



OCEAN OBSERVATORIES INITIATIVE

WORK BREAKDOWN STRUCTURE DICTIONARY

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DRAFT v1.0

Consortium for Ocean Leadership
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WBS	Element Type	Element Name	Definition
1	S	OOI	
1.1	S	System Integration	This Summary Task for OOI System Integration directs and manages the integration of all implementing organization activities necessary to create a system of systems.
1.1.1	S	Program Management	This Summary Task for OOI Program Management directs and manages all resources and activities necessary for the OOI Program
1.1.1.1	C	2008 Support	Control Account for the OOI Program Management Office LOE tasks for 2008. The scope of this Control Account contains all the labor and associated costs of the personnel in the program office.
1.1.1.1.1	W	Program Management and Controls	Work Package Account for the OOI Program Management Office LOE tasks for 2008. The scope of this Work Package Account contains all the labor and associated costs of the personnel in the program office, including but not limited to: Program Executive Staff, Program Management staff, Program Finance, EV analysis, Program Scheduler. This Workpackage includes the efforts for creating and maintenance of the Earned Value System and the Performance Measurement Baseline The Creation and Maintenance of a Risk Management plan and register, the Program Schedule, status and management of all monthly, quarterly reporting requirements, creation and maintenance of all program contingency funds.
1.1.1.1.1.1	T	Program Executive Staff	This task identifies the LOE labor and associated costs for the OOI Program Executive staff.
1.1.1.1.1.2	T	Project Management COTRs	This task identifies the LOE labor and associated costs for the COTR's for the OOI Program
1.1.1.1.1.3	T	Program Planning and Controls	This task identifies the LOE labor and associated costs for the OOI Program Planning and Controls staff. Including Program Finance, EV analysis, Program Scheduler.
1.1.1.1.2	W	Science Outreach and Education	Work Package Account for the OOI Program Science Staff LOE tasks for 2008. The scope of this Work Package Account contains all the labor and associated costs of the personnel in the Science office, including but not limited to: OOI Program Principle Investigator, OOI Program Science Advisors, OOI Program Science Staff. This workpackage exists for the creation and distribution of information to the Science community and to the public.
1.1.1.1.2.1	T	Principal Investigator Activities	This task identifies the LOE labor and associated costs for the OOI Program Principal Investigator.
1.1.1.1.2.2	T	Science Staff	This task identifies the LOE labor and associated costs for the OOI Program Science Staff
1.1.1.1.2.3	T	Science Advisor	This task identifies the LOE labor and associated costs for the OOI Program Science Advisors
1.1.1.1.3	W	Quality, Health, and Safety	Work Package Account for the OOI Program Quality, Health, and Safety Staff LOE tasks for 2008. The scope of this Work Package Account contains all the Labor and associated overhead costs Including but not limited to: Program QA manager, and staff, Program Health and Safety staff. This task will include program QA planning and implementation, Program health and safety planning and implementation.
1.1.1.2	C	2009 Support	Control Account for the OOI Program Management Office LOE tasks for 2009. The scope of this Control Account contains all the labor and associated costs of the personnel in the program office.

WBS	Element Type	Element Name	Definition
1.1.1.2.1	W	Program Management and Controls	Work Package Account for the OOI Program Management Office LOE tasks for 2009. Continuation of Work Package 1.1.1.1.1
1.1.1.2.2	W	Science Outreach and Education	Work Package Account for the OOI Program Science Staff LOE tasks for 2009. Continuation of Work Package 1.1.1.1.2
1.1.1.2.3	W	Quality, Health, and Safety	Work Package Account for the OOI Program Quality, Health, and Safety Staff LOE tasks for 2009. Continuation of Work Package 1.1.1.1.3
1.1.1.3	C	2010 Support	Control Account for the OOI Program Management Office LOE tasks for 2010. The scope of this Control Account contains all the labor and associated costs of the personnel in the program office.
1.1.1.3.1	W	Program Management and Controls	Work Package Account for the OOI Program Management Office LOE tasks for 2010. Continuation of Work Package 1.1.1.1.1
1.1.1.3.2	W	Science Outreach and Education	Work Package Account for the OOI Program Science Staff LOE tasks for 2010. Continuation of Work Package 1.1.1.1.2
1.1.1.3.3	W	Quality, Health, and Safety	Work Package Account for the OOI Program Quality, Health, and Safety Staff LOE tasks for 2010. Continuation of Work Package 1.1.1.1.3
1.1.1.4	C	2011 Support	Control Account for the OOI Program Management Office LOE tasks for 2011. The scope of this Control Account contains all the labor and associated costs of the personnel in the program office.
1.1.1.4.1	W	Program Management and Controls	Work Package Account for the OOI Program Management Office LOE tasks for 2011. Continuation of Work Package 1.1.1.1.1
1.1.1.4.2	W	Science Outreach and Education	Work Package Account for the OOI Program Science Staff LOE tasks for 2011. Continuation of Work Package 1.1.1.1.2
1.1.1.4.3	W	Quality, Health, and Safety	Work Package Account for the OOI Program Quality, Health, and Safety Staff LOE tasks for 2011. Continuation of Work Package 1.1.1.1.3
1.1.1.5	C	2012 Support	Control Account for the OOI Program Management Office LOE tasks for 2012. The scope of this Control Account contains all the labor and associated costs of the personnel in the program office.
1.1.1.5.1	W	Program Management and Controls	Work Package Account for the OOI Program Management Office LOE tasks for 2012. Continuation of Work Package 1.1.1.1.1
1.1.1.5.2	W	Science Outreach and Education	Work Package Account for the OOI Program Science Staff LOE tasks for 2012. Continuation of Work Package 1.1.1.1.2
1.1.1.5.3	W	Quality, Health, and Safety	Work Package Account for the OOI Program Quality, Health, and Safety Staff LOE tasks for 2012. Continuation of Work Package 1.1.1.1.3
1.1.1.6	C	2013 Support	Control Account for the OOI Program Management Office LOE tasks for 2013. The scope of this Control Account contains all the labor and associated costs of the personnel in the program office.
1.1.1.6.1	W	Program Management and Controls	Work Package Account for the OOI Program Management Office LOE tasks for 2013. Continuation of Work Package 1.1.1.1.1
1.1.1.6.2	W	Science Outreach and Education	Work Package Account for the OOI Program Science Staff LOE tasks for 2013. Continuation of Work Package 1.1.1.1.2
1.1.1.6.3	W	Quality, Health, and Safety	Work Package Account for the OOI Program Quality, Health, and Safety Staff LOE tasks for 2013. Continuation of Work Package 1.1.1.1.3
1.1.2	S	System Engineering	This Summary Task for OOI Systems Engineering provides direction for resources and activities necessary for effective technical management of the OOI Program
1.1.2.1	C	2008 SE Support	Control Account for the OOI Program Systems Engineering Office LOE tasks for 2008. The scope of this Control Account contains all the labor and associated costs of the SE office.

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1.1.2.1.1	W	Systems Engineering Oversight / Support	Work Package Account for the OOI Program Systems Engineering Office LOE tasks for 2008. The scope of this Control Account contains all the labor and associated costs of the personnel in the SE office.
1.1.2.1.1.1	T	Systems Engineering Management	This task identifies the LOE labor and associated costs for the OOI Systems Engineer.
1.1.2.1.1.2	T	Design Engineering Activities	This task identifies the LOE labor and associated costs for the OOI Design Engineers.
1.1.2.1.1.3	T	COTR Interface and Management	This task identifies labor and associated costs for the COTR Interface and Management of cross program issues.
1.1.2.1.2	W	Requirements Management	Work Package Account for the OOI Program Requirements Management effort for 2008. The Scope of this work package includes the creation and maintenance of System Level, Science User and End Users Requirements documents for OOI, establishment of OOI Reliability/ Maintainability Requirements, OOI Quality Assurance Plan, Integrated Logistics Support (ILS) requirements.
1.1.2.1.3	W	Systems Integration	Work Package Account for the OOI Systems Integration effort for 2008. The scope of this work package includes the development and management of system interfaces and Interoperability documents, between RSN, CGO, and CI portions of the program.
1.1.2.1.4	W	Technical Change Control Process	Work Package Account for the OOI Technical Change Control Process effort for 2008. This work package includes all effort necessary for the creation and management of the Configuration Management and Change Control Plans, change control boards, Engineering Change Orders and technical documentation.
1.1.2.1.5	W	System Integration Test and Evaluation	Work Package Account for the OOI Systems Integration testing and evaluation effort for 2008. The scope of this work package includes the development and management of system testing and evaluation documents, performance of tests and evaluations, commissioning.
1.1.2.2	C	2009 SE Support	Control Account for the OOI Program Systems Engineering Office LOE tasks for 2009. The scope of this Control Account contains all the labor and associated costs of the personnel in the SE office
1.1.2.2.1	W	Systems Engineering Oversight / Support	Work Package Account for the OOI Program Systems Engineering Office LOE tasks for 2009. Continuation of 1.1.2.1.1
1.1.2.2.2	W	Requirements Management	Work Package Account for the OOI Program Requirements Management effort for 2009. Continuation of 1.1.2.1.2
1.1.2.2.3	W	Systems Integration	Work Package Account for th OOI Systems Integration effort for 2009. Continuation of 1.1.2.1.3
1.1.2.2.4	W	Technical Change Control Process	Work Package Account for the OOI Technical Change Control Process effort for 2009. Continuation of 1.1.2.1.4
1.1.2.2.5	W	System Integration Test and Evaluation	Work Package Account for the OOI Systems Integration testing and evaluation effort for 2009. Continuation of 1.1.2.1.5
1.1.2.3	C	2010 SE Support	Control Account for the OOI Program Systems Engineering Office LOE tasks for 2010. The scope of this Control Account contains all the labor and associated costs of the personnel in the SE office
1.1.2.3.1	W	Systems Engineering Oversight / Support	Work Package Account for the OOI Program Systems Engineering Office LOE tasks for 2010. Continuation of 1.1.2.1.1
1.1.2.3.2	W	Requirements Management	Work Package Account for the OOI Program Requirements Management effort for 2010. Continuation of 1.1.2.1.2
1.1.2.3.3	W	Systems Integration	Work Package Account for th OOI Systems Integration effort for 2010. Continuation of 1.1.2.1.3

WBS	Element Type	Element Name	Definition
1.1.2.3.4	W	Technical Change Control Process	Work Package Account for the OOI Technical Change Control Process effort for 2010. Continuation of 1.1.2.1.4
1.1.2.3.5	W	System Integration Test and Evaluation	Work Package Account for the OOI Systems Integration testing and evaluation effort for 2010. Continuation of 1.1.2.1.5
1.1.2.4	C	2011 SE Support	Control Account for the OOI Program Systems Engineering Office LOE tasks for 2011. The scope of this Control Account contains all the labor and associated costs of the personnel in the SE office
1.1.2.4.1	W	Systems Engineering Oversight / Support	Work Package Account for the OOI Program Systems Engineering Office LOE tasks for 2011. Continuation of 1.1.2.1.1
1.1.2.4.2	W	Requirements Management	Work Package Account for the OOI Program Requirements Management effort for 2011. Continuation of 1.1.2.1.2
1.1.2.4.3	W	Systems Integration	Work Package Account for th OOI Systems Integration effort for 2011. Continuation of 1.1.2.1.3
1.1.2.4.4	W	Technical Change Control Process	Work Package Account for the OOI Technical Change Control Process effort for 2011. Continuation of 1.1.2.1.4
1.1.2.4.5	W	System Integration Test and Evaluation	Work Package Account for the OOI Systems Integration testing and evaluation effort for 2011. Continuation of 1.1.2.1.5
1.1.2.5	C	2012 SE Support	Control Account for the OOI Program Systems Engineering Office LOE tasks for 2012. The scope of this Control Account contains all the labor and associated costs of the personnel in the SE office
1.1.2.5.1	W	Systems Engineering Oversight / Support	Work Package Account for the OOI Program Systems Engineering Office LOE tasks for 2012. Continuation of 1.1.2.1.1
1.1.2.5.2	W	Requirements Management	Work Package Account for the OOI Program Requirements Management effort for 2012. Continuation of 1.1.2.1.2
1.1.2.5.3	W	Systems Integration	Work Package Account for th OOI Systems Integration effort for 2012. Continuation of 1.1.2.1.3
1.1.2.5.4	W	Technical Change Control Process	Work Package Account for the OOI Technical Change Control Process effort for 2012. Continuation of 1.1.2.1.4
1.1.2.5.5	W	System Integration Test and Evaluation	Work Package Account for the OOI Systems Integration testing and evaluation effort for 2012. Continuation of 1.1.2.1.5
1.1.2.6	C	2013 SE Support	Control Account for the OOI Program Systems Engineering Office LOE tasks for 2013. The scope of this Control Account contains all the labor and associated costs of the personnel in the SE office
1.1.2.6.1	W	Systems Engineering Oversight / Support	Work Package Account for the OOI Program Systems Engineering Office LOE tasks for 2013. Continuation of 1.1.2.1.1
1.1.2.6.2	W	Requirements Management	Work Package Account for the OOI Program Requirements Management effort for 2013. Continuation of 1.1.2.1.2
1.1.2.6.3	W	Systems Integration	Work Package Account for th OOI Systems Integration effort for 2013. Continuation of 1.1.2.1.3
1.1.2.6.4	W	Technical Change Control Process	Work Package Account for the OOI Technical Change Control Process effort for 2013. Continuation of 1.1.2.1.4
1.1.2.6.5	W	System Integration Test and Evaluation	Work Package Account for the OOI Systems Integration testing and evaluation effort for 2013. Continuation of 1.1.2.1.5
1.1.3	C	Operations Planning	This Summary Task for OOI Operations Planning directs and manages all resources and activities necessary for effective development of the Operations Plan and transfer of system operation and maintenance activities and functions to the operating entity.

WBS	Element Type	Element Name	Definition
1.1.3.1	W	Operations Planning Documentation	Work Package Account for the OOI Program Operations Management documentation discrete tasks. The scope of this Work Package Account contains all the labor and associated costs of OOI Operations Management of the documentation necessary for the transition to operations via the creation of the Operations Plan.
1.1.3.2	W	Transition to Operations	Work Package Account for the OOI Program Operations Management discrete tasks. The scope of this Work Package contains all the labor and associated costs of OOI Operations Management transition to operations in accordance with the Operations plan.
1.1.4	S	Education and Public Awareness	This Summary Task for OOI Education and Public Awareness directs and manages all resources and activities necessary for effective management of the OOI Education and Outreach Program
1.1.4.1	C	2008 Education and Public Awareness	Control Account for the OOI Program Education and Public Awareness LOE tasks for 2008. The scope of this Control Account contains all the labor and associated costs of the personnel in the Education office.
1.1.4.1.1	W	Community Interest and Information	Work Package Account OOI Program Community Interest and Information LOE tasks for 2008. This Work Package Account contains the labor and associated costs of personnel, and costs associated with creation of information and distribution of OOI information to the OOI Science Community. This workpackage supports Science planning workshops, Advisory Committees, and attendance at other science conferences as needed.
1.1.4.1.1.1	T	National and International Meeting R	Support for Science planning workshops, Advisory Committees, and attendance at other science conferences as needed.
1.1.4.1.1.2	T	Informational Material and Website	Support for maintenance and updates to the OOI website.
1.1.4.1.2	W	Extramural Coordination and Liaison	Work Package Account OOI Program Extramural Coordination and Liaison LOE tasks for 2008. This Work Package Account contains all the labor and associated costs of Activities in support of coordination / Liason with other federal and international Science Organizations and Agencies and attendance at other science conferences as needed.
1.1.4.1.2.1	T	Coordination and Liason with Federal	LOE Support for coordination efforts between OOI and other Federal and International Science organizations and agencies
1.1.4.1.3	W	Communication and Outreach	Work Package Account OOI Program Communication and Outreach LOE tasks for 2008. The scope of this Work Package Account contains all the labor and associated costs of personnel, the creation of teaching information for K-12 students, undergraduate and graduate students, Policy makers, and the general public.
1.1.4.1.3.1	T	Education and Public Awareness Plan	LOE Support for creation of educational materials for K-12 students, undergraduate and graduate students, policy makers, and the general public.
1.1.4.2	C	2009 Education and Public Awareness	Control Account for the OOI Program Education and Public Awareness LOE tasks for 2009. The scope of this Control Account contains all the labor and associated costs of the personnel in the Education office.
1.1.4.2.1	W	Community Interest and Information	Work Package Account OOI Program Community Interest and Information LOE tasks for 2009. Continuation of 1.1.4.1.1

WBS	Element Type	Element Name	Definition
1.1.4.2.2	W	Extramural Coordination and Liaison	Work Package Account OOI Program Extramural Coordination and Liaison LOE tasks for 2009. Continuation of 1.1.4.1.2
1.1.4.2.3	W	Communication and Outreach	Work Package Account OOI Program Communication and Outreach LOE tasks for 2009. Continuation of 1.1.4.1.3
1.1.4.3	C	2010 Education and Public Awareness	Control Account for the OOI Program Education and Public Awareness LOE tasks for 2010. The scope of this Control Account contains all the labor and associated costs of the personnel in the Education office.
1.1.4.3.1	W	Community Interest and Information	Work Package Account OOI Program Community Interest and Information LOE tasks for 2010. Continuation of 1.1.4.1.1
1.1.4.3.2	W	Extramural Coordination and Liaison	Work Package Account OOI Program Extramural Coordination and Liaison LOE tasks for 2010. Continuation of 1.1.4.1.2
1.1.4.3.3	W	Communication and Outreach	Work Package Account OOI Program Communication and Outreach LOE tasks for 2010. Continuation of 1.1.4.1.3
1.1.4.4	C	2011 Education and Public Awareness	Control Account for the OOI Program Education and Public Awareness LOE tasks for 2011. The scope of this Control Account contains all the labor and associated costs of the personnel in the Education office.
1.1.4.4.1	W	Community Interest and Information	Work Package Account OOI Program Community Interest and Information LOE tasks for 2011. Continuation of 1.1.4.1.1
1.1.4.4.2	W	Extramural Coordination and Liaison	Work Package Account OOI Program Extramural Coordination and Liaison LOE tasks for 2011. Continuation of 1.1.4.1.2
1.1.4.4.3	W	Communication and Outreach	Work Package Account OOI Program Communication and Outreach LOE tasks for 2011. Continuation of 1.1.4.1.3
1.1.4.5	C	2012 Education and Public Awareness	Control Account for the OOI Program Education and Public Awareness LOE tasks for 2012. The scope of this Control Account contains all the labor and associated costs of the personnel in the Education office.
1.1.4.5.1	W	Community Interest and Information	Work Package Account OOI Program Community Interest and Information LOE tasks for 2012. Continuation of 1.1.4.1.1
1.1.4.5.2	W	Extramural Coordination and Liaison	Work Package Account OOI Program Extramural Coordination and Liaison LOE tasks for 2012. Continuation of 1.1.4.1.2
1.1.4.5.3	W	Communication and Outreach	Work Package Account OOI Program Communication and Outreach LOE tasks for 2012. Continuation of 1.1.4.1.3
1.1.4.6	C	2013 Education and Public Awareness	Control Account for the OOI Program Education and Public Awareness LOE tasks for 2013. The scope of this Control Account contains all the labor and associated costs of the personnel in the Education office.
1.1.4.6.1	W	Community Interest and Information	Work Package Account OOI Program Community Interest and Information LOE tasks for 2013. Continuation of 1.1.4.1.1
1.1.4.6.2	W	Extramural Coordination and Liaison	Work Package Account OOI Program Extramural Coordination and Liaison LOE tasks for 2013. Continuation of 1.1.4.1.2
1.1.4.6.3	W	Communication and Outreach	Work Package Account OOI Program Communication and Outreach LOE tasks for 2013. Continuation of 1.1.4.1.3

WBS	Element Type	Element Name	Definition
1	S	OOI	
1.2	S	Cyberinfrastructure	
1.2.1	C	Project Management	
1.2.1.1	W	Project Management	Project life cycle management functions involving planning, budgeting, change management and performance assessment at the program, project and subcontract levels)
1.2.1.2	W	Business Operations	Project administration and control functions covering administrative duties, financial accounting, contingency management, subcontract management, purchasing and Earned Value Management.
1.2.1.3	W	Risk and Opportunity Management	Processes and procedures to identify, characterize and manage conditions (risks and opportunities) that could impact the cost, schedule, scope and/or performance of the program.
1.2.1.4	W	Communication & Outreach	Media communications and public outreach activities covering Education & Public Awareness, Ocean Science and CI conference participation and promotion of the program through Web and Media presence.
1.2.2	C	System Engineering	
1.2.2.1	W	System Engineering Management	System life cycle management activities covering engineering process performance management, technical performance management, configuration/document management, deficiency management, integration/verification management and security management
1.2.2.2	W	Requirements Management	Requirements elicitation, capture, structuring/coloration and management activities resulting in Science User Requirements, Concept of Operations and System Requirements.
1.2.2.3	W	Interoperability Management	Processes and procedures to ensure the interoperability of the CI with the hardware and software elements produced by the Marine IOs and key external entities, notably IOOS
1.2.2.4	W	System Design	Provide the design expertise and process to drive and support architecture and applications for all the subsystem components. The major concerns are system requirements analysis, domain modeling and application and user interface design. This is the development center for the DoDAF artifacts.
1.2.2.5	W	Change Control Management	Processes and procedures to manage changes to the system and subsystem designs
1.2.2.6	W	Integrated Logistics Support	Management of the ten elements comprising ILS
1.2.2.7	W	Community Involvement & Support	Processes and procedures for stakeholder engagement, user support/documentation and user training
1.2.3	S	System Development	
1.2.3.1	C	Sensing and Acquisition	The subsystem responsible for providing the life cycle and operational management of sensor network environments as well as observing activities (i.e., scheduling, collecting, processing) associated with sensor data acquisition.
1.2.3.1.1	W	Marine Facility Services	Building on the capabilities of the Facility Service, provides services to task, coordinate, and manage the "marine" observatory resources and their interdependencies. The management services provide oversight to ensure safe and secure operations and to maximize the total data return from all instruments.

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1.2.3.1.2	W	Instrument Direct Access	This service provides direct IP connectivity between the research team and their instrumentation from anywhere within the integrated network. The service is designed to support instrument connections using telnet, ssh and/or proprietary instrument software. Such a channel has a higher-level security requirement, and initiation will require a separate and more stringent authentication process.
1.2.3.1.3	W	Instrument Management Services	Provides the command, control, and monitoring services to operate and manage an instrument. Operating an instrument has a higher-level security requirement, and engagement will require a separate and more stringent authentication process. This service also supports instrument development and deployment through test and validation services.
1.2.3.1.4	W	Instrument and Data Process Repository	Maintains informational representations of instruments and their configuration and calibration, along with references to their acquired data. It also maintains copies of all processes applied to data from acquisition through product delivery. All are associated with their respective metadata
1.2.3.1.5	W	Instrument Activation Services	Provides registration, testing and validation services for instruments and instrument platforms to ensure conformity with different operational requirements in the network.
1.2.3.1.6	W	Data Acquisition Services	Provides services to configure data acquisition, disseminate and persistence of observed data originating from an Instrument platform to the Integrated Observatory Network
1.2.3.1.7	W	Data Processing Services	Provides services to configure the application of specific data processing steps at the acquisition site and/or at the ingest site
1.2.3.1.8	W	Data Calibration & Validation Services	Enables configuration of the data calibration and validation processes and the application of custom automated data processing steps. The service supports the flagging and sequestering of derived data until reviewed by responsible participants. Derived data are automatically associated with their data source. The service supports automated revisions of the derived data on a partial or complete basis.
1.2.3.1.9	W	Marine Resource Scheduling Services	The coordination services are the primary means for allocating and scheduling instrument use of communications and power, but will extend to the coordination of environmental interactions (i.e. sound, chemical, light).
1.2.3.1.10	W	Data Product Catalog & Repository Services	Maintains informational representations of measurements and data products with associated metadata, configuration and calibration by maintaining a history of all processes applied to data from acquisition through product delivery.
1.2.3.1.11	W	Data Product Activation Services	Provides services to produce and publish data products and apply processes for generating products from data and/or derived data. Data products are automatically persisted and published based on the configuration set for individual product development.
1.2.3.1.12	W	Spiral Development System Reviews	Costs and effort associate with the 4 spiral development anchor point system wide reviews per Release Cycle. The Anchor Point Reviews are: Life Cycle Objective in month 4, Life Cycle Architecture in month 8, Initial Operating Capacity in month 14 and System Release in final month of a Release, month 16. The System Release review for the current release is held with the Life Cycle Objective review for the next release as a face to face meeting at UCSD. (See SSEP for more detail).

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1.2.3.2	C	Analysis and Synthesis	The subsystem responsible for providing the life cycle and operational management of community models, ensembles of models and the virtual ocean simulator as well as modeling activities (i.e., assimilation, analysis, evaluation) using observed and derived data products.
1.2.3.2.1	W	Laboratory & Classroom Facility Services	Building on the capabilities of the Observatory Facility, provides services to organize, manage, and control research and educational activities, the resources they use, and the participants involved. It is the virtual home where research teams gather their resources, carry out their objectives, and collect their results. It belongs to an individual or a group. It provides the group management tools to facilitate membership and collaborations and to assign roles and responsibilities.
1.2.3.2.2	W	Data Analysis & Visualization Services	Provides a generalized analysis and synthesis framework for transforming, analyzing, and visualizing data through the application of user and community developed processes.
1.2.3.2.3	W	Event Detection Services	Provides services to register processes to detect and publish events from data streams. Events are automatically persisted and distributed based on the configuration set for the detector.
1.2.3.2.4	W	Model Catalog & Repository Services	Maintains a hierarchy of evolving interdisciplinary models (e.g. from 'reduced' process-oriented models to operational forecast systems). Supports the registration and dissemination of model data sets. An initial set of community-based numerical ocean models, such as Regional Ocean Modeling System (ROMS) and the Harvard Ocean Prediction System (HOPS), will be introduced.
1.2.3.2.5	W	Modeling Services	Provides ocean modeling network services for access to multiple community-based numerical ocean models for parameter estimation/optimization and data assimilation. Provides the services to construct, modify, and execute numerical ocean models with command and control services for their operation and management. It provides a Virtual Measurement Sampling service to drive virtual instruments and/or virtual data acquisition processes. Services support: multiple models used in ensemble techniques, uncertainty and error estimation, and adaptive multi domain 2-way nested configurations for generating dynamical interpolation of data sets, data assimilation, reanalyzes (hindcasts), nowcasts, and forecasts.
1.2.3.2.6	W	Model Activation Services	Provides testing and validation services to ensure conformity with the different operational requirements in the network.
1.2.3.2.7	W	Virtual Ocean Simulator	Provides services to interact with the ocean through a simulator producing virtual ocean fields updated on a daily basis covering all three observatory types. The simulator involves on the order of twenty tracers including four physical variables (temperature, salinity, zonal and meridional current), a dozen biogeochemical variables (silicate, nitrate, phytoplankton, ammonium, two phytoplankton groups, two zooplankton grazers, two detrital pools, DIC, and oxygen), and four more tracers of interests (e.g., tracers from hydrothermal event plumes).
1.2.3.2.8	W	Ocean System Simulation Experiments	Provides services to assist in selecting observatory sites and sensor network designs, as well as generate trade studies, data impact investigations, and data and information management exercises.

WBS	Element Type	Element Name	Definition
1.2.3.2.9	W	Spiral Development System Reviews	Costs and effort associate with the 4 spiral development anchor point system wide reviews per Release Cycle. The Anchor Point Reviews are: Life Cycle Objective in month 4, Life Cycle Architecture in month 8, Initial Operating Capacity in month 14 and System Release in final month of a Release, month 16. The System Release review for the current release is held with the Life Cycle Objective review for the next release as a face to face meeting at UCSD. (See SSEP for more detail).
1.2.3.3	C	Planning and Prosecution	The subsystem responsible for providing the mission and campaign planning and prosecution (execution through completion) activities associated with carrying out simultaneous coordinated multi-objective observations across the resources of the observatory.
1.2.3.3.1	W	Interactive Observatory Facility Services	Building on the capabilities of the Observatory Facility, provides the services to design, assemble, and operate configurations of resources from across the OOI into unique systems for planning, testing and prosecuting observation requests, leveraging the nested and autonomous capabilities of the fully integrated network of sensing, modeling, and control resources. Provides experimentalists with services to define, compose, and schedule multi-instrument observations that can execute across the observatory. As an example of a simple observation statement: on event "X" provide a CTD and a current profile of region "Y" using gliders "A, B, C" in configuration "Z" using behavior scenario "W".
1.2.3.3.2	W	Event Response Services	Provides services for policy and behavior based reconfiguration of tasks and observational programs. Provides a nested communication, command, and control architecture that enables and supports the deployment and prosecution, fully autonomously or under operator control, of new missions, processes and behaviors, in parallel to and without interruption of prior platform objectives.
1.2.3.3.3	W	Portable Control Software	Provides a portable, platform-generic higher-level control software package based on the public-domain MOOS mission control software that can run natively on fixed observatory assets, and for download and implementation into platforms such as gliders and AUV's operated in the observatory. The software provides a standard communication, command, and control connectivity with the overall OOI CI, and a standard NMEA interface to native control software on the platforms.
1.2.3.3.4	W	Mission Catalog & Repository Services	Provides and maintains platform specifications, planning elements, and plan and behavior modules for a variety of multi-objective ocean observation missions, such as the capture of a coastal upwelling event. A representative set of plan and behavior modules that adhere to a full Boolean logic precondition language for generically-conditioned autonomy actions will be introduced.
1.2.3.3.5	W	Planning Services	Provides software tools and user interfaces for the scientist defining a set of states for each fixed or mobile node involved in a planned experiment or observation campaign, and to design the associated, conditional state transitions, forming the basis for defining the behavior algebra (language) necessary to complete a predetermined, as well as autonomously adaptive sensing task.

WBS	Element Type	Element Name	Definition
1.2.3.3.6	W	Mission Coordination Services	Provides standard safety procedures protecting the fixed or mobile assets that could be damaged through improper use by inexperienced operators, such as collision control for multiple AUVs and assurances of depth limits for sensor packages.
1.2.3.3.7	W	Mission Simulator	Provides a complete mission simulation capability for pre-deployment planning and testing of specific measurement campaigns. Seamlessly linked to the OOI Virtual Ocean Simulator, this enables comprehensive testing of predetermined as well as adaptive missions, such as the capture and measurement of a rapidly developing coastal front or a subsea volcanic eruption.
1.2.3.3.8	W	Spiral Development System Reviews	Costs and effort associate with the 4 spiral development anchor point system wide reviews per Release Cycle. The Anchor Point Reviews are: Life Cycle Objective in month 4, Life Cycle Architecture in month 8, Initial Operating Capacity in month 14 and System Release in final month of a Release, month 16. The System Release review for the current release is held with the Life Cycle Objective review for the next release as a face to face meeting at UCSD. (See SSEP for more detail).
1.2.3.4	C	Data Management	The subsystem responsible for providing life cycle management, federation, preservation and presentation of OOI data holdings and associated metadata via data streams, repositories and catalogs
1.2.3.4.1	W	OOI Common Data & Metadata Model	Provides the common data and metadata model for the Integrated Observatory into which all integrated data products must translate, if required, for shared syntactic and semantic access. The scope of syntactic representation of observed data shall be extendable and comprehensive. The scope of the observatory metadata model and semantic representation shall be extendable yet constrained in implementation to at least meet all data requirements imposed by the set "Core" OOI sensors and their associated QA/QC processing.
1.2.3.4.2	W	Dynamic Data Distribution Services	Provides publication, subscription, and query services associated with variant and dynamic data resources. Used in combination with the Processing Service to drive the policy decision to execute a process.
1.2.3.4.3	W	Data Catalog & Repository Services	Provides registration, indexing, and presentation services to collect and organize data holdings with their associated metadata for an individual, group and/or community.
1.2.3.4.4	W	Persistent Archive Services	Provides cataloging, preservation, validation & curation services to organize, persist and maintain data holdings with their associated metadata for an individual, group and/or community.
1.2.3.4.5	W	Search & Navigation Services	Provides query and browsing services by context based on the content , metadata and semantics of the data holdings.
1.2.3.4.6	W	External Data Access Services	Provides an extensible suite of access interfaces and data formats for interoperability with external communities and applications (i.e., OPeNDAP, THREDDS, LAS and the suite of OGC Web services).
1.2.3.4.7	W	Aggregation Service	Provides for the classification, categorization, and general grouping of data into collections.

WBS	Element Type	Element Name	Definition
1.2.3.4.8	W	Attribution & Association Services	Associates and retrieves attributes to resources. The attributes can be associated within a semantic context (ontology). The service facilitates the characterization, qualification, and general commentary about the elements with which the participants interact.
1.2.3.4.9	W	Spiral Development System Reviews	Costs and effort associate with the 4 spiral development anchor point system wide reviews per Release Cycle. The Anchor Point Reviews are: Life Cycle Objective in month 4, Life Cycle Architecture in month 8, Initial Operating Capacity in month 14 and System Release in final month of a Release, month 16. The System Release review for the current release is held with the Life Cycle Objective review for the next release as a face to face meeting at UCSD. (See SSEP for more detail).
1.2.3.5	C	Common Operating Infrastructure	Provides the services and distributed infrastructure to build a secure, scalable, fault-tolerant federated system of independently operated observatory components.
1.2.3.5.1	W	Federated Facility (Virtual Organization) Services	Provides the management and governance services for a collection of resources on behalf of a group or individual. It represents the domain of authority for the set of resources managed by the facility. The governance services provide for the following set of collaboration agreements: membership, partnership, federation, and delegation. Delegation, for example, is used to give a marine observatory the rights to operate/manage a research team's instrument on their behalf.
1.2.3.5.2	W	Enterprise Service Bus & Container	Provides the distributed service infrastructure for the secure, scalable and fault-tolerant operation and federation of the Facilities (operational domains of authority) that comprise the deployed system of systems
1.2.3.5.2.1	T	Presentation Framework	Provides the web services & browser presentation containers as well as the web user interface "portlet" building blocks.
1.2.3.5.2.2	T	Governance Framework	System for identity and policy management to govern the use of resources by participants through policy enforcement & decision services.
1.2.3.5.2.3	T	Service Framework	System for provisioning, federating, delegating, and binding service interactions between resources.
1.2.3.5.2.4	T	Resource Framework	System for provisioning, managing, and tracking the use of resources.
1.2.3.5.2.5	T	Distributed State Management	System for managing active and persisted distributed state.
1.2.3.5.2.6	T	Communication Infrastructure	System for messaging, bulk data transfer, guaranteed data transfer and provisioning streaming media channels.
1.2.3.5.3	W	Identity & Policy Management Services	Services that provision and securely manage information about participants used in the governance (i.e. authentication, authorization) of their activities across the network. The services ensure that personal information is owned and its exposure to other participants is controlled by the participant.
1.2.3.5.4	W	Resource Catalog & Repository Services	Services that provide for the persistence, preservation, and retrieval of information elements associated with resources registered with the system.
1.2.3.5.5	W	Resource Lifecycle Services	Resource management services to transition a resource from cradle to grave.
1.2.3.5.6	W	Resource Activation Services	Testing and validation services to ensure conformity with the different operational requirements in the network.

WBS	Element Type	Element Name	Definition
1.2.3.5.7	W	Resource Collaboration Services	Services that facilitate the negotiations between participants and facilities for sharing resources (e.g., instruments, processes, and models). Agreements are captured and associated with all parties materially involved.
1.2.3.5.8	W	Spiral Development System Reviews	Costs and effort associate with the 4 spiral development anchor point system wide reviews per Release Cycle. The Anchor Point Reviews are: Life Cycle Objective in month 4, Life Cycle Architecture in month 8, Initial Operating Capacity in month 14 and System Release in final month of a Release, month 16. The System Release review for the current release is held with the Life Cycle Objective review for the next release as a face to face meeting at UCSD. (See SSEP for more detail).
1.2.3.6	C	Common Execution Infrastructure	Provides the services to manage the distributed, immediate mode execution of processes
1.2.3.6.1	W	Elastic Computing Services	Scheduling, provisioning, and monitoring services to maintain a balanced deployment of Virtual Compute Nodes to the computational engines.
1.2.3.6.2	W	Execution Engine Catalog & Repository Services	Maintains references to registered execution sites and Virtual Compute Node configuration packages.
1.2.3.6.3	W	Resource Management Services	Establishes standard models for the operational management (monitor & control) of stateful and taskable resources.
1.2.3.6.4	W	Process Management Services	Provides the validation, scheduling, and management services for policy-based process execution at specified execution sites. The service supports the coupling of the dynamic data distribution service with the process and its triggering. Provenance and citation annotation are registered associating the input and output products with the execution process and its operating context.
1.2.3.6.5	W	Process Catalog & Repository Services	Maintains process itineraries and references to registered process engine configurations and execution sites.
1.2.3.6.6	W	Integration w/ National Computing Infrastructure	Provide the capability to deploy OOI processing, both data stream and ocean models on to the nation computing infrastructure, in particular the focus is on the Open Science Grid and the Terregrid (and/or its logical successor)
1.2.3.6.7	W	Spiral Development System Reviews	Costs and effort associate with the 4 spiral development anchor point system wide reviews per Release Cycle. The Anchor Point Reviews are: Life Cycle Objective in month 4, Life Cycle Architecture in month 8, Initial Operating Capacity in month 14 and System Release in final month of a Release, month 16. The System Release review for the current release is held with the Life Cycle Objective review for the next release as a face to face meeting at UCSD. (See SSEP for more detail).
1.2.3.7	C	System Integration, Test, and Validation	This area of activity is responsible for the coordination, integration, testing and validation of all of the subsystems
1.2.3.7.1	W	IT&V Management	Provides the overall planning, management and delivery of the integrated CI system to Operations

WBS	Element Type	Element Name	Definition
1.2.3.7.2	W	System Integration	Takes receipt of the CI subsystems and delivers the integrated CI system of subsystems to System Test. Also responsible for the implementation and activation of the CI Development and Testing environments at UCSD which comprises a source code and configuration repository, a simulated OOI wide area network deployment with the major communication computing regimes represented, and system building environment and a qualified system testing environment.
1.2.3.7.3	W	System Test & Validation	Provides a fully qualified CI system to Operations. This entails testing the Integrated CI system internally against the OOI User, System and Operational requirements and validating the system externally with the OOI community
1.2.3.7.4	W	Spiral Development System Reviews	Costs and effort associate with the 4 spiral development anchor point system wide reviews per Release Cycle. The Anchor Point Reviews are: Life Cycle Objective in month 4, Life Cycle Architecture in month 8, Initial Operating Capacity in month 14 and System Release in final month of a Release, month 16. The System Release review for the current release is held with the Life Cycle Objective review for the next release as a face to face meeting at UCSD. (See SSEP for more detail).
1.2.4	S	Hardware Development	Not Applicable - There are no requirements to develop specialized hardware components for the Cyber Infrastructure
1.2.5	S	Implementation	Provides the specific labor and systems to implement, integrate and activate distributed components of the OOI wide area network
1.2.5.1	C	Marine Observatory Node Activation	Provides the specific labor, software and hardware systems to implement, integrate and activate each of the Marine Nodes into the Integrated Observatory Facility
1.2.5.1.1	W	Integration of Core Instrumentation	Implement and test OOI instrument proxy drivers for 80 unique instrument types and 120 data streams types with their associated QA/QC processes designated as the Core instrumentation for the OOI
1.2.5.1.2	W	Mid Atlantic Bight - Pioneer Array	For the Mid Atlantic Bight - Pioneer Array: Integrate and test the Integrated Observatory's power and communication resource scheduler with the Marine Node's resource controller, and Activate 220 instances of instrument proxies and 281 instances of data streams associated with the Node.
1.2.5.1.3	W	Pacific Northwest - Endurance Array	For the Pacific Northwest - Endurance Array: Integrate and test the Integrated Observatory's power and communication resource scheduler with the Marine Node's resource controller, and Activate 234 instances of instrument proxies and 278 instances of data streams associated with the Node.
1.2.5.1.4	W	Station Papa - Discus Buoy	For the Station Papa - Discus Buoy: Integrate and test the Integrated Observatory's power and communication resource scheduler with the Marine Node's resource controller, and Activate 84 instances of instrument proxies and 102 instances of data streams associated with the Node.

WBS	Element Type	Element Name	Definition
1.2.5.1.5	W	Southern Ocean 55 S - Discus Buoy	For the Southern Ocean 55 S - Discus Buoy: Integrate and test the Integrated Observatory's power and communication resource scheduler with the Marine Node's resource controller, and Activate 98 instances of instrument proxies and 116 instances of data streams associated with the Node.
1.2.5.1.6	W	Irminger Sea - Discus Buoy	For the Irminger Sea - Discus Buoy: Integrate and test the Integrated Observatory's power and communication resource scheduler with the Marine Node's resource controller, and Activate 97 instances of instrument proxies and 115 instances of data streams associated with the Node.
1.2.5.1.7	W	Mid Atlantic - Extended Draft Platform	For the Mid Atlantic - Extended Draft Platform: Integrate and test the Integrated Observatory's power and communication resource scheduler with the Marine Node's resource controller, and Activate 62 instances of instrument proxies and 80 instances of data streams associated with the Node.
1.2.5.1.8	W	Hydrate Ridge - Cabled Node	For the Hydrate Ridge - Cabled Node: Integrate and test the Integrated Observatory's power and communication resource scheduler with the Marine Node's resource controller, and Activate 45 instances of instrument proxies and 55 instances of data streams associated with the Node.
1.2.5.1.9	W	Blanco - Cabled Node	For the Blanco - Cabled Node: Integrate and test the Integrated Observatory's power and communication resource scheduler with the Marine Node's resource controller, and Activate 11 instances of instrument proxies and 37 instances of data streams associated with the Node.
1.2.5.1.10	W	Axial - Cabled Node	For the Axial - Cabled Node: Integrate and test the Integrated Observatory's power and communication resource scheduler with the Marine Node's resource controller, and Activate 25 instances of instrument proxies and 53 instances of data streams associated with the Node.
1.2.5.1.11	W	Midplate - Cabled Node	For the Midplate - Cabled Node: Integrate and test the Integrated Observatory's power and communication resource scheduler with the Marine Node's resource controller, and Activate 4 instances of instrument proxies and 10 instances of data streams associated with the Node.
1.2.5.1.12	W	Subduction Zone - Cabled Node	For the Subduction Zone - Cabled Node: Integrate and test the Integrated Observatory's power and communication resource scheduler with the Marine Node's resource controller, and Activate 9 instances of instrument proxies and 12 instances of data streams associated with the Node.
1.2.5.2	C	Terrestrial Cyber Points of Presence (CyberPoP) Activation	Provides the specific labor, software, hardware and communication systems to implement, integrate and activate each of the terrestrial CyberPoPs and Operation Centers with the Integrated Observatory Network
1.2.5.2.1	W	Integrated Observatory Communication Network	Implements and activates the secure, scalable, fault-tolerant wide area communication (networking) infrastructure between the all terrestrial cyber point of presence, CyberPoPs and the interconnection between the shore side CyberPoPs and their respective Marine Observatory Nodes
1.2.5.2.2	W	San Diego CyberPoP - Observatory & Marine Functionality	Implements and activates the secure, scalable, fault-tolerant primary CI CyberPoP with collocated secondary CGSN functionality for the Mid Atlantic EDP at San Diego

WBS	Element Type	Element Name	Definition
1.2.5.2.3	W	Boulder(tbd) CyberPoP - Observatory Functionality	Implements and activates the secure, scalable, fault-tolerant secondary CI CyberPoP at San Diego
1.2.5.2.4	W	Portland CyberPoP - Marine Facility Functionality	Implements and activates the secure, scalable, fault-tolerant primary RSN CyberPoP with collocated secondary CGSN functionality for the PNW Endurance Array at Portland
1.2.5.2.5	W	Wood Hole CyberPoP - Marine Facility Functionality	Implements and activates the secure, scalable, fault-tolerant primary CGSN CyberPoP at Woods Hole
1.2.5.2.6	W	CI Operations Center	Implements and activates the CI Operations primary workstation
1.2.5.2.7	W	CGSN Woods Hole Operations Center	Integrates and activates the OOI Integrated Observatory Management functionality into CGSN Management & Operations console
1.2.5.2.8	W	CGSN Corvallis Operations Center	Integrates and activates the OOI Integrated Observatory Management functionality into CGSN Management & Operations console
1.2.5.2.9	W	RSN Seattle Operations Center	Integrates and activates the OOI Integrated Observatory Management functionality into RSN Management & Operations console
1.2.5.2.10	W	RSN Portland High Bandwidth Stream Processor	Implements and activates the High Bandwidth Data Stream Processor at shore end of the RSN cable network. This system recognizes the extreme capabilities of a 10Gbps cabled system to produce unprecedented volumes of observed data on a continuous basis. The system provides enough processing to characterize, summarize and downsample this class of data streams as well as provide storage capacity to support short term (order of days) buffering. This work covers the implementation and activation of the system with the Integrated Observatory network and the integration and activation of the high bandwidth stream processes. It does not cover the identification and development of the high bandwidth stream processing functions.
1.2.5.3	C	External Observatory Interfaces	Provided the specific labor, software interfaces to implement, integrate and activate the interface and initial data products to be shared bi-directional between the Integrated Observatory Facility and external observatories.
1.2.5.3.1	W	Neptune Canada	Develop the mapping between Neptune Canada's and OOI's respective observatory data & metadata models
1.2.5.3.2	W	IOOS	Develop the mapping between IOOS's and OOI's respective observatory data & metadata models
1.2.5.3.3	W	WMO/IOC formats and standards	Develop the mapping of the OOI data stream is to the WMO/IOC formats and standards for international distribution to operational (and research) institutions.
1.2.6	S	Operations & Maintenance	
1.2.6.1	C	Program Management	
1.2.6.1.1	W	Project Management	Project life cycle management functions involving planning, budgeting, change management and performance assessment at the program, project and subcontract levels)
1.2.6.1.2	W	Business Operations	Project administration and control functions covering administrative duties, financial accounting and purchasing.
1.2.6.1.3	W	Communication & Outreach	Media communications and public outreach activities covering Education & Public Awareness, Ocean Science and CI conference participation and promotion of the program through Web and Media presence.
1.2.6.2	C	Observatory Services Facility	
1.2.6.2.1	W	Data Management Center	Provides the management and curation for the OOI data holdings

WBS	Element Type	Element Name	Definition
1.2.6.2.2	W	Observation Planning & Execution Center	Provides the planning and management support for the life cycle of all scientific observations and campaigns
1.2.6.2.3	W	Testing & Certification Center	Provides the testing & certification programs for all software components deployed within the OOI Observatory and Marine Facilities that directly interact with the Integrated Observatory Network
1.2.6.2.4	W	Training & Support Center	Provides the OOI membership with "End User" training and support
1.2.6.3	C	Cyber Operations Facility	
1.2.6.3.1	W	System & Network Administration	Provides the systems and network administration to support the 24/7 operations of the Integrated Observatory Network.
1.2.6.3.2	W	Software Maintenance & Upgrade	Provides the service and software configuration management and software upgrades to sustain the ongoing operations of the Integrated Observatory Network

WBS	Element Type	Element Name	Definition
1	S	OOI	
1.3	S	Coastal / Global Observatory	
1.3.1	S	Project Management	This Summary Task effort directs and manages all resources and activities necessary to deliver the Coastal and Global Scale Nodes to the OOI network on time, on budget and meeting all performance requirements. It includes tasking to develop a PEP, implement EVMS, prepare reports and perform other management activities both internal to the IO and in coordination with the other IO's and the OOI Program Office.
1.3.1.1	C	2008 Support	Summary for 2008
1.3.1.1.1	W	PM and Controls	This task includes all effort to manage the project. It includes establishing and maintaining an organization to perform the tasks defined in the Statement of Work at the prime and subcontract locations. It includes establishment and maintenance of the Performance Measurement Baseline and subsequent Earned Value Management System (EVMS) status and analysis, monthly and quarterly reports, management of contingency funds, internal project meetings and meetings with the OOI Program Office. It includes establishment, maintenance and implementation of the Risk Management Plan and management of the contingency funds. It includes finance and scheduling support to these tasks. It includes travel related to these tasks.
1.3.1.1.2	W	Science Outreach and Education	This task includes all effort on the part of the CGSN IO to prepare infrastructure to disseminate information to the science community and to the public. This task includes coordination with the other IO's to maximize the impact of the Education and Outreach program.
1.3.1.2	C	2009 Support	Summary for 2009
1.3.1.2.1	W	PM and Controls	see 1.3.1.1.1
1.3.1.2.2	W	Science Outreach and Education	see 1.3.1.1.2
1.3.1.3	C	2010 Support	Summary for 2010
1.3.1.3.1	W	PM and Controls	see 1.3.1.1.1
1.3.1.3.2	W	Science Outreach and Education	see 1.3.1.1.2
1.3.1.4	C	2011 Support	Summary for 2011
1.3.1.4.1	W	PM and Controls	see 1.3.1.1.1
1.3.1.4.2	W	Science Outreach and Education	see 1.3.1.1.2
1.3.1.5	C	2012 Support	Summary for 2012
1.3.1.5.1	W	PM and Controls	see 1.3.1.1.1
1.3.1.5.2	W	Science Outreach and Education	see 1.3.1.1.2
1.3.1.6	C	2013 Support	Summary for 2013
1.3.1.6.1	W	PM and Controls	see 1.3.1.1.1
1.3.1.6.2	W	Science Outreach and Education	see 1.3.1.1.2
1.3.1.7	S	Environmental Compliance and Permitting	This task includes all effort and expense associated with permitting and environmental compliance. Legal costs, permitting fees, studies and reports to support environmental compliance are included. The assumption is that JOI Division will provide the Environmental Impact Assessment for the entire OOI Program; the CGSN IO will be responsible to provide inputs to the OOI-level EIA. A list of permit requirements, schedule and status will be maintained.

WBS	Element Type	Element Name	Definition
1.3.2	S	Systems Engineering	This Summary Task effort directs and manages the system engineering for the Coastal and Global Scale Nodes. In addition to developing performance and interface requirements with traceability to the science user requirements, these tasks will allocate CGSN subcomponents, develop maintenance and sparing philosophies, develop logistics and support plans, conduct trade studies, and participate in risk management activities. These tasks also develop test scenarios and plans for acceptance of the CGSN nodes and sensors.
1.3.2.1	C	2008 SE Support	Summary for 2008
1.3.2.1.1	W	Requirements Management	This task includes all effort to generate, review and maintain CGSN system level requirements including (as required) Quality Assurance Plan, Reliability Plan, Reliability Allocation, Configuration Management Plan, Maintainability Plan, Sparing Philosophy and Quantity Plan, Integrated Logistics Support Plan, Interoperability Plan. The task includes requirements for calibration facilities and PI instrumentation.
1.3.2.1.2	W	Detailed Performance Requirements	This task includes all effort to generate, review, approve and maintain requirements specific to each CGSN site, the Shore Station(s), Science Systems and Sensors. For each CGSN site, Systems Engineer for the site will lead this effort with the support of the Systems Engineering Coordinator, Science Advisor for the site and the Project Scientists. For non-site specific requirements, the Systems Engineering Team will lead the effort with input from the Project Scientists.
1.3.2.1.3	W	Integration and Test Planning	This task includes all effort to generate, review, approve and maintain test plans for component performance, system integration, pre-installation integration and site installation of CGSN equipment. It includes Component Test Plans, Subassembly Test Plans, Integration Test Plans, Pre-Installation Integration Test Plans (for each installable unit), Installation Test Plans (for each installable unit), Commissioning and Acceptance Plans (for each commissionable unit) and a Commissioning and Acceptance Verification Matrix (for each commissionable unit). The Systems Engineer for a specific site will lead this effort with support from the Project Scientists and Site Science Advisors.
1.3.2.1.4	W	Systems Engineering Oversight / Support	This task includes all effort associated with Systems Engineering Coordination following the approval of the requirements, through design approval at Critical Design Review and continuing through Commissioning. It includes direction to engineers and review of design and design change information.
1.3.2.1.5	W	Engineering Information Management Methodology	This task includes all effort associated with refinement, documentation and maintenance of interface requirements.
1.3.2.1.6	W	Software Development Practices	This task includes all effort associated with documentation and training with respect to Software Development Practices. It includes, as required, generation, review, approval and implementation of a software design process to allow for review of software requirements, design and implementation as well as development of methodology to control and maintain the software design.

WBS	Element Type	Element Name	Definition
1.3.2.1.7	W	Hardware Development Practices	This task includes all effort associated with documentation and training with respect to Hardware Development Practices. It includes, as required, generation, review, approval and implementation of a hardware design process to allow for review of hardware requirements, design and implementation as well as development of methodology to control and maintain the hardware design.
1.3.2.1.8	W	Technical Change Control Process	This task includes all effort associated with development, training, implementation and maintenance of a Configuration Management Control Process to cover management of requirements, interface agreements, bills of materials, software designs and hardware designs.
1.3.2.2	C	2009 SE Support	2009 Summary
1.3.2.2.1	W	Requirements Management	see 1.3.2.1.1
1.3.2.2.2	W	Detailed Performance Requirements	see 1.3.2.1.2
1.3.2.2.3	W	Integration and Test Planning	see 1.3.2.1.3
1.3.2.2.4	W	Systems Engineering Oversight / Support	see 1.3.2.1.4
1.3.2.2.5	W	Engineering Information Management Methodology	see 1.3.2.1.5
1.3.2.2.6	W	Software Development Practices	see 1.3.2.1.6
1.3.2.2.7	W	Hardware Development Practices	see 1.3.2.1.7
1.3.2.2.8	W	Technical Change Control Process	see 1.3.2.1.8
1.3.2.3	C	2010 SE Support	2010 Summary
1.3.2.3.1	W	Requirements Management	see 1.3.2.1.1
1.3.2.3.2	W	Detailed Performance Requirements	see 1.3.2.1.2
1.3.2.3.3	W	Integration and Test Planning	see 1.3.2.1.3
1.3.2.3.4	W	Systems Engineering Oversight / Support	see 1.3.2.1.4
1.3.2.3.5	W	Engineering Information Management Methodology	see 1.3.2.1.5
1.3.2.3.6	W	Software Development Practices	see 1.3.2.1.6
1.3.2.3.7	W	Hardware Development Practices	see 1.3.2.1.7
1.3.2.3.8	W	Technical Change Control Process	see 1.3.2.1.8
1.3.2.4	C	2011 SE Support	2011 Summary
1.3.2.4.1	W	Requirements Management	see 1.3.2.1.1
1.3.2.4.2	W	Detailed Performance Requirements	see 1.3.2.1.2
1.3.2.4.3	W	Integration and Test Planning	see 1.3.2.1.3
1.3.2.4.4	W	Systems Engineering Oversight / Support	see 1.3.2.1.4
1.3.2.4.5	W	Engineering Information Management Methodology	see 1.3.2.1.5
1.3.2.4.6	W	Software Development Practices	see 1.3.2.1.6
1.3.2.4.7	W	Hardware Development Practices	see 1.3.2.1.7

WBS	Element Type	Element Name	Definition
1.3.2.4.8	W	Technical Change Control Process	see 1.3.2.1.8
1.3.2.5	C	2012 SE Support	2012 Summary
1.3.2.5.1	W	Requirements Management	see 1.3.2.1.1
1.3.2.5.2	W	Detailed Performance Requirements	see 1.3.2.1.2
1.3.2.5.3	W	Integration and Test Planning	see 1.3.2.1.3
1.3.2.5.4	W	Systems Engineering Oversight / Support	see 1.3.2.1.4
1.3.2.5.5	W	Engineering Information Management Methodology	see 1.3.2.1.5
1.3.2.5.6	W	Software Development Practices	see 1.3.2.1.6
1.3.2.5.7	W	Hardware Development Practices	see 1.3.2.1.7
1.3.2.5.8	W	Technical Change Control Process	see 1.3.2.1.8
1.3.2.6	C	2013 SE Support	2013 Summary
1.3.2.6.1	W	Requirements Management	see 1.3.2.1.1
1.3.2.6.2	W	Detailed Performance Requirements	see 1.3.2.1.2
1.3.2.6.3	W	Integration and Test Planning	see 1.3.2.1.3
1.3.2.6.4	W	Systems Engineering Oversight / Support	see 1.3.2.1.4
1.3.2.6.5	W	Engineering Information Management Methodology	see 1.3.2.1.5
1.3.2.6.6	W	Software Development Practices	see 1.3.2.1.6
1.3.2.6.7	W	Hardware Development Practices	see 1.3.2.1.7
1.3.2.6.8	W	Technical Change Control Process	see 1.3.2.1.8
1.3.3	S	Subsystem Development	This Summary Task develops, designs, and specifies software, hardware and the ship/shore facilities of the CGSN. Software development is focused on software necessary to ensure the operation of the CGSN on the OOI Network and coordination and control of the CGSN equipment. Hardware development includes hardware prototypes, engineering and qualification testing. Design documentation generation, review and approval is included.
1.3.3.1	C	Buoy Design	
1.3.3.1.1	W	Electrical	
1.3.3.1.1.1	T	Power System Design	This task includes all effort to develop, design, document and test a hybrid power generation, distribution and control system. Hardware and software tasking is included. Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.

WBS	Element Type	Element Name	Definition
1.3.3.1.1.2	T	Telemetry Design	This task includes all effort to develop, design, document and test a hybrid telemetry and control system. Hardware and software tasking is included. Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System. (Satellite comms, WiFi, Freewave)
1.3.3.1.1.3	T	Mooring System Controller	This task includes all effort to develop, design, document and test a mooring system controller. Hardware and software tasking is included. Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.1.1.4	T	Data Concentrator & Logger (DCL)	This task includes all effort to develop, design, document and test a data concentrator & logger. Hardware and software tasking is included. Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.1.1.5	T	EOM Design	This task includes all effort to develop, design, document and test an EOM connection from a surface buoy to an MFN on the sea floor. Hardware and software tasking is included. Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.1.2	W	Interface to CI	This task includes all effort to develop, design, document and test a buoy-based interface to CI. Hardware and software tasking is included. Participation in the Interface Meetings and Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.1.3	W	Mechanical Design	This task includes all effort to develop, design, document and test the buoy. It includes definition of the generic mooring structure for EM and EOM operations. Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.2	C	Mooring Component Design	This task includes all effort to develop, design, document and test mooring components specific to CGSN. Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.3	C	Profiling Mooring Design	
1.3.3.3.1	W	Global Hybrid Profiler Mooring	This task includes all effort to develop, design and document a deep water hybrid profiler mooring based on a commercially available deep water profiler and a hardened upper ocean winched profiler. It includes definition of telemetry, power, profiler interface and mooring structure tasks. Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task.

WBS	Element Type	Element Name	Definition
1.3.3.3.2	W	Coastal Profiler Mooring	This task includes all effort to develop, design and document a coastal profiler mooring based on a commercially available profiler. It includes definition of telemetry, power, profiler interface and mooring structure tasks.
1.3.3.3.3	W	Coastal Hybrid Profiler Mooring	This task includes all effort to develop, design and document a coastal hybrid profiler mooring based on a commercially available deep water profiler and an upper ocean winched profiler. It includes definition of telemetry, power, profiler interface and mooring structure tasks.
1.3.3.3.4	W	Coastal Cabled Hybrid Profiler Mooring	This task includes all effort to develop, design and document a cabled coastal hybrid profiler mooring based on a commercially available deep water profiler and an upper ocean winched profiler. It includes definition of telemetry, power, profiler interface and mooring structure. Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task.
1.3.3.4	C	Mesoscale Flanking Mooring Design	This task includes all effort to develop, design and document a mesoscale flanking mooring. It includes definition of telemetry, power, instrument interfaces and mooring structure. Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task.
1.3.3.5	C	Near Shore Mooring Design	This task includes all effort to develop, design, document and test a near shore mooring (25m depth). It includes definition of telemetry, power, instrument interfaces and mooring structure. Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.6	C	Benthic Package Design	
1.3.3.6.1	W	EDP Junction Box Design	This task includes all effort to develop, design, document and test the EDP junction box. Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.6.2	W	MFN Design	This task includes all effort to develop, design, document and test the Multifunction Node (MFN). Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.6.3	W	Benthic Experiment Node Design	This task includes all effort to develop, design, document and test the Benthic Experiment Node. Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.6.4	W	Cabled Benthic Experiment Node Design	This task includes all effort to develop, design, document and test the Cabled Benthic Experiment Node. Participation in Interface Meetings and Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.

WBS	Element Type	Element Name	Definition
1.3.3.6.5	W	Low Voltage Node Design	This task includes all effort to develop, design, document and test the Low Voltage Node. Participation in Interface Meetings is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.6.6	W	Medium Voltage Node Design	This task includes all effort to develop, design, document and test the Medium Voltage Node. Participation in Interface Meetings is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.7	C	Vehicle Design	
1.3.3.7.1	W	AUV	
1.3.3.7.1.1	T	AUV Design	This task includes all effort to develop, design, document and test an AUV with instrument interfaces required by CGSN and capable of docking. Docking will provide an interface for power and communications with the AUV. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.7.1.2	T	AUV Dock Design	This task includes all effort to develop, design, document and test an AUV Dock. Docking will provide an interface for power and communications with the AUV. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.7.2	W	Global Winched Profiler Design	This task includes all effort to develop, design, document and test a winched profiler for use at high latitude sites in the Global system. Participation in Integrated and Cross Design Teams (IDT, CDT) is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.7.3	W	Coastal Winched Profiler	This task includes all effort to develop, design, document and test a winched profiler, battery and/or cable-powered base for use in Coastal cabled and uncabled applications. Participation in Interface Meetings is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.7.4	W	Glider Design	
1.3.3.7.4.1	T	Extension of Endurance and Payload Capability	This task includes all effort to develop, design, document and test a capability to enable glider use at Global sites for up to a year.
1.3.3.7.4.2	T	Biofouling Mitigation	This task includes all effort to design methods to limit biofouling, particularly of optical sensors, planned for use in coastal zones for up to six months.
1.3.3.8	C	Design Integration and Test	This task includes all effort associated with engineering tests of integrated subsystems. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.9	C	Shore Station Design	
1.3.3.9.1	W	Cyber Infrastructure Incorporation Design	This task includes all effort to develop, design, document and test a shore-based interface to the CI IO. Participation in Interface Meetings is an integral part of this task. Travel and engineering prototype materials are included to the extent they will not be used in the final CGSN System.
1.3.3.9.2	W	Operations Management System Design	This task includes all effort to design and document the Operations Management System.

WBS	Element Type	Element Name	Definition
1.3.3.9.3	W	Change Management System Design	This task includes all effort to design and document the Change Management System.
1.3.3.9.4	W	Operations Management Centers Design	This task includes all effort to design and document the Operations Management Centers.
1.3.3.9.5	W	Data Acquisition Management Design	This task includes all effort to design and document the Data Acquisition management processes and procedures to be used throughout the project.
1.3.3.10	C	EDP Design	
1.3.4	S	Implementation	
1.3.4.1	S	Global Sites	
1.3.4.1.1	S	Station Papa	Summary for Station Papa Site
1.3.4.1.1.1	C	Station Papa Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.
1.3.4.1.1.2	C	Station Papa Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.1.1.3	C	AL Discus Mooring Procure, Build, Inspect & Test	
1.3.4.1.1.3.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.1.1.3.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.1.1.3.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.
1.3.4.1.1.3.4	W	DCL Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the DCLs for this site.
1.3.4.1.1.3.5	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.1.1.4	C	Global Hybrid Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.1.1.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.1.1.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.1.1.5	C	Mesoscale Flanking Mooring Procure, Build, Inspect & Test	

WBS	Element Type	Element Name	Definition
1.3.4.1.1.5.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.1.1.5.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.1.1.6	C	Glider Procure, Build, Inspect & Test	
1.3.4.1.1.6.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.1.1.6.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.1.1.6.3	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.1.1.7	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.1.1.8	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.1.1.9	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.1.2	S	Southern Ocean 55 S	
1.3.4.1.2.1	C	Southern Ocean 55 S Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.
1.3.4.1.2.2	C	Southern Ocean 55 S Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.1.2.3	C	Advanced Discus Mooring Procure, Build, Inspect & Test	
1.3.4.1.2.3.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform. Includes EOM cable build.

WBS	Element Type	Element Name	Definition
1.3.4.1.2.3.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform. Includes accommodation for EOM cable.
1.3.4.1.2.3.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.
1.3.4.1.2.3.4	W	MFN Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the MFN for this site.
1.3.4.1.2.3.5	W	DCL Build	This task includes all material, build labor, inspectoin labor and test labor to procure, construct, inspect and test the MFN for this site.
1.3.4.1.2.3.6	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.1.2.4	C	Global Hybrid Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.1.2.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.1.2.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.1.2.5	C	Mesoscale Flanking Mooring Procure, Build, Inspect & Test	
1.3.4.1.2.5.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.1.2.5.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.1.2.6	C	Glider Procure, Build, Inspect & Test	
1.3.4.1.2.6.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.1.2.6.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.1.2.6.3	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.

WBS	Element Type	Element Name	Definition
1.3.4.1.2.7	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.1.2.8	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.1.2.9	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.1.3	S	Irminger Sea	
1.3.4.1.3.1	C	Irminger Sea Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.
1.3.4.1.3.2	C	Irminger Sea Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.1.3.3	C	AL Discus Node Procure, Build, Inspect & Test	
1.3.4.1.3.3.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.1.3.3.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.1.3.3.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.
1.3.4.1.3.3.4	W	DCL Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the DCLs for this site.
1.3.4.1.3.3.5	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.1.3.4	C	Global Hybrid Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.1.3.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.1.3.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.1.3.5	C	Mesoscale Flanking Mooring Procure, Build, Inspect & Test	

WBS	Element Type	Element Name	Definition
1.3.4.1.3.5.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.1.3.5.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.1.3.6	C	Glider Procure, Build, Inspect & Test	
1.3.4.1.3.6.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.1.3.6.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.1.3.6.3	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.1.3.7	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.1.3.8	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.1.3.9	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.1.4	S	Mid Atlantic	
1.3.4.1.4.1	C	Mid Atlantic Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.
1.3.4.1.4.2	C	Mid Atlantic Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.1.4.3	C	EDP Procure, Build, Inspect & Test	
1.3.4.1.4.3.1	W	Build, Inspect, Manufacturing Test	
1.3.4.1.4.3.2	T	Platform Hull Mods	
1.3.4.1.4.3.3	T	Mooring	
1.3.4.1.4.3.4	T	Power System	
1.3.4.1.4.3.5	T	Satellite Communicaitons	
1.3.4.1.4.3.6	T	Sensors	

WBS	Element Type	Element Name	Definition
1.3.4.1.4.3.7	T	Build Labor	
1.3.4.1.4.3.8	T	Test (FAT)	
1.3.4.1.4.4	C	Global Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.1.4.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.1.4.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.1.4.5	C	Mesoscale Flanking Mooring Procure, Build, Inspect & Test	
1.3.4.1.4.5.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.1.4.5.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.1.4.6	C	Glider Procure, Build, Inspect & Test	
1.3.4.1.4.6.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.1.4.6.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.1.4.6.3	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.1.4.7	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.1.4.8	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.1.4.9	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.1.5	S	Global Material to Support Turns	

WBS	Element Type	Element Name	Definition
1.3.4.1.5.1	C	Global Material Support to Turns Design	This task includes all labor to define, document, review and approve an equipment plan to support the Operational use of the system over long periods. This equipment is used to replace deployed equipment returned to shore for refurbishment.
1.3.4.1.5.2	C	AL Discus Mooring Procure, Build, Inspect & Test	
1.3.4.1.5.2.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.1.5.2.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.1.5.2.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.
1.3.4.1.5.2.4	W	DCL Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the DCLs for this site.
1.3.4.1.5.2.5	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform.
1.3.4.1.5.3	C	Global Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.1.5.3.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.1.5.3.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform.
1.3.4.1.5.4	C	Mesoscale Flanking Mooring Procure, Build, Inspect & Test	
1.3.4.1.5.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.1.5.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform.
1.3.4.1.5.5	C	Gliders	
1.3.4.2	S	PNW Endurance Array	
1.3.4.2.1	S	OR 80m	
1.3.4.2.1.1	C	OR 80m Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.
1.3.4.2.1.2	C	OR 80m Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.2.1.3	C	Coastal Mooring Procure, Build, Inspect & Test	

WBS	Element Type	Element Name	Definition
1.3.4.2.1.3.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.2.1.3.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.2.1.3.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.
1.3.4.2.1.3.4	W	DCL Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the DCL(s) for this site.
1.3.4.2.1.3.5	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.1.4	C	Cabled Coastal Winched Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.2.1.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical / rigging portions of this platform.
1.3.4.2.1.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.1.5	C	Cabled Benthic Experiment Node Procure, Build, Inspect & Test	
1.3.4.2.1.5.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical / rigging portions of this platform.
1.3.4.2.1.5.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.1.6	C	Cabling	
1.3.4.2.1.6.1	W	Cable Procure and Install	This task includes all material, build labor, inspection labor and test labor to procure, construct, install, inspect and test the cable extension from RSN to this site.
1.3.4.2.1.6.2	W	Medium Voltage Node	This task includes all material, build labor, inspection labor and test labor to procure, construct, install, inspect and test the medium voltage node NP3 on the extension from RSN to this site.
1.3.4.2.1.6.3	W	Low Voltage Node	This task includes all material, build labor, inspection labor and test labor to procure, construct and test the Low Voltage Node for this site. LV Node is assumed to be installed with the site rather than with the RSN equipment.

WBS	Element Type	Element Name	Definition
1.3.4.2.1.7	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.2.1.8	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.2.1.9	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.2.2	S	OR 25m	
1.3.4.2.2.1	C	OR 25m Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.
1.3.4.2.2.2	C	OR 25m Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.2.2.3	C	Near Shore Mooring Procure, Build, Inspect & Test	
1.3.4.2.2.3.1	W	Electrical / Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical / rigging portions of this platform.
1.3.4.2.2.3.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.2.3.3	W	MFN Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the MFN for this site.
1.3.4.2.2.3.4	W	DCL Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the DCL(s) for this site.
1.3.4.2.2.4	C	Coastal Winched Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.2.2.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical / rigging portions of this platform.
1.3.4.2.2.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.2.5	C	Benthic Experiment Node Procure, Build, Inspect & Test	

WBS	Element Type	Element Name	Definition
1.3.4.2.2.5.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical / rigging portions of this platform.
1.3.4.2.2.5.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.2.6	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.2.2.7	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.2.2.8	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.2.3	S	OR 500m	
1.3.4.2.3.1	C	OR 500m Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.
1.3.4.2.3.2	C	OR 500m Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.2.3.3	C	Coastal Mooring Procure, Build, Inspect & Test	
1.3.4.2.3.3.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.2.3.3.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.2.3.3.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.
1.3.4.2.3.3.4	W	DCL Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the DCL(s) for this site.
1.3.4.2.3.3.5	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.3.4	C	Cabled Coastal Hybrid Profiler Mooring Procure, Build, Inspect & Test	

WBS	Element Type	Element Name	Definition
1.3.4.2.3.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical / rigging portions of this platform.
1.3.4.2.3.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.3.5	C	Cabled Benthic Experiment Node Procure, Build, Inspect & Test	
1.3.4.2.3.5.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical / rigging portions of this platform.
1.3.4.2.3.5.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.3.6	T	Cabling	This task includes all material, build labor, inspection labor and test labor to procure, construct, install, inspect and test the cable extension and secondary infrastructure from RSN to this site.
1.3.4.2.3.7	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.2.3.8	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.2.3.9	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.2.4	S	WA 80m	
1.3.4.2.4.1	C	WA 80m Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.
1.3.4.2.4.2	C	WA 80m Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.2.4.3	C	Coastal Mooring Procure, Build, Inspect & Test	
1.3.4.2.4.3.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.

WBS	Element Type	Element Name	Definition
1.3.4.2.4.3.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.2.4.3.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.
1.3.4.2.4.3.4	W	DCL Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the DCL(s) for this site.
1.3.4.2.4.3.5	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.4.3.6	W	MFN Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the MFN for this site.
1.3.4.2.4.4	C	Coastal Winched Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.2.4.4.1	W	Electrical /Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical / rigging portions of this platform.
1.3.4.2.4.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.4.5	C	Benthic Experiment Node Procure, Build, Inspect & Test	
1.3.4.2.4.5.1	W	Electrical / Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical / rigging portions of this platform.
1.3.4.2.4.5.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.4.6	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.2.4.7	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.2.4.8	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.2.5	S	WA 25m	

WBS	Element Type	Element Name	Definition
1.3.4.2.5.1	C	WA 25m Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.
1.3.4.2.5.2	C	WA 25m Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.2.5.3	C	Near Shore Mooring Procure, Build, Inspect & Test	
1.3.4.2.5.3.1	W	Electrical / Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical / rigging portions of this platform.
1.3.4.2.5.3.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.5.3.3	W	MFN Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the MFN for this site.
1.3.4.2.5.3.4	W	DCL Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the DCL(s) for this site.
1.3.4.2.5.4	C	Coastal Winched Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.2.5.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical / rigging portions of this platform.
1.3.4.2.5.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.5.5	C	Benthic Experiment Node Procure, Build, Inspect & Test	
1.3.4.2.5.5.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical / rigging portions of this platform.
1.3.4.2.5.5.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.5.6	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.

WBS	Element Type	Element Name	Definition
1.3.4.2.5.7	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.2.5.8	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.2.6	S	OR 150m	
1.3.4.2.6.1	C	OR 150m Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.
1.3.4.2.6.2	C	OR 150m Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.2.6.3	C	Cabled Coastal Winched Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.2.6.3.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical / rigging portions of this platform.
1.3.4.2.6.3.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.6.4	C	Cabled Benthic Experiment Node Procure, Build, Inspect & Test	
1.3.4.2.6.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical / rigging portions of this platform.
1.3.4.2.6.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.2.6.5	C	Cabling	This task includes all material, build labor, inspection labor and test labor to procure, construct, install, inspect and test the cable extension and secondary infrastructure from RSN to this site.
1.3.4.2.6.6	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.2.6.7	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.

WBS	Element Type	Element Name	Definition
1.3.4.2.6.8	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.2.7	S	WA 150m	
1.3.4.2.7.1	C	WA 150m Site Survey	
1.3.4.2.7.2	C	WA 150m Site Design	
1.3.4.2.7.3	C	Procure, Build, Inspect & Test	
1.3.4.2.7.3.1	W	Electrical Build	
1.3.4.2.7.3.2	W	Mechanical Build	
1.3.4.2.7.3.3	W	Rigging Shop	
1.3.4.2.7.3.4	W	Sensors	
1.3.4.2.7.4	C	Pre-Installation Integration Test	
1.3.4.2.7.5	C	Installation and Test	
1.3.4.2.7.6	C	Commissioning & Acceptance	
1.3.4.2.8	S	Gliders	
1.3.4.2.8.1	C	Glider Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control / mechanical portions of this platform. This includes the SENSORS.
1.3.4.2.8.2	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.2.8.3	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.2.8.4	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.2.9	S	PNW Material to Support Turns	
1.3.4.2.9.1	C	PNW Material Support to Turns Design	This task includes all labor to define, document, review and approve an equipment plan to support the Operational use of the system over long periods. This equipment is used to replace deployed equipment returned to shore for refurbishment.
1.3.4.2.9.2	C	Coastal Mooring Procure, Build, Inspect & Test	
1.3.4.2.9.2.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.2.9.2.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.2.9.2.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.

WBS	Element Type	Element Name	Definition
1.3.4.2.9.2.4	W	DCL Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the DCLs for this site.
1.3.4.2.9.2.5	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform.
1.3.4.2.9.3	C	Coastal Winched Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.2.9.3.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.2.9.3.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform.
1.3.4.2.9.4	C	Benthic Experiment Node Procure, Build, Inspect & Test	
1.3.4.2.9.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.2.9.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform.
1.3.4.2.9.5	C	Cabled Benthic Experiment Node Procure, Build, Inspect & Test	
1.3.4.2.9.5.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.2.9.5.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform.
1.3.4.2.9.6	C	Gliders	
1.3.4.3	S	Pioneer Array	
1.3.4.3.1	S	P1 - Central EM/MFN with winched profiler (150 m)	
1.3.4.3.1.1	C	P1 Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.
1.3.4.3.1.2	C	P1 Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.3.1.3	C	Coastal Mooring, MFN Procure, Build, Inspect & Test	
1.3.4.3.1.3.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.

WBS	Element Type	Element Name	Definition
1.3.4.3.1.3.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.3.1.3.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.
1.3.4.3.1.3.4	W	MFN Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the MFN for this site.
1.3.4.3.1.3.5	W	DCL Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the DCL(s) for this site.
1.3.4.3.1.3.6	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.3.1.4	C	Coastal Winched Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.3.1.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.3.1.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.3.1.5	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.3.1.6	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.3.1.7	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.3.2	S	P2 - Upstream EM/MFN with winched profiler (150 m)	
1.3.4.3.2.1	C	P2 Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.
1.3.4.3.2.2	C	P2 Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.3.2.3	C	Coastal Mooring, MFN Procure, Build, Inspect & Test	

WBS	Element Type	Element Name	Definition
1.3.4.3.2.3.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform. Includes EOM cable build.
1.3.4.3.2.3.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform. Includes accommodation for EOM cable.
1.3.4.3.2.3.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.
1.3.4.3.2.3.4	W	MFN Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the MFN for this site.
1.3.4.3.2.3.5	W	DCL Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the DCL(s) for this site.
1.3.4.3.2.3.6	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.3.2.4	C	Coastal Winched Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.3.2.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.3.2.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.3.2.5	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.3.2.6	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.3.2.7	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.3.3	S	P3 - Inshore EM/Dock with winched profiler (120 m)	
1.3.4.3.3.1	C	P3 Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.

WBS	Element Type	Element Name	Definition
1.3.4.3.3.2	C	P3 Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.3.3.3	C	Coastal Mooring Procure, Build, Inspect & Test	
1.3.4.3.3.3.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.3.3.3.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.3.3.3.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.
1.3.4.3.3.3.4	W	MFN Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the MFN for this site.
1.3.4.3.3.3.5	W	DCL Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the DCL(s) for this site.
1.3.4.3.3.3.6	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.3.3.4	C	Coastal Winched Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.3.3.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.3.3.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.3.3.5	C	Dock Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the AUV dock.
1.3.4.3.3.6	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.3.3.7	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.3.3.8	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.

WBS	Element Type	Element Name	Definition
1.3.4.3.4	S	P4 - Offshore EM/Dock with winched profiler (800 m)	
1.3.4.3.4.1	C	P4 Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.
1.3.4.3.4.2	C	P4 Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.3.4.3	C	Coastal Mooring Procure, Build, Inspect & Test	
1.3.4.3.4.3.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.3.4.3.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.3.4.3.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.
1.3.4.3.4.3.4	W	MFN Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the MFN for this site.
1.3.4.3.4.3.5	W	DCL Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the DCL(s) for this site.
1.3.4.3.4.3.6	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.3.4.4	C	Coastal Winched Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.3.4.4.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.3.4.4.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.3.4.5	C	Dock Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the AUV dock.
1.3.4.3.4.6	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.

WBS	Element Type	Element Name	Definition
1.3.4.3.4.7	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.3.4.8	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.3.5	S	Coastal Profiler Moorings	
1.3.4.3.5.1	C	Site Survey	This task includes all effort and expense associated with surveying or otherwise obtaining site-specific data to enable modeling of conditions for design inputs.
1.3.4.3.5.2	C	Site Design	This task includes all effort to document the equipment assembly and site organization. It includes effort associated with the design review to assess maturity for implementation.
1.3.4.3.5.3	C	Coastal Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.3.5.3.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.3.5.3.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.3.5.3.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.
1.3.4.3.5.3.4	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform. Sensors include spares appropriate to the platform in sufficient quantities to support the project through Commissioning.
1.3.4.3.5.4	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.3.5.5	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.3.5.6	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.3.6	S	Gliders	
1.3.4.3.6.1	C	Glider Procure, Build, Inspect & Test	This task includes procurement of full-up gliders for use at this site.

WBS	Element Type	Element Name	Definition
1.3.4.3.6.2	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.3.6.3	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.3.6.4	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.3.7	S	AUV	
1.3.4.3.7.1	C	AUV Procure, Build, Inspect & Test	This task includes procurement of full-up AUVs for use at this site.
1.3.4.3.7.2	C	Pre-Installation Integration Test	This task includes labor and materials / equipment necessary for pre-installation integration tests (burn-in) in accordance with the approved test plan. Testing will confirm extended CGSN equipment functionality and interface integrity with the CI equipment.
1.3.4.3.7.3	C	Installation and Test	This task includes all labor and materials / equipment necessary for installation and installation testing of the site in accordance with the approved installation and installation test plans. Ship time, mobilization and demobilization time and fees are included.
1.3.4.3.7.4	C	Commissioning & Acceptance	This task includes all labor associated with commissioning and acceptance of the equipment at the site. It includes documentation of known deficiencies at installation and resolution plans.
1.3.4.3.8	S	Pioneer Material to Support Turns	
1.3.4.3.8.1	C	Pioneer Material Support to Turns Design	This task includes all labor to define, document, review and approve an equipment plan to support the Operational use of the system over long periods. This equipment is used to replace deployed equipment returned to shore for refurbishment.
1.3.4.3.8.2	C	Coastal Mooring Procure, Build, Inspect & Test	
1.3.4.3.8.2.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.3.8.2.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.3.8.2.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.
1.3.4.3.8.2.4	W	MFN Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the MFN for this site.

WBS	Element Type	Element Name	Definition
1.3.4.3.8.2.5	W	DCL Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the DCL(s) for this site.
1.3.4.3.8.2.6	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform.
1.3.4.3.8.3	C	Coastal Winched Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.3.8.3.1	W	Procure, Build, Inspect & Test	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration, mooring control, mechanical and rigging portions of this platform.
1.3.4.3.8.3.2	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform.
1.3.4.3.8.4	C	Coastal Profiler Mooring Procure, Build, Inspect & Test	
1.3.4.3.8.4.1	W	Electrical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the power, satellite and acoustic telemetry (Iridium, C-band, KU band, WiFi, and/or acoustic), instrument integration and mooring control portions of this platform.
1.3.4.3.8.4.2	W	Mechanical Build	This task includes all material, build labor, inspection labor and test labor to procure, construct, inspect and test the mechanical portions of this platform.
1.3.4.3.8.4.3	W	Rigging Shop	This task includes all rigging shop material and labor to procure, construct, inspect and test the rigging portions of the platform.
1.3.4.3.8.4.4	W	Sensors	This task includes all sensor material and labor to procure, inspect and test the sensors for this platform.
1.3.4.3.8.5	C	AUV	
1.3.4.3.8.6	C	Gliders	
1.3.4.4	S	Shore Station	
1.3.4.4.1	C	Procure, Build, Inspect & Test	
1.3.4.4.1.1	W	Computing and Communications Centers	This task includes all material and labor to procure, construct and test the Computing and Communications systems at the Shore Station.
1.3.4.4.1.2	W	Operations Centers	This task includes all material and labor to procure equipment and construct the Operations Center.
1.3.4.4.1.3	W	Scientific Data Management Systems	This task includes all material and labor to implement and test the scientific data management systems to meet defined requirements.
1.3.4.4.2	C	Integration	This task includes costs associated with testing of the shore facility to ensure compatibility with other OOI components.
1.3.4.4.3	C	Acceptance	This task includes the costs associated with acceptance of the Shore Station.

WBS	Element Type	Element Name	Definition
1	S	OOI	
1.4	S	Regional Scale Observatory	This summary account captures all of the MREFC work assigned to the RSN Implementing Organization.
1.4.1	S	Project Management	This summary account captures the project management and permitting effort for the RSN IO.
1.4.1.1	C	2008 Project Management and Support	This cost account is a level of effort account to capture the labor, travel, and materials associated with project management, project controls, science outreach, science education, and related UW support for the RSN during the 2008 calendar year of the RSN project.
1.4.1.1.1	W	Project management and controls	This work package is a level of effort for the labor, travel, and materials associated with UW's project management and controls for the RSN during the 2008 calendar year.
1.4.1.1.2	W	Science Outreach and Education	This work package is a level of effort for the labor, travel, and materials associated with UW's project scientists and their science outreach and education efforts on behalf of the RSN during the 2008 calendar year.
1.4.1.2	C	2009 Project Management and Support	This cost account is a level of effort account to capture the labor, travel, and materials associated with project management, project controls, science outreach, science education, and related UW support for the RSN during the 2009 calendar year of the RSN project.
1.4.1.2.1	W	Project management and controls	This work package is a level of effort for the labor, travel, and materials associated with UW's project management and controls for the RSN during the 2009 calendar year.
1.4.1.2.2	W	Science Outreach and Education	This work package is a level of effort for the labor, travel, and materials associated with UW's project scientists and their science outreach and education efforts on behalf of the RSN during the 2009 calendar year.
1.4.1.3	C	2010 Support	This cost account is a level of effort account to capture the labor, travel, and materials associated with project management, project controls, science outreach, science education, and related UW support for the RSN during the 2010 calendar year of the RSN project.
1.4.1.3.1	W	Project management and controls	This work package is a level of effort for the labor, travel, and materials associated with UW's project management and controls for the RSN during the 2010 calendar year.
1.4.1.3.2	W	Science Outreach and Education	This work package is a level of effort for the labor, travel, and materials associated with UW's project scientists and their science outreach and education efforts on behalf of the RSN during the 2010 calendar year.
1.4.1.4	C	2011 Support	This cost account is a level of effort account to capture the labor, travel, and materials associated with project management, project controls, science outreach, science education, and related UW support for the RSN during the 2011 calendar year of the RSN project.
1.4.1.4.1	W	Project management and controls	This work package is a level of effort for the labor, travel, and materials associated with UW's project management and controls for the RSN during the 2011 calendar year.
1.4.1.4.2	W	Science Outreach and Education	This work package is a level of effort for the labor, travel, and materials associated with UW's project scientists and their science outreach and education efforts on behalf of the RSN during the 2011 calendar year.

WBS	Element Type	Element Name	Definition
1.4.1.5	C	2012 Support	This cost account is a level of effort account to capture the labor, travel, and materials associated with project management, project controls, science outreach, science education, and related UW support for the RSN during the 2012 calendar year of the RSN project.
1.4.1.5.1	W	Project management and controls	This work package is a level of effort for the labor, travel, and materials associated with UW's project management and controls for the RSN during the 2012 calendar year.
1.4.1.5.2	W	Science Outreach and Education	This work package is a level of effort for the labor, travel, and materials associated with UW's project scientists and their science outreach and education efforts on behalf of the RSN during the 2012 calendar year.
1.4.1.6	C	2013 Support	This cost account is a level of effort account to capture the labor, travel, and materials associated with project management, project controls, science outreach, science education, and related UW support for the RSN during the 2013 calendar year of the RSN project.
1.4.1.6.1	W	Project management and controls	This work package is a level of effort for the labor, travel, and materials associated with UW's project management and controls for the RSN during the 2013 calendar year.
1.4.1.6.2	W	Science Outreach and Education	This work package is a level of effort for the labor, travel, and materials associated with UW's project scientists and their science outreach and education efforts on behalf of the RSN during the 2013 calendar year.
1.4.1.7	C	Permitting Process	This cost account captures the work associated with contracted services to identify the permit list, develop permit strategies and responsibilities, file UW or NSF paperwork, and monitor the permits that must be in place for the RSN.
1.4.1.7.1	W	Permit Acquisition	This work package captures the list of permits and links each of these to subsequent activities that cannot be performed until the permit is in place.
1.4.2	S	Systems Engineering	This summary account captures the systems engineering work for the RSN IO
1.4.2.1	C	2008 SE Management and Support	This cost account is a level of effort account to capture the labor, travel, and materials associated with systems engineering at APL for the RSN during the 2008 calendar year of the RSN project.
1.4.2.1.1	W	Systems Engineering Oversight / Support	This work package is a level of effort for the labor, travel, and materials associated with systems engineering oversight and support at APL for the RSN during the 2008 calendar year.
1.4.2.1.2	W	Requirements Management	This work package is a level of effort for the labor, travel, and materials associated with RSN requirements management at APL during the 2008 calendar year.
1.4.2.1.3	W	Integration and Test Planning	This work package is a level of effort for the labor, travel, and materials associated with RSN integration and test planning at APL during the 2008 calendar year.
1.4.2.1.4	W	Interface Agreements	This work package is a level of effort for the labor, travel, and materials associated with negotiating and writing interface agreements between the RSN and the other IOs during the 2008 calendar year.
1.4.2.2	C	2009 SE Management and Support	This cost account is a level of effort account to capture the labor, travel, and materials associated with systems engineering at APL for the RSN during the 2009 calendar year of the RSN project.

WBS	Element Type	Element Name	Definition
1.4.2.2.1	W	Systems Engineering Oversight / Support	This work package is a level of effort for the labor, travel, and materials associated with systems engineering oversight and support at APL for the RSN during the 2009 calendar year.
1.4.2.2.2	W	Requirements Management	This work package is a level of effort for the labor, travel, and materials associated with RSN requirements management at APL during the 2009 calendar year.
1.4.2.2.3	W	Integration and Test Planning	This work package is a level of effort for the labor, travel, and materials associated with RSN integration and test planning at APL during the 2009 calendar year.
1.4.2.2.4	W	Interface Agreements	This work package is a level of effort for the labor, travel, and materials associated with negotiating and writing interface agreements between the RSN and the other IOs during the 2009 calendar year.
1.4.2.3	C	2010 SE Support	This cost account is a level of effort account to capture the labor, travel, and materials associated with systems engineering at APL for the RSN during the 2010 calendar year of the RSN project.
1.4.2.3.1	W	Systems Engineering Oversight / Support	This work package is a level of effort for the labor, travel, and materials associated with systems engineering oversight and support at APL for the RSN during the 2010 calendar year.
1.4.2.3.2	W	Requirements Management	This work package is a level of effort for the labor, travel, and materials associated with RSN requirements management at APL during the 2010 calendar year.
1.4.2.3.3	W	Integration and Test Planning	This work package is a level of effort for the labor, travel, and materials associated with RSN integration and test planning at APL during the 2010 calendar year.
1.4.2.3.4	W	Interface Agreements	This work package is a level of effort for the labor, travel, and materials associated with negotiating and writing interface agreements between the RSN and the other IOs during the 2010 calendar year.
1.4.2.4	C	2011 SE Support	This cost account is a level of effort account to capture the labor, travel, and materials associated with systems engineering at APL for the RSN during the 2011 calendar year of the RSN project.
1.4.2.4.1	W	Systems Engineering Oversight / Support	This work package is a level of effort for the labor, travel, and materials associated with systems engineering oversight and support at APL for the RSN during the 2011 calendar year.
1.4.2.4.2	W	Requirements Management	This work package is a level of effort for the labor, travel, and materials associated with RSN requirements management at APL during the 2011 calendar year.
1.4.2.4.3	W	Integration and Test Planning	This work package is a level of effort for the labor, travel, and materials associated with RSN integration and test planning at APL during the 2011 calendar year.
1.4.2.4.4	W	Interface Agreements	This work package is a level of effort for the labor, travel, and materials associated with negotiating and writing interface agreements between the RSN and the other IOs during the 2011 calendar year.
1.4.2.5	C	2012 SE Support	This cost account is a level of effort account to capture the labor, travel, and materials associated with systems engineering at APL for the RSN during the 2012 calendar year of the RSN project.
1.4.2.5.1	W	Systems Engineering Oversight / Support	This work package is a level of effort for the labor, travel, and materials associated with systems engineering oversight and support at APL for the RSN during the 2012 calendar year.
1.4.2.5.2	W	Requirements Management	This work package is a level of effort for the labor, travel, and materials associated with RSN requirements management at APL during the 2012 calendar year.

WBS	Element Type	Element Name	Definition
1.4.2.5.3	W	Integration and Test Planning	This work package is a level of effort for the labor, travel, and materials associated with RSN integration and test planning at APL during the 2012 calendar year.
1.4.2.5.4	W	Interface Agreements	This work package is a level of effort for the labor, travel, and materials associated with negotiating and writing interface agreements between the RSN and the other IOs during the 2012 calendar year.
1.4.2.6	C	2013 SE Support	This cost account is a level of effort account to capture the labor, travel, and materials associated with systems engineering at APL for the RSN during the 2013 calendar year of the RSN project.
1.4.2.6.1	W	Systems Engineering Oversight / Support	This work package is a level of effort for the labor, travel, and materials associated with systems engineering oversight and support at APL for the RSN during the 2013 calendar year.
1.4.2.6.2	W	Requirements Management	This work package is a level of effort for the labor, travel, and materials associated with RSN requirements management at APL during the 2013 calendar year.
1.4.2.6.3	W	Integration and Test Planning	This work package is a level of effort for the labor, travel, and materials associated with RSN integration and test planning at APL during the 2013 calendar year.
1.4.2.6.4	W	Interface Agreements	This work package is a level of effort for the labor, travel, and materials associated with negotiating and writing interface agreements between the RSN and the other IOs during the 2013 calendar year.
1.4.3	S	Subsystem Development	This summary account captures labor, travel, contracts and materials associated with the design, development, and testing for the component (configuration) items needed to build the RSN. These activities will end when each component has been through a production readiness review and first article test.
1.4.3.1	C	Element Management System	This cost account captures the labor, materials, contracts, and travel associated with the design, development, and testing of an element management system for the RSN nodes. This element manager must work in conjunction with both the network management system (NMS) of the wet plant supplier and with the overall OOI Network Management being supplied by the CI IO.
1.4.3.1.1	W	Develop interface with Submarine Wet Plant Supplier Network Management System (NMS)	This work package captures the labor, material, contracts and travel associated with understanding and developing the interface with the wet plant supplier's NMS.
1.4.3.1.2	W	Coding and software module test	This work package captures the labor, material, contracts, and travel associated with developing the element management system software modules at APL.
1.4.3.1.3	W	Integration and check-out	This work package captures the labor, material, contracts, and travel associated with integrating the software modules of the element management system at APL.
1.4.3.1.4	W	Installation and check-out on Submarine wet plant NMS	This work package captures the labor, material, contracts, and travel associated with integrating and testing the element management system from APL with the NMS from the wet plant supplier.
1.4.3.2	C	Primary and Secondary Nodes Development	This cost account captures the labor, materials, contracts, and travel associated with the design, development, and testing of the Primary And Secondary Nodes of the RSN. These nodes are two list numbers of the same basic design.

WBS	Element Type	Element Name	Definition
1.4.3.2.1	W	Preliminary Design	This work package captures the labor, material, contracts, and travel associated with the initial design and testing of the Primary and Secondary Nodes of the RSN up through the Preliminary Design Review.
1.4.3.2.2	W	Final Design and Development	This work package captures the labor, material, contracts, and travel associated with design changes and retesting of the Primary and Secondary Nodes to incorporate the lessons learned in the Preliminary Design stage. This includes the development of a production drawing package and conducting a Qualification Test Readiness Review.
1.4.3.2.3	W	Prototype Assembly Testing	This work package captures the labor, material, contracts, and travel associated with building a small quantity (TBD) of prototypes of the Primary and Secondary Nodes and putting them through a comprehensive qualification program. Qualification test results will be reviewed at a Production Readiness Review.
1.4.3.2.4	W	Production	This work package captures the labor, material, contracts, and travel associated with building and testing the first production Primary and Secondary Nodes. The results of the First Article Test will be reviewed before authorizing production of parts for installation in the OOI Network.
1.4.3.3	C	LV Nodes Development	This cost account captures the labor, materials, contracts, and travel associated with the design, development, and testing of the Low Voltage Nodes of the RSN.
1.4.3.3.1	W	Preliminary Design	This work package captures the labor, material, contracts, and travel associated with the initial design and testing of the Low Voltage Nodes of the RSN up through the Preliminary Design Review.
1.4.3.3.2	W	Final Design and Development	This work package captures the labor, material, contracts, and travel associated with design changes and retesting of the Low Voltage Nodes to incorporate the lessons learned in the Preliminary Design stage. This includes the development of a production drawing package and conducting a Qualification Test Readiness Review.
1.4.3.3.3	W	Assembly Testing	This work package captures the labor, material, contracts, and travel associated with building a small quantity (TBD) of prototypes of the Low Voltage Nodes and putting them through a comprehensive qualification program. Qualification test results will be reviewed at a Production Readiness Review.
1.4.3.3.4	W	Production	This work package captures the labor, material, contracts, and travel associated with building and testing the first production Low Voltage Nodes. The results of the First Article Test will be reviewed before authorizing production of parts for installation in the OOI Network.
1.4.3.4	C	Extension Cables including Cable Terminations Development	This cost account captures the labor, materials, contracts, and travel associated with the design, development, and testing of the Extension Cables, including Cable Terminations to Connector Interface(s) of the RSN.
1.4.3.4.1	W	Preliminary Design	This work package captures the labor, material, contracts, and travel associated with the initial design and testing of the Extension Cables, including Cable Terminations to Connector Interface(s) of the RSN up through the Preliminary Design Review.

WBS	Element Type	Element Name	Definition
1.4.3.4.2	W	Final Design and Development	This work package captures the labor, material, contracts, and travel associated with design changes and retesting of the Extension Cables, including Cable Terminations to Connector Interface(s) to incorporate the lessons learned in the Preliminary Design stage. This includes the development of a production drawing package and conducting a Qualification Test Readiness Review.
1.4.3.4.3	W	Assembly Testing	This work package captures the labor, material, contracts, and travel associated with building a small quantity (TBD) of prototypes of the Extension Cables, including Cable Terminations to Connector Interface(s) and putting them through a comprehensive qualification program. Qualification test results will be reviewed at a Production Readiness Review.
1.4.3.4.4	W	Production	This work package captures the labor, material, contracts, and travel associated with building and testing the first production Extension Cables, including Cable Terminations to Connector Interface(s). The results of the First Article Test will be reviewed before authorizing production of parts for installation in the OOI Network.
1.4.3.5	C	Vertical Moorings Development	This cost account captures the labor, materials, contracts, and travel associated with the design, development, and testing of the Vertical Moorings of the RSN.
1.4.3.5.1	W	Preliminary Design	This work package captures the labor, material, contracts, and travel associated with the initial design and testing of the Vertical Moorings of the RSN up through the Preliminary Design Review.
1.4.3.5.2	W	Final Design and Development	This work package captures the labor, material, contracts, and travel associated with design changes and retesting of the Vertical Moorings to incorporate the lessons learned in the Preliminary Design stage. This includes the development of a production drawing package and conducting a Qualification Test Readiness Review.
1.4.3.5.3	W	Assembly Testing	This work package captures the labor, material, contracts, and travel associated with building a small quantity (TBD) of prototypes of the Vertical Moorings and putting them through a comprehensive qualification program. Qualification test results will be reviewed at a Production Readiness Review.
1.4.3.5.4	W	Production	This work package captures the labor, material, contracts, and travel associated with building and testing the first production Vertical Moorings. The results of the First Article Test will be reviewed before authorizing production of parts for installation in the OOI Network.
1.4.3.6	C	Winch and Profilers Development	This cost account captures the labor, materials, contracts, and travel associated with the design, development, and testing of the Winch and Profilers of the RSN.
1.4.3.6.1	W	Preliminary Design	This work package captures the labor, material, contracts, and travel associated with the initial design and testing of the Winch and Profilers of the RSN up through the Preliminary Design Review.

WBS	Element Type	Element Name	Definition
1.4.3.6.2	W	Final Design and Development	This work package captures the labor, material, contracts, and travel associated with design changes and retesting of the Winch and Profilers to incorporate the lessons learned in the Preliminary Design stage. This includes the development of a production drawing package and conducting a Qualification Test Readiness Review.
1.4.3.6.3	W	Assembly Testing	This work package captures the labor, material, contracts, and travel associated with building a small quantity (TBD) of prototypes of the Winch and Profilers and putting them through a comprehensive qualification program. Qualification test results will be reviewed at a Production Readiness Review.
1.4.3.6.4	W	Production	This work package captures the labor, material, contracts, and travel associated with building and testing the first production Winch and Profilers. The results of the First Article Test will be reviewed before authorizing production of parts for installation in the OOI Network.
1.4.3.7	C	J-Boxes Development	This cost account captures the labor, materials, contracts, and travel associated with the design, development, and testing of the Junction Box of the RSN.
1.4.3.7.1	W	Preliminary Design	This work package captures the labor, material, contracts, and travel associated with the initial design and testing of the Junction Box of the RSN up through the Preliminary Design Review.
1.4.3.7.2	W	Final Design and Development	This work package captures the labor, material, contracts, and travel associated with design changes and retesting of the Junction Box to incorporate the lessons learned in the Preliminary Design stage. This includes the development of a production drawing package and conducting a Qualification Test Readiness Review.
1.4.3.7.3	W	Assembly Testing	This work package captures the labor, material, contracts, and travel associated with building a small quantity (TBD) of prototypes of the Junction Box and putting them through a comprehensive qualification program. Qualification test results will be reviewed at a Production Readiness Review.
1.4.3.7.4	W	Production	This work package captures the labor, material, contracts, and travel associated with building and testing the first production Junction Box. The results of the First Article Test will be reviewed before authorizing production of parts for installation in the OOI Network.
1.4.3.8	C	Shore Station Development	This cost account captures the labor, material, and travel associated with any non-standard store station equipment; for example, a National Security System Interface.
1.4.3.8.1	W	National Security System Interface	This work package captures the labor, material, and travel associated with the design, development, and testing of a National Security System Interface for the US Navy.
1.4.3.9	C	Core Instrument Packages Development	This cost account captures the labor, contracts, and travel associated with the procurement and testing of prototype Core Instrument Packages for the RSN.
1.4.3.9.1	W	HPIES	This work package captures the labor, contracts, and travel associated with the procurement and testing of prototype Current Meters for use on the RSN. Test results will be reviewed prior to authorizing production of parts for installation in the OOI Network.

WBS	Element Type	Element Name	Definition
1.4.3.9.2	W	Bottom Pressure Sensor	This work package captures the labor, contracts, and travel associated with the procurement and testing of prototype Seabottom Pressure Sensor for use on the RSN. Test results will be reviewed prior to authorizing production of parts for installation in the OOI Network.
1.4.3.9.3	W	Hydrophone	This work package captures the labor, contracts, and travel associated with the procurement and testing of prototype Hydrophones for use on the RSN. Test results will be reviewed prior to authorizing production of parts for installation in the OOI Network.
1.4.3.9.4	W	Broadband Seismometer	This work package captures the labor, contracts, and travel associated with the procurement and testing of prototype Broadband Seismometers for use on the RSN. Test results will be reviewed prior to authorizing production of parts for installation in the OOI Network.
1.4.3.9.5	W	Surface Layer Core Instrument	This work package captures the labor, contracts, and travel associated with the procurement and testing of prototype Surface Layer Instrument Package for use on the RSN. Test results will be reviewed prior to authorizing production of parts for installation in the OOI Network.
1.4.3.9.6	W	Mid Level Core Instrument	This work package captures the labor, contracts, and travel associated with the procurement and testing of prototype Mid-Level Instrument Package for use on the RSN. Test results will be reviewed prior to authorizing production of parts for installation in the OOI Network.
1.4.3.9.7	W	Bottom Level Core Instrument	This work package captures the labor, contracts, and travel associated with the procurement and testing of prototype Bottom Layer Instrument Package for use on the RSN. Test results will be reviewed prior to authorizing production of parts for installation in the OOI Network.
1.4.3.9.8	W	Site Specific Core Sensors	This work package captures the labor, contracts and travel associated with the procurement and testing of prototype site specific core sensors for use on the RSN. Test results will be reviewed prior to authorizing production of parts for installation in the OOI Network.
1.4.3.10	C	Logistic Depot Equipment Development	This cost account captures the labor, materials, and travel associated with developing equipment that will be required in the logistics depot; for example, a system simulator for pre-installation testing.
1.4.3.10.1	W	System Simulator for Pre-Installation Testing	This work package captures the labor, materials, and travel associated with developing and testing a system simulator for pre-installation testing of RSN infrastructure and sensors, including future sensors.
1.4.3.10.2	W	WBS Reserved	
1.4.3.10.3	W	WBS Reserved	
1.4.3.10.4	W	WBS Reserved	
1.4.3.10.5	W	WBS Reserved	
1.4.3.10.6	W	WBS Reserved	
1.4.4	S	Implementation	This summary account captures all of the work required to construct and build the RSN from the fully developed components.

WBS	Element Type	Element Name	Definition
1.4.4.1	C	Pacific City Shore Facilities Installation	This cost account captures the labor, materials, contracts, and travel required to lease and prepare the Pacific City cable landing station, to construct the beach landing including conduits, bore pipes and beach manholes, to procure and install the common and specific shore station equipment, and to lease a transmission link back to an Internet POP.
1.4.4.1.1	W	Shore Station	This work package captures the labor, travel, to negotiate a lease agreement to obtain conditioned cable station space for the termination of Segments N1, N2, and N3 of the RSN in Pacific City, Oregon. Any up-front charges to the lease will also be captured in this work package.
1.4.4.1.2	W	Beach Landing	This work package captures the labor, materials, contracts, and travel to construct the beach landing for three segments of the RSN in Pacific City, Oregon. This includes the construction of a beach manhole, directional drilling of borepipes, and installation of conduits between the beach manhole and the cable station.
1.4.4.1.3	W	Shore Station Equipment Procurement	This work package captures the billing milestones related to the shore station equipment including Power Feed Equipment, Terminal Equipment, and Network Management Equipment for Segments N1, N2, and N3 of the RSN from the wet plant supplier's contract.
1.4.4.1.4	W	Leased Link to Internet POP	This work package captures the labor and travel to negotiate an agreement to lease a transmission link from the Pacific City shore station to an agreed Internet POP, presumed to be in Portland.
1.4.4.2	C	Warrenton Oregon Shore Facilities Installation	This cost account captures the labor, materials, contracts, and travel required to lease and prepare the Warrenton cable landing station, to construct the beach landing including conduits, bore pipes and beach manholes, to procure and install the common and specific shore station equipment, and to lease a transmission link back to an Internet POP.
1.4.4.2.1	W	Shore Station	This work package captures the labor, travel, to negotiate a lease agreement to obtain conditioned cable station space for the termination of Segment N4 of the RSN in Warrenton, Oregon. Any up-front charges to the lease will also be captured in this work package.
1.4.4.2.2	W	Beach Landing	This work package captures the labor, materials, contracts, and travel to construct the beach landing for one segment of the RSN in Warrenton, Oregon. This includes the construction of a beach manhole, directional drilling of a borepipe, and installation of conduits between the beach manhole and the cable station.
1.4.4.2.3	W	Shore Station Equipment	This work package captures the billing milestones related to the shore station equipment including Power Feed Equipment, Terminal Equipment, and Network Management Equipment for Segment N4 of the RSN from the Submarine Cable System supplier's contract.
1.4.4.2.4	W	Leased Link to Internet POP	This work package captures the labor and travel to negotiate an agreement to lease a transmission link from the Warrenton shore station to an agreed Internet POP, presumed to be in Portland.
1.4.4.3	C	Submarine Cable System Subcontract Installation	This cost account captures the contract milestones and billing for the non-Segment specific milestones in the Submarine Cable System Subcontract.

WBS	Element Type	Element Name	Definition
1.4.4.3.1	W	Submarine Cable System Subcontract for all segments	This work package captures the contract milestones and billing for the non-Segment specific milestones in the Submarine Cable System Subcontract, up to and including the ready to load milestone for each segment.
1.4.4.4	C	Segment N1 - Hydrate Ridge Site Assembly/ Installation/ Test	This cost account aggregates all of the costs associated with the complete backbone, primary, and secondary infrastructure and testing associated with the construction of Segment N1 of the RSN system.
1.4.4.4.1	W	Site Survey	This work package captures the labor, material, contracts, and travel associated with surveying the seabed in the immediate area of Hydrate Ridge to support the placement of Node 1 and the associated secondary infrastructure.
1.4.4.4.2	W	Site Design (Layout) Customization Specs for Hardware) (Cable Length_ SIMS)	This work package captures the labor, material, and travel associated with analyzing the site survey results to accurately determine the placement of the primary node, secondary infrastructure and sensors at Hydrate Ridge.
1.4.4.4.3	W	Primary Node 1 - Hydrate Ridge	This work package captures the labor, material, and travel associated with constructing and testing one Primary Node 1 for Hydrate Ridge.
1.4.4.4.4	W	Secondary Nodes (2) 1A and 1B - Hydrate Ridge	This work package captures the labor, material, and travel associated with constructing and testing two Secondary Nodes for Hydrate Ridge.
1.4.4.4.5	W	LV Nodes (2) 1A and 1B- Hydrate Ridge	The work package captures the labor, material, and travel associated with constructing and testing four low voltage nodes for placement at Hydrate Ridge.
1.4.4.4.6	W	Seafloor J-Box 1A- Hydrate Ridge	The work package captures the labor, material, and travel associated with constructing and testing three seafloor junction box for placement at Hydrate Ridge.
1.4.4.4.7	W	WBS Reserved	
1.4.4.4.8	W	Sensors- Mooring, Hydrate Ridge	The work package captures the labor, material, and travel associated with procuring and testing core sensors for placement on the Vertical Mooring at Hydrate Ridge.
1.4.4.4.9	W	Extension Cables	The work package captures the labor, material, and travel associated with constructing and testing all of the extension cables with their connectors for Hydrate Ridge.
1.4.4.4.10	W	Vertical Mooring 1- Hydrate Ridge	The work package captures the labor, material, and travel associated with constructing and testing a vertical mooring for placement at Hydrate Ridge.
1.4.4.4.11	W	Sensors- Bottom, Hydrate Ridge	The work package captures the labor, material, and travel associated with procuring and testing core sensors for placement at Hydrate Ridge.
1.4.4.4.12	W	Pre-Installation Integration and Test - Hydrate Ridge	This work package captures the labor, material, and travel associated with assembling and testing a fully integrated Hydrate Ridge node in a dry environment.
1.4.4.4.13	W	Primary Backbone Installation - Hydrate Ridge Site	This work package captures the submarine system supplier billing schedule and milestones for the installation and commissioning of the Segment N1 of the RSN, including any secondary infrastructure that is incorporated into the submarine system subcontract.

WBS	Element Type	Element Name	Definition
1.4.4.4.14	W	Secondary Infrastructure Installation - Hydrate Ridge Site	This work package captures the labor, materials, contracts, ship and ROV time, and travel associated with the installation of the secondary infrastructure at the Hydrate Ridge Site. It does not include the installation of the Newport coastal line at this juncture.
1.4.4.4.15	W	Commissioning - Hydrate Ridge Site	This work package captures the labor, materials, contracts, and travel required to commission the secondary infrastructure and sensors at the Hydrate Ridge Site.
1.4.4.5	C	Segment N2 - Blanco Site Assembly/ Installation/ Test	This cost account aggregates all of the costs associated with the complete backbone, primary, and secondary infrastructure and testing associated with the construction of Segment N2 of the RSN system.
1.4.4.5.1	W	Site Survey	This work package captures the labor, material, contracts, and travel associated with surveying the seabed in the immediate area of Blanco to support the placement of Node 2 and the associated secondary infrastructure.
1.4.4.5.2	W	Site Design (Layout)	This work package captures the labor, material, and travel associated with analyzing the site survey results to accurately determine the placement of the primary node, secondary infrastructure and sensors at Blanco.
1.4.4.5.3	W	Primary Node 2 - Blanco Site	This work package captures the labor, material, and travel associated with constructing and testing one Primary Node 2 for Blanco.
1.4.4.5.4	W	LV Nodes (2) 2A and 2B - Blanco Site	The work package captures the labor, material, and travel associated with constructing and testing two low voltage nodes for placement at Blanco.
1.4.4.5.5	W	J-Box (9) 2A thru 2I - Blanco Site	The work package captures the labor, material, and travel associated with constructing and testing nine seafloor junction boxes for placement at Blanco.
1.4.4.5.6	W	WBS Reserved	
1.4.4.5.7	W	WBS Reserved	
1.4.4.5.8	W	Extension Cables	The work package captures the labor, material, and travel associated with constructing and testing all of the extension cables with their connectors for Blanco.
1.4.4.5.9	W	WBS Reserved	
1.4.4.5.10	W	Sensors - Bottom, Blanco Site	The work package captures the labor, material, and travel associated with procuring and testing core sensors for placement at Blanco.
1.4.4.5.11	W	Pre-Installation Integration and Test - Blanco	This work package captures the labor, material, and travel associated with assembling and testing a fully integrated Blanco node in a dry environment.
1.4.4.5.12	W	Primary Backbone Installation - Blanco	This work package captures the submarine system supplier billing schedule and milestones for the installation and commissioning of the Segment N2 of the RSN, including any secondary infrastructure that is incorporated into the submarine system subcontract.
1.4.4.5.13	W	Secondary Infrastructure Installation - Blanco	This work package captures the labor, materials, contracts, ship and ROV time, and travel associated with the installation of the secondary infrastructure at the Blanco Site.
1.4.4.5.14	W	Commissioning - Blanco	This work package captures the labor, materials, contracts, and travel required to commission the secondary infrastructure and sensors at the Blanco Site.

WBS	Element Type	Element Name	Definition
1.4.4.6	C	Segment N3 - Axial/ Midplate Sites Assembly/ Installation/ Test	This cost account aggregates all of the costs associated with the complete backbone, primary, and secondary infrastructure and testing associated with the construction of Segment N3 of the RSN system.
1.4.4.6.1	W	Site Survey	This work package captures the labor, material, contracts, and travel associated with surveying the seabed in the immediate area of Axial and Midplate to support the placement of Node 3, Node 5, and their associated secondary infrastructure.
1.4.4.6.2	W	Site Design (Layout)	This work package captures the labor, material, and travel associated with analyzing the site survey results to accurately determine the placement of the primary node, secondary infrastructure and sensors at Axial and Midplate.
1.4.4.6.3	W	Primary Node 3 Axial	This work package captures the labor, material, and travel associated with constructing and testing one Primary Node 3 for Axial.
1.4.4.6.4	W	Primary Node 5 Midplate	This work package captures the labor, material, and travel associated with constructing and testing one Primary Node 5 for Midplate; this Node also contains the regenerative function for Segment N3.
1.4.4.6.5	W	Secondary Node 3A Axial	This work package captures the labor, material, and travel associated with constructing and testing a Secondary Nodes for Axial.
1.4.4.6.6	W	WBS Reserved	
1.4.4.6.7	W	LV Nodes (7) 3A through 3G - Axial	The work package captures the labor, material, and travel associated with constructing and testing seven low voltage nodes for placement at Axial.
1.4.4.6.8	W	LV Nodes (7) 5A through 5G - Midplate	The work package captures the labor, material, and travel associated with constructing and testing two low voltage nodes for placement at Midplate.
1.4.4.6.9	W	J-Box (6) 3A through 3F - Axial	The work package captures the labor, material, and travel associated with constructing and testing six seafloor junction box for placement at Axial.
1.4.4.6.10	W	WBS Reserved	
1.4.4.6.11	W	Bottom J-Box 3 - Axial	The work package captures the labor, material, and travel associated with constructing and testing a seafloor junction box for placement at MidPlate.
1.4.4.6.12	W	WBS Reserved	
1.4.4.6.13	W	WBS Reserved	
1.4.4.6.14	W	Sensors - Mooring, Axial	The work package captures the labor, material, and travel associated with procuring and testing core sensors for placement on the Vertical Mooring at Axial.
1.4.4.6.15	W	Extension Cables Node 3	The work package captures the labor, material, and travel associated with constructing and testing all of the extension cables with their connectors for Axial.
1.4.4.6.16	W	Vertical Mooring 3 Axial	The work package captures the labor, material, and travel associated with constructing and testing a vertical mooring for placement at Axial.
1.4.4.6.17	W	Extension Cables Node 5	The work package captures the labor, material, and travel associated with constructing and testing all of the extension cables with their connectors for Midplate.
1.4.4.6.18	W	Sensors - Bottom, Axial	The work package captures the labor, material, and travel associated with procuring and testing core sensors for placement at Axial.

WBS	Element Type	Element Name	Definition
1.4.4.6.19	W	Sensors - Bottom, Midplate	The work package captures the labor, material, and travel associated with procuring and testing core sensors for placement at Midplate.
1.4.4.6.20	W	Pre-Installation Integration and Test - Axial	This work package captures the labor, material, and travel associated with assembling and testing a fully integrated Axial node in a dry environment.
1.4.4.6.21	W	Pre-Installation Integration and Test - Midplate	This work package captures the labor, material, and travel associated with assembling and testing a fully integrated Midplate node in a dry environment.
1.4.4.6.22	W	Primary Backbone Installation - Axial/Midplate	This work package captures the submarine system supplier billing schedule and milestones for the installation and commissioning of the Segment N3 of the RSN, including any secondary infrastructure that is incorporated into the submarine system subcontract.
1.4.4.6.23	W	Secondary Infrastructure Installation - Axial	This work package captures the labor, materials, contracts, ship and ROV time, and travel associated with the installation of the secondary infrastructure at the Axial Site.
1.4.4.6.24	W	Secondary Infrastructure Installation - Midplate	This work package captures the labor, materials, contracts, ship and ROV time, and travel associated with the installation of the secondary infrastructure at the Midplate Site.
1.4.4.6.25	W	Commissioning Axial/Midplate	This work package captures the labor, materials, contracts, and travel required to commission the secondary infrastructure and sensors at the Axial and Midplate Sites.
1.4.4.7	C	Segment N4 - Subduction Zone Site Assembly/ Installation/ Test	This cost account aggregates all of the costs associated with the complete backbone, primary, and secondary infrastructure and testing associated with the construction of Segment N4 of the RSN system.
1.4.4.7.1	W	Site Survey	This work package captures the labor, material, contracts, and travel associated with surveying the seabed in the immediate area of Subduction Zone to support the placement of Node 4 and the associated secondary infrastructure.
1.4.4.7.2	W	Site Design (Layout)	This work package captures the labor, material, and travel associated with analyzing the site survey results to accurately determine the placement of the primary node, secondary infrastructure and sensors at Subduction Zone.
1.4.4.7.3	W	Primary Node 4 - Subduction Zone	This work package captures the labor, material, and travel associated with constructing and testing one Primary Node 4 for Subduction Zone.
1.4.4.7.4	W	WBS Reserved	
1.4.4.7.5	W	LV Nodes (3) 4A, 4B, 4C - Subduction Zone	The work package captures the labor, material, and travel associated with constructing and testing three low voltage nodes for placement at Subduction Zone.
1.4.4.7.6	W	J-Box (2) 4A and 4B - Subduction Zone	The work package captures the labor, material, and travel associated with constructing and testing a seafloor junction box for placement at Subduction Zone.
1.4.4.7.7	W	WBS Reserved	
1.4.4.7.8	W	WBS Reserved	
1.4.4.7.9	W	Extension Cables - Subduction Zone	The work package captures the labor, material, and travel associated with constructing and testing all of the extension cables with their connectors for Subduction Zone.
1.4.4.7.10	W	WBS Reserved	

WBS	Element Type	Element Name	Definition
1.4.4.7.11	W	Sensors - Bottom, Subduction Zone	The work package captures the labor, material, and travel associated with procuring and testing core sensors for placement at Subduction Zone.
1.4.4.7.12	W	Pre-Installation Integration and Test - Subduction Zone	This work package captures the labor, material, and travel associated with assembling and testing a fully integrated Subduction Zone node in a dry environment.
1.4.4.7.13	W	Primary Backbone Installation - Subduction Zone	This work package captures the submarine system supplier billing schedule and milestones for the installation and commissioning of the Segment N4 of the RSN, including any secondary infrastructure that is incorporated into the submarine system subcontract.
1.4.4.7.14	W	Secondary Infrastructure Installation - Subduction Zone	This work package captures the labor, materials, contracts, ship and ROV time, and travel associated with the installation of the secondary infrastructure at the Subduction Zone Site.
1.4.4.7.15	W	Commissioning	This work package captures the labor, materials, contracts, and travel required to commission the secondary infrastructure and sensors at the Subduction Zone Site.
1.4.4.8	C	Logistics Depot	This cost account captures the labor, materials, contracts, and travel required to construct the various facilities needed to construct and maintain the RSN, including staging facilities, a depot for spare parts, a repair facility, a calibration facility, and a test facility.
1.4.4.8.1	W	Staging Facility	This work package captures the labor, materials, contracts, and travel associated with development and construction of a staging facility for the RSN Nodes.
1.4.4.8.2	W	Spare Parts Depot	This work package captures the labor, materials, contracts, and travel associated with development and construction of a depot for spare parts for the RSN.
1.4.4.8.3	W	Repair Facility	This work package captures the labor, materials, contracts, and travel associated with development and construction of a repair facility for the RSN Infrastructure and sensors.
1.4.4.8.4	W	Calibration Facility	This work package captures the labor, materials, contracts, and travel associated with development and construction of a calibration facility for the RSN sensors and instruments.
1.4.4.8.5	W	Test Facility	This work package captures the labor, materials, contracts, and travel associated with development and construction of a test facility for the RSN.