OOI Science Themes

• Ocean-Atmosphere Exchange
• Climate Variability, Ocean Circulation and Ecosystems
• Turbulent Mixing and Biophysical Interactions
• Coastal Ocean Dynamics and Ecosystems
• Fluid-Rock Interactions and the Subseafloor Biosphere
• Plate-scale, Ocean Geodynamics
Additional Science Focus

- Climate change
- Ocean ecosystem health
- Carbon cycling
- Ocean acidification
• Six Arrays
  – Southern Ocean
  – Irminger Sea
  – Station Papa
  – Argentine Basin
  – Endurance
    • Newport Line
    • Grays Harbor
  – Pioneer
OOI Transition Risks and Strategies

• Project staffing and transition strategy
• OOI Maintenance strategy
• Weather risks during deployment
Project Staffing Strategy

• Manage ramp-up/ramp-down of construction to operations staffing
  – Initial ramp-up of staffing to procure, construct, inspect and test equipment
  – Post-deployment, transition key staff to the Operations and Maintenance side of the project

• Solutions
  – Develop staff hiring/transition plans
  – Retain key PM, Engineering, Deployment positions
  – Cross train staff to O&M functions for Data Management etc.
MREFC Staff Transition to O&M
## Acceptance Schedule

### Project Management
- OOI Project Start
- CI Release 1
- CI Release 2
- PNW Glider
- Pioneer Coastal Proflers
- Station Papa
- Pioneer Glider
- CI Release 3
- Axial Seamount
- Endurance OR 80m Cabled Winched Profler
- Hydrate Ridge
- Argentine Basin
- Endurance OR 80m Surface Mooring
- Endurance OR 80m Benthic Experiment Node
- Irminer Sea
- CI Release 4
- Endurance OR 25m
- Endurance WA 25m
- Endurance OR 500m
- Endurance WA 50m
- Endurance WA 500m
- Pioneer P1
- Pioneer P4
- Endurance WA 500m
- Southern Ocean - 5S5
- Pioneer P3
- Pioneer AUV
- CI Release 5
- OOI Project End

### Design Engineering
- Software and Hardware

### Hardware/Software Engineering

### Quality/EH&S Assurance

### Software and Hardware

### Systems Testing

### Systems Commissioning

### Full Operations

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<th>Milestone</th>
<th>External Tasks</th>
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<td>Summary</td>
<td>Project Summary</td>
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**OOI Acceptance Schedule**

**FY2010**

**2011**

**2012**

**2013**

**2014**

**2015**

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OOI Maintenance Risks

- Ocean environments are severe
- Biofouling of equipment is a reality
- Maintenance repair/replacements cannot be performed during severe weather
- Ship day rates are expensive
- O&M and logistics support cost estimates derived from:
  - Historical telecommunications cable industry maintenance estimates
  - Previous global and coastal mooring O&M cost estimates
  - Sensor, glider and Autonomous Underwater Vehicle (UAV) maintenance cost efforts
  - Distributed IT systems hardware and software O&M and logistics costs
Maintenance Solutions

• Global Moorings - Annual retrieve/replace using large ships
• Coastal Moorings - Semi-annual retrieve and replace using less expensive coastal vessels
• Pioneer Array - Semi annual retrieve and replace using smaller vessels
• AUVs/Gliders - Retrieve and replace quarterly, or as required using small vessels
• Regional Scale Node –
  – Bi-annual maintenance cruises
  – Commercial telecom maintenance agreements
Spares Solutions

- Acquire few unique logistic system spares to cover 25 year system life of regional cabled array
- Acquire most spares for routine 2 to 5 year maintenance cycle
- Replace sensors every 5 to 10 years
- Technology refresh an Engineering consideration
Weather Risks at High Latitudes

- Severe weather buoy deployment delays
- High sea state deployment delays
- Solutions
  - Evaluate historical weather (50 year) data for:
    - Persistence/Duration of Storm Peak Periods data
    - Persistence/Duration of Significant Wave Heights
    - Persistence/Duration of Wind Speeds
  - Schedule Coastal/Global mooring deployments in most favorable weather windows