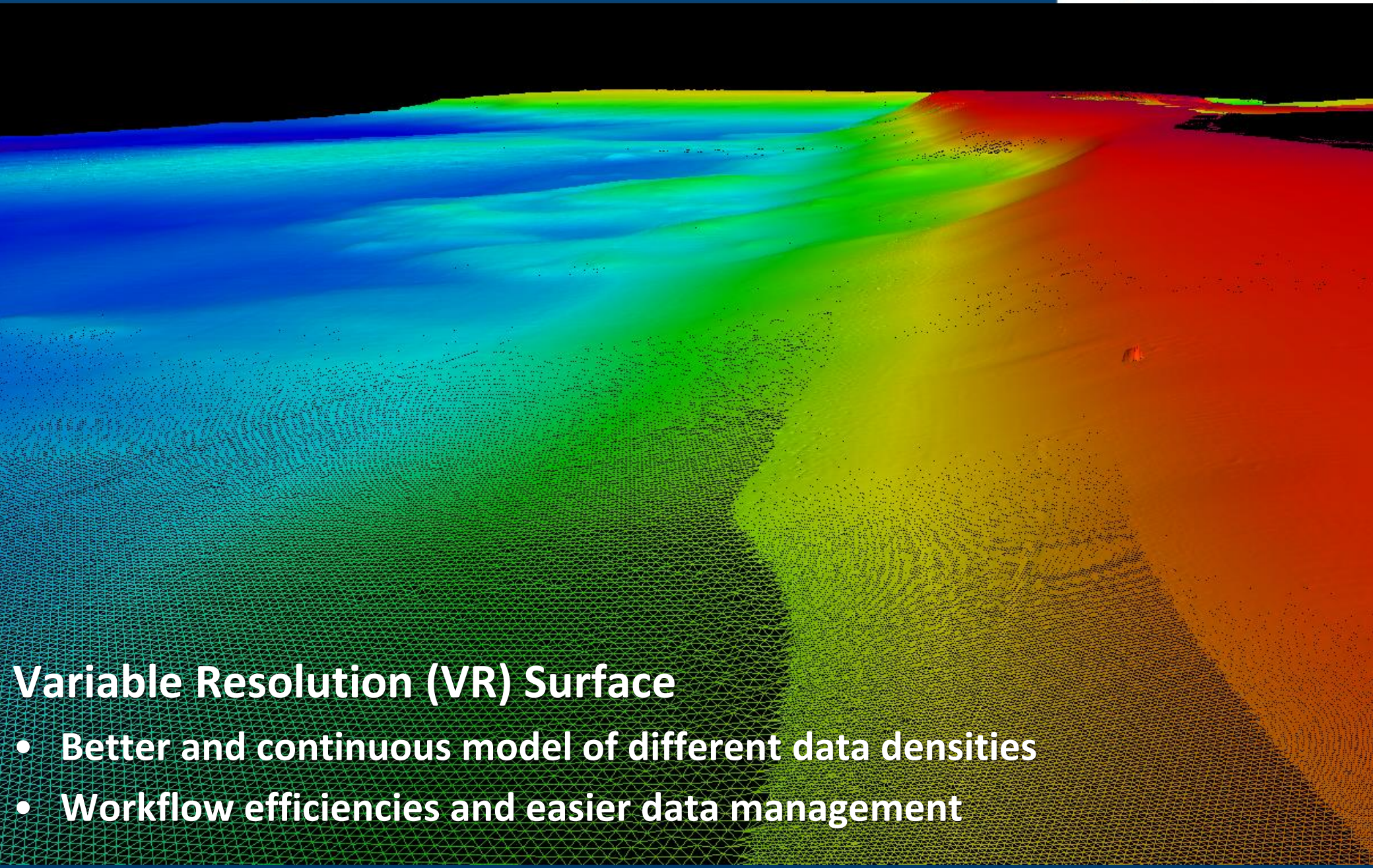


Combined Digital Elevation Model

Multi-Sensor Surveys



Variable Resolution Surfaces



Variable Resolution (VR) Surface

- Better and continuous model of different data densities
- Workflow efficiencies and easier data management

Autonomous Surveys

- Autonomous Survey Operations have increased over the past 5 years.
- Benefits are lower operating costs, rapid deployment/recovery, ability to work closer to the intended target.
- Expectation: more vehicles, better sensors & batteries: much more data!
- Survey Data stored internally and processed post mission
- Creating a **data processing bottleneck**

Autonomous Surveys

- Automated solution to overcome processing bottleneck: postprocessing done on board of autonomous vehicle.
- Deployed on computer on survey launch or autonomous vehicle payload
- Provides near real-time seafloor mapping
- Built using proven CARIS HIPS and SIPS algorithms and expertise
- Supports optimal use of human resources
- Provides time savings to reduce Ping-to-Chart timeline

caris ONBOARD

Crowd Sourced Bathymetry

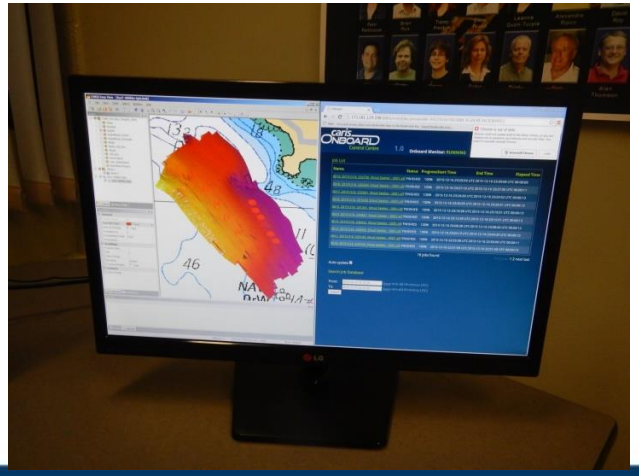
- CSB is being collected in limited capacity
  - Some data is better than none

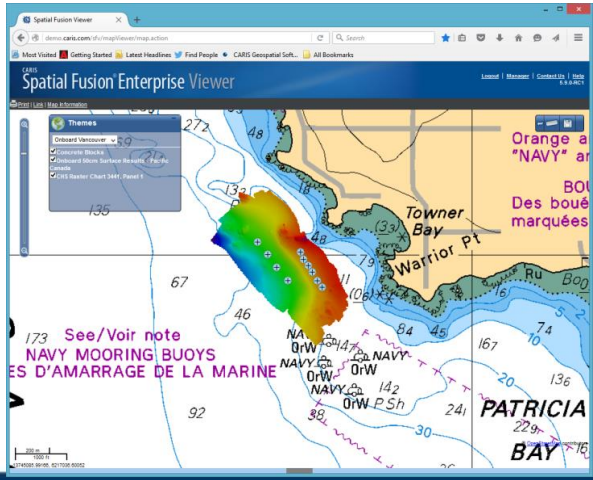
- IHO CSB Working Group established
  - Examine how best to incorporate, manage and use bathymetric data from non-conventional means
  - Develop policy and guidelines for trusted CSB for potential charting and non-navigational purposes

- HOs evaluating ‘trusted’ CSB through multi-agency collaboration

Crowd Sourced Bathymetry

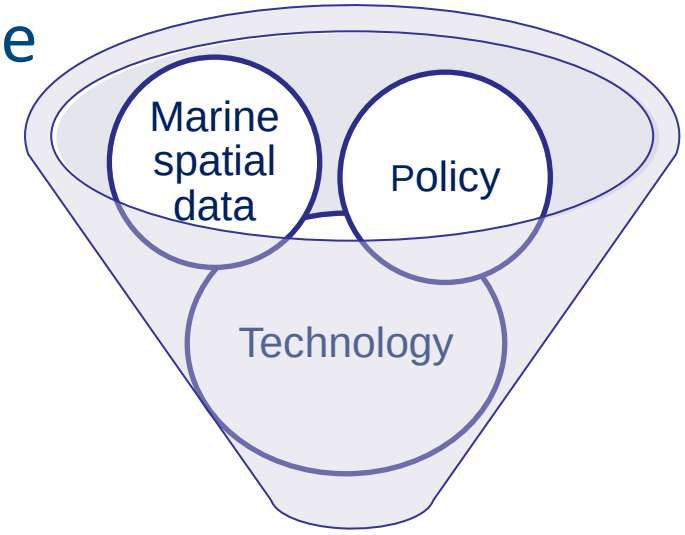
- Canadian Hydrographic Service trial to automate processing of sonar data and remotely monitor/access processed results
  - Sonar data automatically processed using defined workflow during the survey
  - Processed results monitored from the office using internet connection for QC
  - Bathymetry surface shared as OGC layer for non-navigational applications
- Simulates how trusted CSB could work using CARIS Onboard



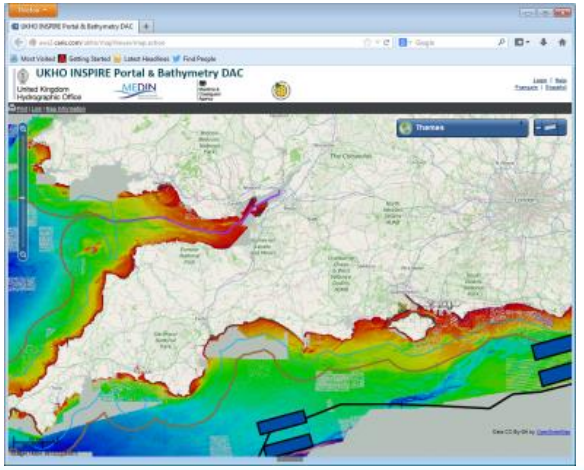


Interoperability

- Hydrographic offices need an interoperable approach to maximize value from marine spatial data
- IHO S-100 Development
  - ‘Beyond the scope of traditional hydrography’
  - Compatible with ISO/TC211
  - CARIS supports S-100 Development, e.g. S-101 & S-102
- Open Geospatial Consortium (OGC) and IHO cooperation.
  - MOU being established
  - OGC Marine Domain Working Group Established in June (CARIS chairing)



Spatial Data Infrastructure



Data Centricity

- Many geospatial organizations are looking into data centric workflows and management
- To transition **from chart producer to marine data provider**
- To support a broader user base
  - Supports open data and national SDI initiatives
- To realize efficiencies
  - Collect once use many times
  - Ad hoc products and services
  - Increased automation in processing and product compilation

Inputs and outputs in a data centric workflow

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CARIS Technology Vision

- CARIS Supports Data Centricity
- Enhance support for a wide range of sensors.
- Enable users to efficiently provide standardized and ad-hoc products for the marine community & others.
- Modularity & Interoperability: Products share technology and data using IHO/OGC/ISO standards.
- Focus on automation
- Enable workflow efficiencies for all users

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Washington DC, USA - 26–28 April
Bologna, Italy - 17-19 May
Wellington, New Zealand - 26-28 July
Kuala Lumpur, Malaysia - 23-25 August

CARIS WORLD TOUR 2016

Seattle, USA - 13-15 September
Rio de Janeiro, Brazil - 18-20 October
Shanghai, China - 15-17 November
Galway, Ireland - 15-17 November
Busan, Republic of Korea - December

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