

# OTC2015

2015 Offshore Technology Conference

4-7 May 2015  
HOUSTON, TEXAS, USA

**25742**

## **From On-Orbit to Offshore: Shared Challenges, Collaborative Solutions**

Gianluca Callini

**JACOBS**<sup>®</sup>



# Agenda



Similarities



Shared  
Challenges



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Similarities

Innovation



Shared  
Challenges



Collaborative  
Solutions



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## Similarities

# Space and Offshore Environments

Environments do not naturally support life (requires life support)

Extreme temperature ranges

Pressurized Systems

Remote operations

Hazardous operations requiring very specific training

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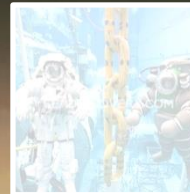


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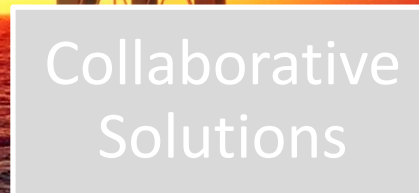
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Innovation

# Open Innovation @ NASA



## Challenge Cycle

- Develop Plan (Scope, Cost, Schedule)
- Develop Challenge Plan (Refine Scope, type of challenge, and desired outcome)
- Execute Challenge (Marketing, evaluate solutions, award prize)
- Post Challenge (evaluation, lessons learned)

## Services

- Educate & Share Best Practices
- Implementation Guidance
- Measure Impact

## Current Platforms

- |  |   |
|--|---|
| - NASA Challenge owners                  | - Other Federal Agency Challenge owners |
| - NASA@Work                              | - InnoCentive                           |
| - NASA Innovation Pavilion (InnoCentive) | - Harvard/TopCoder                      |
| - NASA Tournament Lab (Harvard/TopCoder) | - yet2.com                              |
| - yet2.com                               |   |

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# Innovation @ NASA

## NASA@work

### Challenge Details: Lunar Regolith-Tolerant Valve

#### Detailed Description & Requirements

The development of vacuum tight applications, particularly covers. The reusable In-Situ by reacting it with regolith into a react

Development of a re produce oxygen on t

1. Regolith would
2. The regolith wo
3. The collected wa
4. The hot regolith, i or through a sepa
5. This whole process

For further details on the des

In numbers...

Online since **2010**

**15,826** registered users,

**769** active

**2-4** active challenges per

month

**100** total challenges to

date

**74** awarded solutions

#### Additional Information

[Suggest A Challenge](#)  
[Simple Information Exchange](#)  
[Challenges Home »](#)

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Innovation

## Open Innovation @ NASA

### FILLING VASCULAR SPACES

Alan B. Lumsden, M.D., DeBakey Heart & Vascular Center

### PIPELINE INFECTION

### ROBOTS IN HOSTILE ENVIRONMENTS

Robert Ambrose, Ph.D., NASA/Johnson Space Center

Click here to view the **Challenge Lecture**

To send your thoughts or ideas to Robert Ambrose [click here](#)



# PUMPS &



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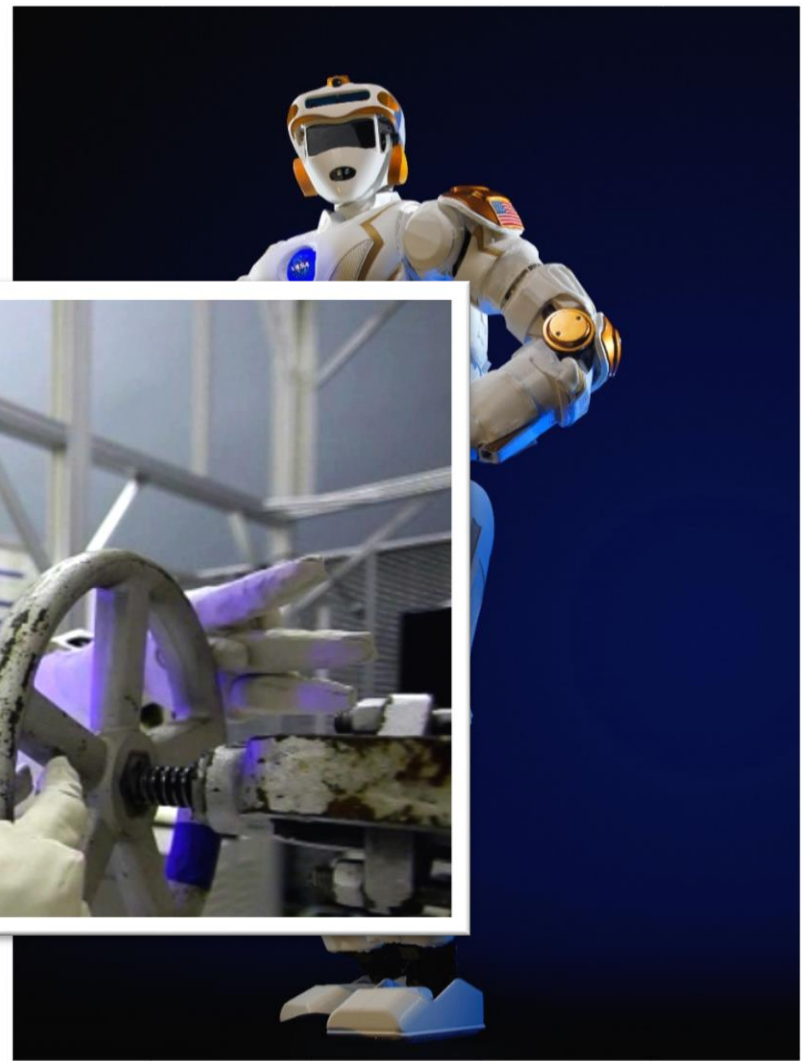
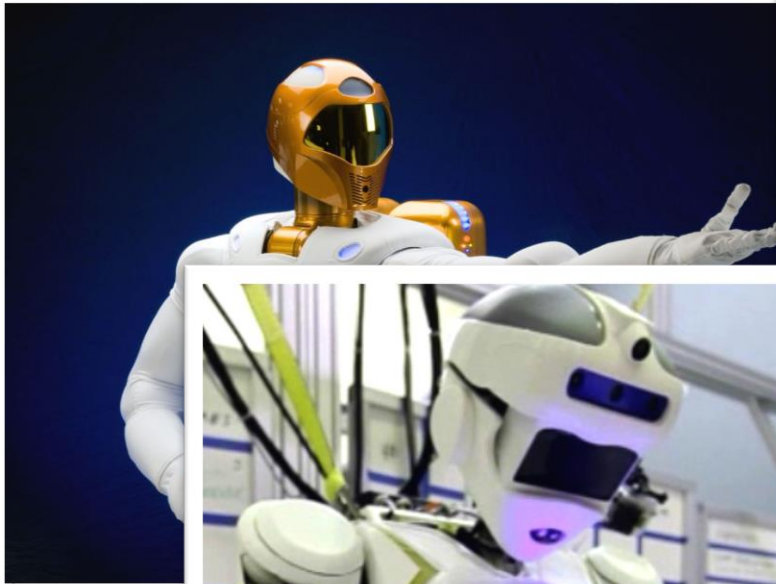
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Innovation

## Open Innovation @ NASA



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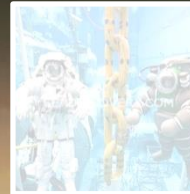
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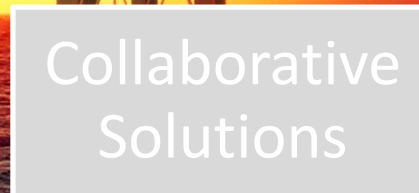
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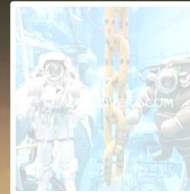


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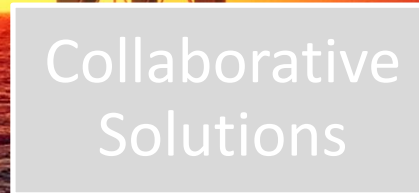
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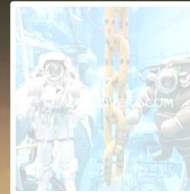


Shared  
Challenges

## Shared Challenges

Areas	Challenges
Crew and Thermal Systems	Life support systems and thermal control systems in extreme environments (pressure, thermal, remote).
Aerosciences and Flight Mechanics	Mission design, risk mitigation; software reliability and safety.
Propulsion and Power	Safer battery technologies in extreme environments.
Software, Robotics, and Simulation	Assist/Augment humans; take humans place in hazardous situations; teleoperation/telepresence.
Structures	Lighter, human-rated composite structures.
Avionics	Autonomous guidance, navigation and controls; RFID asset management; human interface systems.

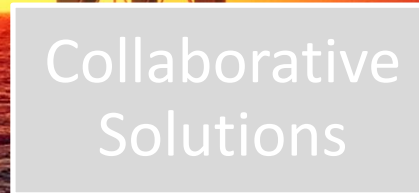
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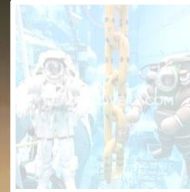
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Collaborative  
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## Collaborative Solutions

Engineering Services

NASA & contractors working with counterparts of other industries by providing knowledge and expertise

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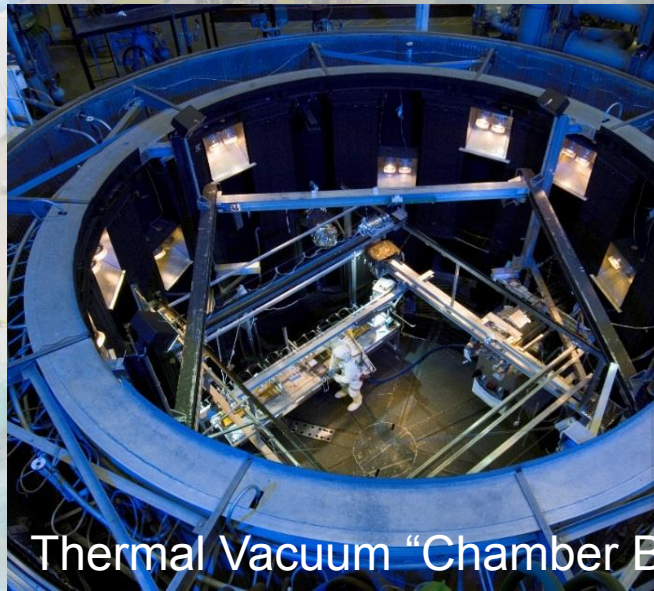




Collaborative  
Solutions

## Collaborative Solutions

### Environmental Analogs



Repurposing/adapting space simulation test facilities (e.g. thermal/thermal-vacuum, weightlessness) for training and testing.

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Collaborative  
Solutions

## Collaborative Solutions

### Hazardous Operations

### The Customer

Petrofac can provide services to customer cycle, on either a stand-alone or integrated to a customer's needs.



press training. Utilize NBL operations

to offer these services long term

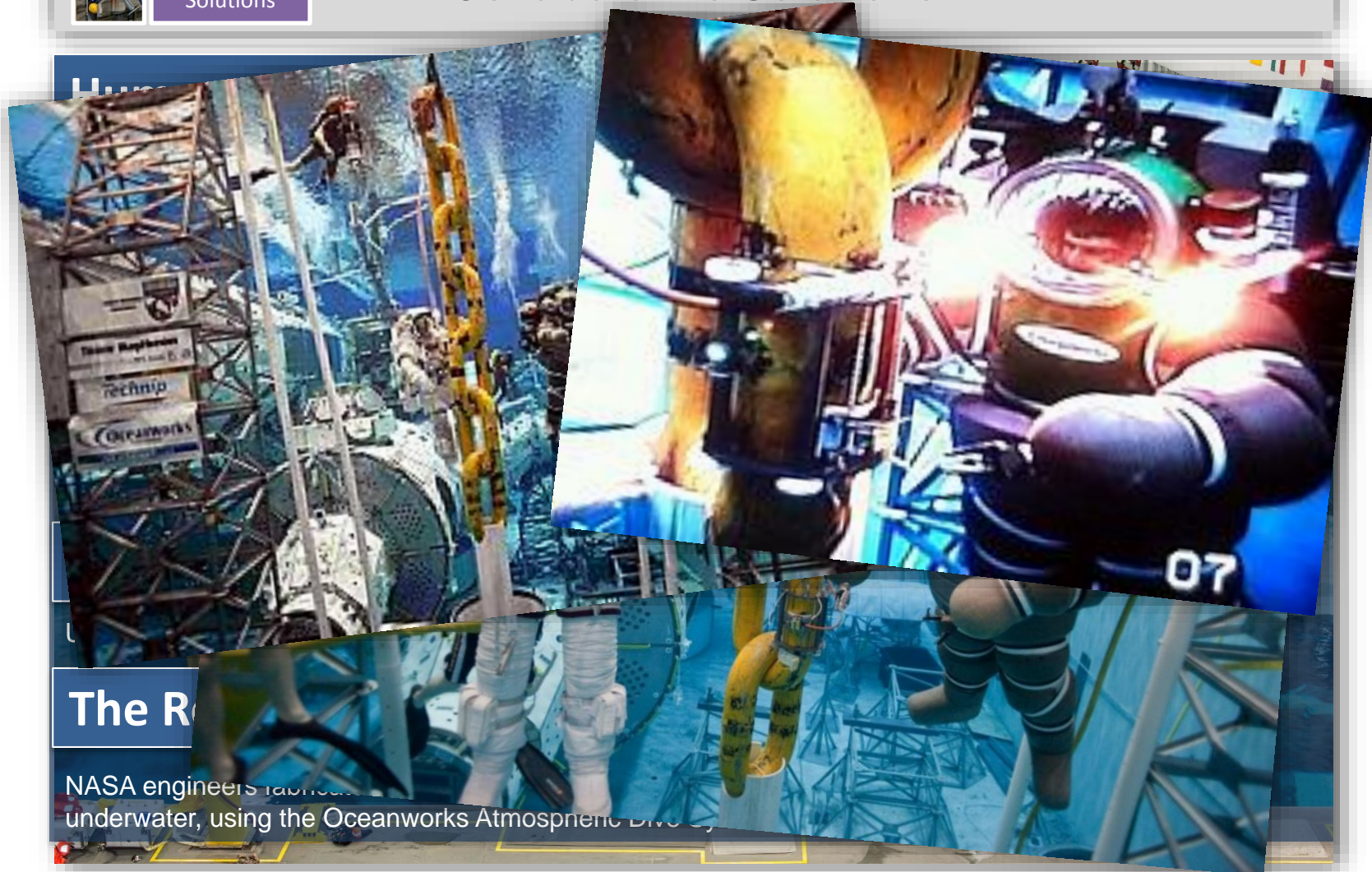






Collaborative  
Solutions

## Collaborative Solutions



The R

NASA engineers fabricated  
underwater, using the Oceanworks Atmospheric Diving

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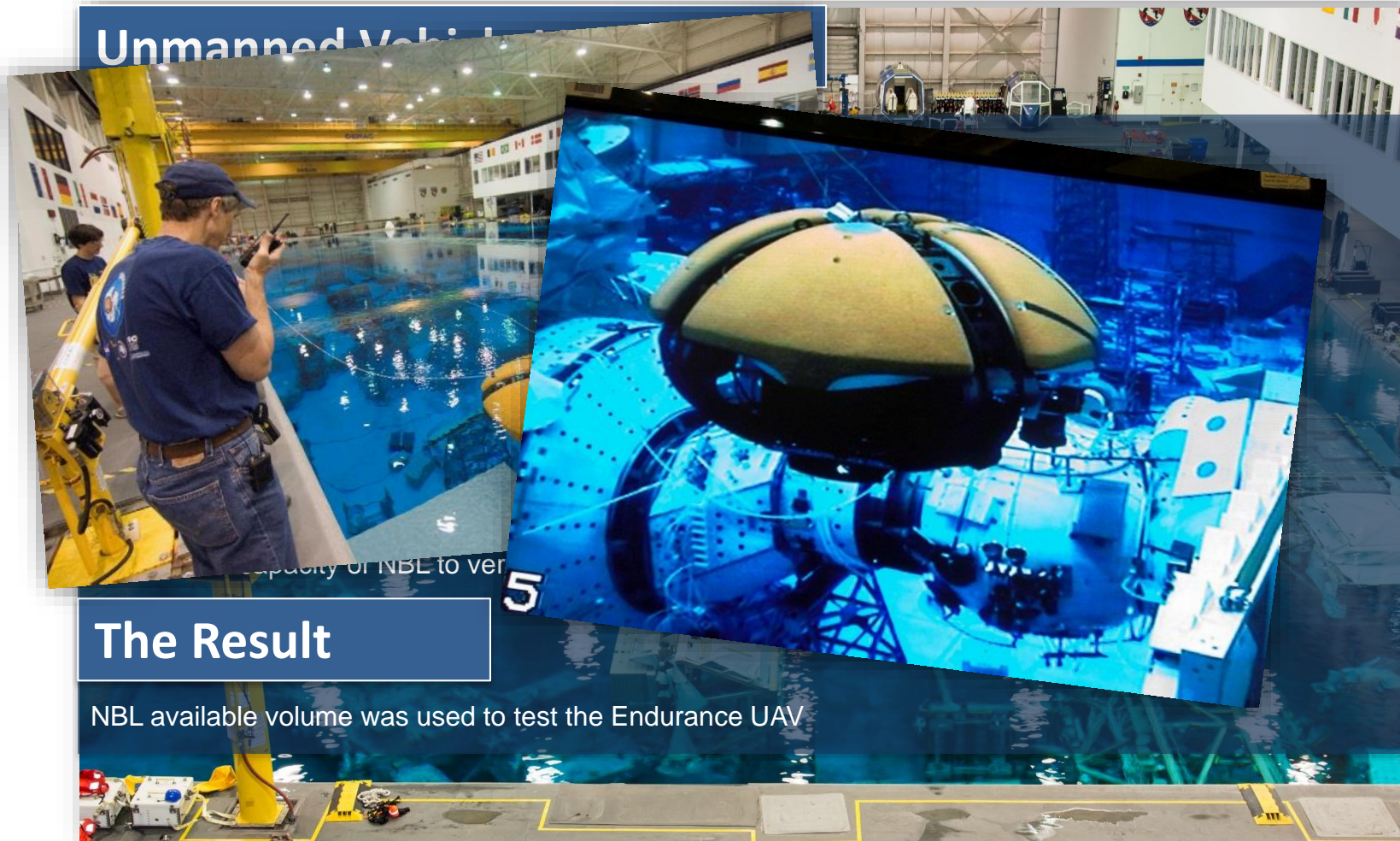




Collaborative  
Solutions

## Collaborative Solutions

### Unmanned Vehicle



### The Result

NBL available volume was used to test the Endurance UAV

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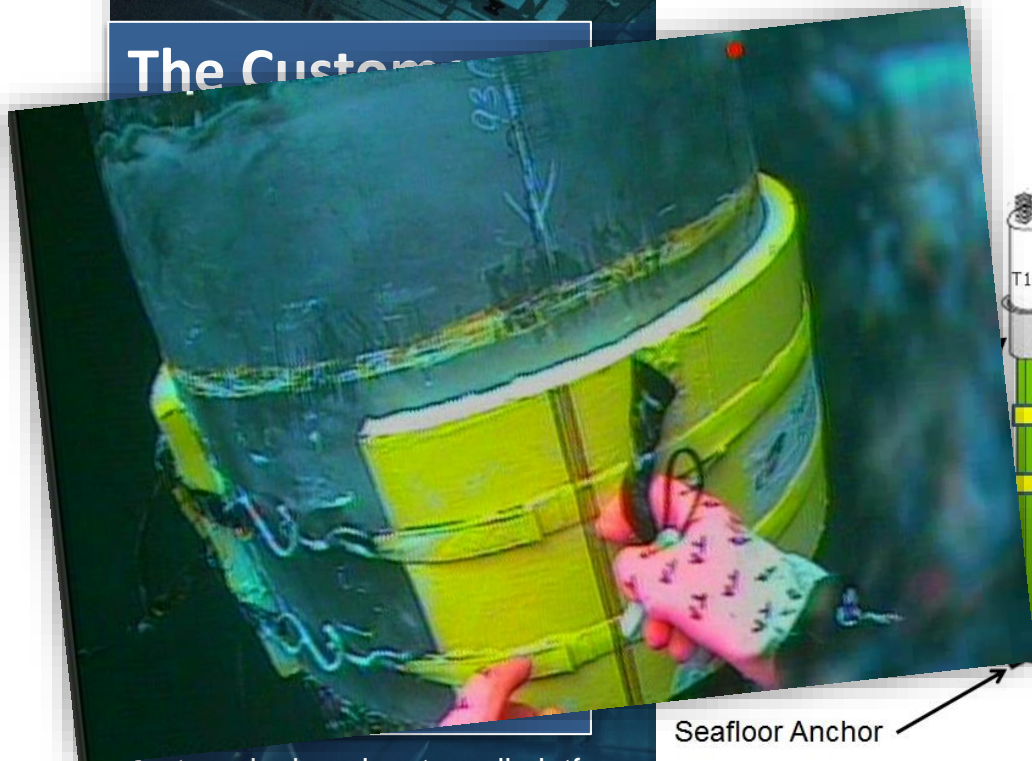
Collaborative  
Solutions

# Collaborative Solutions

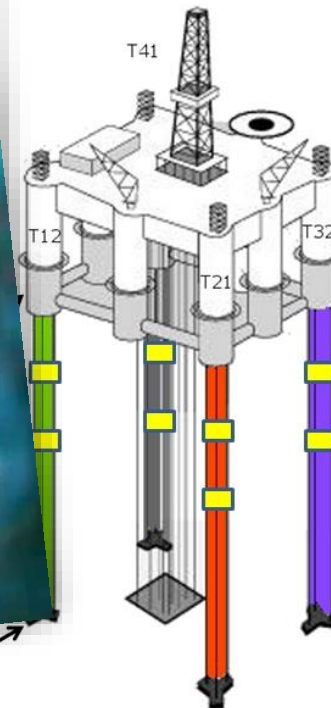
## Hardware Development

## The Customer

## Tension Leg Platform



System deployed on two oil platforms in West Africa



Instrumented Clamps  
(Two per Tendon at  
60 and 120 ft Depth)

A total of 16 clamps  
were installed on  
two oil platforms

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Collaborative  
Solutions

## Collaborative Solutions

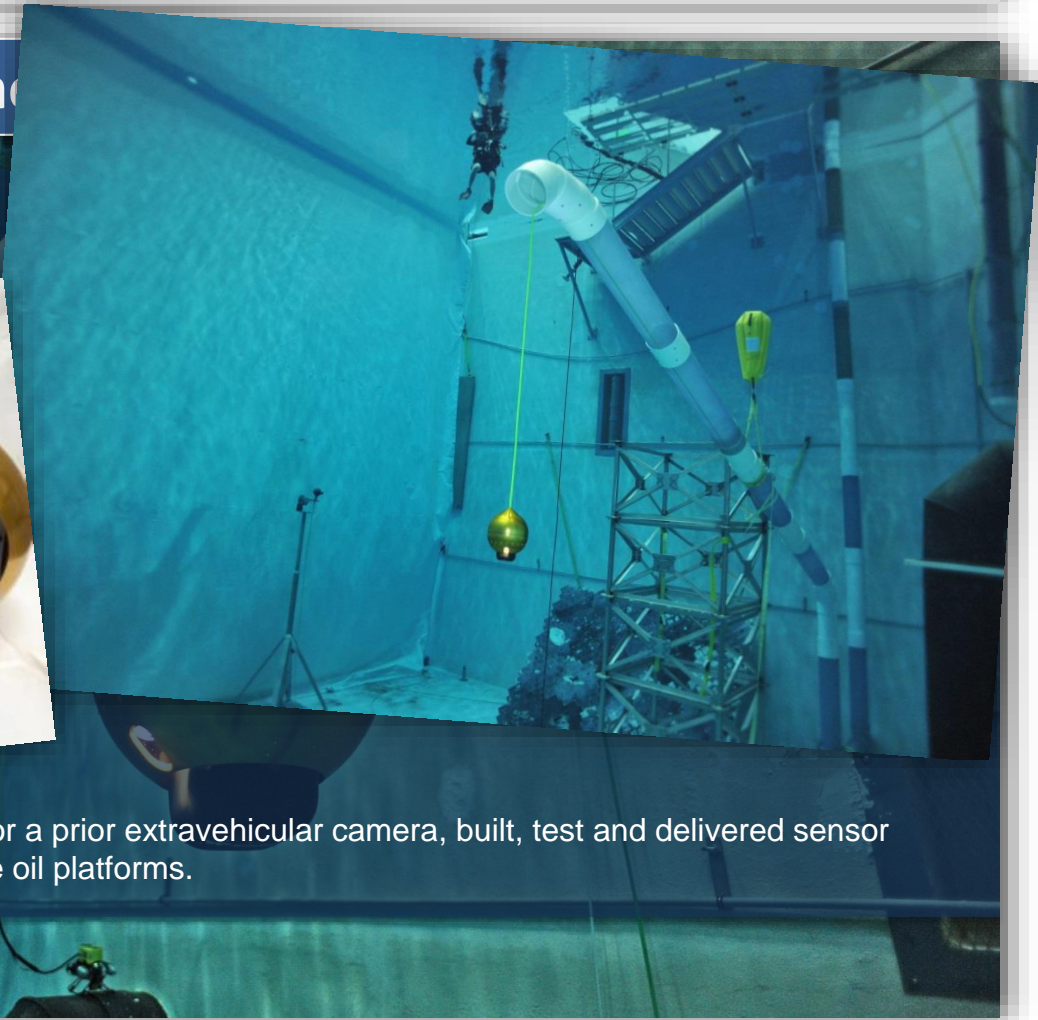
### Hardware Development

### The Customer

Major oil and gas companies



Using some technologies developed for a prior extravehicular camera, built, test and delivered sensor spheres. Tested at NBL and at remote oil platforms.



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## Conclusion

**Today's NASA is in a very different environment than at its inception**

**Opportunities for collaboration with other industries driving technology in their respective fields**

**Agency is transforming to become lean and more adaptive to innovate and collaborate**



Similarities



Shared Challenges



A composite image showing the Earth and Mars in space. The Earth is a large blue sphere with white clouds, occupying the upper right portion of the frame. The Mars is a smaller, reddish-brown sphere, occupying the lower left portion. A bright, glowing sun is visible in the upper right background, casting a blue glow. The text "This is just the beginning..." is centered over the image.

**This is just the beginning...**

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## Acknowledgements / Thank You / Questions

