

# ***HSRP Technology Working Group***

Ed Saade and Lindsay Gee

Seattle April 18-20, 2017



# *Technology Working Group Session Summary*

- Visualization R&D at the NOAA JHC/CCOM  
University of New Hampshire - Dr. Larry Mayer  
and Capt. Andy Armstrong (JHC/CCOM UNH)
- Data as the 5th Modality for 21st Century Ports -  
Marten Hogeweg (Esri)
- An Introduction to Bathymetric Lidar: Sensors,  
Capabilities and Limitations - Carol Lockhart  
(Geomatics Data Solutions)
- Review of Technology Working Group activities  
and ***discussion***

# ***Visualization R&D at the Joint Hydrographic Center/Center for Coastal and Ocean Mapping***

Dr. Larry Mayer and Capt. Andy Armstrong  
(NOAA, ret.)

Co-directors, Joint Hydrographic Center/Center for Coastal and Ocean Mapping, University of New Hampshire

# ***Data as the 5th Modality for 21st Century Ports***

Marten Hogeweg,  
Senior Project Manager, Esri Inc.





# ***An Introduction to Bathymetric Lidar: Sensors, Capabilities and Limitation***

Carol Lockhart,  
President, Geomatics Data Solutions LLC.

# ***Review of Technology WG activities 2016/2017***

- Monthly technology WG meetings
- Input to some issue papers
- Technology transfer discussion paper
- What's next for Technology WG?

# ***Technology Working Group TOR***

The technology working group will focus on providing advice and recommendations on the use of technology to optimize efficiency and enhance safety across navigation services activities and operations; including observations, processing and analysis, and production and distribution. This should include use of existing technology not currently in operations, and new and emerging technology in research and development. The working group will provide ongoing recommendations at the public meetings.



# *Monthly Technology WG Meetings*

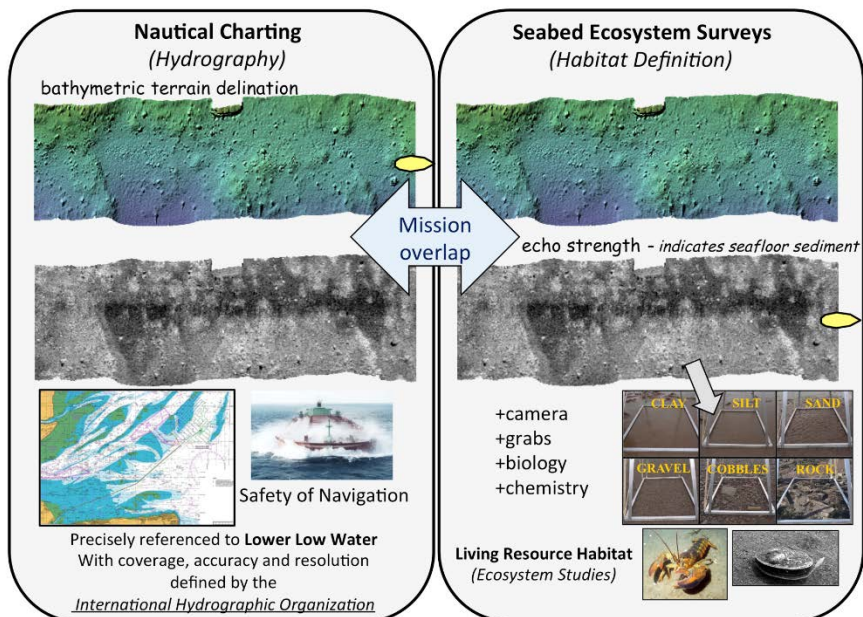
- Initial meeting at JHC/CCOM June 2016
- Monthly meetings for insight to current NOAA processes and technology strategy.
- Limited time to gain knowledge.
- Outside presentations of technology and processes.



# NOAA Seabed Mapping Requirements & Technological Development Impacts on Fleet Recapitalization needs

## John Hughes Clarke - JHC/CCOM

NOAA's two seabed mapping mandates:



### NOAA Access to Sea to support:

- Nautical Charting (Hydrography)
- Habitat Mapping (Ecosystem Surveys)

### SUMMARY

Enough commonality with AGOR – OSV or RCRV?

### Specialized Needs:

- Coastal/Shelf Focus
- Defined Resolution (IHO or habitat)
- Deliver inshore/restricted water platforms

### High at-Sea Staffing:

- Launch/Recovery
- Data Handling/QC
- (even with alternate technologies)
- Commensurate hotel demands

*“mission tailored platforms”*

### Not Currently Clearly Defined:

#### Benefits of ASV/AUVs

- Changes in Ship Requirements?
- Staffing
  - Loading

#### Arctic Capability:

- an additional role ? or
- a replacement role?



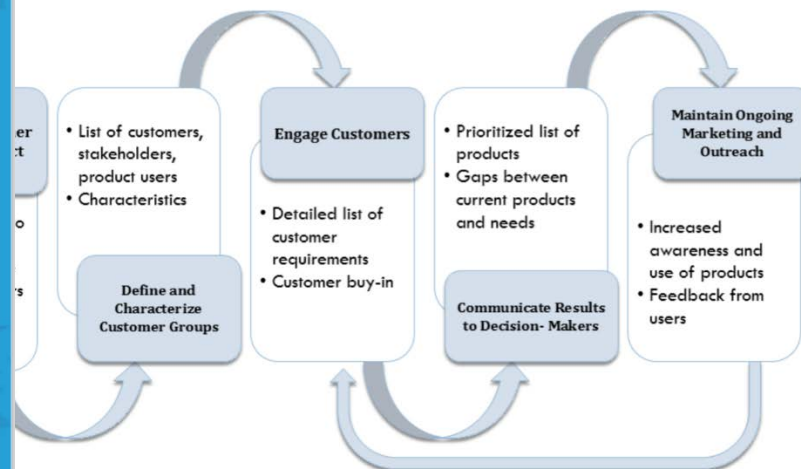
# The Next Generation of Precision Navigation: Products and Services to Support Real Time Decision-making for Coastal Marine Transportation. Neil Weston - NOAA

## Precision Navigation

The ability of a vessel to safely and efficiently navigate and operate in close proximity to the seafloor, narrow channels, and other hazards.



## Customer Engagement Strategy





# Quality Assurance of Hydrographic Data

## Captain Rick Brennan - NOAA

### HydrOffice Apps

Features scanned ensure proper distribution per SD Chapter 8. Discrepancies are flagged.

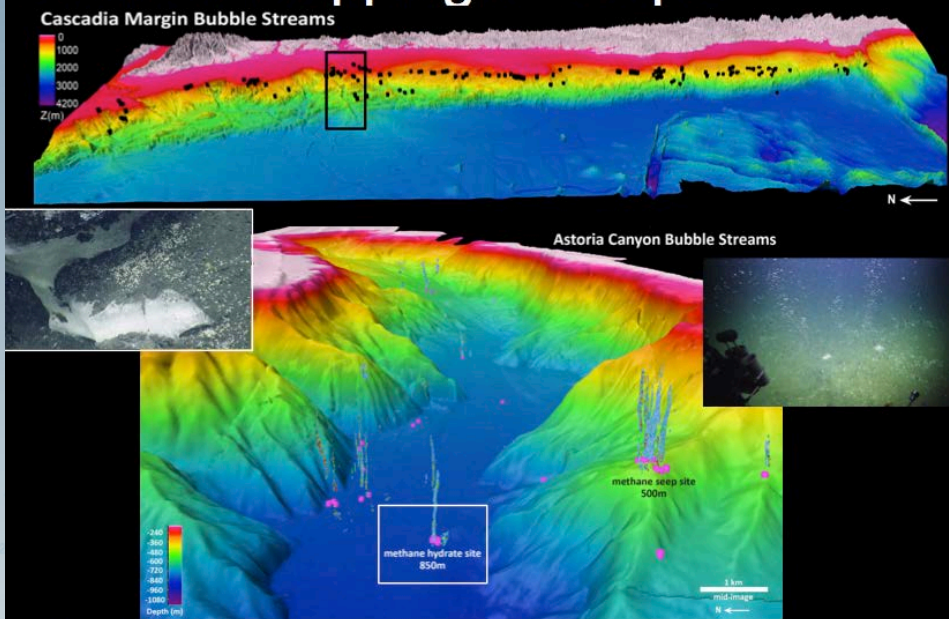
Feature scan

| Acronym | Name  | Value                                 |
|---------|---|---------------------------------------|
| SCAMAX  | Scale maximum   |                                       |
| CATWRK  | Category of wreck                                       |                                       |
| CONRAD  | Conspicuous, rad  |                                       |
| CONVIS  | Conspicuous, visu                                       |                                       |
| EXPSOU  | Exposition of sou                                       |                                       |
| HEIGHT  | Height  |                                       |
| NOBJNM  | Object name in r  |                                       |
| OBJNAM  | Object name   |                                       |
| QUASOU  | Quality of soundi least depth known                     |                                       |
| SOUACC  | Sounding accur  |                                       |
| STATUS  | Status  |                                       |
| TECSOU  | Technique of sou found by side scan sonar,found by mult |                                       |
| VALSOU  | Value of soundin: 3.326 m                               |                                       |
| VERACC  | Vertical accuracy                                       |                                       |
| VERDAT  | Vertical datum  |                                       |
| VERLEN  | Vertical length   |                                       |
| WATLEV  | Water level effec always under water/submerged          |                                       |
| PICREP  | Pictorial represen                                      |                                       |
| remrks  | Remarks   | Five wrecks were developed with objec |
| recomd  | Recomendator  | Due to the large volume of wrecks and |
| prkyid  | Primary Key ID  |                                       |
| asnmt   | Assignment flag   |                                       |
| invreq  | Investigation Rec                                       |                                       |
| acqsts  | Acquisition Statu                                       | Resolved                              |
| images  | Images  | 40.590295N.73.930969W_MB_3D-2D_       |
| keywrd  | Keyword   |                                       |

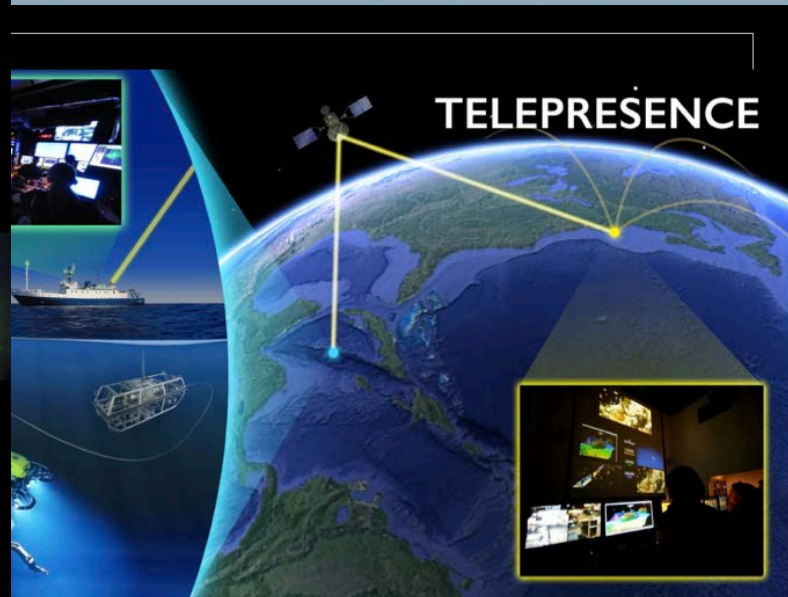


# *E/V Nautilus Telepresence and Seep Surveys Call to HSRP Cleveland*

## Seafloor Mapping & Seeps



Embley, et al., 2017




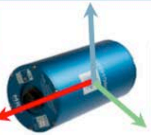




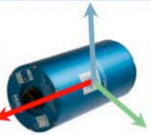




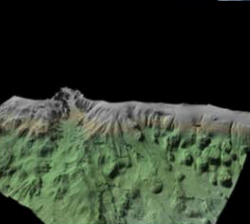
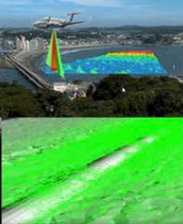
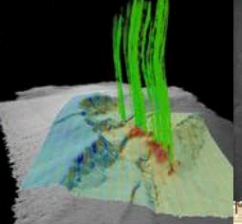

# Big Data, Big Changes in the Marine Mapping World

## Dickie Martin - Fugro

Today's Technologies and Deliverables







|                  |                   |                |
|------------------|-------------------|----------------|
| Teledyne R2Sonic | Edgetech Atlas    | Kongsberg Elac |
| Coda EchoScope   | Fugro SeaStripper | Cathx Ocean    |

www.fugro.com

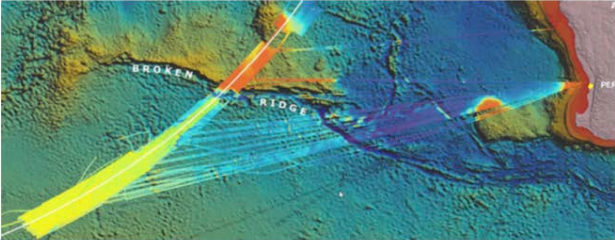
Study: Roames data processing for MH370



...s of data streamed from the vessels using Fugro Back2Base with direct staging  
 ...AMES processing pipeline  
 ...lick processing of bathymetry, side scan data & feature extraction  
 ...t data  
 ...DTM  
 ...Bathymetry raster  
 ...Normalised side scan files  
 ...3D georeferencing of sidescan data  
 ...Raster of sidescan  
 ...Data holidays & features  
 ...t formats supported  
 ...Roames Portal  
 ...Roames World  
 ...Google Earth  
 ...Geotiff  
 ...KMLs, Shapefiles  
 ...WMS, WMTS  
 ...

- Three vessels
- 24/7/365 operation
- Over two years of survey data

**Total processing time in Roames ... three hours**



www.fugro.com

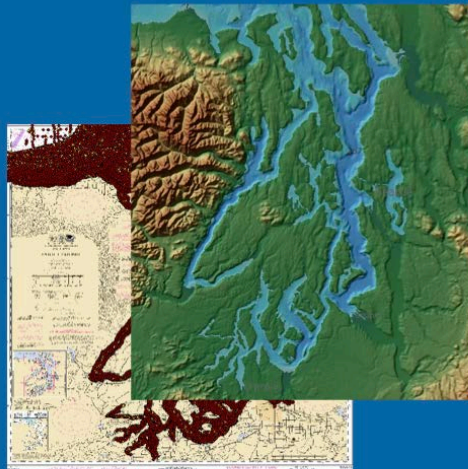
# Implementing a Navigational Bathymetric Database within Coast Survey

## Kurt Nelson - NOAA

### Initial Bathymetric Database

Understanding the Technology

Puget Sound Test Area



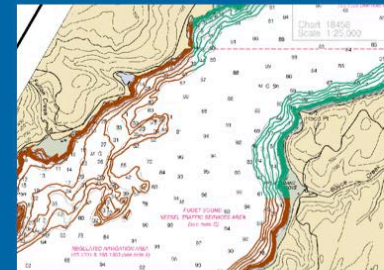
- Picking a Region
- Gathering the Bathymetry
- Selecting the Software
- Selecting the Hardware
- Developing Processes for Managing the Data

Office of Coast Survey

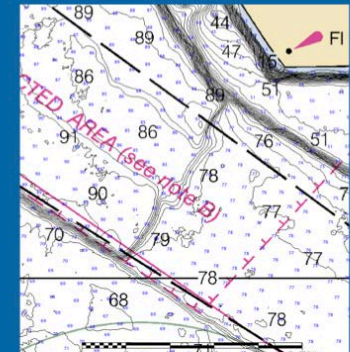
11



### Contour Development



Puget Sound Continuous Contours



Long Beach Precision Navigation

Office of Coast Survey

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# NOAA/NOS nowCOAST Web Mapping Portal John Kelly - NOAA

## nowCOAST Map Viewer for Mariners



## nowCOAST Map Services and the Experimental Precision Navigation Tool (PNT)



Map viewer based on nowCOAST map viewer code

nowCOAST  
GeoServices REST Map Services  
OGC Web Map Services

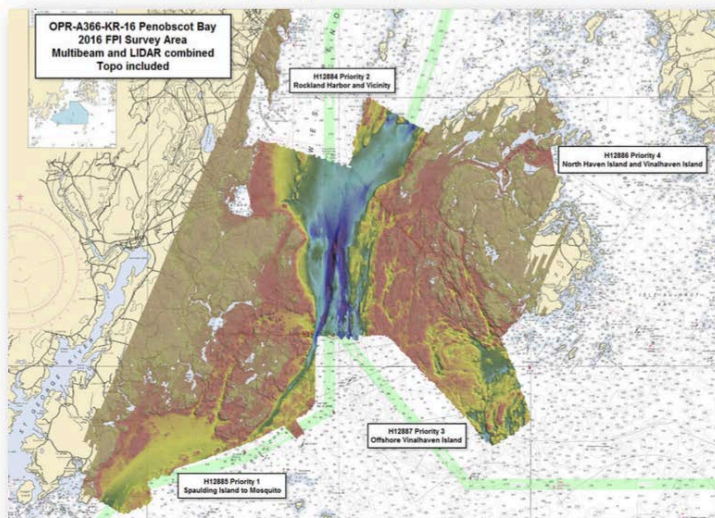
# Fugro Integrated Approach to Survey of Penobscot Bay, Maine

## David Millar - Fugro

### MBES / LIDAR / SDB Integration



#### Combined SDB, Bathymetry LIDAR, Topo LIDAR and MBES



### Challenges of Area



#### Environmental Issues / Challenges

- Thousands of islands, rocks, shoals and drying reefs
- High volume of vessel traffic (commercial fishery and recreational boaters)
- Active lobster fishery (thousands of buoys)
- Variable water clarity (best in winter)
- Dark substrate
- Limited survey window (best in summer)
- Dense fog

#### Other Issues / Challenges

- Limited accommodations (due to high tourist activity)
- Limited availability of suitable vessels



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www.fugro.com

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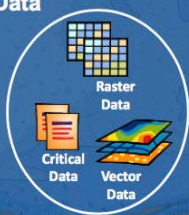


# NOAA OCS Charting update

## John Nyberg - NOAA

### ENC First

Source Data



Weekly Updates  
BSB /  
POD

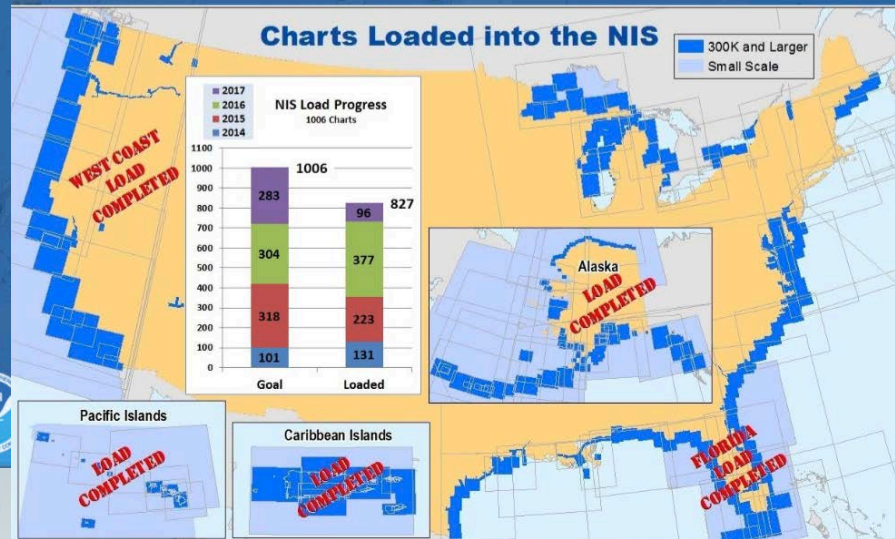
Weekly Updates

New editions are de-emphasized. Chart changes are made and published continuously.

Office of Coast Survey



### Charts Loaded into the NIS



Office of Coast Survey



# *Monthly Technology WG Meetings*

- Automation and autonomous systems
  - Development
  - Industry Collaboration
  - Future support of autonomous navigation
- Future products and data
  - Beyond ENC and RNC
  - Supporting data infrastructure
- Future ECDIS
- Industry collaboration

# *Technology Transfer Discussion Paper*

- Joint Hydrographic Center/Center for Coastal and Ocean Mapping
- Established 1999
- Ocean Mapping Science R&D
- Train hydrographers and ocean mappers
- R&D success - map the world under the water better, faster, and cheaper.

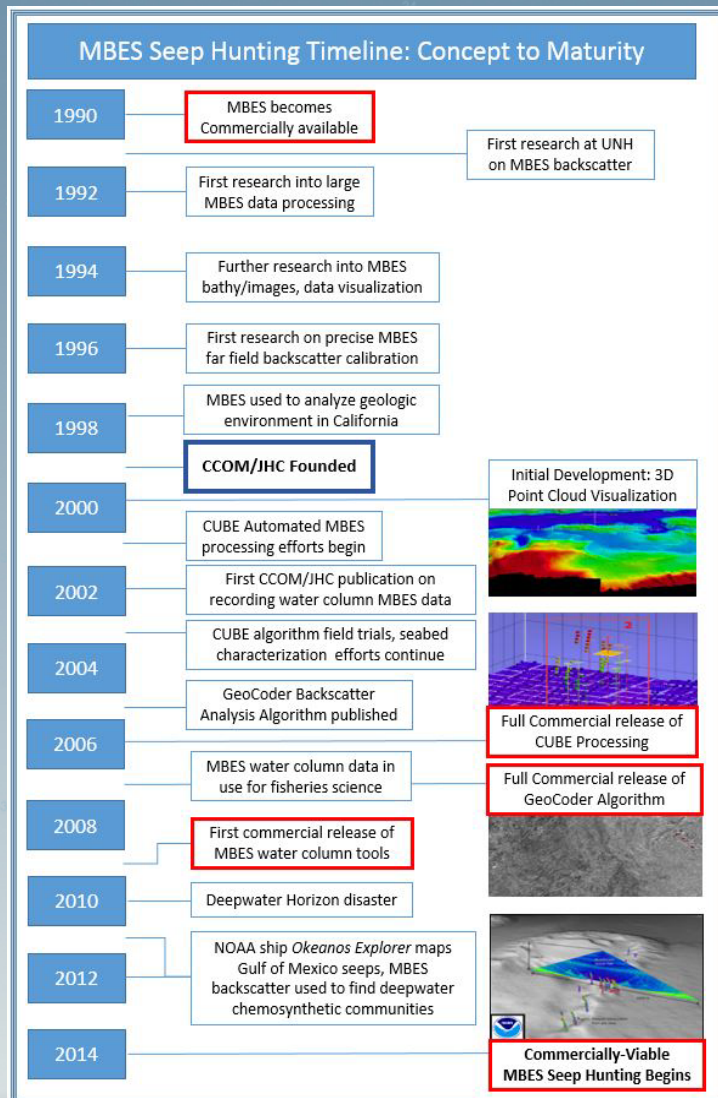


# *Technology Transfer Discussion Paper*

- CCOM/JHC Research Benefits
  - Safety of navigation and better coastal zone management
  - Long-term risks from sea level rise
  - Return of investment via transfer of technology to industry
  - Economic activity related to tourism, fisheries, energy, infrastructure development, and mineral resources worth many times investment
  - Train skilled professionals to be innovators of the future, bringing value to government and competitive edge to U.S. businesses



# Case Study - Natural Hydrocarbon Seep Detection



- Combination of R&D projects
- Long term R&D cycle
- Technology transfer leads to significant economic impact

# ***Technology Transfer Discussion Paper***

## ***- Recommendations***

- Increase R&D funding at CCOM/JHC for clearly-defined goal of improving the safe, efficient pursuit of hydrographic and charting tasks
- Cost benefit analysis of the contributions CCOM/JHC technology transfer makes to industry, to better understand the return on investment.
- Process to ensure industry fully aware of the R&D at to maximize technology transfer
- Optimize the processes to enable the rapid transfer of technology to support U.S. competitiveness and economic growth.

# *Technology WG – what's next?*

- Feedback from the Panel
- Discussion and issue paper
- Continued monthly meetings?
- Future topics to cover
  - Next technology focus after ALB at HSRP meeting
  - Monthly meeting subjects of interest