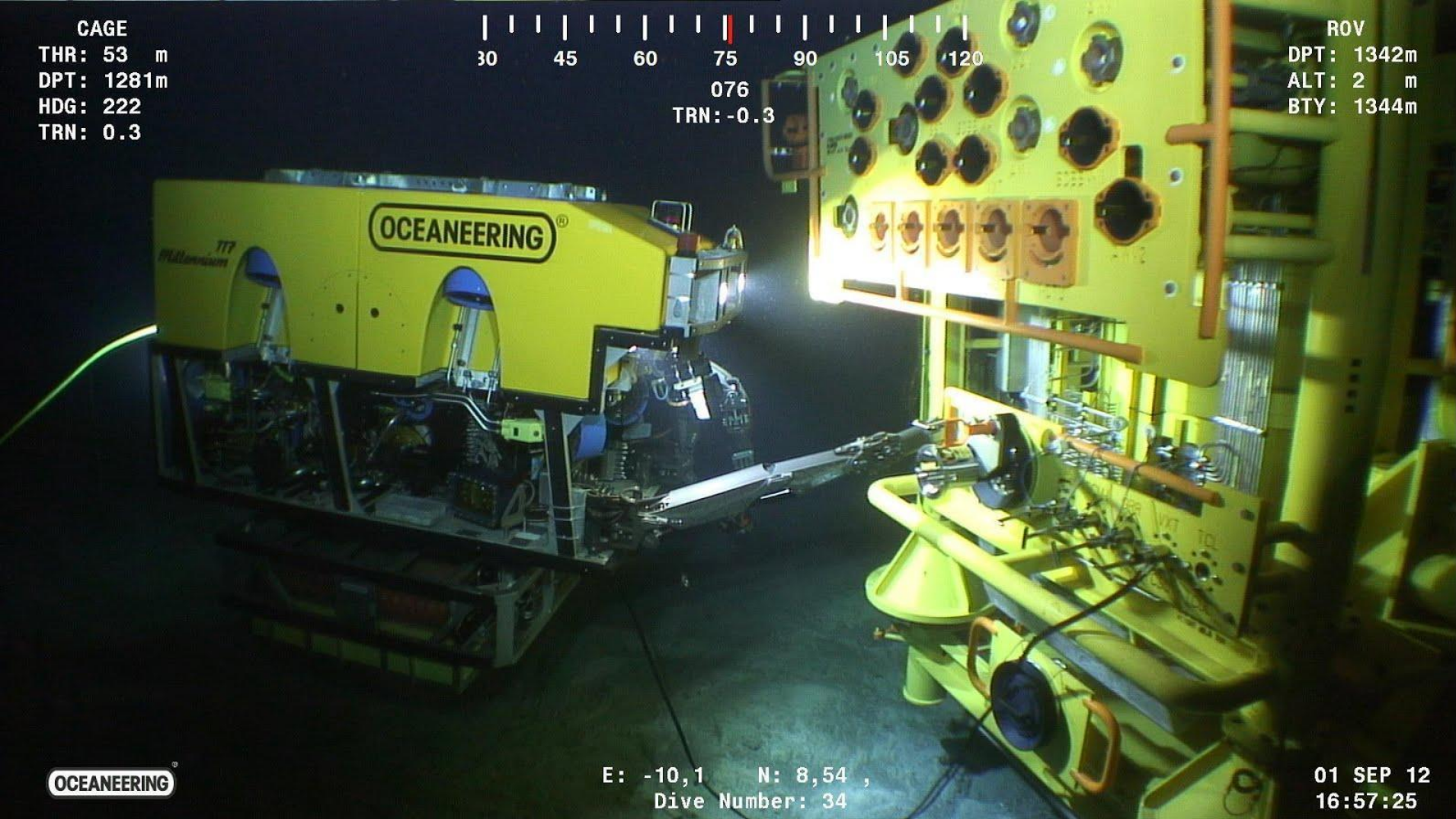


CAGE  
THR: 53 m  
DPT: 1281m  
HDG: 222  
TRN: 0.3

30 45 60 75 90 105 120  
076  
TRN: -0.3

ROV  
DPT: 1342m  
ALT: 2 m  
BTY: 1344m



# Digital Subsea-Aberdeen, Scotland

## Oceaneering Communications Solutions

### June 2014

# **OCEANEERING<sup>®</sup>** Safety is the #1 Priority

*Personnel safety is always the primary consideration and will not be compromised.*

*- Oceaneering International, Inc.  
#1 Operating Standard*

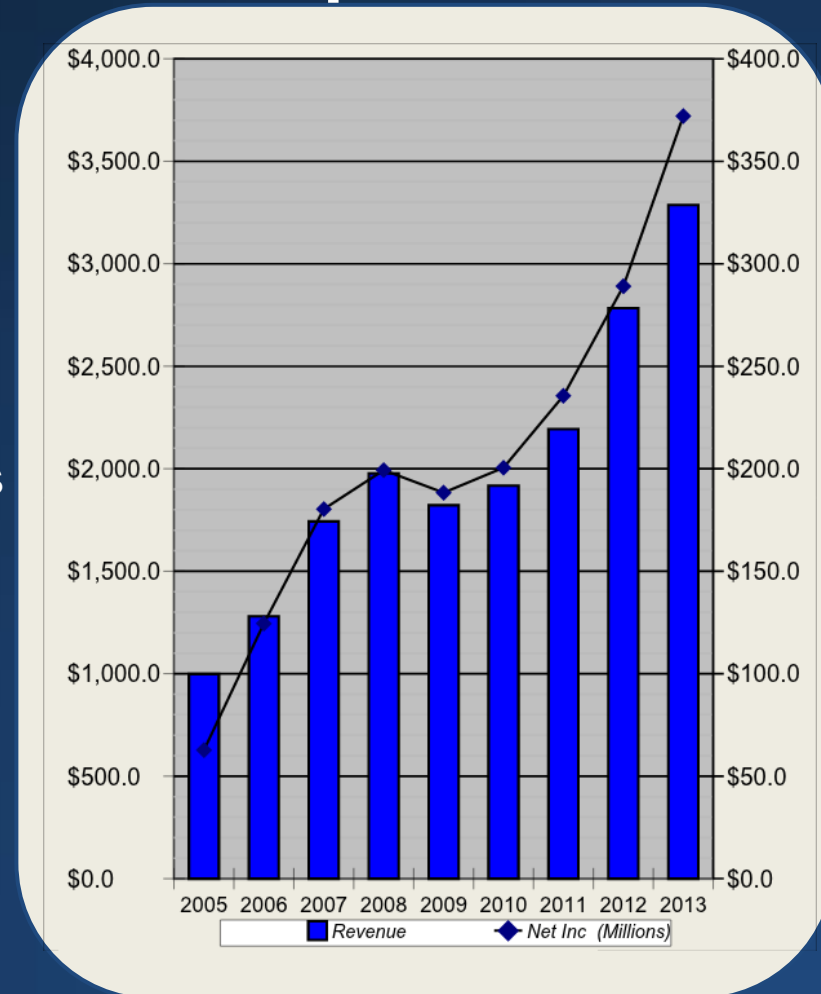




# Oceaneering International, Incorporated

- Oceaneering International, Inc. (NYSE: OII)
- Founded 1964
- Corporate Headquarters: Houston, TX
- Worldwide: ~12,200 people in 28 countries
- Primary Business: Oil & Gas Services
- FY2013 Sales: \$3.3 Billion

**Solutions for Customer needs in any harsh environment**



# Harsh Environments

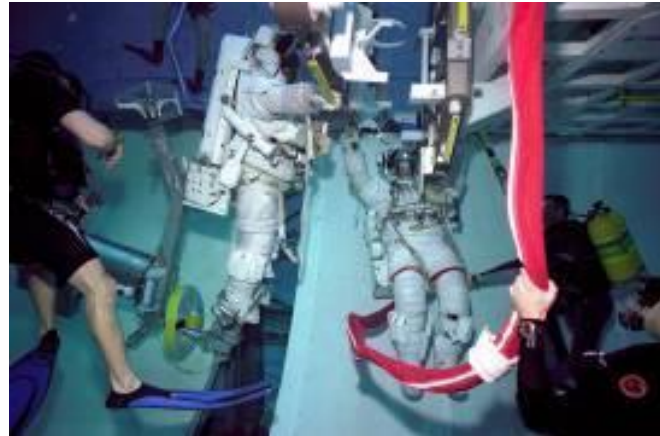
# Extravehicular Activity - EVA

## Safe and Effective Life Support Systems...

- Crew Space Suit System (CSSS) Prime Contractor
- Advanced life support systems / cryogenic life support systems
- Spacecraft ECLSS



*OSS Liquid Air Pack, Mars Exploration Simulation*



*Automated Nitrox Breathing Gas System for NASA's Neutral Buoyancy Lab (NBL)*



*NASA Concept of CSSS Configuration 1 and Configuration 2 Suits*

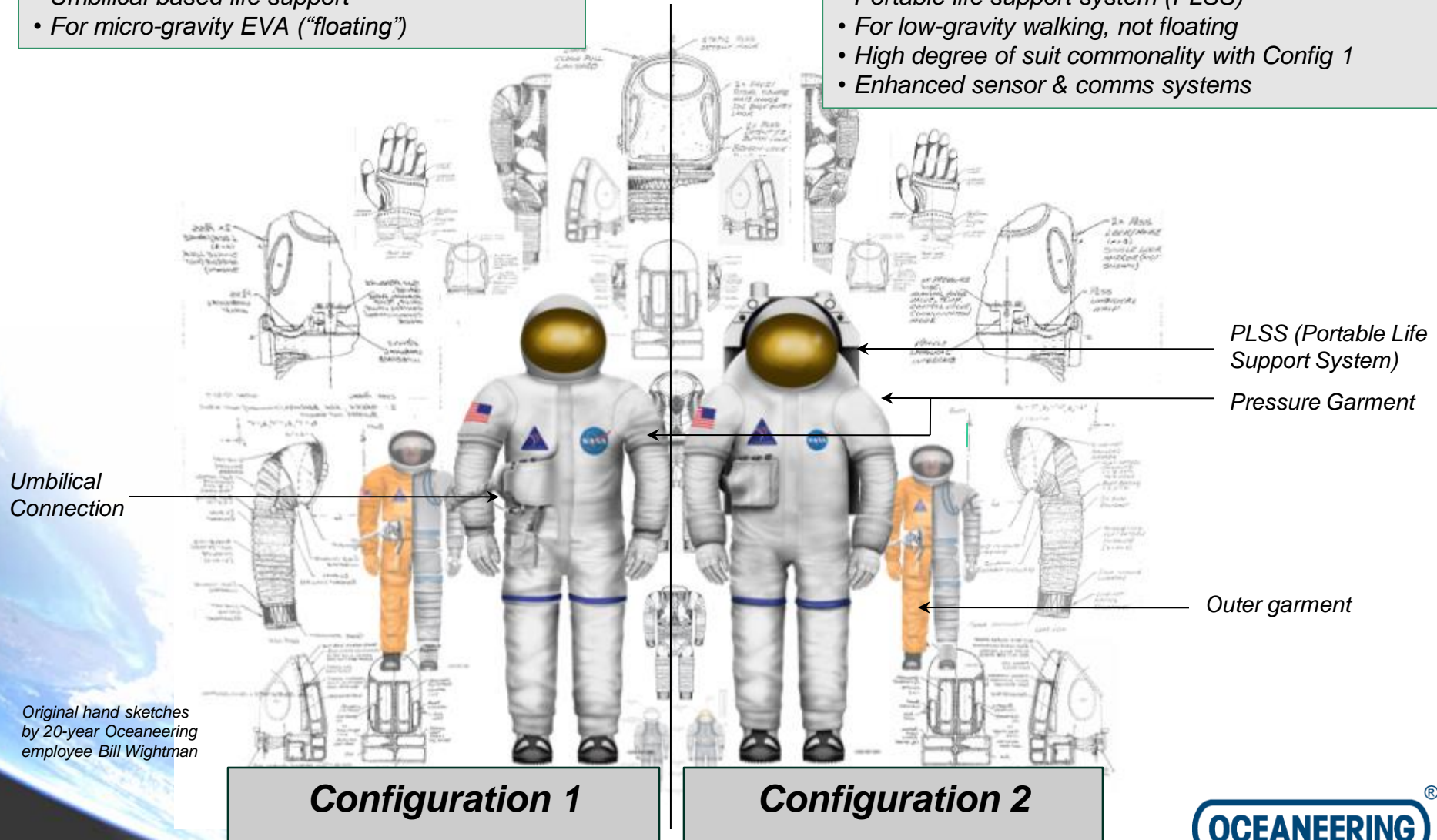
# NASA Crew Space Suit System

## **For Launch/Entry/Abort/Contingency EVA**

- Umbilical based life support
- For micro-gravity EVA (“floating”)

## **For Lunar Surface Ops**

- Portable life support system (PLSS)
- For low-gravity walking, not floating
- High degree of suit commonality with Config 1
- Enhanced sensor & comms systems



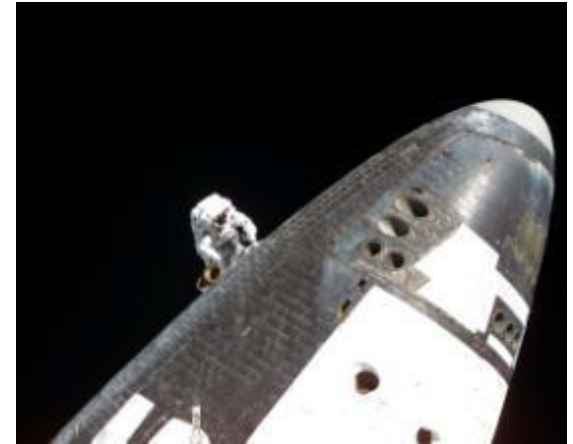
Original hand sketches  
by 20-year Oceaneering  
employee Bill Wightman



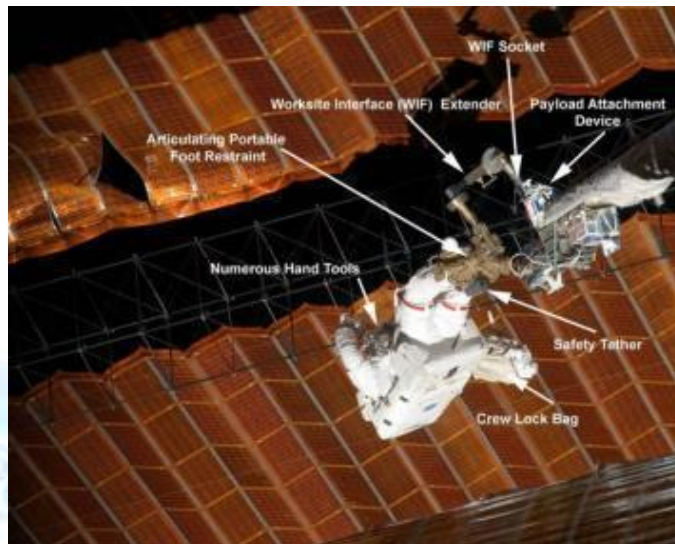
# EVA Tools and Equipment

## Astronaut Tools & Equipment for Safe and Reliable Space Operations...

- NASA's leading DDT&E contractor for new EVA tools and equipment
- Responsible for sustaining engineering and replenishment of all operational EVA tools and equipment for Shuttle and ISS
- History goes back to STS-1 and includes all satellite retrieval and repair missions



*Return to Flight Tile Repair Systems*



*Preparation for deployment of an ISS solar array*



OSS provides sustaining engineering for all of NASA's Shuttle & ISS EVA tools and crew aids

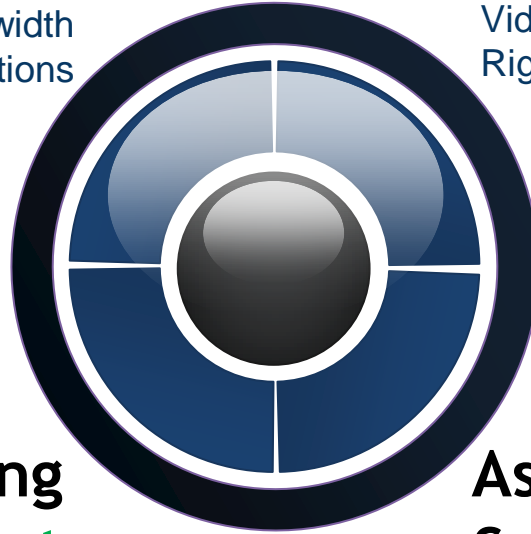
# OCS business lines (OII Newest Division)

## Communications services

On-Rig IT Technical Support  
Satellite/Bandwidth  
RF Mesh Networks/multi-vessel operations

## Live data streaming

Per-Camera Video Stream  
Video Encoder Rental  
Rig Floor Camera Rental



## Data Recording & media management

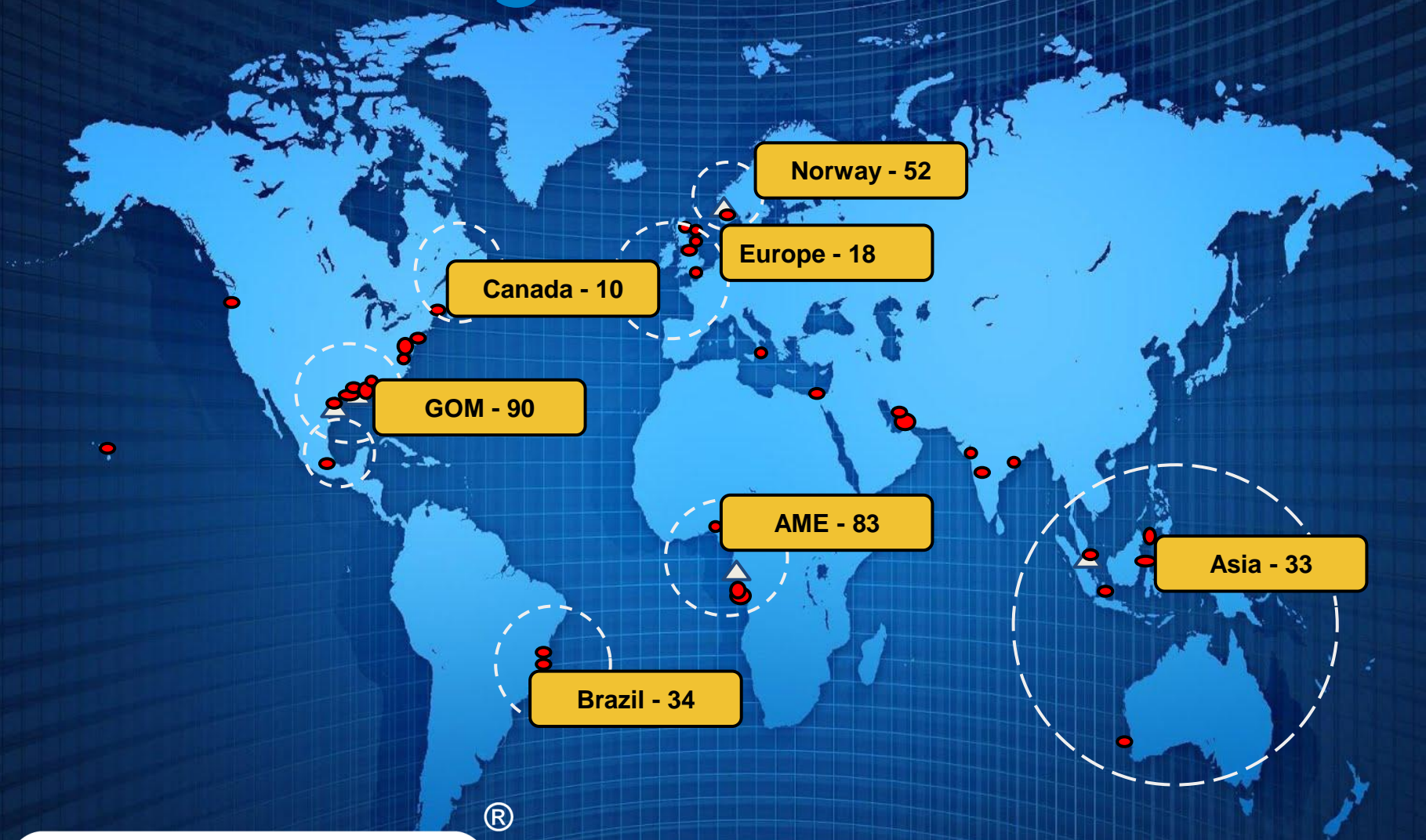
Video & Telemetry Data Storage  
Video Tagging, Editing, and Storyboarding

## Asset Tracking & data visualization

COP-Common Operating PictureReal-Time  
Operations Dashboards  
Add-on Layers /Vessel Tracking and Wx



# 320 working class ROVs



**OCEANEERING**

Updated: June 2014

# SubSea Video & Recording

# DSSI 2014 HDCameras

## Next Generation

Increase Resolution

Reduced Size

Reduced Cost

6,000 meter  
depth rated

**Ocean Pro  
HD TV Camera**

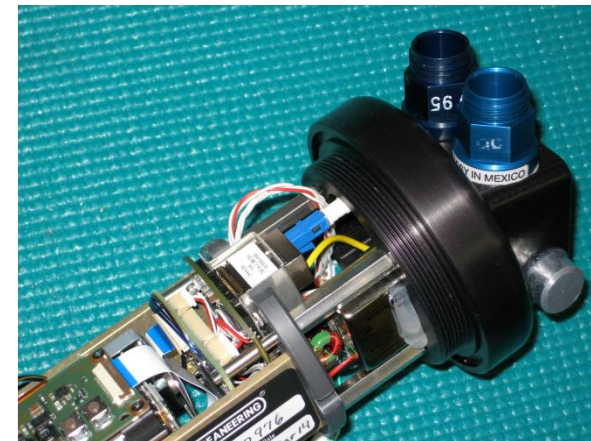
30 dB SM  
Optical budget

Up to 6 HD camera's  
on "One SM Fiber"

All in One Camera Unit



Exclusive to the  
Oceaneering ROV fleet





# DSSI 2014 SubSea Lighting



Now In full production

## Improved 200 Watt LED Light

Wider variable Intensity control

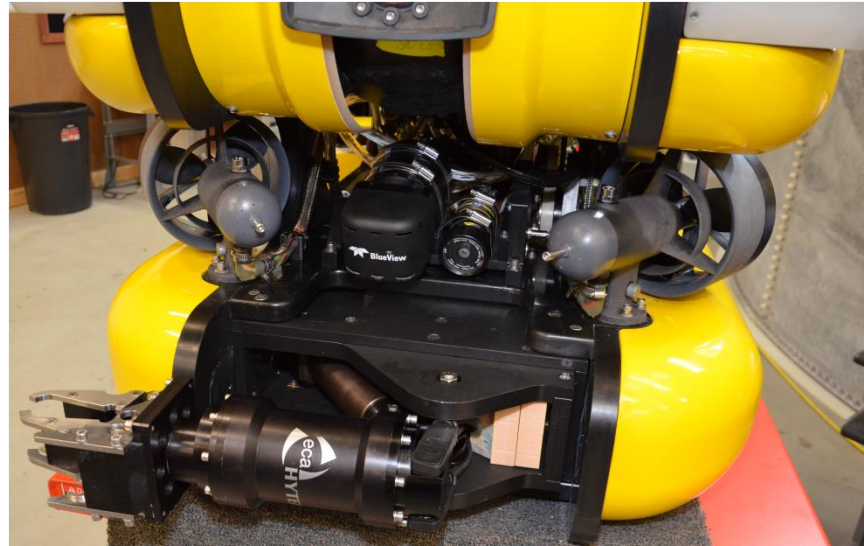
Overvoltage auto shutoff protection



Over 3,800 LED lights built to date

Widely used throughout the ROV Fleet

# Omni Maxx ROV features



Wide zoom HDTV Camera  
400 watts of LED lighting  
Gyro controlled Pitch & Roll

Blue View scanning Sonar  
Low light BW TV camera  
Aft Looking TV Camera & Light

3.8 Knots speed  
10 KVA Power (10hp )  
4,000 meter depth rated



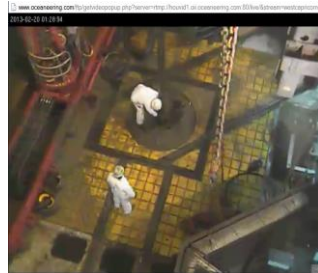
3 function E-Manipulator with line cutter  
Tool Bay with Power and Data  
onboard T-100 Ethernet

# Live streaming video (Topside)

Stream Live Deck Video of  
Vessel/Rig Operations

Video Recording and  
Cataloging

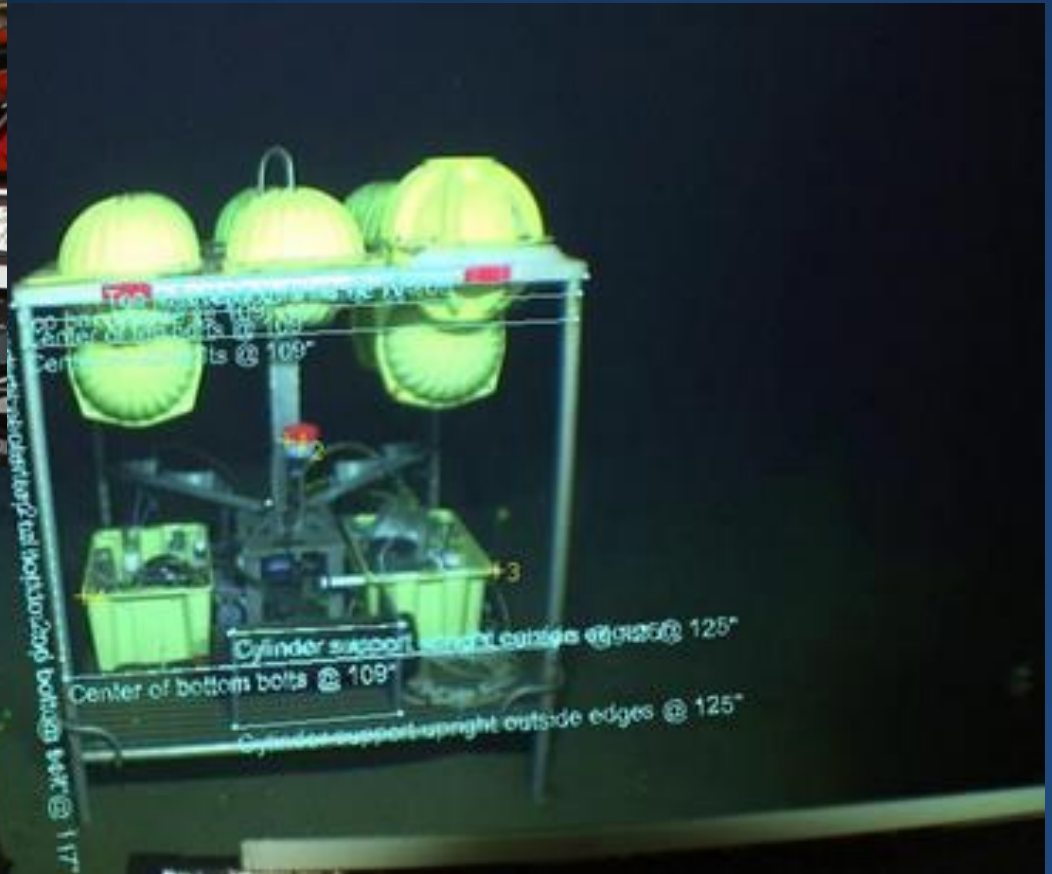
Supports HD/SD Native  
Cameras and IP Based  
Cameras.





# Photogrammetry OceanPro HD

## 3D Stereo Measuring Systems



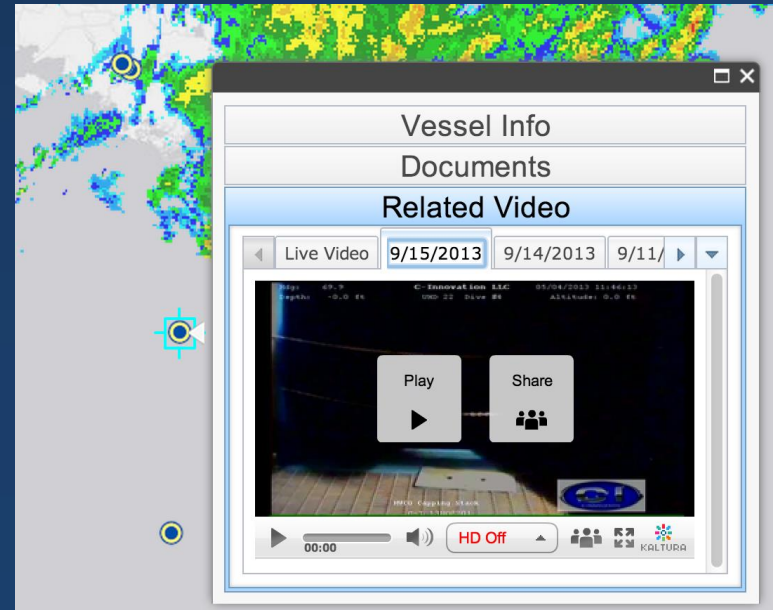
# 2014 live video

Deploy new KLV video encoder (Integrate GIS Coordinates)  
MilSPEC & FIPS Certified

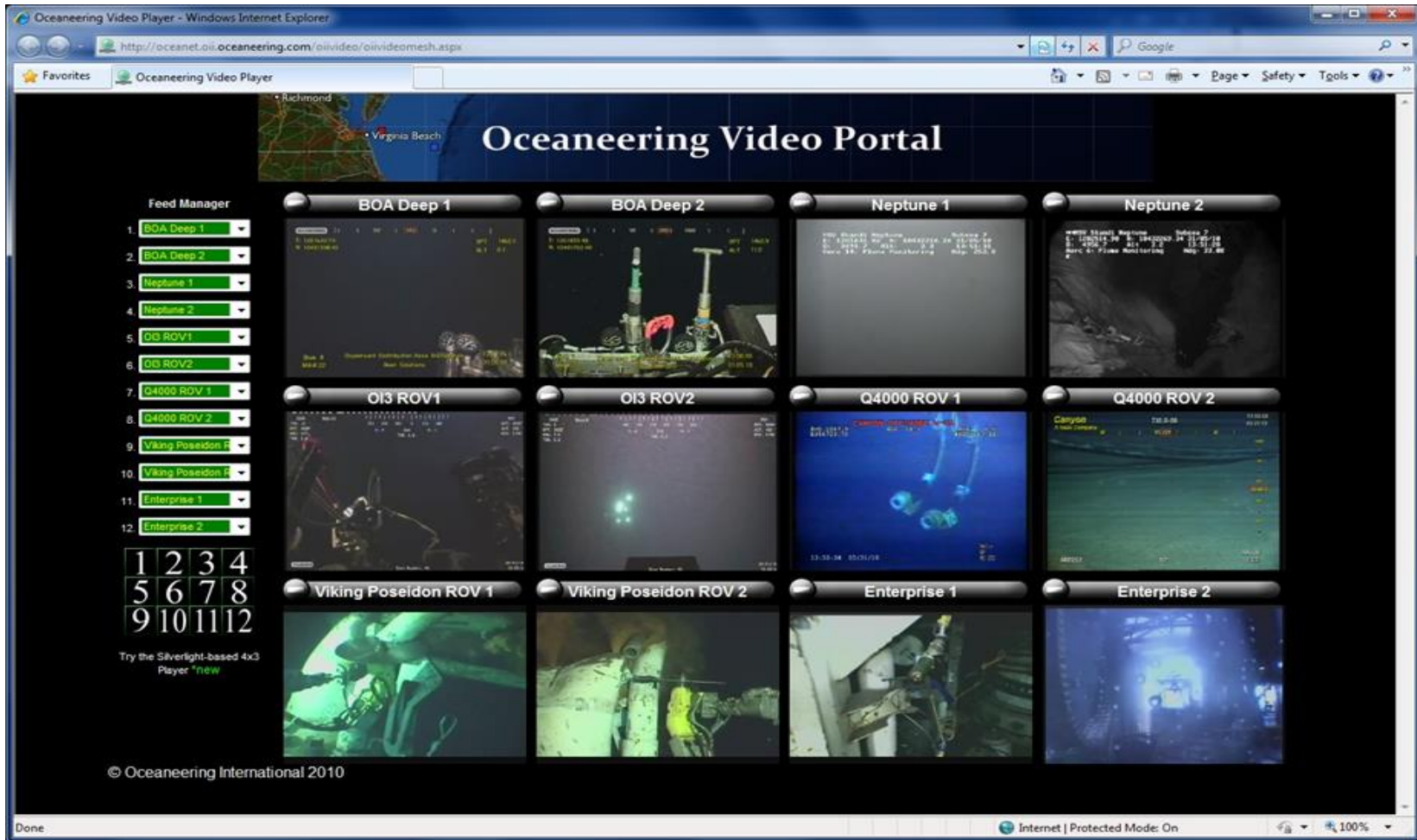
H265 (twice the quality, same bandwidth) Uses as low as 50K of bandwidth

Custom Video Overlay

Integrate the live video into the COP



# Live streaming video (Underwater)



Support for 20 million viewers

Low Bandwidth (50Kb)



# Video & DVR products

## ROV & OII Video Library

The screenshot displays the OCEANEERING video library interface. At the top, there's a navigation bar with tabs: Dashboard, Streaming, COP (highlighted), Search, Metrics, Feeds, and Users. Below this, a status bar shows 'Logged In As: oceaneering' and 'Last login: 2014-05-15 13:00'. The main area is titled 'Common Operational Picture' and features a map of the Gulf of Mexico with various locations marked. A search bar on the left allows filtering by Platform, Base Location, Current Location, Source Provider, and MCA Range. A video player is open, showing a ROV feed. The player has tabs for Video and Metadata. A 'ROV Hover' box is visible, showing 'Watch', 'Follow', and 'Zoom' options, along with 'ROV' and 'US - Deepwater Champion' labels. The bottom of the interface shows a 'Dashboard' with a grid of video thumbnails, each with a status indicator (e.g., 'ACTIVE', 'Last Update: 11 hours ago').

- Thumbnail creation
- Subtitles (Reference jobs, device name, vessel time)
- Tag capabilities
- Search and Indexing
- Rule Based Playlist Capability (IE, Playlist based on Job xxx or Tool xxx)
- Workflow and Video Approval (IE Legal approves distribution and entitlement)
- Custom Video Player Modification (Add Subtitles/Transcriptions)
- Metadata content management
- Extract of GEOCoded Data Workflow status metadata.

# SubSea Integrity Management

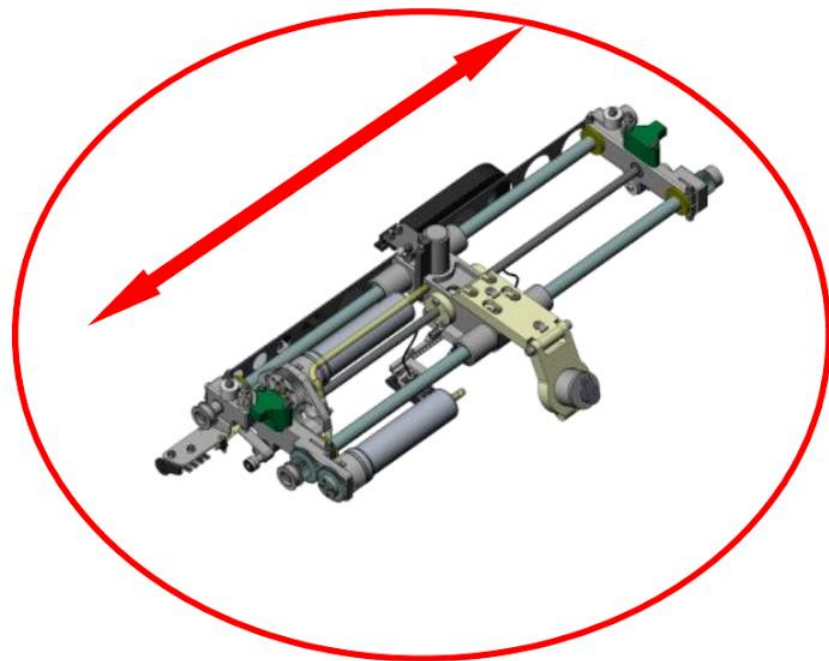
# Mooring Line Cleaning Tool

- Rotating knives
- Brushes
- Self propelled





## Neptune

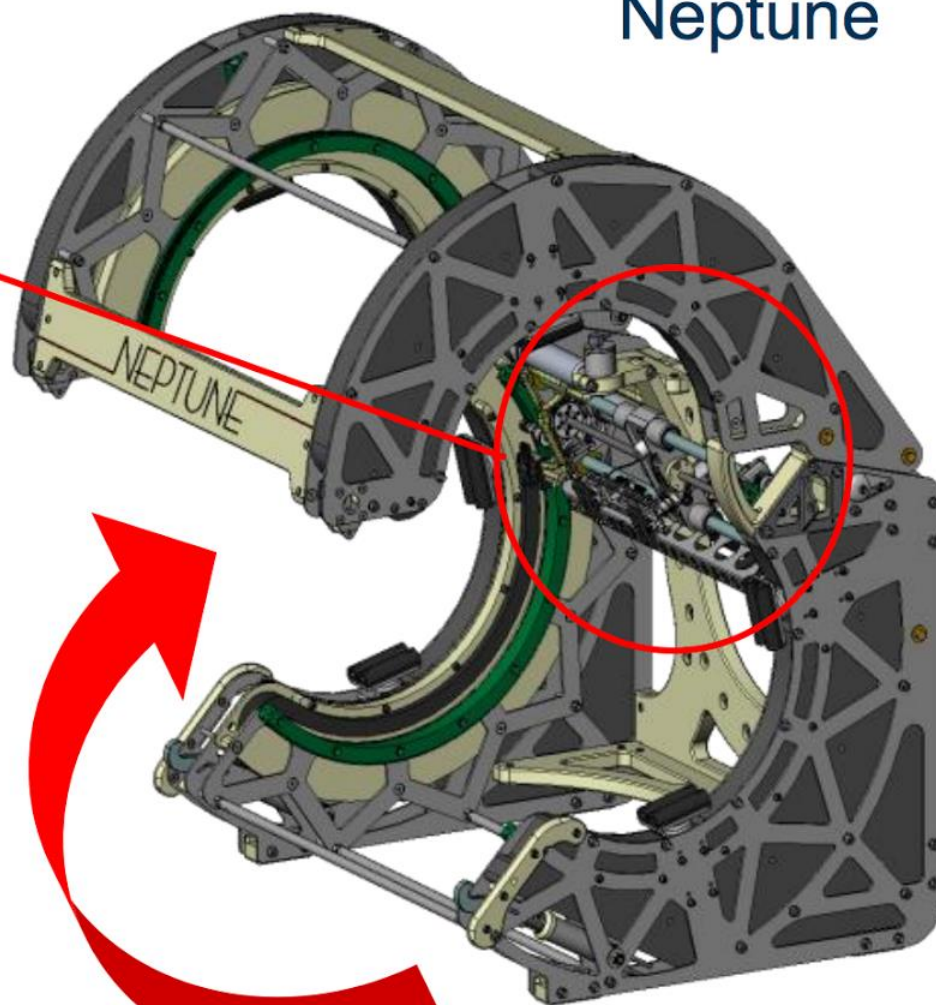


High resolution UT Scanning tool for subsea inspection.

ROV Deployed up to 3000m  
360 degree, by 500mm long

Pipe sizes from 6" to 21"

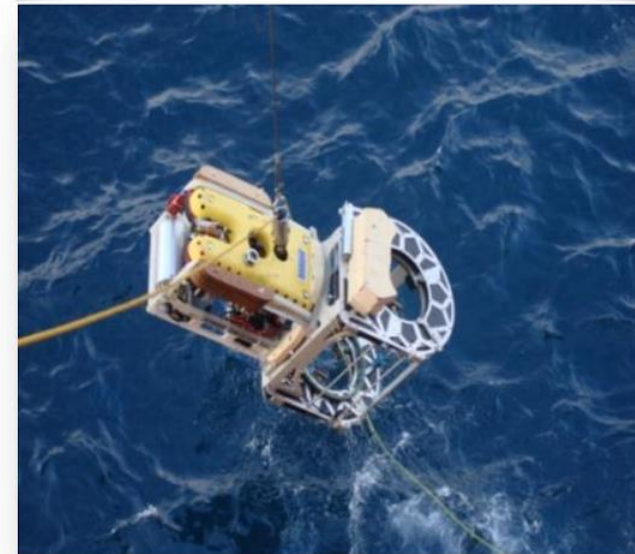
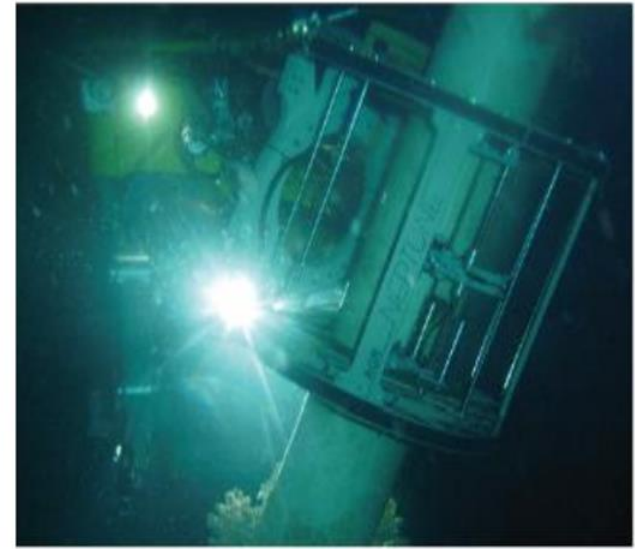
Pulse Echo & TOFD



Carriage  
Rotation

### Neptune can be used for:

- Rapid monitoring, from ROV Supply Vessel, of pipelines following subsea impacts
- Platform based routine wall thickness monitoring of Platform Risers
- Regular monitoring of anomalous pipeline sections (legacy infrastructure) in lieu of remedial intervention
- Pre-inspection of pipeline hot tap areas
- Rapid IP Pigging anomaly verification
- Flexible risers and flow lines inspection: annulus flooding and outer armour wire condition



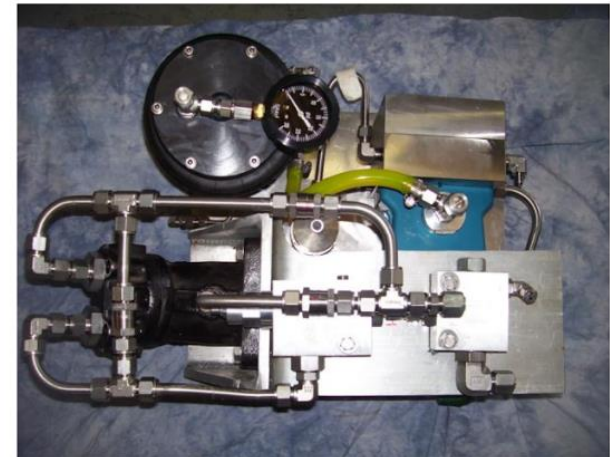
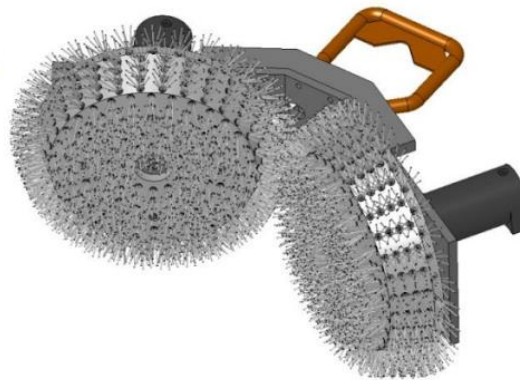


## Available tools – ROV deployed



Hydraulic Cylindrical Brush

Hydraulic Rotary Brush



High Volume High Pressure  
Sea Water Pump



# Trident



- High resolution UT scanning tool for subsea inspection
- Diver/ROV deployed down to 300m
- 360 degree, by 500mm long
- Pipe sizes from 6" to 22" (no upward limit)
- Pulse Echo, TOFD & Phased Array



# Chain link weld inspection tool

## Safety Alert

**BOEMRE**

U.S. Department of the Interior  
Bureau of Ocean Energy Management,  
Regulation and Enforcement  
Gulf of Mexico OCS Region

Safety Alert No. 296  
12 May 2011

Contact: Russell Hoshman  
(504) 736-2627

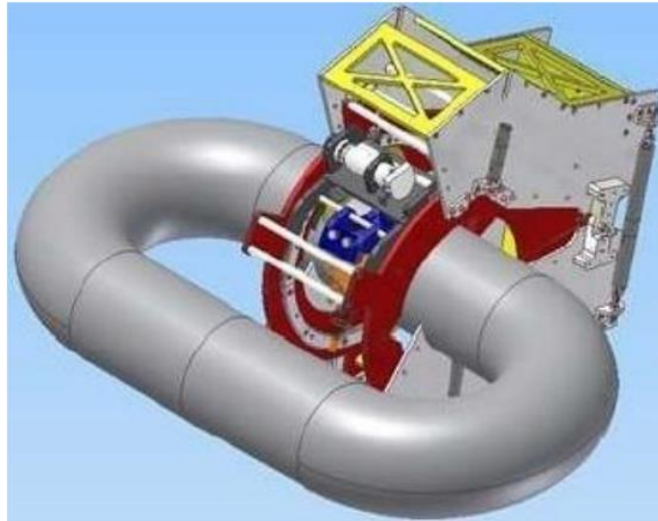
### Catastrophic Failures in Mooring Systems Possibly Put Floating Structures at Risk

In early 2011, a single point mooring system for a deepwater Gulf of Mexico (GOM) project failed at the tether chain for a free-standing hybrid riser, allowing the buoyancy air can and the free-standing flowline riser to separate. The 440-ton buoyancy air can rose suddenly to the surface while the free standing riser collapsed. Based on the investigation of this event and a review of historical events, BOEMRE is revising and re-issuing Safety Alert #259.



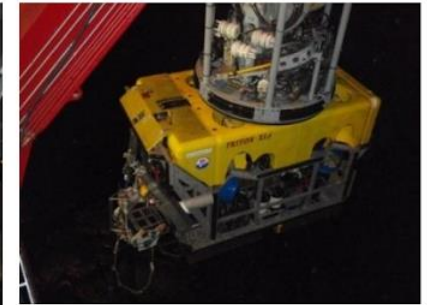
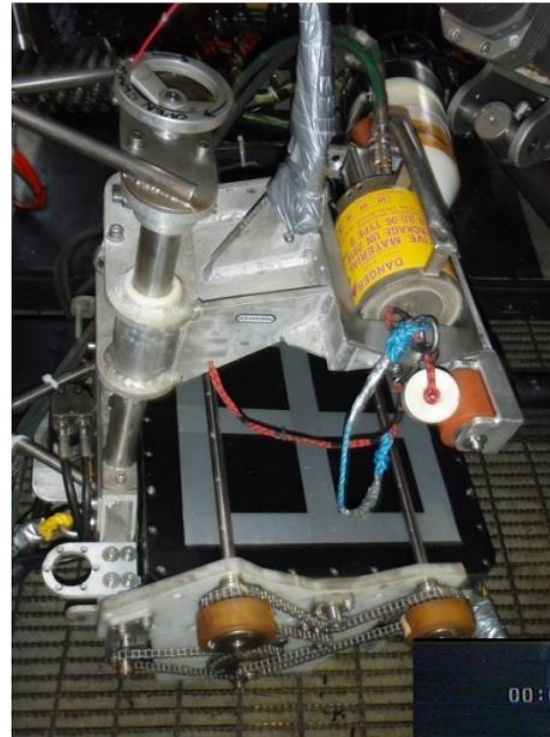
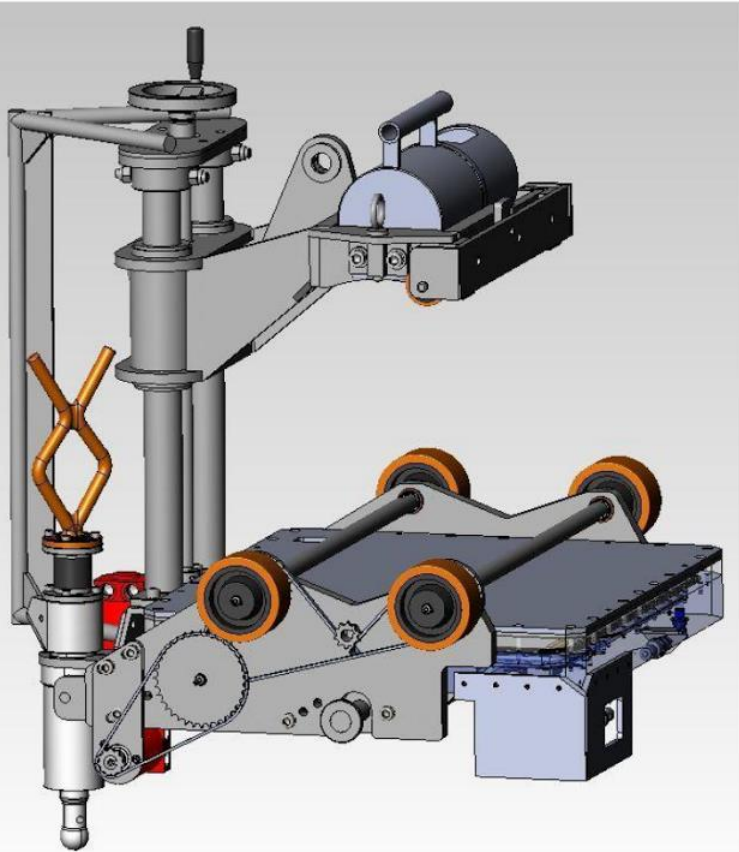
Failed Chain Link

The investigation determined that a 6 3/4-inch diameter, 862-pound chain link in the tether chain had fractured and separated near its butt weld. Analysis of the fracture indicated that the chain link had a weld repair and the fracture initiated in the middle of the weld. Three links of the 24-link tether chain were found to have weld repairs. After the chain had been heat treated, the non-US based manufacturer had made weld repairs to the chain by grinding defects and filling the void with weld material. The chain was being built in accordance with Det Norske Veritas (DNV) Offshore Mooring Chain standard. Post heat treat weld repairs are disallowed per DNV's Offshore Mooring Chain standard. The post heat treat weld repairs made the chain susceptible to hydrogen induced stress cracking due to the extreme hardness





# Digital Radiography





# Splash Zone Cleaning and Inspection Tool

- V-block mounting unit
- Telescopic Unit
- Hydraulic lift winch
- Lower clamp
- Adjustable wheel mounts
- Tool head
- Inspection camera module
- UT/PEC NDE inspection module
- Cleaning module
- Controller
- Hydraulic power pack/control unit



# Communications

# 2014 communications & R&D

Bandwidth add-ons

Skid Deployment

Focus on technician placement

4G LTE Expansion (TopSide)

SubSea LED Communications (Subsea-Optical & Acoustic)







Inspection Services

Surface &  
Saturation  
Diving



Intervention Vessels

Production Controls  
& Chemical Injection

Vessel Tracking-  
Phase 1



ROVs &  
ROV Tooling



ROV Tracking-  
Phase 2

Subsea  
BOP Control  
Systems

Installation & Workover  
Control Systems

ROVs &  
ROV Tooling

Subsea Well  
Intervention

SubSea Tracking-  
Phase 3

Atmospheric Diving  
Systems



Specialized Subsea  
Hardware & Distribution  
Systems

Flowline Connections &  
Installation



Chemical Distribution  
Valves

Connector Systems  
& Services

Umbilical Connection  
Systems & Installation

# Life of Field Data Collection

# Field Wireless-Vessel LAN



It comes with dual 2.4 & 5.8 Ghz 2x3 MIMO omni antennas

six external N-Type connectors for different antennas

Installed on the aft handrails of monkey island. PoE CAT5 to inside network

Installed on the handrails on the crane walkway. **But it is mounted on the starboard inside of the crane and not the fore side as shown.** CAT5 PoE cable ran from crane cabin to the radio.

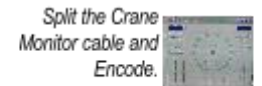
## Crane Cabin Options



Cameras



Cisco Phone



Split the Crane Monitor cable and Encode.



IP Intercom Station



Small Cisco PoE switch



# Supports Vessel to Vessel Network Mesh

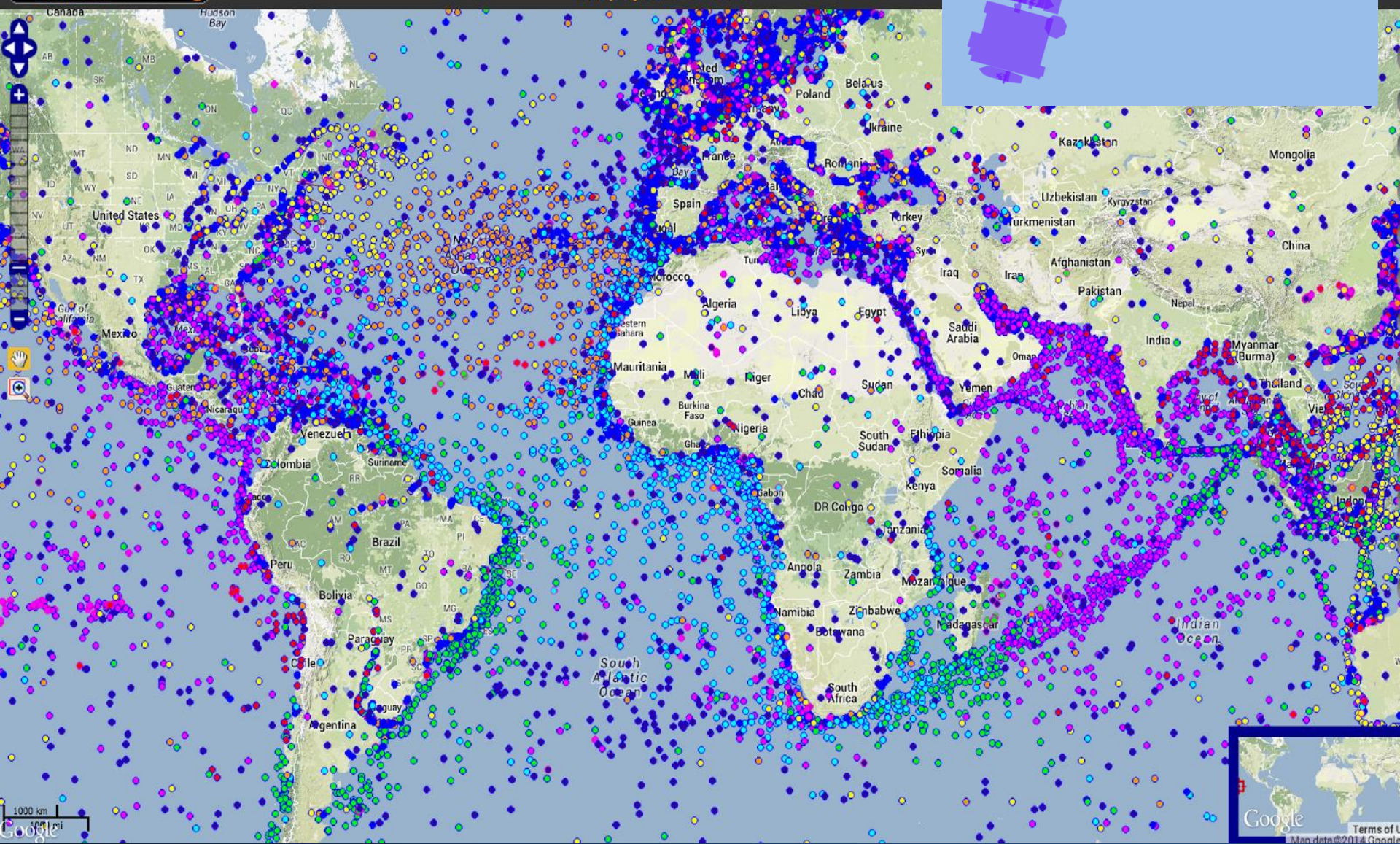
# Asset Tracking Data Visualization



# Asset tracking

Chart selection

2014/01/13 15:13:12 UTC



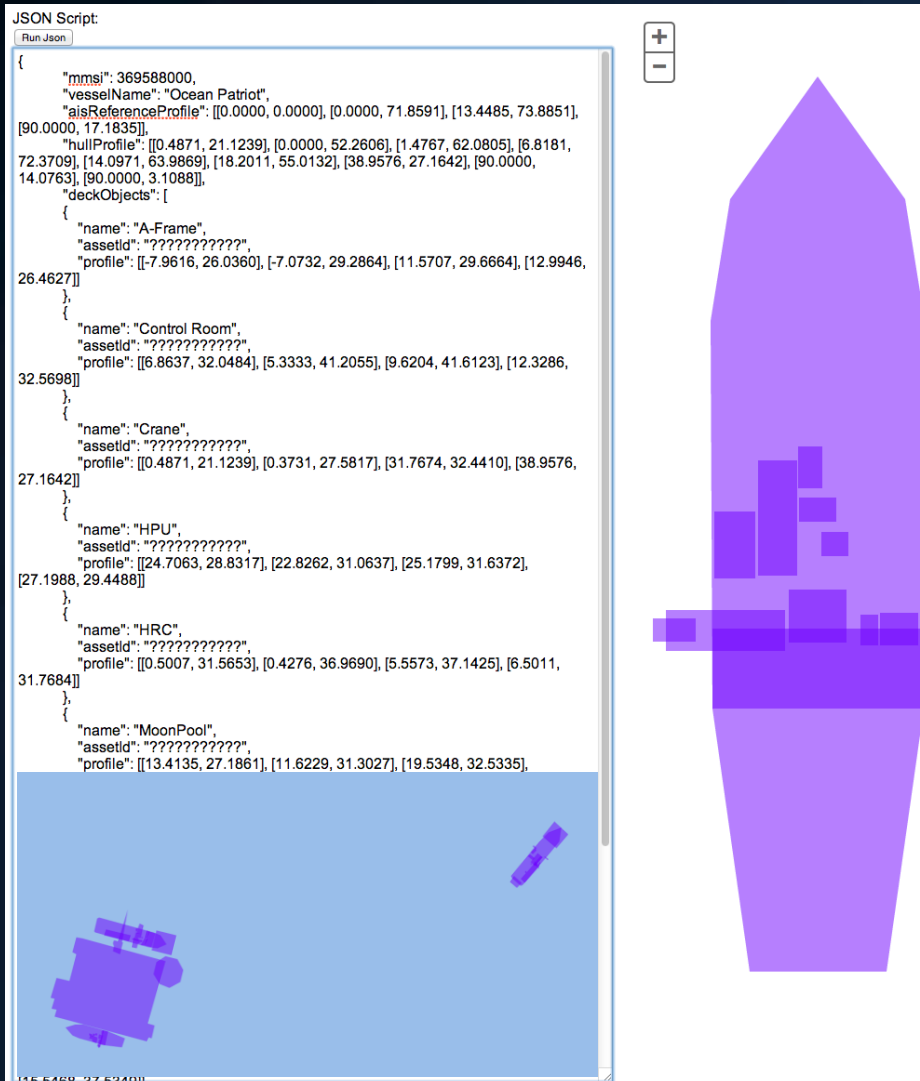
Google

Terms of U  
Map data ©2014 Google

OCEANEERING



# Asset tracking



Accurate Vessel  
Profiles Worldwide

Container, Equipment,  
Personnel Real-time  
tracking

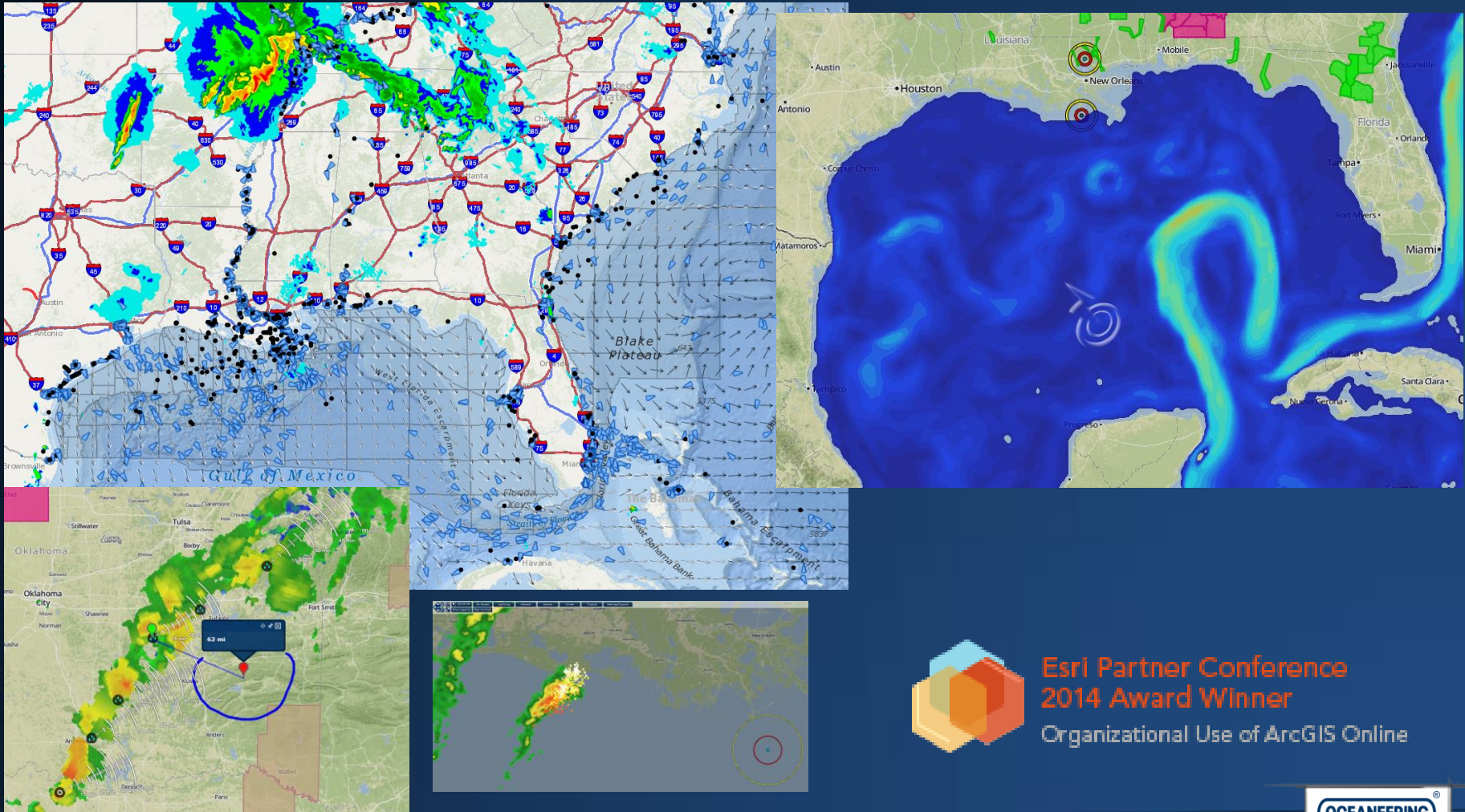
Geo-Fence Alerts for  
asset movement alerting

[Example Link](#)

[Activity Link](#)

# Common operating picture

Integration of live asset tracking, real-time weather, aircraft overflight data (3in res), Satellite Imagery (3m res)

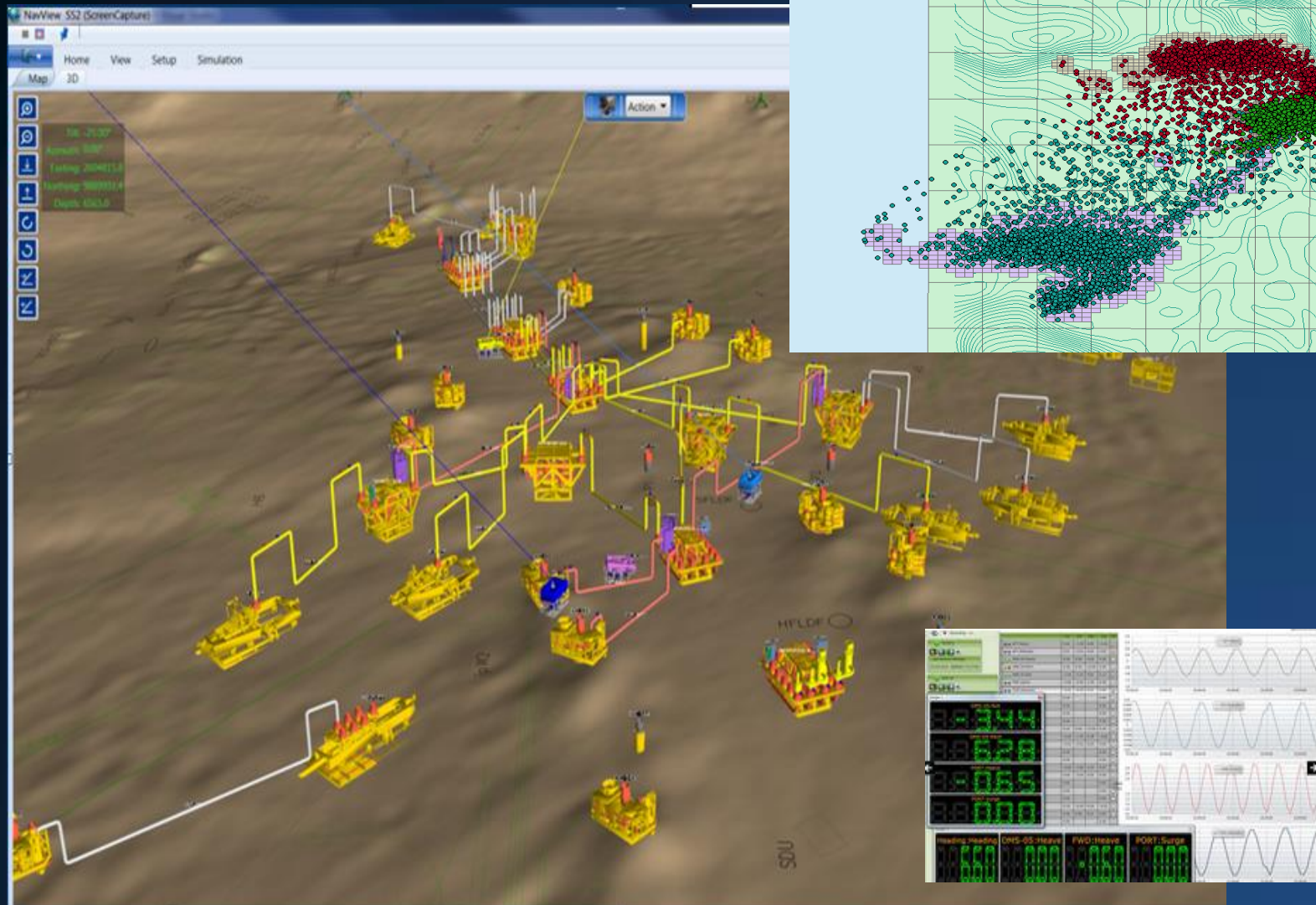


Esri Partner Conference  
2014 Award Winner

Organizational Use of ArcGIS Online



# Common operating picture



# SerialTap secure data stream



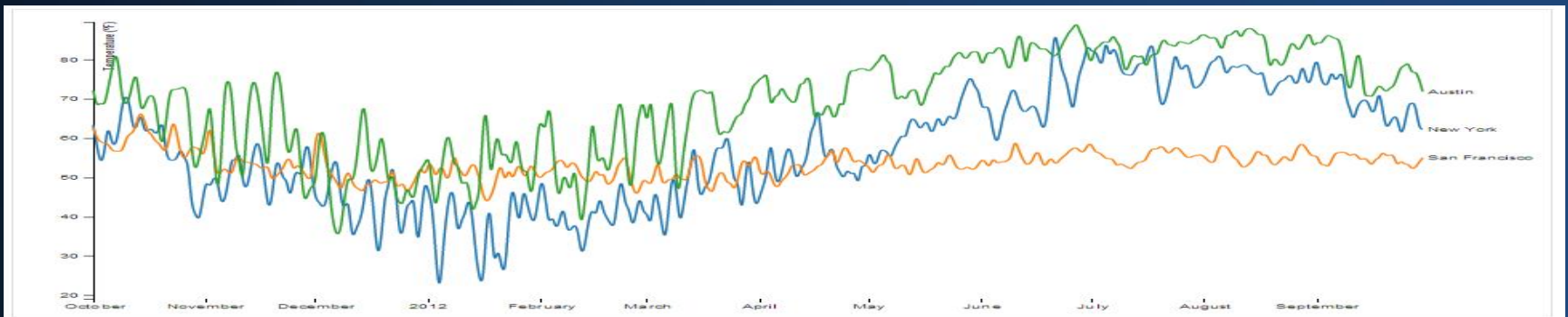
SerialTap provides real-time and store & forward data streaming capability

Uses: [BOP Pressure Data](#)

Valve Positioning

Fluid flow rates and torque settings

Temperature & SubSea weather data (Water Column)



# SubSea & COP Standards



International Association of  
Oil & Gas Producers  
COP Standards-2014





# Integrated video/data

## Thank You

User Interface

Encoder

Library

Overlay

DVR

Sensor

Mark Stevens  
Director of Communications  
Oceaneering Communications  
Solutions  
mstevens@oceaneering.com

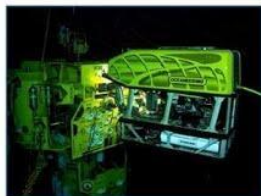


## Oceaneering International, Inc.

### Remotely Operated Vehicles

[oceaneering.com/rovs](http://oceaneering.com/rovs)

- Worldwide Work Class ROV Market Leader
- ROV Manufacturing
- Completion & Construction
- Inspection, Repair, & Maintenance
- Skilled Pilot Technician Training Program



### Subsea Products

#### BOP Control Systems

[oceaneering.com/bop](http://oceaneering.com/bop)

- BOP Components & Subassemblies
- ROV Intervention Panels & ROV Operable Ball Valves
- Subsea Control Systems & Topside Control Components



#### Deepwater Technical Solutions

[oceaneering.com/dts](http://oceaneering.com/dts)

- Emergency Engineering
- ROV Tooling & Ready-to-Ship Stabs, Manifolds, & Valves
- Decommissioning, Cutting, & Dredging Services
- Flow Assurance, Hydrate Remediation, Well Stimulation



#### GRAYLOC® Products

[oceaneering.com/grayloc](http://oceaneering.com/grayloc)

- Strong, Lightweight, Reusable Elastic Action Metal Ring Connectors



### High Performance Cables (HPC)

[oceaneering.com/hpc](http://oceaneering.com/hpc)

- ROV Umbilicals & Tethers
- Seismic Leads
- BOP Multiplexed Cables
- IWOCs Electrical Cables
- Specialty Cables



### Oceaneering Rotator

[oceaneering.com/rotator](http://oceaneering.com/rotator)

- Hydraulic Control Valves
- Subsea Chemical Injection Valves
- Specialty Control Systems



### Pipeline Connection & Repair Systems

[oceaneering.com/pcrs](http://oceaneering.com/pcrs)

- Diver Installable Subsea Pipeline Repair, Maintenance, & New Construction Products
- ROV Installable Subsea Pipeline Connection & Repair Systems



### Subsea Field Development Hardware

[oceaneering.com/ssfd](http://oceaneering.com/ssfd)

- Control & Chemical Injection Valves
- Flying Leads & Flowline Connection Systems
- Installation, Workover, Control Systems (IWOCs) & Support Equipment
- Retrievable Utility Modules (Filtering, Chemical Metering, & Accumulation Modules)
- Subsea Pig Launchers
- Electrically Piloted Hydraulic (EHP) Control Modules



### Umbilical Solutions

[oceaneering.com/umbilicals](http://oceaneering.com/umbilicals)

- Custom Design of Highly Engineered Umbilicals
- Material Selection, Research & Development, Manufacturing, Testing
- Steel Tube, Thermoplastic & Fiber Optic Umbilicals
- Power & Pump Umbilicals



### Subsea Projects

[oceaneering.com/subsea-projects](http://oceaneering.com/subsea-projects)

- Multi-Service & Dive Support Vessels
- Installations & Light Construction
- Inspection, Repair, & Maintenance
- Project Engineering & Management
- Diving Services



### Inspection Services

[oceaneering.com/inspection](http://oceaneering.com/inspection)

- Specialist Inspection Services & Non-Destructive Testing
- Inspection & Integrity Management
- Pipeline Inspection
- Rope Access
- Materials Testing
- Vendor Inspection Services



### Communications

[oceaneering.com/communications](http://oceaneering.com/communications)

- Offshore & ROV Streaming Video
- Ship to Ship & Satellite Communications







# OCEANEERING

[www.oceaneering.com](http://www.oceaneering.com)