

An aerial view of a large container ship, the 'HADRAGON SEASIDE (L)' by HADRAGON SHIPPING CO., sailing on a nautical chart. The ship is loaded with blue and orange containers. The chart background shows depth contours, soundings, and navigational lines. The ship's name 'HADRAGON SEASIDE (L)' is visible on the white superstructure.

# Automation in Nautical Cartography

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 **TELEDYNE** | CARIS

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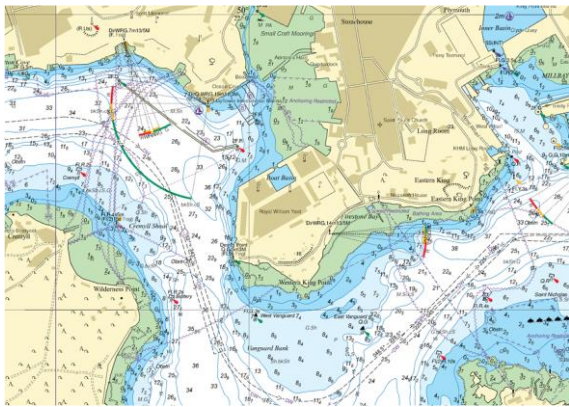
INTERNATIONAL MAP INDUSTRY ASSOCIATION

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- Oceans, rivers and lakes cover 70% of our planet's surface, there is a lot to map to modern standards
- Nautical charts are bound by international regulations, which is not the case with topo or leisure maps
- Vessels require the most up-to-date charts to ensure safety and environmental protection

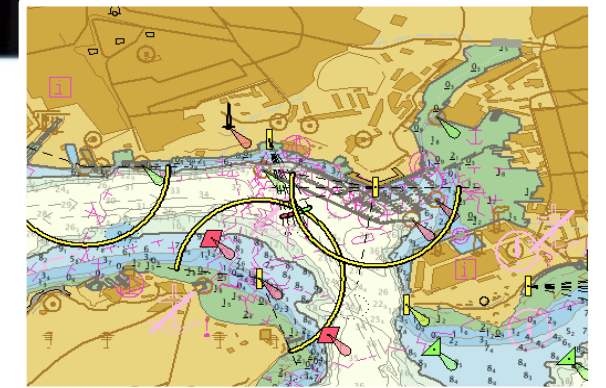
# The Modern Vessel Bridge



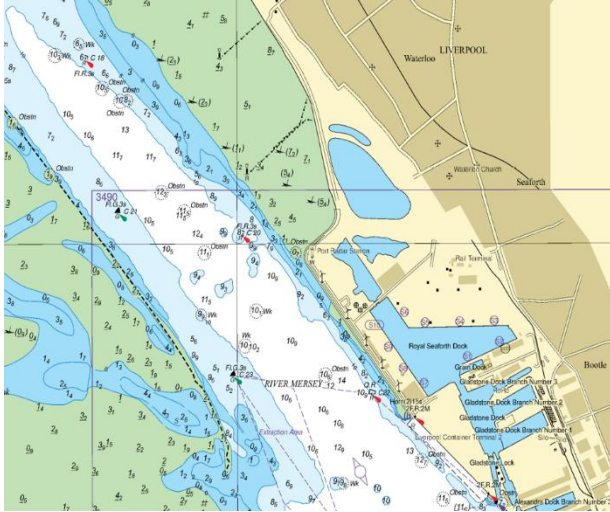
Traditional **Paper Charts** function as a failsafe and are being relegated to analog backups or discontinued



**ENCs** are the primary navigation dataset in the modern vessel bridge, displayed on the Electronic Chart Display Information System (**ECDIS**)

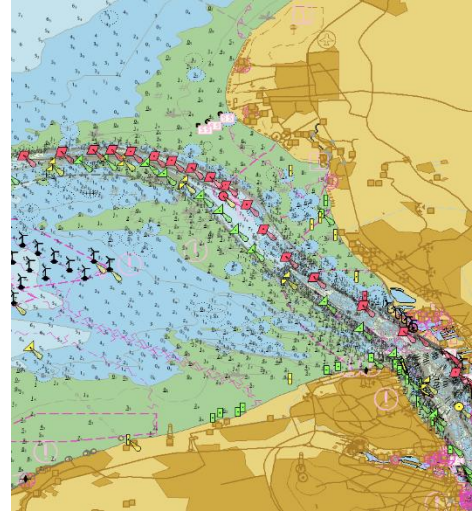


# The Increasing Pressure on Chart Producers



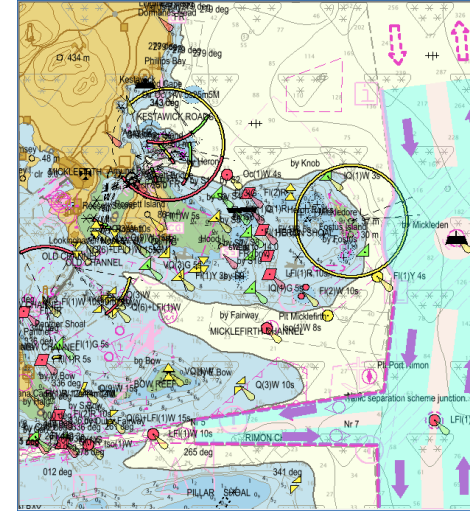
## PAPER CHARTS

- Labor-intensive
- Long time production



## S-57 ENC's

- Mandatory on SOLAS vessels for 3 decades



## S-101 ENC's

- Next gen electronic chart
- Enhanced attribution



## S-100 Products

- Rich datasets
- Supplementary contextual data: bathymetry, currents, tides, sea ice, MPA's

**More product types:** More time needed, same size workforce

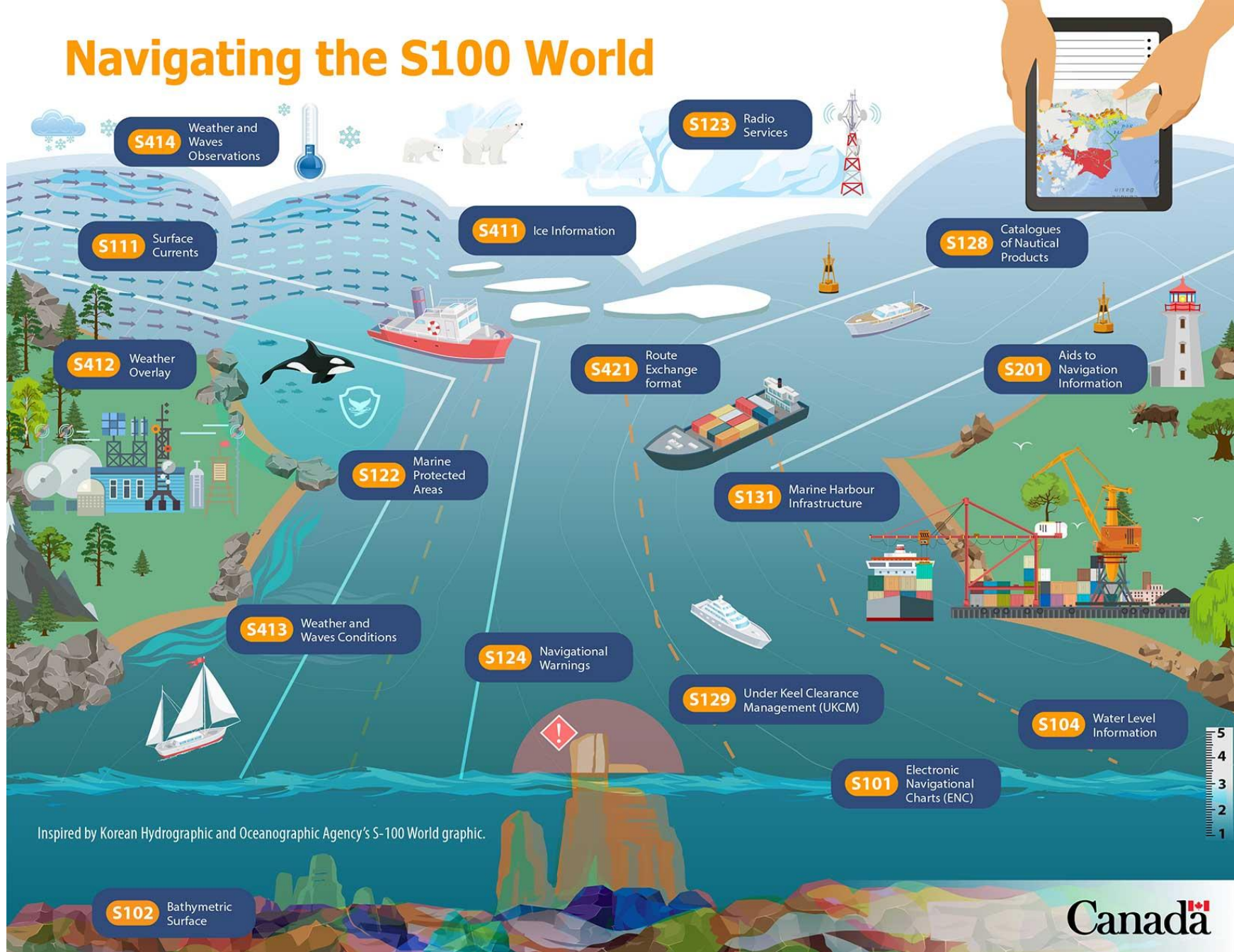
**QA becomes more demanding:** Consistency and validation checks

**Extra post-production steps:** Metadata handling, digital signing



Workload Increases

# Navigating the S100 World



Canada

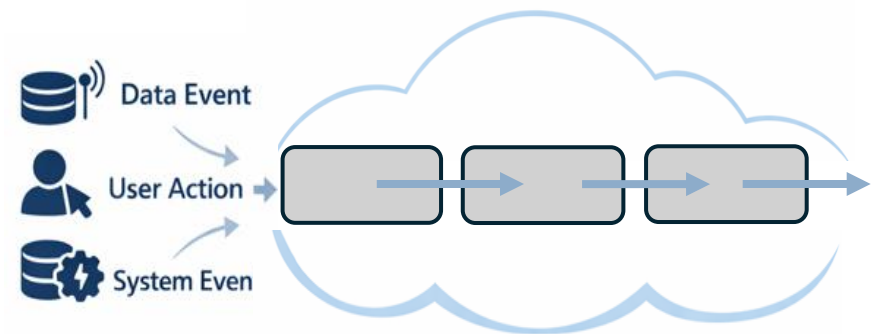
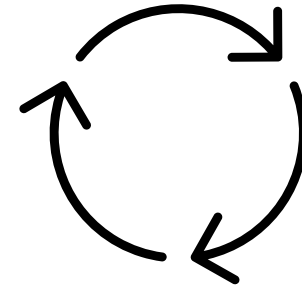
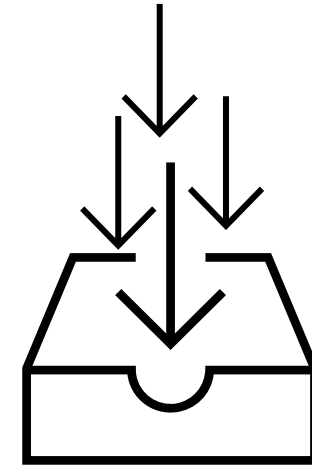
# Bottleneck

*Bathymetric compilation and paper chart production is a time consuming, labor-intensive process, creating a bottleneck between hydrographic organizations, charting agencies and the mariners and other end users*



# Automation is part of the solution

- Automation is key to meeting increased demand, but the potential depends on the product type (vector / overlay / gridded)
- Our approach: Scalable, cloud-based processes for efficiency and consistency
- Rich and meaningful data interactions and touch points



# Automation of Bathymetric Compilation

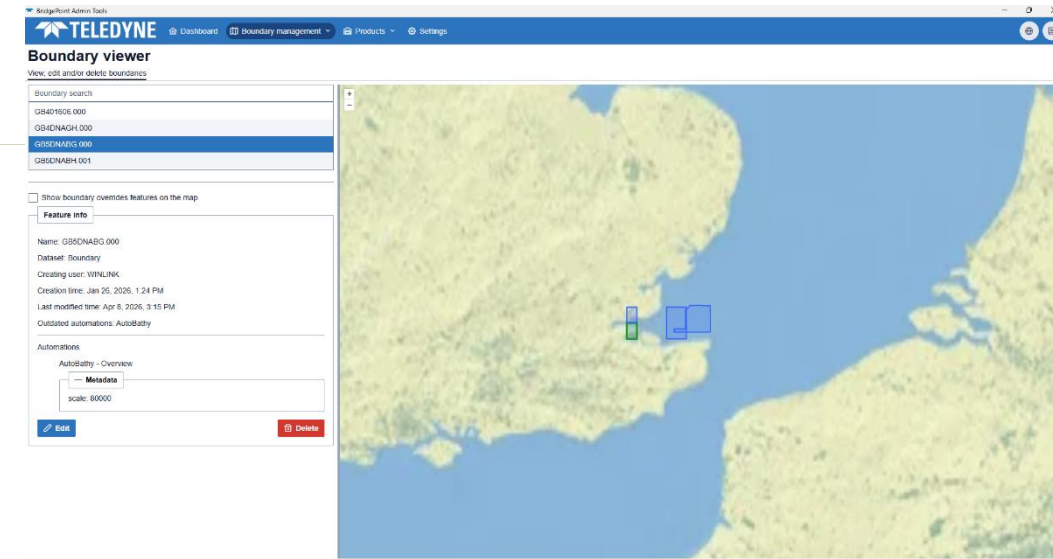
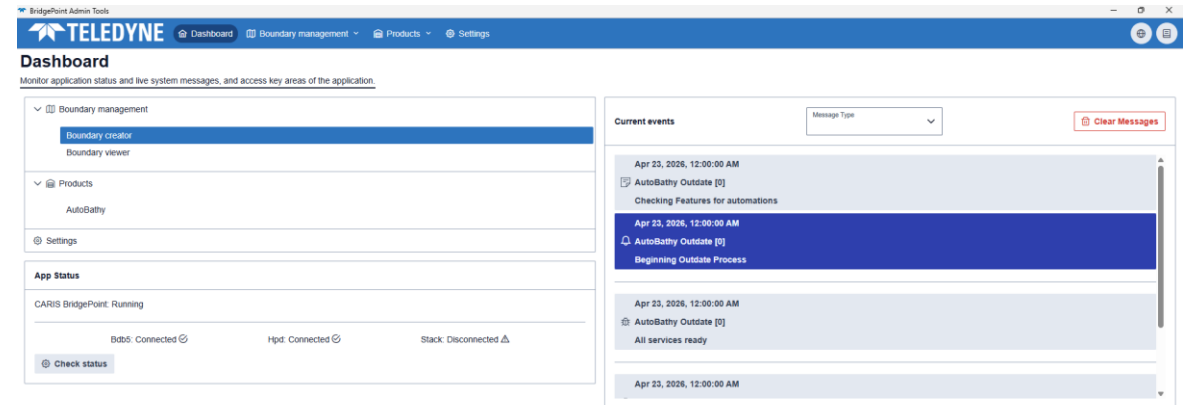
- Updating ENC bathymetry is one of the most time-consuming production tasks:
  - Contour and depth area generation
  - Creation of selected soundings
  - Many agencies manually post process automated outputs
  - Edge matching is the biggest challenge
- Manual updates are time consuming and hard to keep consistent across products

The screenshot displays the 'AutoBathy' interface within the 'SledgePoint Admin Tools' environment. The top navigation bar includes 'Dashboard', 'Boundary management', 'Products', and 'Settings'. The main content area is divided into two sections: 'Workflows' and 'Presets'. The 'Workflows' section features a table with columns for Name, Type, Schedule, Status, and Actions. The 'Presets' section has a search bar and a list of preset items. Below these sections is a message log for 'AutoBathy Workflows' with filters for 'Subscription' and 'Message Type', and a 'Clear Messages' button. The log shows several messages from 'Apr 23, 2026, 12:00:00 AM', including 'AutoBathy Outdate [0]', 'Checking Features for automations', 'Beginning Outdate Process', and 'All services ready'.

Name	Type	Schedule	Status	Actions
Testing AutoBathy	AutoBathy	2026-01-27	Pending	[Action icons]
Testing AutoBathy Outdate	AutoBathy outdate	2026-01-27	Running	[Action icons]
Testing AutoBathy Baseline	AutoBathy baseline	2026-01-27	Waiting	[Action icons]

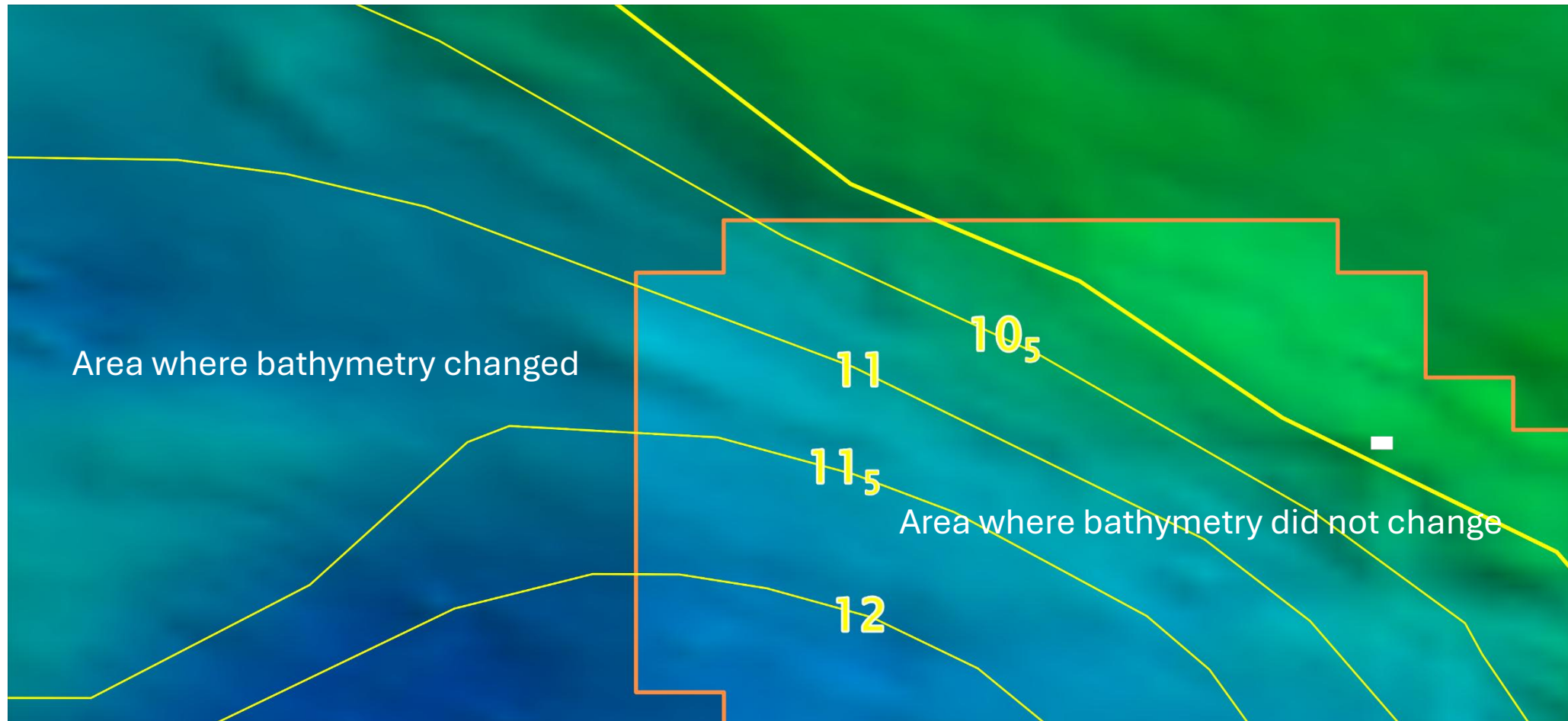
# The AutoBathy Workflow

- AutoBathy is an automated workflow triggered when a new survey is added and overlaps charts
- It retrieves data from the Database and updates vector bathymetry using the new survey
- It targets vector data (contours) and gridded bathymetry (terrain models)



# AutoBathy – Edge Matching

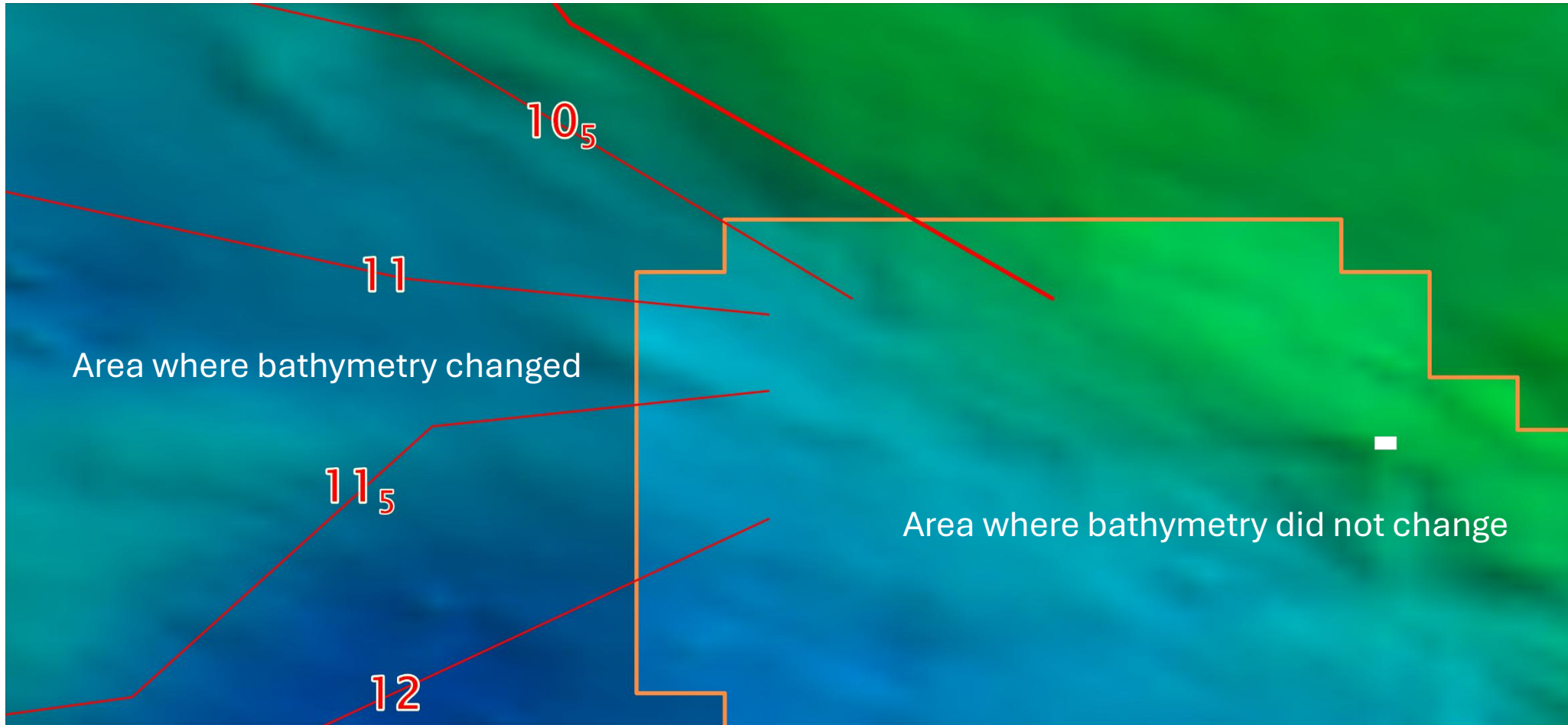
## Original Contours Over Newly Received Bathymetry



Original contours in yellow...

# AutoBathy – Edge Matching

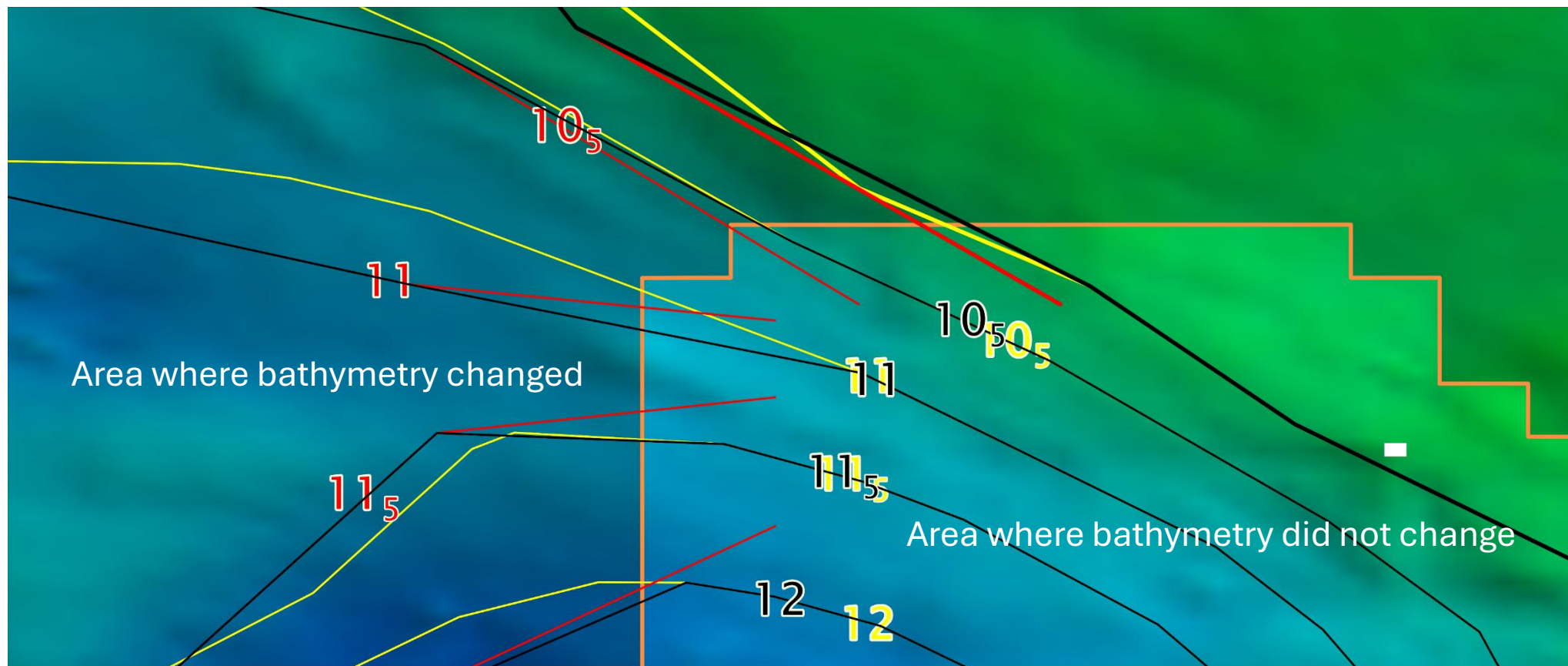
## New Contours in Area of Change



Generated contours in red...

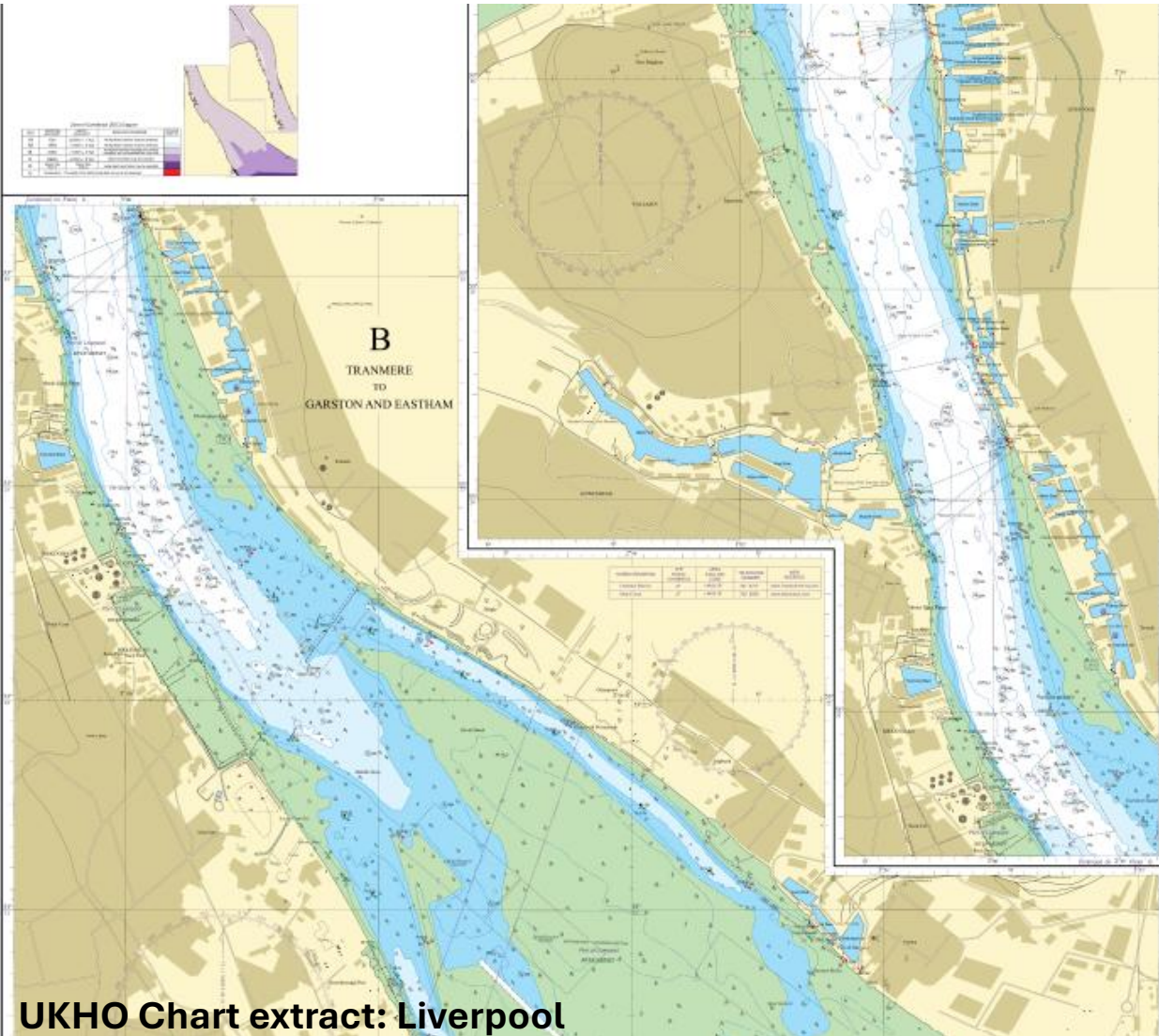
# AutoBathy – Edge Matching

## Updated Contours



Updated contours in black, following the new contours inside the area of change and then following the old contours outside the area of change

# Automation of Paper Charting



UKHO Chart extract: Liverpool

## AutoChart

- A tool for the complete automation of nautical chart production from ENC source
- Reduces production turnaround time considerably >85%
- Frees up human resources
- Maintains traditional paper charts look and feel
  - Uses UKHO produced portrayal rules and support files
- Supports automatic updates (NtMs)
  - Tracings next on the to do list
- Cartographers maintain control over the decision-making process and final chart touch-ups

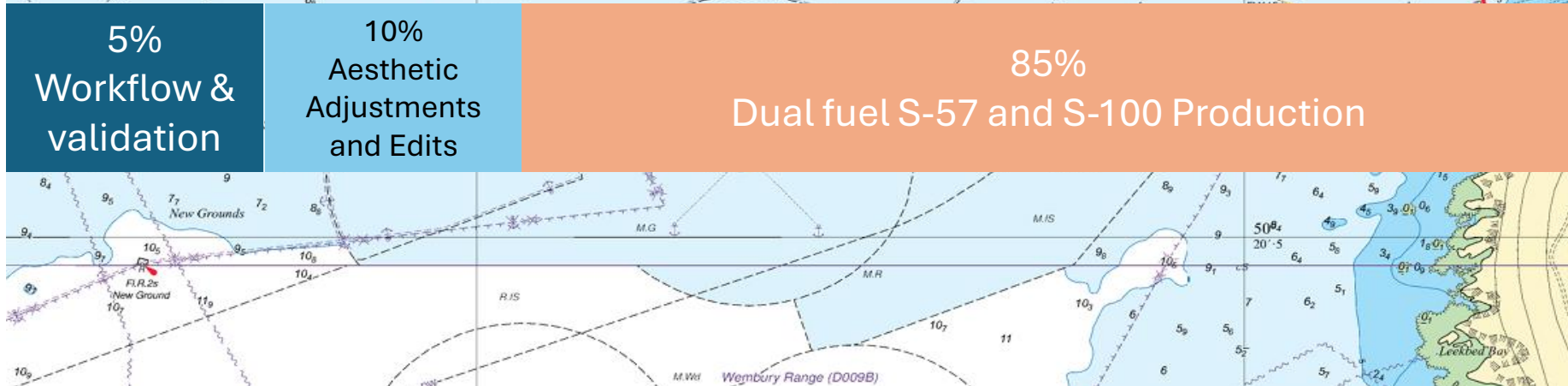
# The Evolving Nautical Cartographer

- Automation will refocus human effort where critical expertise is needed most.
- We want to keep the interest in the profession of the cartographer (data interaction and creativity)

Traditional  
Workflow



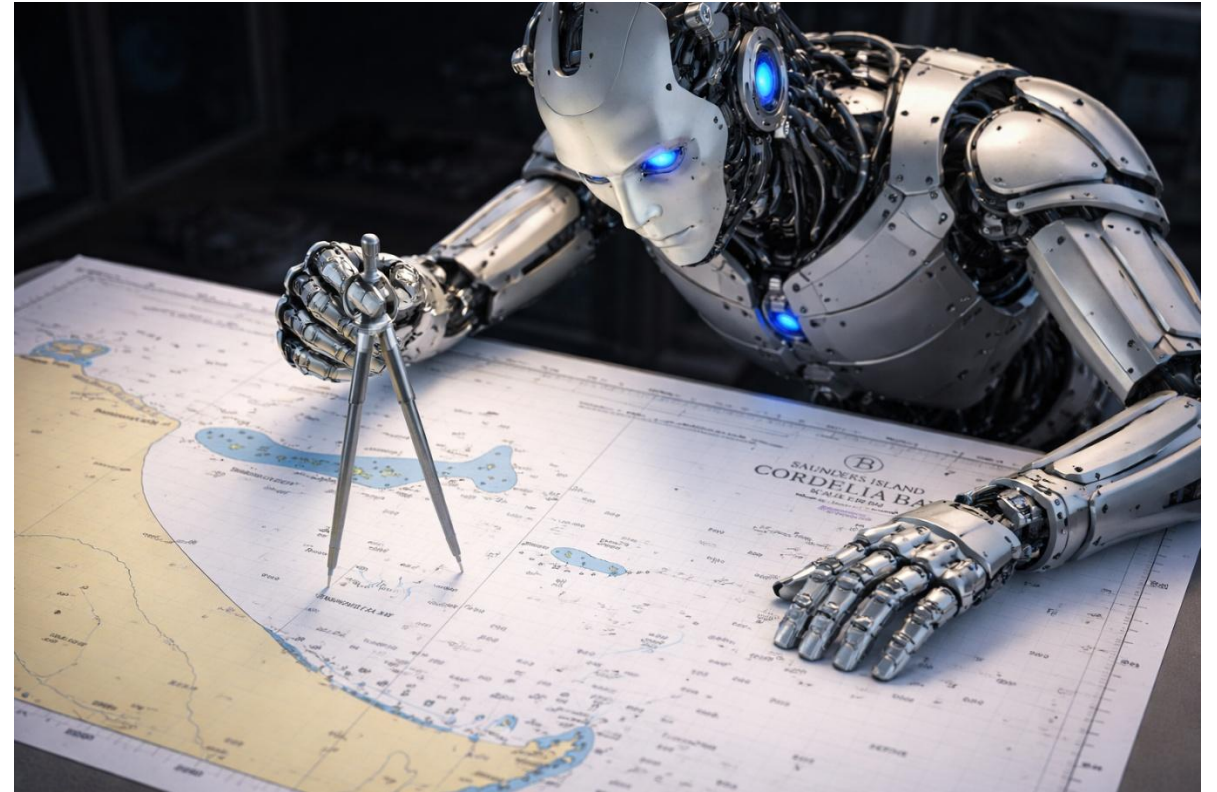
Automated  
Workflow



# The Future of Nautical Cartography

Cartography as a standalone profession may be in decline, BUT the need for cartographic skills is growing rapidly and is very much in demand due in part to S-100

Automation and the potential use of Artificial Intelligence (AI) for some cartographic production e.g. text and symbol placement, generalization has the potential to ease the workload generated by the S-100 standard



# Summary



- **We have discussed two areas for automation to ease the workload and refocus the workforce**
- **AutoBathy: Automation of bathymetric compilation** provides automation in the area of compiling and combining new bathymetric survey source to replace existing contours and sounding on both ENC and Paper Charts
- **AutoChart: Automatic production of paper chart** offers a new approach for the *automated generation of paper charts*, making use of the existing ENC portfolio, metadata and customizable support files
- **More areas for automation will no doubt follow but we need to ensure we can retain and attract people to the industry**

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