GEBCO-Nippon Foundation Alumni Team's solution for Shell Ocean Discovery XPRIZE Competition

presented on behalf of the GNFA Team by
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Geological Institute of Russian Academy of Science

GEBCO Symposium: Map the Gaps
Portsmouth, 2019

Shell OCEAN DISCOVERY XPRIZE

A $7 million global competition challenging teams to advance deep-sea technologies for autonomous, fast and high-resolution ocean exploration.

Create solutions that advance the autonomy, scale, speed, depths and resolution of ocean exploration

http://oceandiscovery.xprize.org

Preliminary phase (Dec 2016): written description of the proposed solution

Round 1 (Nov 2017)
Min. **100 km²** in **16 hours**
48 h of data processing
Max. Depth – **2,000 m**

Round 2 (Nov 2018)
Min. **250 km²** in **24 hours**
48 h of data processing
Max. Depth – **4,000 m**

Shell OCEAN DISCOVERY XPRIZE

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SPF

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CCOM JHC

SHIPOWNERS

esri

EARTH ANALYTIC

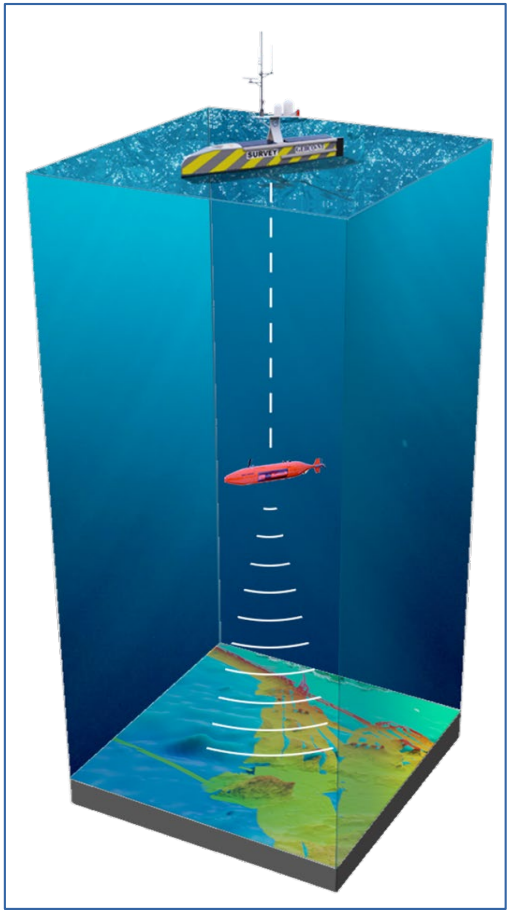
OmniAccess

Raitt Orr & Associates Limited

OFG Ocean Floor Geophysics

HUSHCRAFT

TELEDYNE CARIS



New **autonomous surface vessel** capable of AUV deployment & retrieval

- Hushcraft Limited SEA-KIT *USV Maxlimer* with KM HiPAP
- Remote and Autonomous operations facilitated by Kongsberg Maritime K-MATE

Kongsberg Maritime HUGIN AUV

- Round 1: Ocean Floor Geophysics *Chercheur* AUV: 3,000 m
- Round 2: Kongsberg Maritime: 4,500 m

Seafloor bathymetry and imagery

- Fusion of EM2040 & EM304 MBES, HISAS real aperture bathymetry, HISAS synthetic aperture bathymetry and side-scan imagery
- Spot-focused synthetic aperture HISAS imagery and bathymetry

ROUND 2 PRODUCTS

SURFACES

- 5 m resolution grid of overall combined bathymetric dataset
- 2 m resolution grid of HISAS1032 wide-area mode data
- 1 m resolution grid of standard HISAS1032 mode data
- 1 m resolution grid of EM2040 data
- 5 m resolution grid of EM304 data

IMAGERY

- 10 cm resolution mosaic of standard HISAS1032 mode
- 1 m resolution mosaic of HISAS1032 wide-area mode
- 1 m resolution mosaic of EM2040 backscatter
- 2 cm resolution Spot processed side-scan images of objects (produced using KM Reflection software)
- 3D images: bathymetry drapes (produced using Fledermaus), point cloud images (using Qimera) produced remotely at UNH

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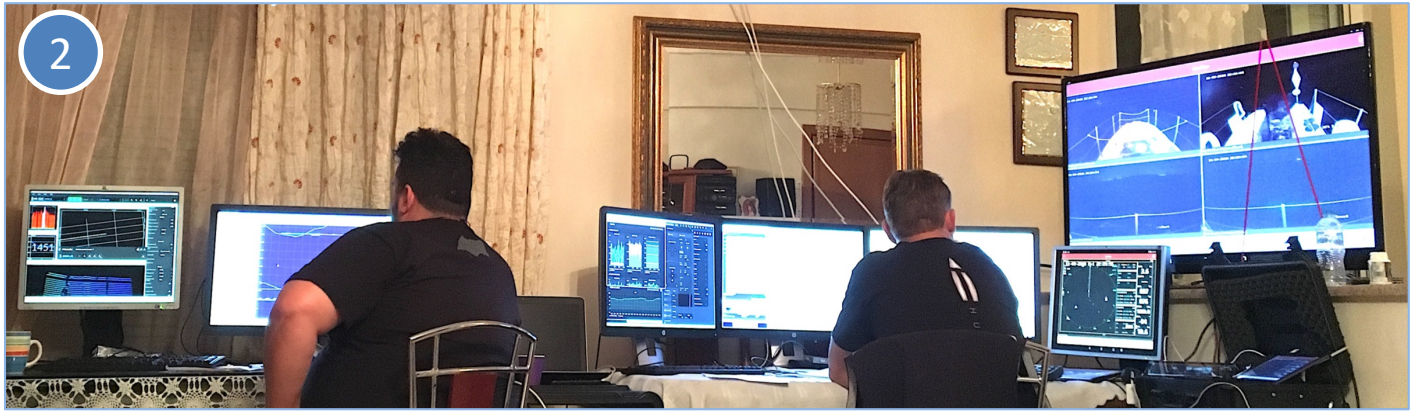
1

2

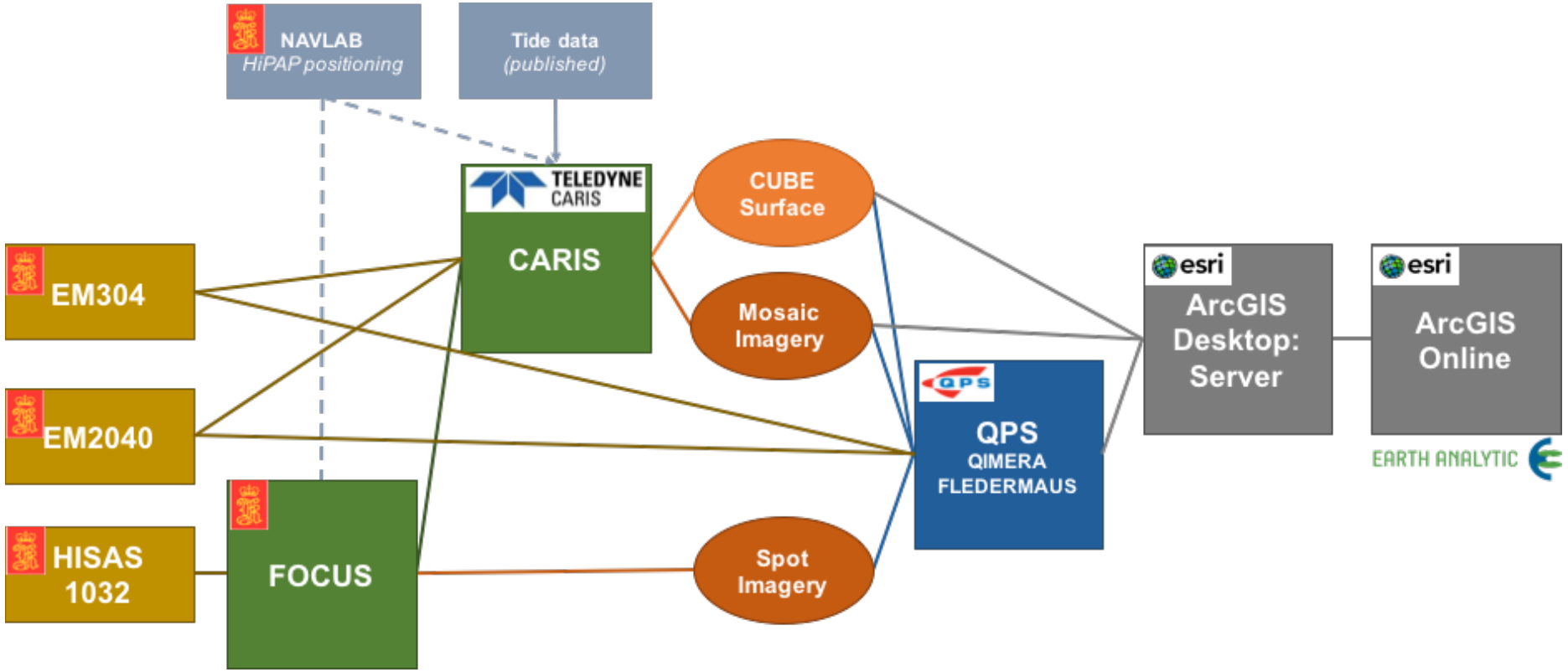


ROUND 2 WORK HUBS

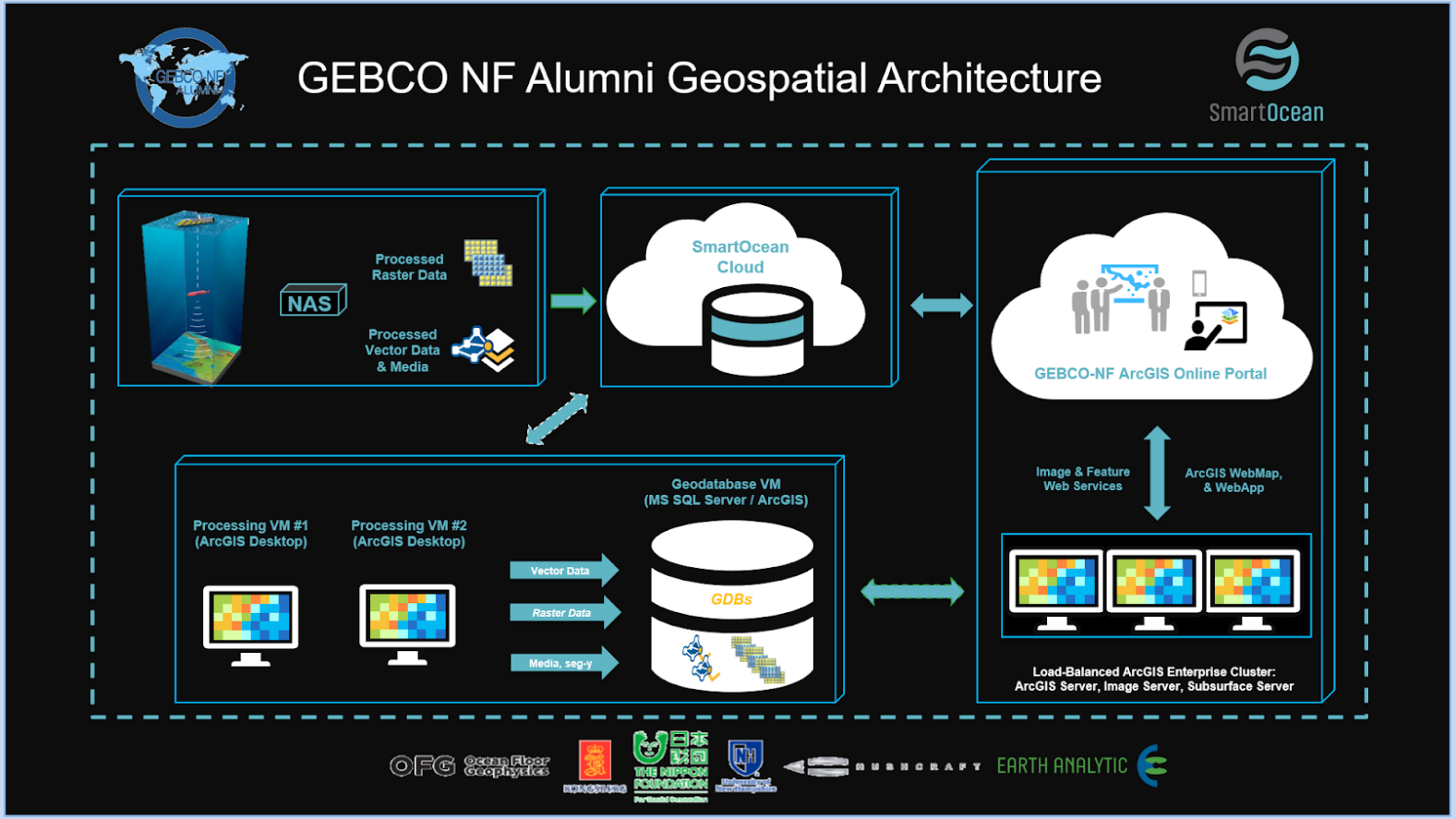
1. Survey equipment
2. Operations Center
3. Data Processing ('Mission Control')

+ NETWORK

3



Automated work flow – data to information


GEBCO NF Alumni Geospatial Architecture
SmartOcean
NAS
Processed Raster Data
Processed Vector Data & Media
SmartOcean Cloud
GEBCO-NF ArcGIS Online Portal
Image & Feature Web Services
ArcGIS WebMap, & WebApp
Processing VM #1 (ArcGIS Desktop)
Processing VM #2 (ArcGIS Desktop)
Geodatabase VM (MS SQL Server / ArcGIS)
Vector Data
Raster Data
Media, seg-y
GDBs
Load-Balanced ArcGIS Enterprise Cluster: ArcGIS Server, Image Server, Subsurface Server
OFG Ocean Floor Geophysics
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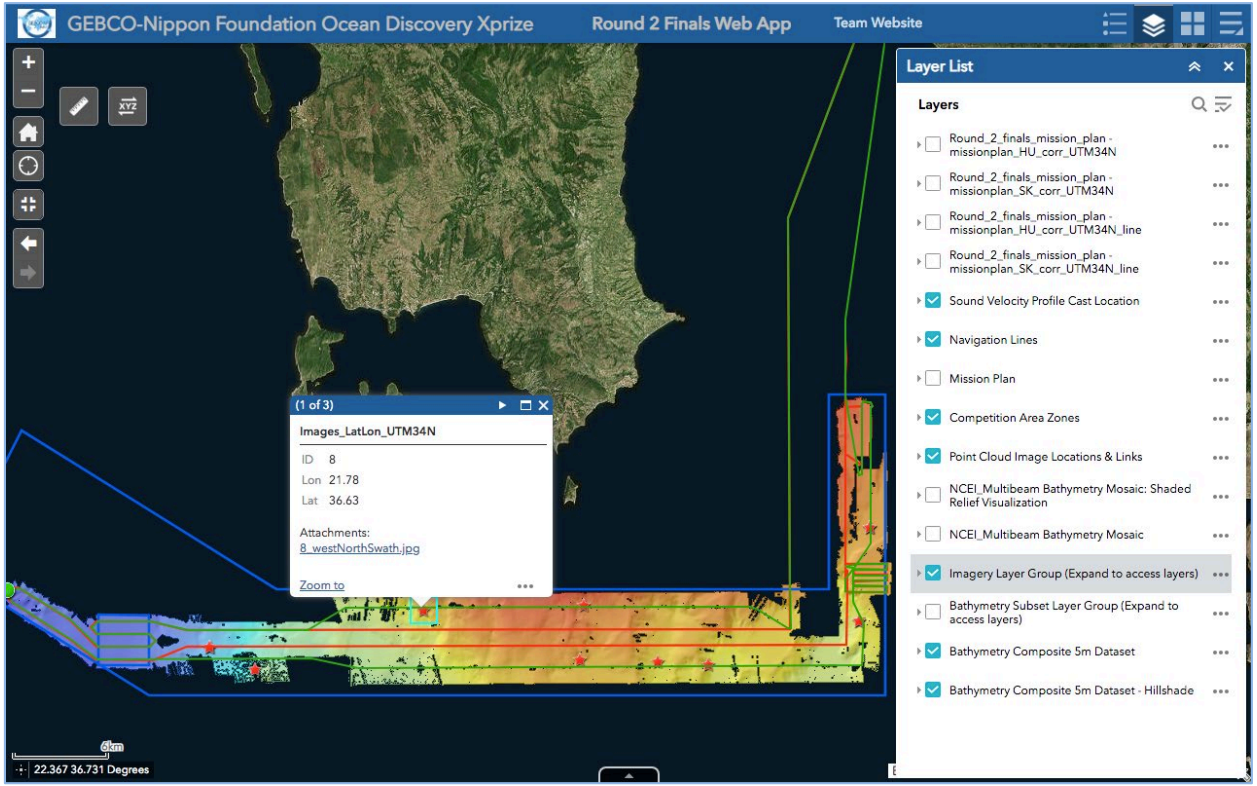

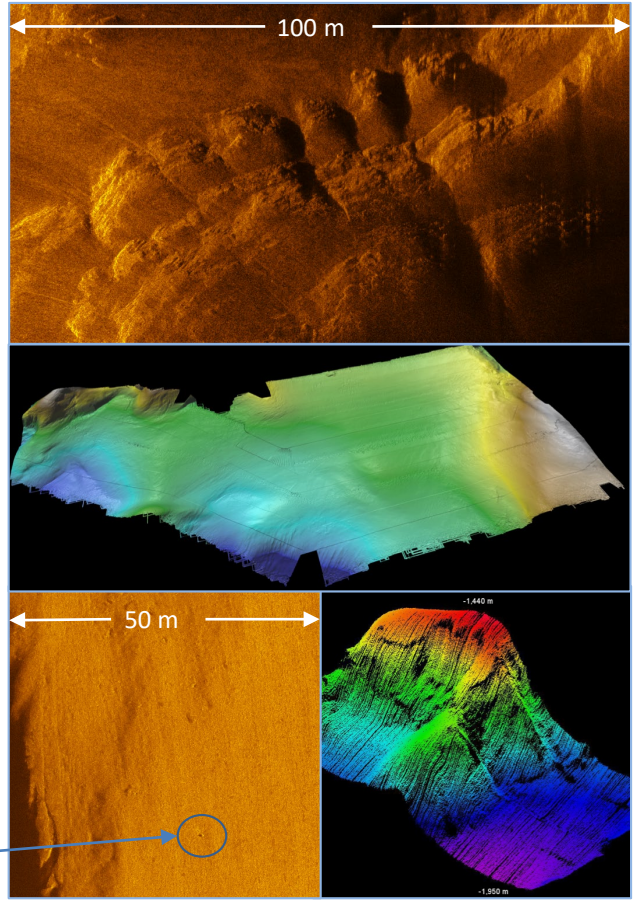

Object - Size: 0.33 x 0.49 m; Height: 0.14 m

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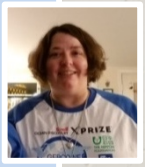
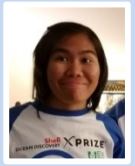

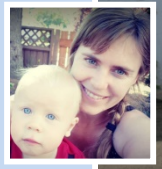
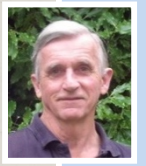

Thank you