Surveying with Objects Efficiencies in Data Acquisition and Transformation

Andrew Leyzack CLS
Canadian Hydrographic Service, Central and Arctic Region

Introduction

- Topic represents surveying methodology and technology which support a departure from "two streams" of Cartography: Hardcopy and ENC.

- In the vector product world of hydrography, spatial object attribution isn't the sole domain of ENC production.

- For surveyors, the approach to capturing data as objects while in the field gives rise to a new approach to managing field notes, multimedia and metadata used to describe survey observations.

- Process of capturing, transforming and expediting data as S-57 objects as a vector product-specific source for chart production.

Capturing Objects in accordance with S-57

- Internationally accepted format for the exchange of digital Hydrographic Information+.

- Prescribed standards for presentation: product content, colours and symbols.

- Object oriented data base structure.

- Standard library of object attributes.

- Traditionally created during ENC chart production.

- Additional and user-defined attributes can be used to capture field note information (text and graphical).

Survey Issues

- Enabling technology for the (OTF) capture and subsequent manipulation of spatial data in and of the marine environment.
- Digital field notes of survey.
- Greater accuracy and resolution are driving a demand for "super-scale" digital products.
- Departure from surveying at 2-3X product scale in order to "bury" systematic errors and positioning system inaccuracies with the scale of the product.
- Need to streamline the process of capturing Hydrographic data (as S-57 objects) and expedite the publication of this new information.
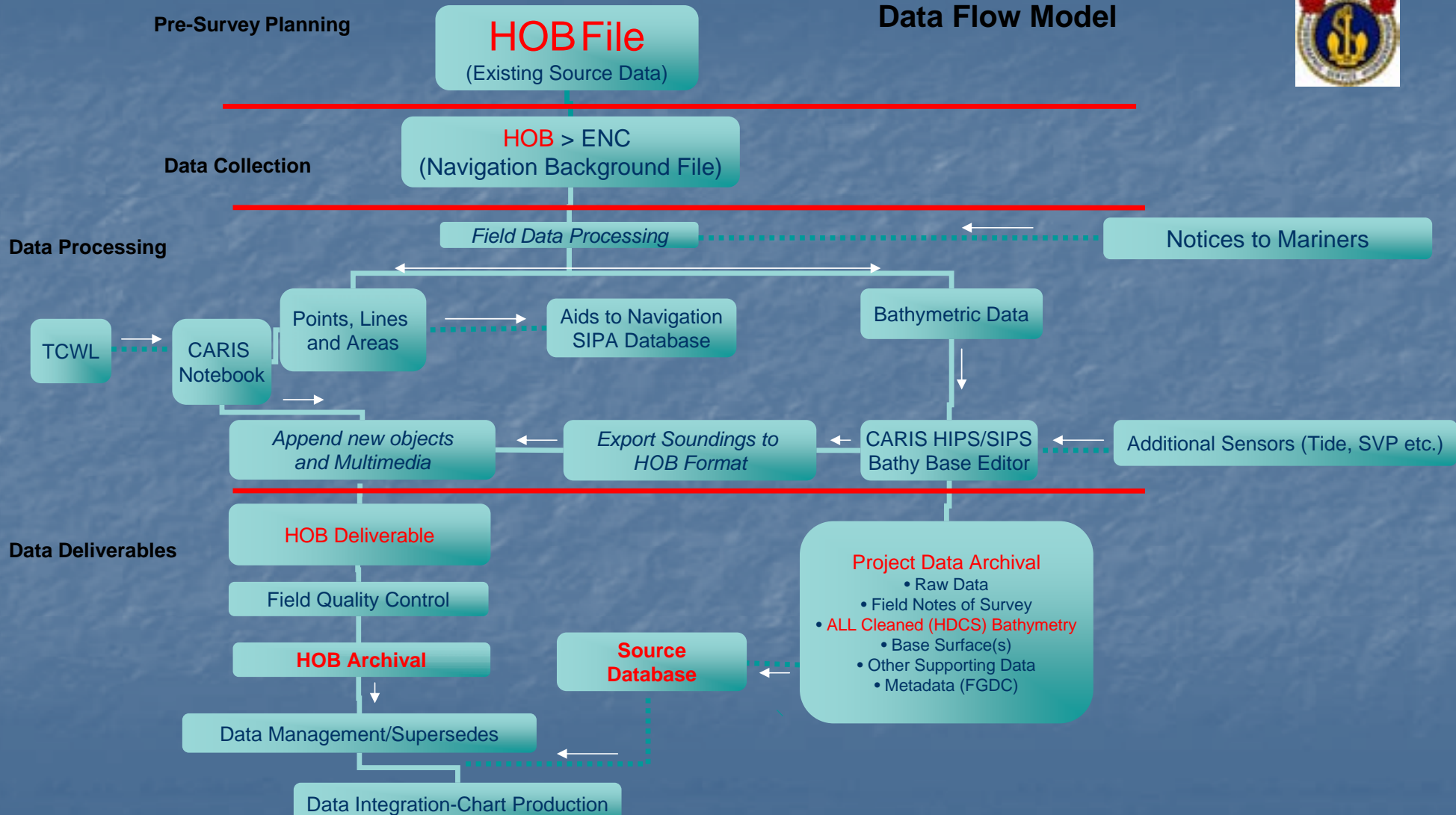
Survey Issues

- *For surveyors, the process of capturing data as objects provides a holistic approach to managing field notes and multimedia.*

- The base file for project planning, data acquisition and source data for chart production begins and ends with a <u>H</u>ydrographic <u>O</u>bject *<u>B</u>inary* File (HOB).

- A HOB file is a quasi (editable) S-57 file loaded with available source information: previous surveys, base mapping, RS imagery and chart maintenance items.
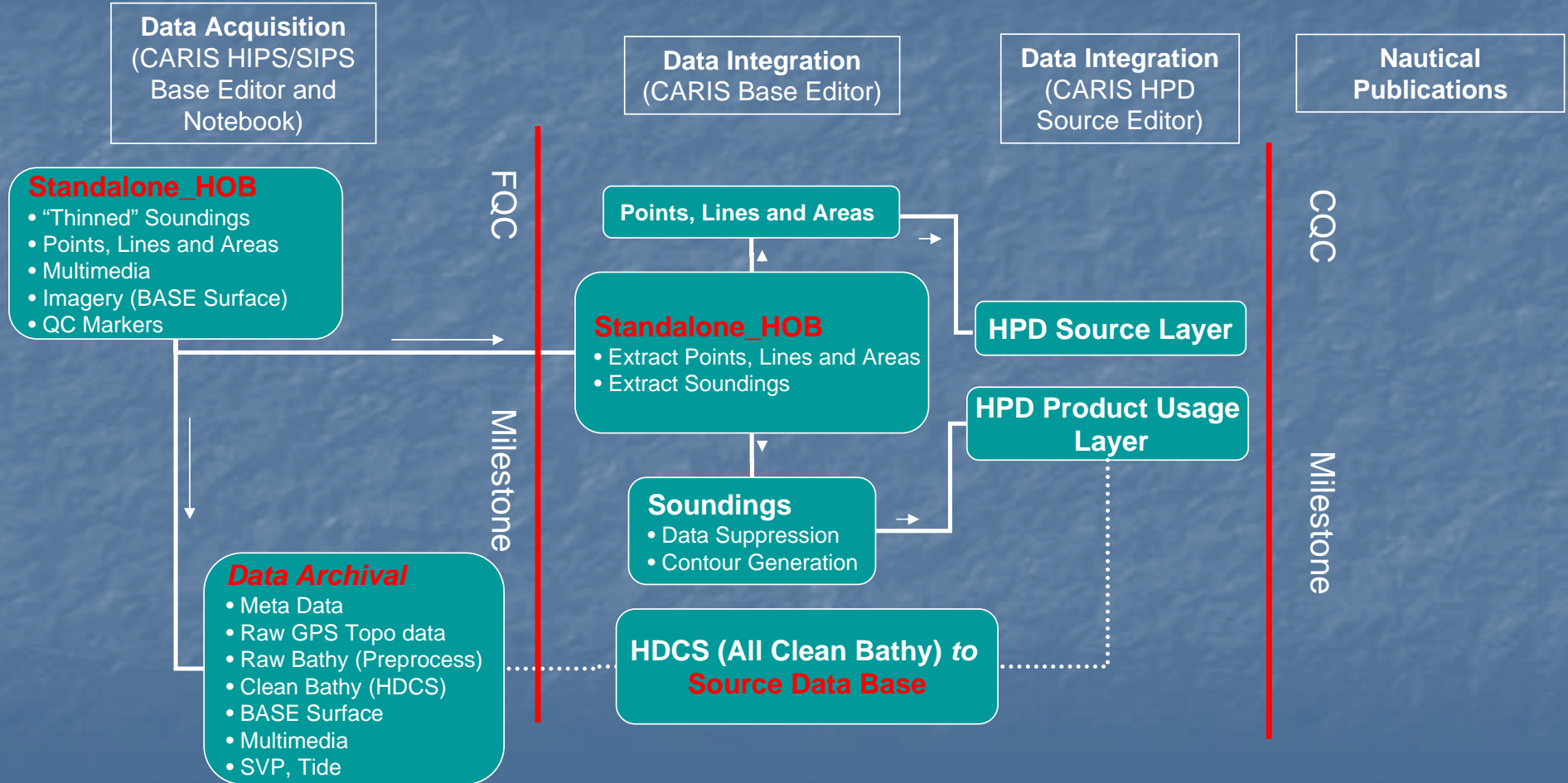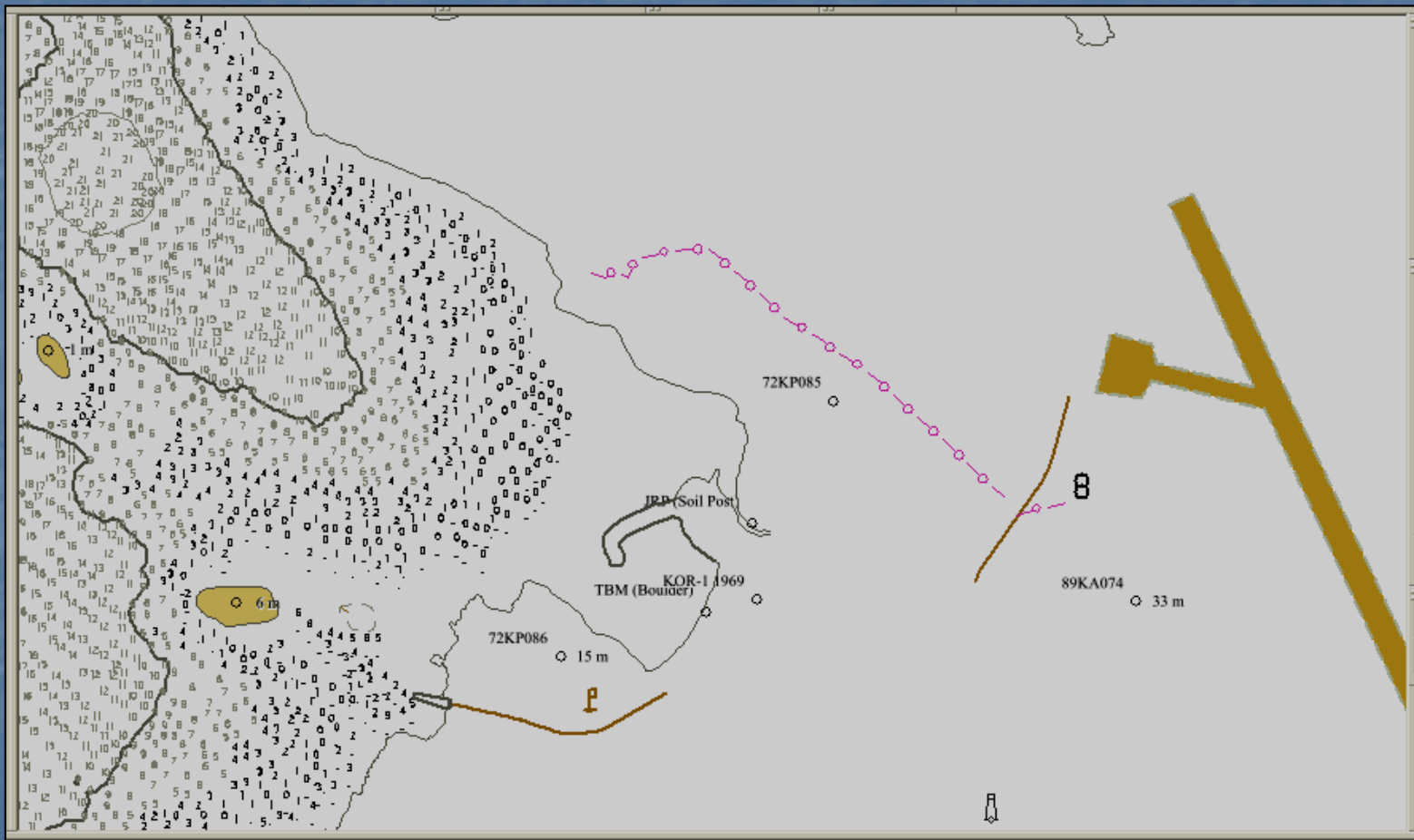
CHS CA Data Acquisition Division
Data Flow Model

Fisheries and Oceans Canada
Pêches et Océans Canada

Pre-Survey Planning

HOB File
(Existing Source Data)

Data Collection

HOB > ENC
(Navigation Background File)

Data Processing

Field Data Processing

Notices to Mariners

TCWL → CARIS Notebook → Points, Lines and Areas → Aids to Navigation SIPA Database

Bathymetric Data

Append new objects and Multimedia ← *Export Soundings to HOB Format* ← CARIS HIPS/SIPS Bathy Base Editor ← Additional Sensors (Tide, SVP etc.)

Data Deliverables

HOB Deliverable

Field Quality Control

HOB Archival

Data Management/Supersedes

Data Integration-Chart Production

Source Database

Project Data Archival
• Raw Data
• Field Notes of Survey
• ALL Cleaned (HDCS) Bathymetry
• Base Surface(s)
• Other Supporting Data
• Metadata (FGDC)

Survey Data Deliverables to Production Workflow

Plan of Survey- HOB File Presentation

User_defined Attributes for Sounding Objects

CARIS .NTX	S-57	Attribute Value (example)
Source ID	linenu	GA1981746_45
User Number	surdat	2006-198
Launch ID	launch	GANT
Timestamp	timest	17:46:11:013
Tide	tidadj	8.6
Sounding Status	sousta	Designated

Survey Returns and Archival

- Stand-alone .hob files (Points, lines and areas, sounding objects and multimedia)
- Bathy Base Surface (From high resolution surveys)
- Metadata file (To capture POS/Field Sheet title information)
- Raw sounding data, Raw GPS (topo)
- Cleaned soundings (HDCS) + Tide and Sound Velocity records
- Hardcopy Field Notes
- Supersedes Report
- Navigational Aids

Metadata

Content Standard for Digital Geospatial Metadata (CSDGM)

- FGDC Meta Data Standard
    - Hydrographic Themes
    - Shoreline Metadata Profile
    - Extensions for Remote sensing metadata
- In-line with ISO19115 International Metadata Standard
- "Corpsmet" (freeware) provided with user documentation by USACE
- QC performed with "mp" (freeware) by USGS
- Metadata record can be captured in CHSDIR and Geoportal M270 Hydrographic Survey Locator.

Conclusions

- Processes are currently being implemented (and tested) by CHS CA survey units.

- The efficiencies of this workflow will be realized when we can reduce the number of times we have to "handle" data in order to transform it into cartographic information.

- "Capturing" objects enables a true field-to-chart workflow.

- As survey deliverables, HOB files and associated Metadata records, provide an up-front record of survey data capture.

Acknowledgements

- CARIS Canada

- Canadian Hydrographic Service
  - Technical Services Working Group
  - Hydrographic Production Database Working Group
  - CHS Pacific Region