I/Ocean

Harmonised and continuous ocean monitoring across the UK large research vessels

Making cost-efficient use of NERC large research vessel time

RRS James Cook

Natural Environment Research Council

RRS Sir David Attenborough

RRS Discovery

Sensors from fixed arrays (e.g. meteorology, sea-floor mapping) will be aggregated, described and made available to users of all abilities.

Workflow provenance using persistent identifiers (PIDs)

RDA RESEARCH DATA ALLIANCE

http://hdl.handle.net/21.T11998/0000-001A-3905-F?noredirect

Using the latest recommendations from the Research Data Alliance **Persistent Identification of Instruments WG** (https://arxiv.org/abs/2003.12958).

Sensor PIDs are identified and rendered to Open Geospatial Consortium (OGC) SensorML web resources

Open source data processing application

Using a community-driven approach, I/Ocean will develop an open-source processing application using international standards (SAMOS, IOOS Qartod, SeaBed 2030).

The application will be used by scientists on board or data managers on land.

Technical and simple data formats for users of all abilities

Utilising complex NetCDF (SeaDataNet Climate Forecast) for technical users and 'easy-to-read' CSV for users with less experience.

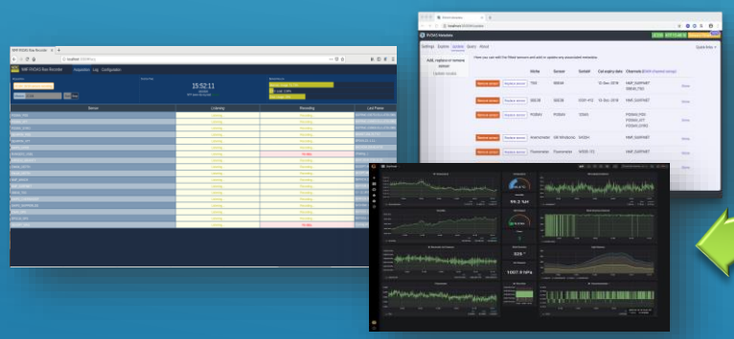
Data formats will be harmonised across ships for easy aggregation and analysis.

```
netcdf example {
dimensions:
        INSTANCE = UNLIMITED ; // (0 currently)
        MAXT = 6 ;
variables:
        float seatemp(INSTANCE, MAXT) ;
                seatemp:instrument = "/TOOL0022_2490" ;

// global attributes:
                :_NCProperties = "version=2,netcdf=4.7.2,hdf5=1.10.5" ;
group: TOOL0022_2490 {
  dimensions:
        NCOLUMNS = 1 ;
  variables:
    string PID(NCOLUMNS) ;
        PID:long_name = "Instrument persistent identifier" ;
    string INSTRUMENT_NAME(NCOLUMNS) ;
        INSTRUMENT_NAME:long_name = "Long name" ;
        INSTRUMENT_NAME:term_definition = "http://vocab.nerc.ac.uk/collection/W07/current/IDEN0002/" ;
    string SERIAL_NUMBER(NCOLUMNS) ;
        SERIAL_NUMBER:long_name = "Serial Number" ;
        SERIAL_NUMBER:term_definition = "http://vocab.nerc.ac.uk/collection/W07/current/IDEN0005/" ;
    string INSTRUMENT_MODEL(NCOLUMNS) ;
        INSTRUMENT_MODEL:long_name = "Model Name" ;
        INSTRUMENT_MODEL:term_definition = "http://vocab.nerc.ac.uk/collection/W06/current/CLSS0002/" ;

// group attributes:
        :comment = "29-Apr-2020 16:21:36: Sensor installed in <niche> on <platform> at 21/10/2019 12:36" ;

group: manufacturer_calibrations {
  dimensions:
        MCTIME = UNLIMITED ; // (2 currently)
  variables:
        double mc_time(MCTIME) ;
            mc_time:_FillValue = -99999. ;
            mc_time:long_name = "Date of manufacturer calibration" ;
            mc_time:term_definition = "TBC" ;
            mc_time:units = "days since 1900-01-01 00:00:00.0" ;
            mc_time:units_definition = "TBC" ;
            mc_time:standard_name = "TBC" ;
            mc_time:calendar = "gregorian" ;
            mc_time:axis = "X" ;
        string cal_funcs(MCTIME) ;
            string cal_funcs:_FillValue = "na" ;
            cal_funcs:long_name = "Calibration function" ;
            cal_funcs:term_definition = "TBC" ;
            cal_funcs:coordinates = "mc_time" ;
        string cal_coeffs(MCTIME) ;
            string cal_coeffs:_FillValue = "na" ;
            cal_coeffs:long_name = "Calibration coefficients" ;
            cal_coeffs:term_definition = "TBC" ;
            cal_coeffs:coordinates = "mc_time" ;
```

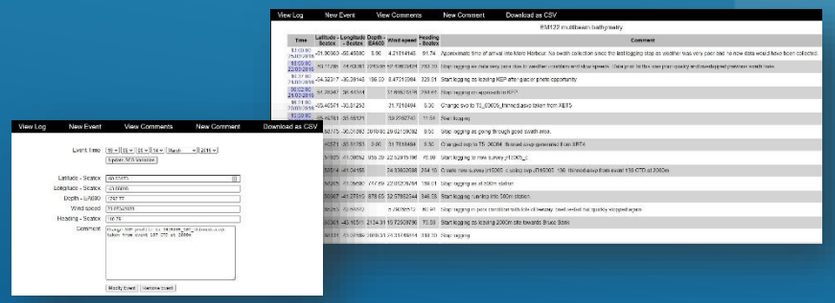
Appending data formats with detailed instrument metadata to help put data into context.

Ship-board services to democratise diverse data and events

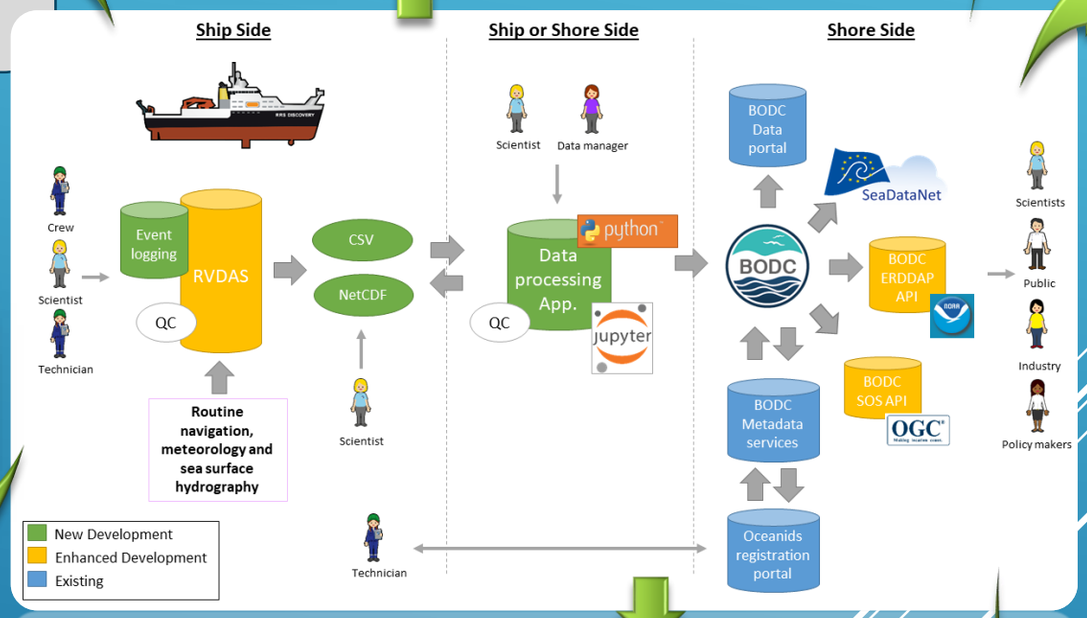
APIs and databases encompassed by micro-services are used to mediate data, metadata and event logging on ships.



An API-based NMEA data logging system, located on the ships (RVDAS), harmonises on-board access and triages sensors for faults.



An established, web-based event logging system will be enhanced and standardised with controlled vocabularies to replace paper logs on all ships



Enriching files with common, well-structured metadata

https://github.com/I-Ocean/common-metadata

Using common metadata to harmonise files across ships

Improving semantic richness using well-established and structured (SKOS) vocabulary collections

NVS

http://vocab.nerc.ac.uk/collection/W07/current/IDEN0003/

Data delivery in multiple ways

Data portals and open source APIs for users to build their own tools (e.g. hackathons)

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