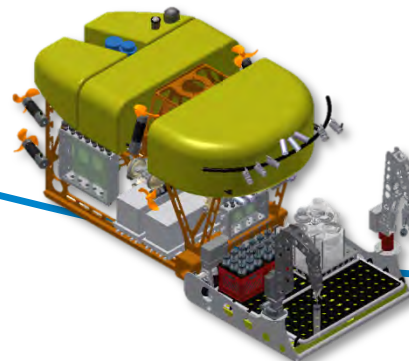
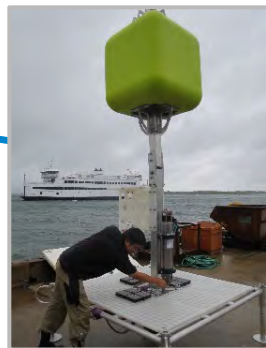




Schmidt Ocean Institute Vehicle Development Program DeSSC Progress Update

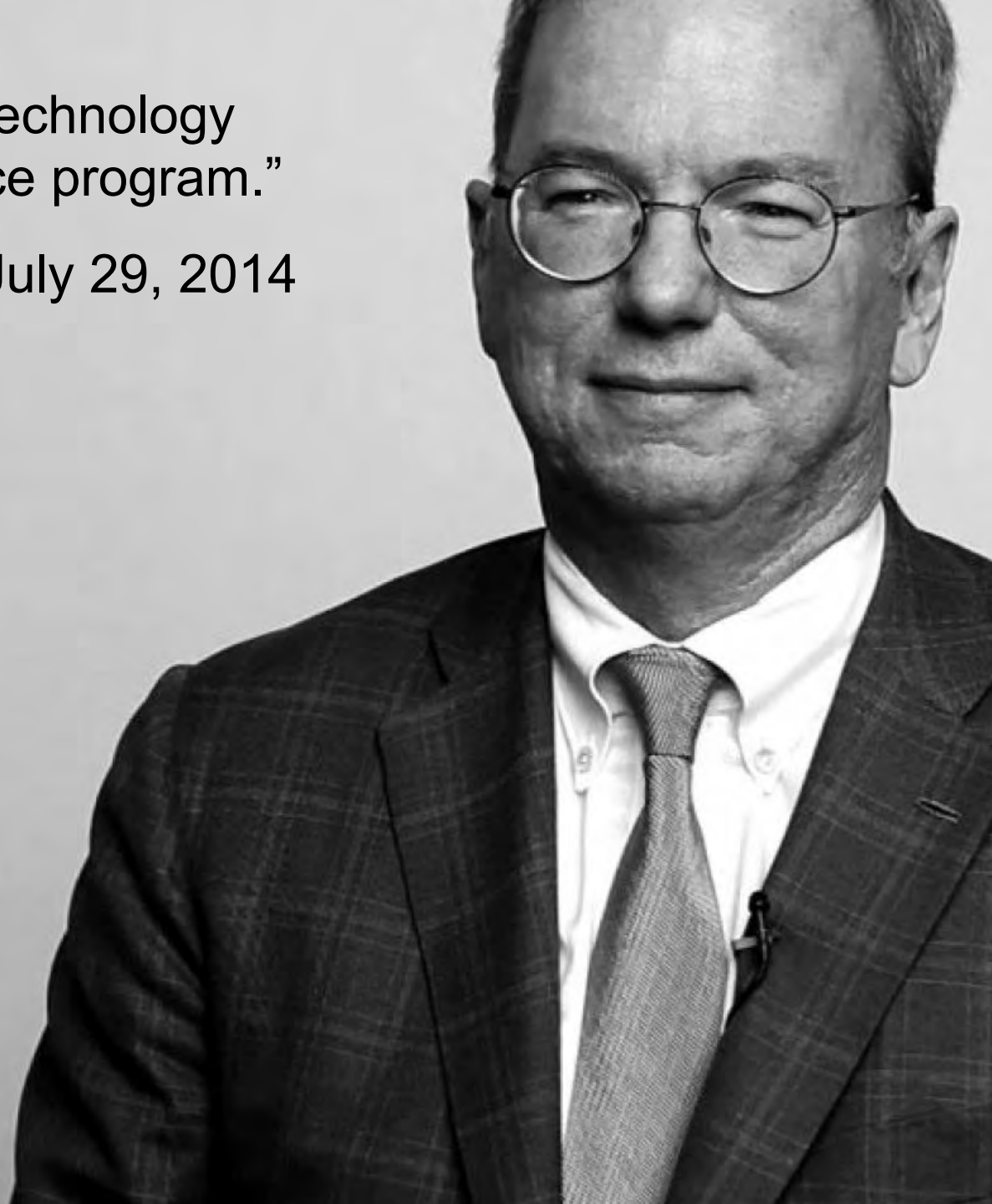
Victor Zykov
Director of Research



The world's ocean understood through technological advancement, intelligent observation, and open sharing of information.

“Technology first: new technology
should drive SOI science program.”

– Eric Schmidt, July 29, 2014



Infrastructure, Platform, and Technology R&D for Ocean Science



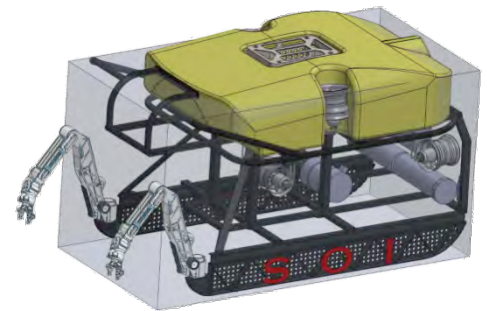
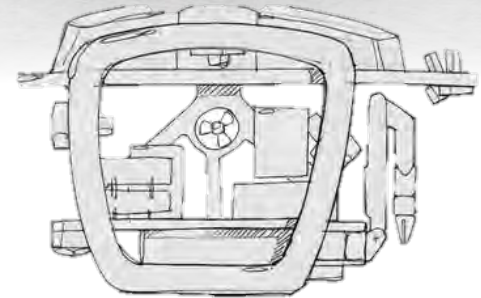
- Robotic research vehicles (HROV, ROV, AUV, ASV, UAV, gliders, etc.)
- Deployable scientific platforms and analytical instruments (sensors, observatories, etc.)
- At-sea R&D of new technologies and computational algorithms on SOI vessels and vehicles
- Technology focused R&D projects as part of *Falkor* cruise program



Proposed SOI Deep Sea Vehicles

Developing vehicles with annual iterations:

- **4500m ROV** based on COTS technologies (2016)
 - Build the engineering team
 - Provides reliable ROV for R/V Falkor
- **6000m AUV** mostly COTS technologies (2017)
 - “Companion” vehicle for the 4500m ROV
 - Developing scientific mission requirements commencing in 2015
- **7500m battery powered hybrid ROV (HROV)**
 - This vehicle will help develop knowledge and technologies for the full ocean depth vehicle
- **11000m battery powered HROV**
 - Capability to support regular scientific operations at full ocean depth
 - Ultimate deep ocean vehicle program goal



4500m ROV core instruments

- Core System Sensors

- CTD Sensor - Seabird FastCAT CTD Sensor (SBE49)
- Pressure Depth Sensor - Paroscientific 8000 Series
- Oxygen Sensor - Contros Hydroflash O2 Sensor

- Core Imaging Suite

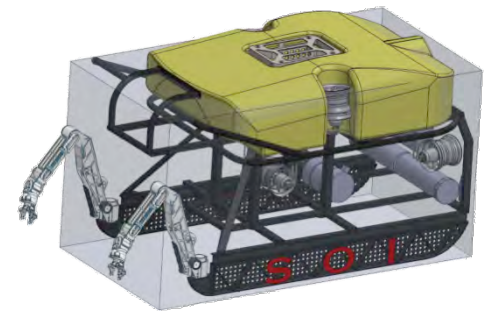
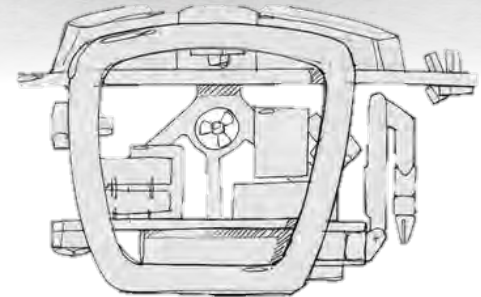
- HD Science Zoom - Insite Zeus Plus
- HD Camera - HD Multi SeaCam 6150
- Situational Video - 4K video camera
- High Resolution Still Image Capture – 12 MP
- Pan / Tilt / Zoom - Schilling
- LED Lighting - DeepSea Power & Light, Inc. SLS-6150
- Frame Grabber

- Core Sampling System

- Optimized Niskin water samplers,
- 100 kg payload, two 7-function Schilling manipulators

- Core Sonar Systems

- M3 Forward Looking Imaging and Multibeam Sonar
- Singlebeam 360° scanning sonar - Mesotech 1071 Series



4500m ROV delivery plan: key project dates



Preliminary Design Review	Wed 9/2/15	Fri 9/4/15
Detailed Design Review	Thu 12/17/15	Fri 12/18/15
Factory Acceptance Test	Mon 4/11/16	Wed 4/20/16
Tank Testing at MBARI	Thu 4/21/16	Sun 5/1/16
System shipping to R/V Falkor	Mon 5/30/16	Fri 6/23/16
Falkor integration, Sea Trials	Fri 7/1/16	Sun 8/14/16
Science Verification Cruise	Fri 11/18/16	Tue 11/29/16

Research projects that will use this vehicle:

- Searching for Life in Hydrothermal Mariana, Dec. 2016
- 3 out of 5 planned projects in 2017
- Requested in 68% of Expressions of Interest for 2018

Vehicle Development Oversight



- Technical Design Reviews

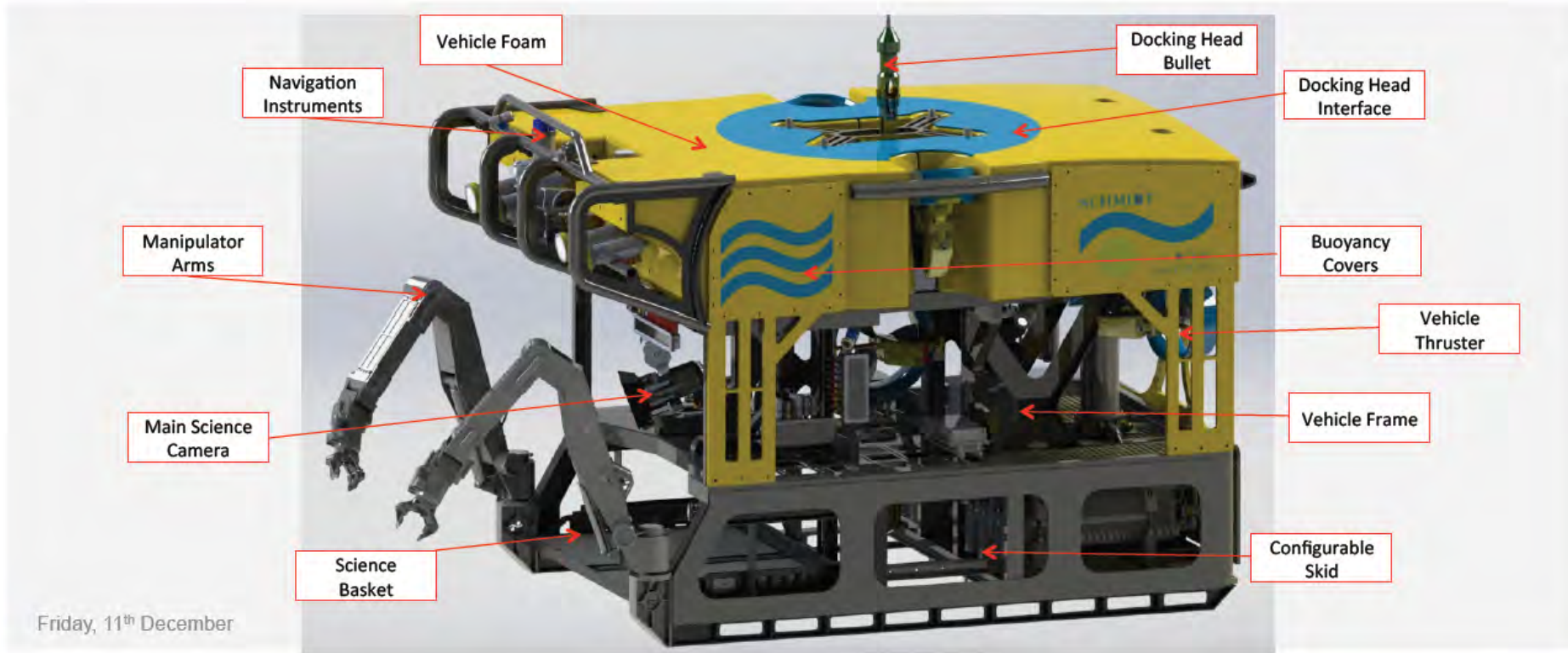
- MIT
- MBARI
- IBM/Google
- CSSF
- Commercial Subsea Industry

- Scientific Advisory Group

- LDEO
- OSU
- MBARI
- Harvard
- GEOMAR
- Duke Univ.
- Natl. Univ. of Singapore



Vehicle Arrangement Overview

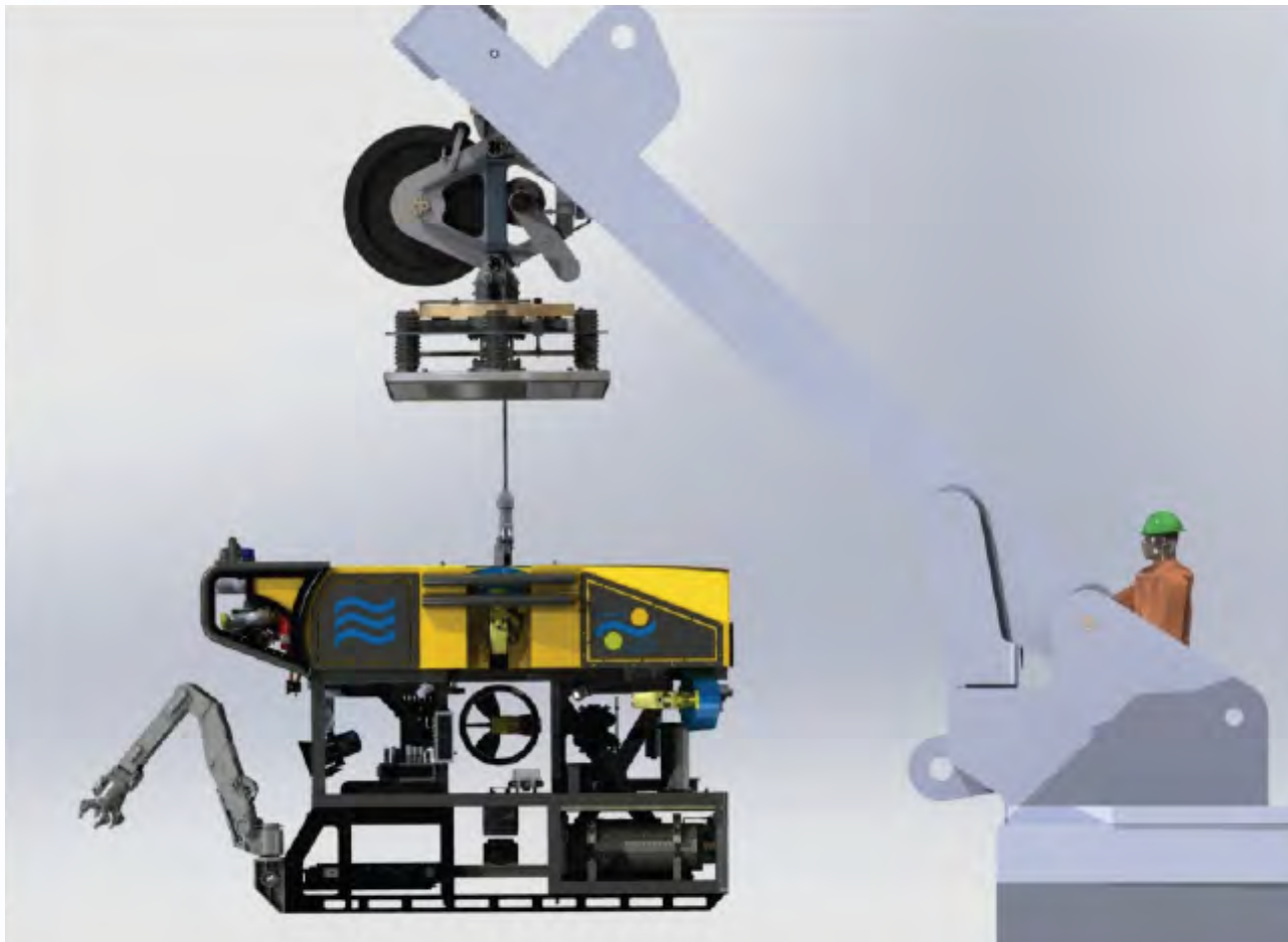


Vehicle Arrangement Overview

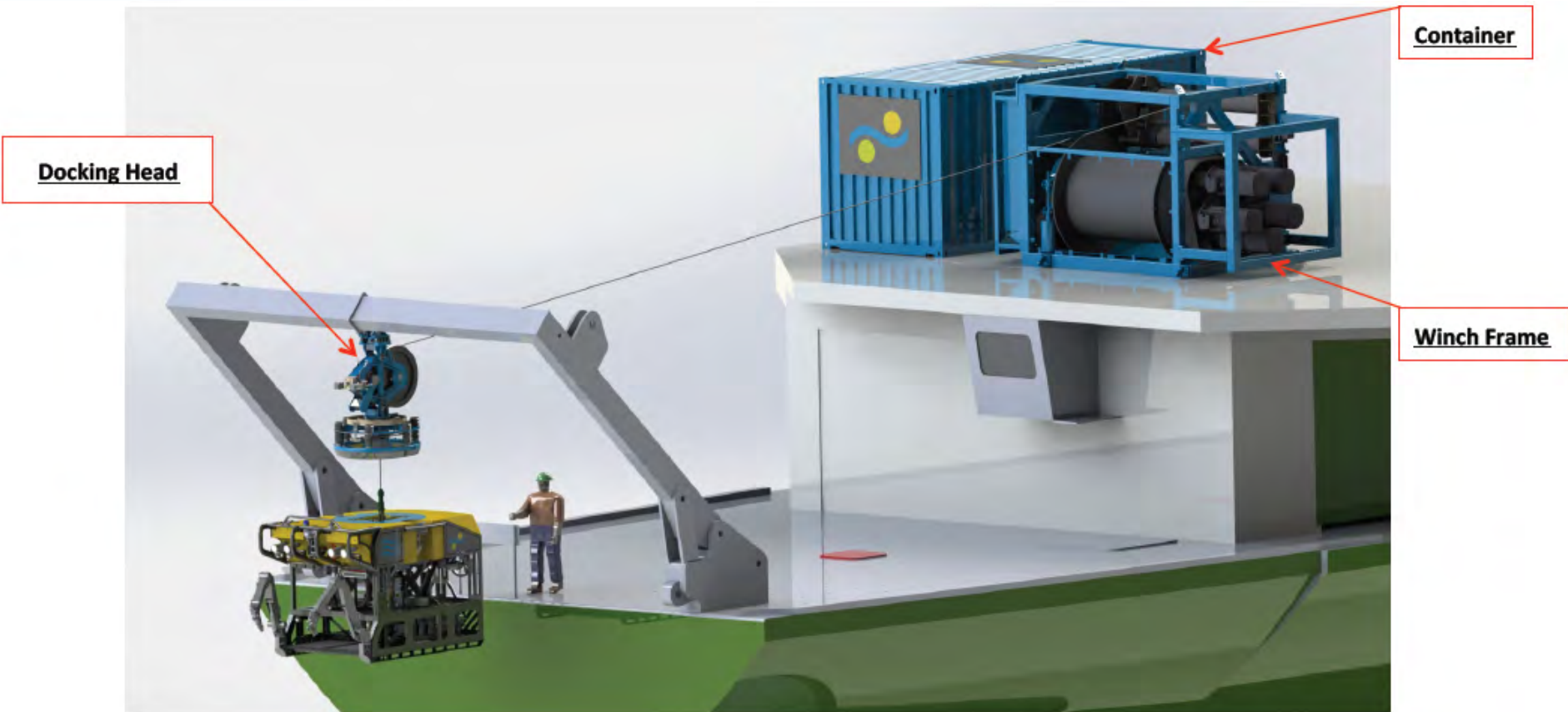


Friday, 11th December

Vehicle Arrangement Overview



Vehicle Arrangement Overview



Docking Head

Container

Winch Frame