OOI 2.0 CI and Data Delivery Update

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Agenda

- CI achievements since last OOIFB meeting
- System availability
- Redmine ticket metrics
- Analysis of alternatives
- CI PYII work plan
- Cyber security
- System architecture graphic
- Organization
- Change management process overview
- Data usage management
- Management dashboard
- Collaborations



OOI 2.0 CI achievements since last OOIFB meeting

- Quality
 - QC proof of concept for gross range test
 - Adoption/implementation of QARTOD code set
 - Migration of ADCP bin depth fix
- Stability
 - Email of ingestion start, completion and error
 - Implementation of Nagios monitoring software
 - Implementation of Grafana system metrics tracking
 - Build-out of UAT system as mirror of production typography
- Data
 - Add time range filter to ingest process (data replay)



OOI 2.0 CI achievements since last OOIFB

- Metrics
 - Number of ingestions or data requests in queue
 - Number of particles (i.e. lines of data) entering the system on a 30 second interval
 - Tracking of Data Portal requests, actual time to service and size
 - Tracking of synchronous data requests
 - Tableau Beta
 - Redmine ticket metrics
 - Data request trending (Alpha)
- User Experience
 - M2M curl and Python examples posted on plotting page
 - Changed default plot style, time range and preferred timestamp



PY1 CI Availability 99.999%

(99.94% considering scheduled downtime)

- System and network utilization requirements have been exceeded.
- High percentage of uptime due to design and management best-practices.
- System utilization ~20 % -Right-sized for anticipated future growth.





PY1 CPU usage for Apache Cassandra and uFrame



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OOI 2.0 Open Ticket Trend by Month

2.0 Number Open at End of Month



28% fewer tickets at close of PYI

Open as of Date Month vs. # Tickets Open. The data is filtered on Open as of Date, which includes dates on or after 9/29/2018.



OOI 2.0 Redmine Ticket Breakdown



OOI 2.0 Number Closed vs Created over Month by Ticket Type

- Bulk of the work is Enhancement, Bug and Support
- Many tickets represent user feed back
- Support represents the operational burden of the team
- Closed tickets start to outpace Open tickets as PYI progresses



OOI 2.0 Analysis of Alternatives - Process

- Process: started 1/19 and completed 6/19
 - Evaluation team: 1 voting member from each IO, PMO; DDCI representation
 - Set scope, goals, roles, evaluation criteria and procedures socialize with program Stakeholders
 - Built list of alternatives (including OOI CI) and research
 - Researched alternatives produced short list
 - Determined list of alternatives to formally evaluate
- Statistics
 - 34 vendors, technologies and reference resources researched
 - 6 measured by evaluation matrix
 - 7 determined not appropriate for replacement but good technologies to watch for future integration
 - 17 determined to not be a fit
 - 3 have a neutral status



OOI 2.0 Analysis of Alternatives - Findings

Report 2100-10011_AoA_Recommendations_2019-06-06_ver_1-00 released as controlled document by the OOI Control Change Board.

- 1. The current CI applications and architecture as they exist today are fixable. A full replacement is not required to achieve the OOI program's mission.
- 2. The areas most in need of attention in the current CI system are user experience (UX), Asset Management and Quality Assurance/Quality Control (QA/QC).
- 3. There are very few existing end-to-end oceanographic data collection systems available that can come close to delivering 100% of the OOI requirements. Concentrating on an incremental, component by component "best of breed" approach, emulating, not re-inventing solutions would be more time and cost effective.
- 4. In order to deliver a more modern interface and meet users' needs for versioned data, OOI will need to move towards providing a pre-processed data source. This can be achieved with a hybrid model where calculate-on-demand is still available for those users who need it, but is not the primary means of data dissemination.
- 5. UX is the area most impactful to the end user and perception of the program, and arguably the area needing most improvement.



OOI 2.0 Analysis of Alternatives - Recommendations It is the recommendation of this AoA panel that *the current CI architecture is fixable and that it should be replaced only in part*.

- ✓ Engage Axiom Data Science to re-architect the Data Portal UX- POC in PYI (Sep 2019), Project start PYII (Oct 2019)
- ✓ Develop the Roundabout asset tracking solution into a full asset management application utilizing WHOI IS, internal and Axiom developers – Project start PYII (Oct 2019)
- ✓ Continue with current QA/QC plan to improve the understanding of OOI data quality and leverage QARTOD standards and community – Project start PYI (Jan 2019)



OOI 2.0 CI PY II Work Plan

- Apply 2,200 hours to prioritized mission critical enhancements and bugs from the PI/PS reviewed ticket list to include:
 - Continue from PYI priorities
 - Fill values (analysis from 1.0)
 - Annotation indicators
 - Data Management be able to maintain database entries more flexibly
 - Digital Object Identifier (DOI) on raw data
 - Instrument centric approach on ticket resolution of bugs, enhancements and data (e.g. ADCP, PCO2, HYDBB, etc...)
- Analysis of Alternatives recommended projects
 - Engage Axiom Data Science to re-architect the Data Portal and implement user experience improvements
 - Develop the Roundabout asset tracking solution into a full asset management application
 - QA/QC continue implementing QARTOD logic and communicating QC results (dashboard)
- OOI CI Software stack upgrade
- Infrastructure
 - Disaster recovery planning
 - Implement Two Factor authentication
 - Technology refresh plan
 - Storage upgrades as needed
- Support hours helping users, issue resolution, non-scheduled work, tasks not classified as bugs or enhancements.



OOI 2.0 Cyber Security Plan

- Engaged Praetorian Group to assess current OOI Cybersecurity, perform a penetration test and an analysis of current security policies (September 2019)
- Plan going forward:
 - ✓ Address analysis findings through UI code changes (PYII)
 - ✓ Implement recommendation of software based security assessment on continuous integration (2nd QTR PYII)
 - ✓ Update policy document incorporating Praetorian feedback and reflecting current technology environment (2nd QTR PYII)
 - ✓ Research and implement developer training (PYII)
 - ✓ Plan next third party analysis of environment (PYIII)
 - ✓ Schedule regular testing of security policy (PYII)



OOI 2.0 System Architecture





OOI 2.0 Software Administration Move to PMO

- ECR 1300-00633 *Transfer scope & budget for CI Software Administration from RU to WHOI* passed review and approved by NSF 5/3/19
- Transition
 - Software stack migration PYI included 18 packages supporting uFrame
 - Software stack migration PYII includes 3 packages supporting work tools
 - Activities associated with migration were:
 - Software/System monitoring
 - Issue resolution
 - Physical migration of code
 - Upgrades and patches
 - User notifications
 - Asset management updates
- Benefits of change
 - Closer developer relationship with production events for support
 - Appropriate privileges to support issue research
 - End to end oversight will reduce latency of diagnosis and solution implementation
 - Advantages that a matrixed organizations brings





OOI CI 2.0 Organization





OOI 2.0 Change Management Process Overview





OOI 2.0 Data Usage Management

- Questions that can now be answered:
 - How many rows of data are stored in the system?
 - How many instruments do we have data for?
 - How many data requests does the system service?
 - What is the most downloaded data set?
 - Who has submitted the most requests?
 - Who is downloading data from the system at this moment?
 - What is the status of the data ingestion process by user or stream?



OOI 2.0 CI Management Dashboard - Beta





System health at a glance



OOI 2.0 Management Dashboard - Detail





State of ingestion



OOI 2.0 Management Dashboard - Detail



OOI 2.0 Collaborations

- Attended Large Facility Work Shop
 - Met with many peers at other institutions to discuss topics such as disaster recovery, collaboration opportunities among large facilities and common data models.
- Attended CI Large Facility Work Shop
 - Presented lightening talk on Analysis of Alternatives process
 - Met with peers to discuss common issues effecting CI departments such as staffing, training and budgeting.
- Self Evaluation
 - Interviewed OOI stake holders
 - External service providers
 - Sub-awardees
 - Users
- Analysis of Alternatives
 - Met with vendors inside and outside of oceanography and science
 - Discussions with other oceanographic service providers
- DDCI Membership
- QA/QC
 - Conversation with Sail Drone to share approach on QA/QC
 - Work with other developers and SMEs at Ann Arbor code week



Questions

