Homework Day 1

OOI Preliminary Design Review
December 4-7, 2007
Arlington, VA

Project Team

OCEAN OBSERVATORIES INITIATIVE

How Will OL ensure IOs buy into MREFC standards etc?

- IO’s are invested in success of OOI.
- Universities are putting in their own funds.
- Ts & Cs in IO subawards, statements of work etc require implementation of MREFC process. IO’s understand compliance with process is necessary.
- Mechanisms are in place to monitor, evaluate, and correct performance, and terminate subawards if necessary.
- OL will continue to provide training and teaching
- Joint selection of tools and work methods ensures alignment with standards

Scenarios

- Change Control Process for de-scope decisions
- RSN Moorings: example of Level 2 re-allocation

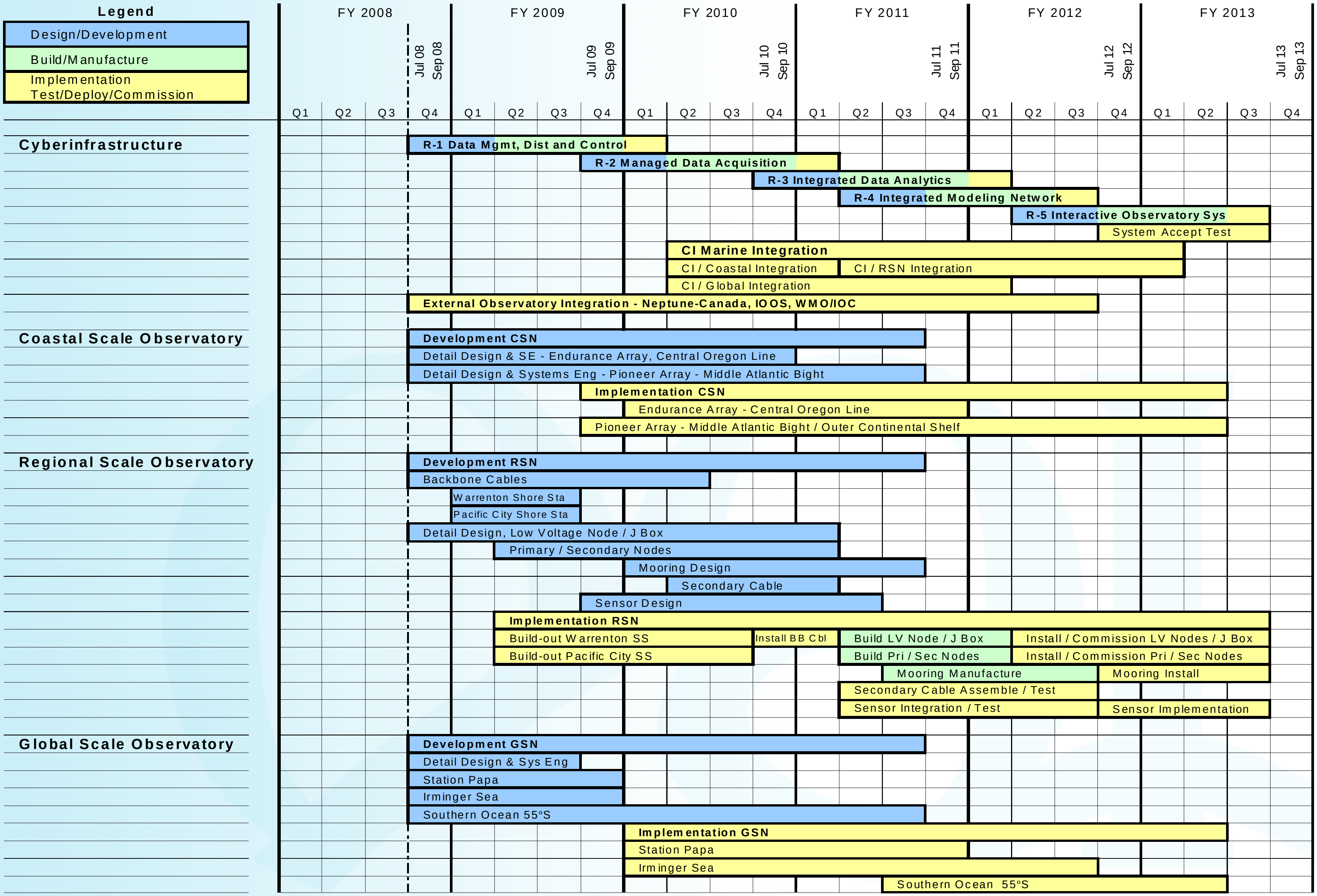
Managing schedule variance

- Behind schedule: If on critical path, shorten schedule by adding resources to make task go faster (uses contingency)
- 11 nodes with incremental commissioning; decreases impact of “standing army”
- Unlink dependencies by reducing requirements - example of glider deployment and biofouling mitigation design work. or fast track some other work

Coordination of E&O

- Detailed presentation in Breakout I (Programmatic)
- Adhere to Guiding Principles of NSF/GEO
- Edu infrastructure via subaward
- Management structure to integrate activities (.5 FTE in Project Office)

Schedule


Legend
Design/Development
Build/Manufacture
Implementation
Test/Deploy/Commission
FY 2008
FY 2009
FY 2010
FY 2011
FY 2012
FY 2013
Jul 08
Sep 08
Jul 09
Sep 09
Jul 10
Sep 10
Jul 11
Sep 11
Jul 12
Sep 12
Jul 13
Sep 13
Q1
Q2
Q3
Q4
Cyberinfrastructure
R-1 Data Mgmt, Dist and Control
R-2 Managed Data Acquisition
R-3 Integrated Data Analytics
R-4 Integrated Modeling Network
R-5 Interactive Observatory Sys
System Accept Test
CI Marine Integration
CI / Coastal Integration
CI / RSN Integration
CI / Global Integration
External Observatory Integration - Neptune-Canada, IOOS, WMO/IOC
Coastal Scale Observatory
Development CSN
Detail Design & SE - Endurance Array, Central Oregon Line
Detail Design & Systems Eng - Pioneer Array - Middle Atlantic Bight
Implementation CSN
Endurance Array - Central Oregon Line
Pioneer Array - Middle Atlantic Bight / Outer Continental Shelf
Regional Scale Observatory
Development RSN
Backbone Cables
Warrenton Shore Sta
Pacific City Shore Sta
Detail Design, Low Voltage Node / J Box
Primary / Secondary Nodes
Mooring Design
Secondary Cable
Sensor Design
Implementation RSN
Build-out Warrenton SS
Install BB Cbl
Build LV Node / J Box
Install / Commission LV Nodes / J Box
Build-out Pacific City SS
Build Pri / Sec Nodes
Install / Commission Pri / Sec Nodes
Mooring Manufacture
Mooring Install
Secondary Cable Assemble / Test
Sensor Integration / Test
Sensor Implementation
Global Scale Observatory
Development GSN
Detail Design & Sys Eng
Station Papa
Irminger Sea
Southern Ocean 55°S
Implementation GSN
Station Papa
Irminger Sea
Southern Ocean 55°S

Impact of Delaying Construction until after another review (FDR)

- Upon reviewing the May 2007 LFM, criteria for FDR, the only item that we don’t have is Final Construction-Ready Design
- Incremental pre-construction reviews are built into our schedule (blue lines)
- Burden of work planned under MREFC gets shifted to R&RA; If we don’t implement in CGSN/RSN/CI or do Education or Environmental work until 6/11, it will cost $60M on R&RA
- CI has special scheduling issues

Down Side of Schedule Impact?

- Pushes implementation out because ALL installation is delayed (distributed system).
- Increases marching army cost (TBD)
- Inflation erodes buying power by at least $20M
- Delaying on RSN cable plant we lose early risk reduction.
- Institutional contributions have been turned on but won't be sustained.
- Community support will erode.

Question 4 Response (CI)

- System Engineering process & Integrated Product Team design used to ensure consistency & entrainment of architectural approach, design & deliverables
- Work Breakdown Structure & Spiral Development model used to establish scope of work & reviews (Anchor Point Milestones reviews: LCO, LCA, IOC)
- OOI's Requirement & CIIO's Spiral Development processes used to establish & refine Interface Agreements between IO's and between the CI subsystems
- Monthly EVM reporting and Anchor Point Milestone reviews used to continuously evaluate subawards' cost & performance to plan
- CIIO's Risk & Opportunity Management process used to determine mitigation plan & corrective action
- OOI's Configuration Management process used to activate corrective action

Global Scale Nodes

Location	Conceptual Network Design	Preliminary Network Design
Station Papa	1 acoustically linked discus buoy 1 subsurface mooring	1 acoustically linked discus buoy (NOAA) 1 subsurface mooring 2 flanking subsurface moorings 5 gliders
Irminger Sea	1 acoustically linked discus buoy 1 subsurface mooring	1 acoustically linked discus buoy 1 subsurface mooring 2 flanking subsurface moorings 5 gliders
55 S Southern Ocean	1 spar buoy with EO cable and seafloor junction box 1 subsurface mooring	1 acoustically linked discus buoy 1 subsurface mooring 2 flanking subsurface moorings 5 gliders

Global Scale Nodes

Location	Conceptual Network Design	Preliminary Network Design
East Pacific Rise	1 spar buoy with EO cable and seafloor junction box 1 subsurface mooring	Eliminated
Mid-Atlantic Ridge	1 discus buoy with EOM cable and benthic node 1 subsurface mooring	UPSCOPE Extended Draft Platform 1 subsurface 2 flanking subsurface 5 gliders
ALOHA	1 EM Subsurface	Eliminated
Argentine Basin, South Atlantic	1 acoustically linked discus buoy 1 subsurface mooring	Eliminated

Global Scale Nodes

Location	Conceptual Network Design	Preliminary Network Design
South Pacific Subtropical Gyre	1 acoustically linked discus buoy 1 subsurface mooring	Eliminated
Peru Basin	1 discus buoy with EOM cable and benthic node 1 subsurface mooring	Eliminated
Global Pioneer	4 subsurface moorings 4 gliders	Eliminated

Coastal Scale Nodes

Location	Conceptual Network Design	Preliminary Network Design
Endurance Array – Oregon	3 paired, cabled surface/subsurface moorings with benthic nodes (25, 80, 500 m) 2 taut surface buoys (50, 150 m) 6 gliders	2 paired, cabled surface/subsurface moorings with benthic nodes (80, 500 m) 1 paired surface/subsurface with multi-function node (no met) (25 m) 6 gliders
Endurance Array -- Washington	3 paired surface/subsurface moorings with junction boxes (25, 80, 500 m) 2 taut surface buoys (50, 100m) 6 gliders	UPSCOPE 2 paired, surface.subsurface moorings (25, 80m)
Southern California Line	2 paired surface/subsurface moorings with junction boxes (80, 500 m)	Eliminated in 3/8/07 CND

Coastal Scale Nodes

Location	Conceptual Network Design	Preliminary Network Design
East Coast Endurance Array	Cable two towers with benthic nodes; subsurface moorings, HF radar	Eliminated in 3/8/07 CND
Pioneer Array	4 paired surface/subsurface moorings 5 subsurface moorings 3 AUVs; 2 docking stations 12 gliders	3 paired surface/subsurface moorings with multi-function nodes 4 subsurface moorings 3 AUVs; 2 docking stations 10 gliders

Regional Scale Nodes

Location	Conceptual Network Design	Preliminary Network Design
Cable Configuration	Ring	Star
Cable Length	1500 km	1200 km
Nodes	5 Primary Nodes (fifth is extension of Newport Line)	5 Primary Nodes (fifth is mid-plate on Axial)
Moorings	6 subsurface	2 subsurface

Cyberinfrastructure

Function	Conceptual Network Design	Preliminary Network Design
Knowledge Management	Part of Design	UPSCOPE

Joint Project Governance

- Working as an integrated team: Joint team has shared core sensor lists, concluded interface agreements, arrived at economies of scale, agreed on working tools and standards as discussed in the CM Plan
- IO's spent years as unpaid community advisors developing the vision for OOI and want to make it happen
- IO's are embedded in change control boards which act by consensus

Science versus Maintenance Trade-off Decisions

- Nodes are designed so that “all lights won’t go out”
- Maintenance is decided on a yearly basis (in annual work plans)
- No heroic maintenance
- MREFC failure prior to commissioning is a contingency issue
- In general, science is favored over maintenance
- Decisions in real time on cost of “not maintaining”

Transition to New Management

- IO subawards have 5 one-year options for operations management in Years 6-10
- One year overlap in operations will be needed
- Ahead of the transition, NSF can add scope to Ocean Leadership to develop a transition plan
- Technical Data Package is specified at internal FDR and “as built”
- Metrics in our operations plan can be used to service level agreements
- OL can recompete IO awards, or NSF can recompete in entirety

Cost Minimization

- Used minimum cost model developed by the ORION CI Committee as baseline
- Centralized CI CyberPoPs system hardware & operation costs contracted as services
  - Leveraging the operational footprint of the large national cyber facilities
    - SDSC, NCAR, TeraGrid, future PetaScale Facility
  - Amortizing their labor pool for 24/7 support at a fraction of an FTE baseline
- Operating model based on Amazon's services
  - Simple Storage Solution, "S3"
  - Elastic Computing Cloud, "EC2"

Cost Minimization

- System is designed for distributed “lights-out” management.
- System components will be supervised by automated management agents
- Software system upgraded remotely.
- Leverage CI personnel at Marine IOs for on-site hardware maintenance and upgrades.
- Use software components which have other sources of development and maintenance support.

Portability of Platform

- Service based Infrastructure contracts with NSF Resource Centers
- Distributed Operations Management
- All data online distributed across national not project infrastructure
- Only fixed assets are the CyberPoPs located within the Marine IO operating environments.

Where Does Buck Stop for the Getting Science Out?

- Science community development is part of our job. If in 5 years the US science community is not interested in using the infrastructure, project team has failed.
- Community must be nurtured to put their experiments on the OOI infrastructure.
- Each IO views that it has outreach responsibility to science community.