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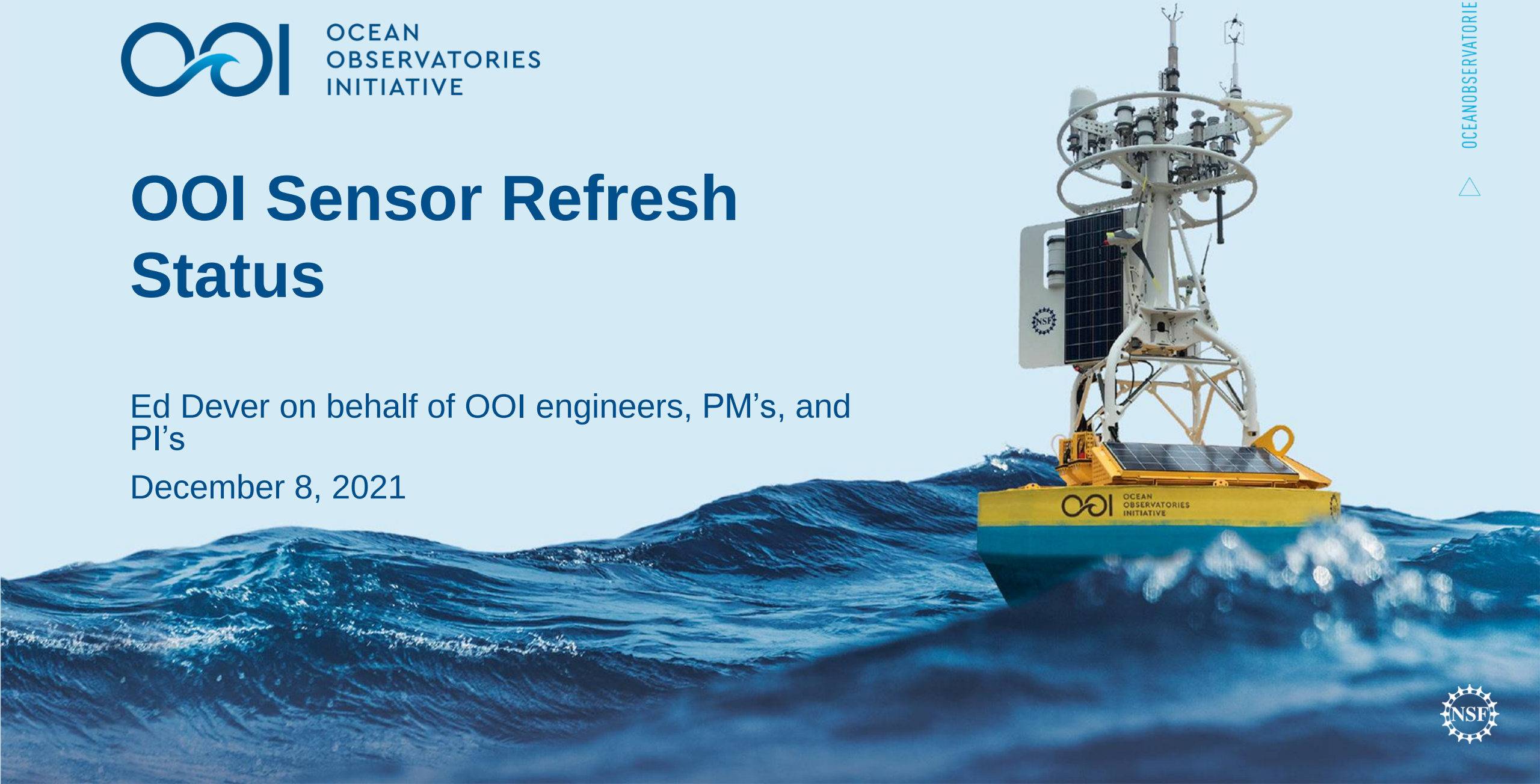
OOI Sensor Refresh Status

Ed Dever on behalf of OOI engineers, PM's, and PI's

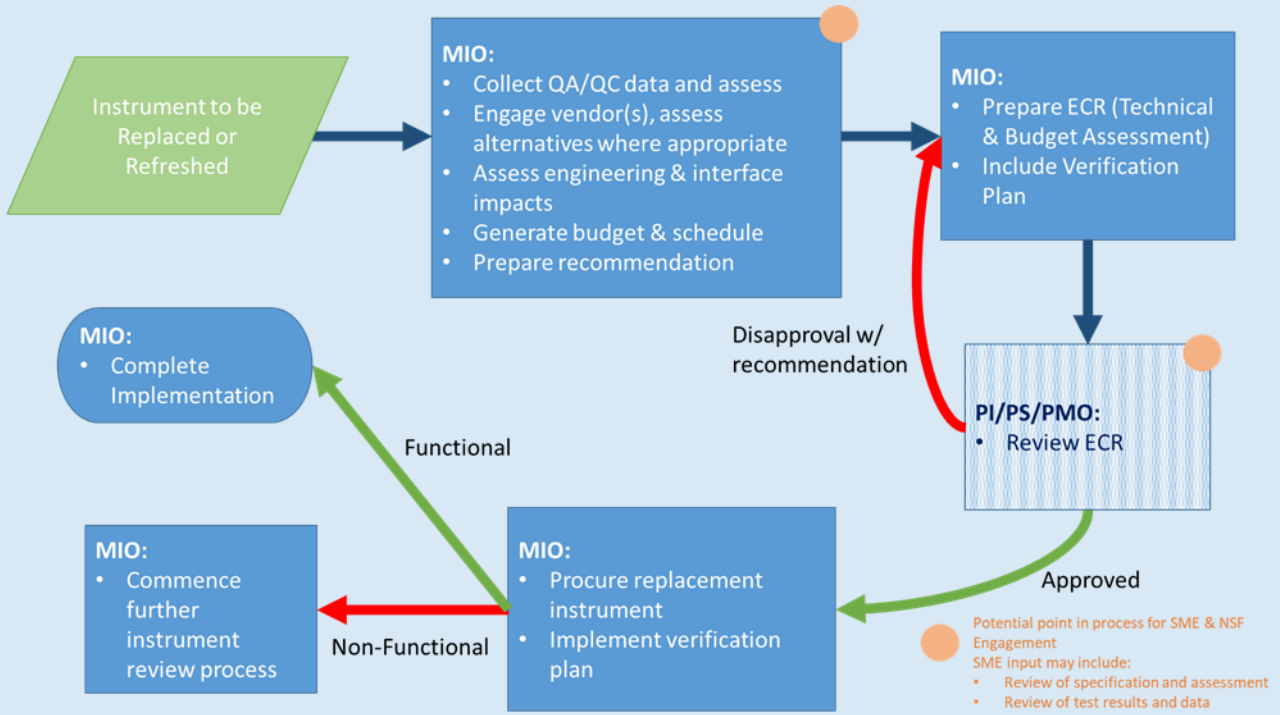
December 8, 2021

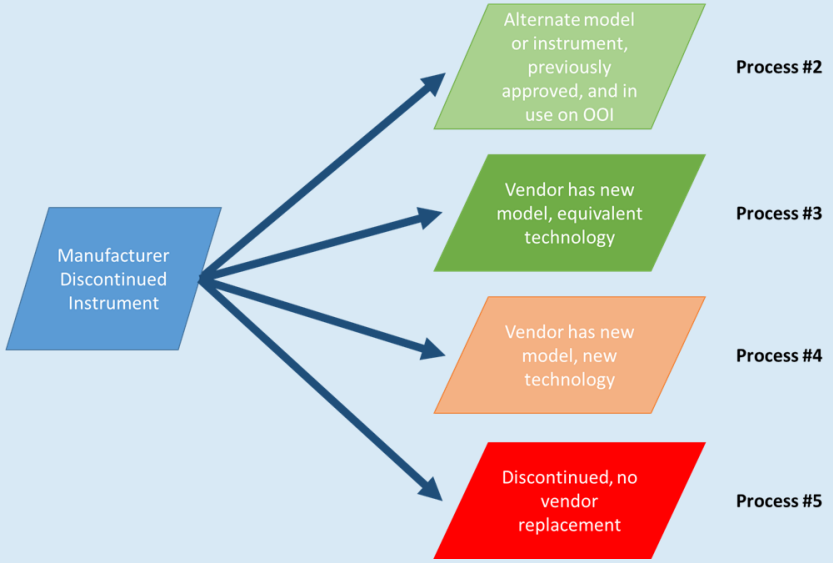


NSF

Process: The OOI Guidance for Instrument Replacement and Technical Refresh (1100-00007; Derek Buffitt; approved Sep 2020)

- Instrument replacement and technical refresh. Potential issues driving instrument replacement
  - Lost or damaged instrument (individual MIO responsibility)
  - Manufacturer discontinued instrument
  - Unreliable instrument or vendor
  - New technology
- Roles and responsibilities of MIO's, PI's, PMO, SME, NSF, OOIFB
- Guidelines for sensor replacement include data review, vendor engagement, a verification and testing plan, and an implementation plan
- MIOs discuss instruments biweekly and maintain MIO Instrument Meeting Notes. Maintain tech refresh info online in a google drive folder:





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No budget is explicitly identified for technical refresh or sensor replacement

- An important caveat is that no OOI budget is explicitly identified for instrument replacement and technical refresh
  - Individual MIO's are expected to budget for sensor replacement when possible.
  - Project underrun may be allocated for replacement and refresh based on approved scope of project (including replacing lost capabilities or improving data return)
  - Procurement is typically incremental, spanning multiple program years

pH Sensor

- pH sensor is an initial example of potential replacement of driven by new technologies/an unreliable instrument
  - The sensors had an initially low data return, in part caused by manufacturer issues (vendor engagement).
  - A recent review of data shows significant data loss is caused by instrument fouling in locations with high amount of sediments in the water (near bottom, coastal)
  - Two available replacement technologies Sea-Bird SeapHOx and Idronaut pH sensor
  - In water comparison testing underway (see presentation by C. Wingard)

ZPLSC (CGSN) Vendor upgrade

- Funds re-directed to procurement of new transducers rather than refurb of old ones.
- Transducers prone to failure in the field.
- Vendors ASL and Airmar worked together to update the design and manufacture process, including:
  - Ti connector and inserts
  - Subcon connectors (changed from Impulse)
  - Bulkhead connectors on transducers instead of potted cables
  - Larger safety factor on the depth rating (to 1000 m)
  - Change in the deposition process onto ceramics to reduce cracking and delamination
- Status:
  - A prototype transducer was deployed at the Pioneer Array in Fall 2020 and recovered in Spring 2021 for a successful test.
  - New quad transducers are now deployed at Endurance, Pioneer and Irminger, and will be at Papa next year.
  - All EA units have been upgraded. CSGN units are still in process of upgrades – The remaining Coastal units will be done in PY4.
  - Global units in PY5.

Discontinued instruments

- CGSN/EA Slocum G2 gliders (ongoing) service will be phased out starting Dec 2022. Manufacturer has offered an upgrade path to G3 gliders. Example of replacing with new instrument, new technology
- RCA VADCP (ongoing) and example of replacing a sensor with existing vendor/new model
- RCA ZPLSC is no longer being produced and vendor will end service. (upcoming)
- RCA digital still cameras (historical), EA digital still cameras (ongoing) examples of replacing with new instrument and/or vendor, equivalent technology
- RCA PAR (historical) example of replacing a sensor with existing vendor/new model
- OOI-wide SUNA replacement for NUTNR (OOI 1.0, historical) example of replacing a sensor with existing vendor/alternate model or instrument, previously approved, and in use on OOI

New operational concept

- New technology/operational concept – DOSTA placement on gliders
  - Initially proposed by an expert user, Ru Nicholson. Utility of approach shown in peer reviewed publications.
  - Implemented as part of Irminger Sea process study in conjunction with PI proposal, codified as part of OOI baseline via ECR 374, being implemented for the OOI G2 glider fleet on a “rolling’ basis – Irminger since 2019; Pioneer as of spring 2021; Papa delayed due to COVID and EA final stage of rollout.

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