

# Ocean Data Interoperability Platform (ODIP) I & II

Collaborative project between Europe, USA, and Australia

**FP7 Grant Number: 312492**

1 October 2012 – 30 September 2015

**FP7 Grant Number: 654310**

1 April 2015 – 31 March 2018

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# E-infrastructures

- A number of regional initiatives have made significant progress in addressing discovery, access, and long term stewardship of ocean and marine data on a regional basis
- ODIP is a community lead initiative to overcome barriers by exploring common standards and interoperability solutions for improving exchange between regional infrastructures and towards global infrastructures such as GEOSS, IODE – ODP, and POGO



*Australia*



*Europe*



*rvdata.us*

*USA*



# Partners

## Europe: 19 EU-funded partners (9 countries)

NERC-BGS/BODC, MARIS, OGS, IFREMER, HCMR, ENEA, ULG, CNR, RBINS, TNO, AWI, BSH, RIHMI-WDC, VLIZ, UniHB, CSIC, 52°North, IEEE, SOCIB



# Contributors

## USA

- Scripps Institution of Oceanography (SIO)
- Woods Hole Oceanographic Institute (WHOI)
- Lamont-Doherty Earth Observatory (LDEO),
- Florida State University (FSU): Center for Ocean-Atmospheric Prediction Studies
- ESRI
- NOAA - NCEI
- US-IOOS
- UNIDATA
- MMI





# Contributors

## Australia:

- University of Tasmania (IMOS)
- CSIRO
- Geoscience Australia (GA)
- NCI
- ANDS



## International:

- UNESCO IOC-IODE
- POGO
- ICSU – WDS
- GEO/GEOSS



## Canada

- Ocean Networks Canada



# Objectives

- To provide a coordination platform to facilitate the establishment of interoperability between regional data infrastructures in Europe, USA and Australia and also with global systems e.g. IODE Ocean Data Portal, GEOSS, POGO
- To demonstrate this co-ordination through the development of several joint prototype projects that allow effective sharing of marine and ocean data
- To develop these prototype projects by largely leveraging on existing and ongoing regional projects and initiatives
- To promote and disseminate ODIP approach and results widely for further uptake and feedback

# International data infrastructures



Data

Prototype 1  
Discovery and access of  
marine data



Prototype 2  
Cruise summary reporting  
(CSR)

Prototype 3  
Sensor web enablement  
(SWE)

**Ocean Data Interoperability Platform**

EUROPE



AUSTRALIA



USA



**Regional data infrastructures**





## ODIP 1 prototype:

- Establishing interoperability between the SeaDataNet, IMOS and US NODC data discovery and access services using the GEO-DAB brokerage service and interacting with the IODE-ODP and GEOSS portals
- Lead by European partners via SeaDataNet

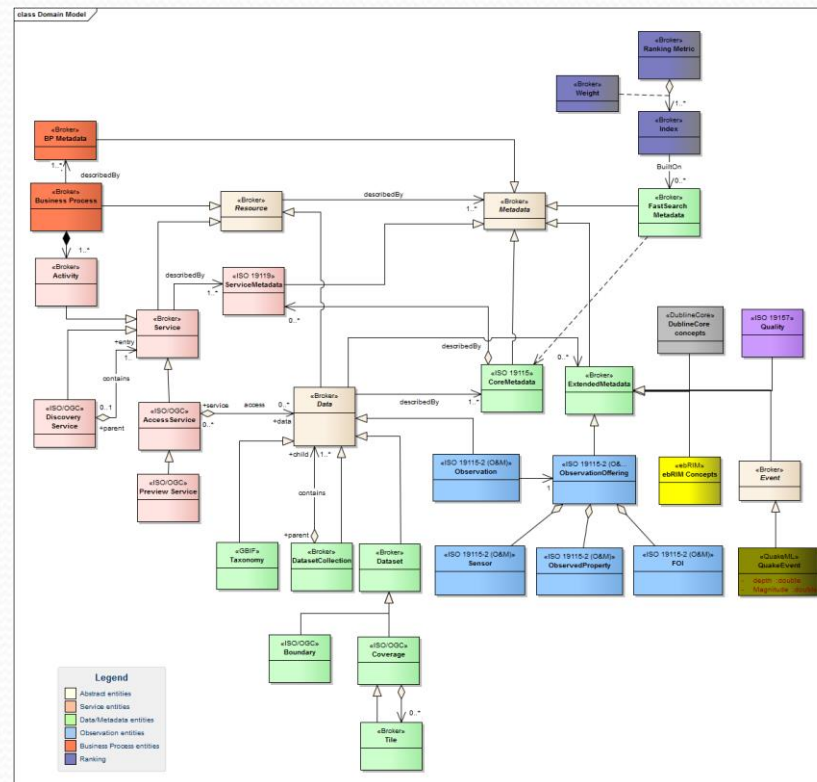


# ODIP Prototype 1 - context

- **Marine Data Discovery & Access services:**
  - Europe: Common Data Index (CDI) service, operated by SeaDataNet
  - USA: Data Discovery and Access service, operated by US NODC
  - Australia: Data Discovery and Access service, operated by AODN
- **Global Data Discovery & Access services:**
  - GEOSS portal
  - IODE Ocean Data Portal (ODP)

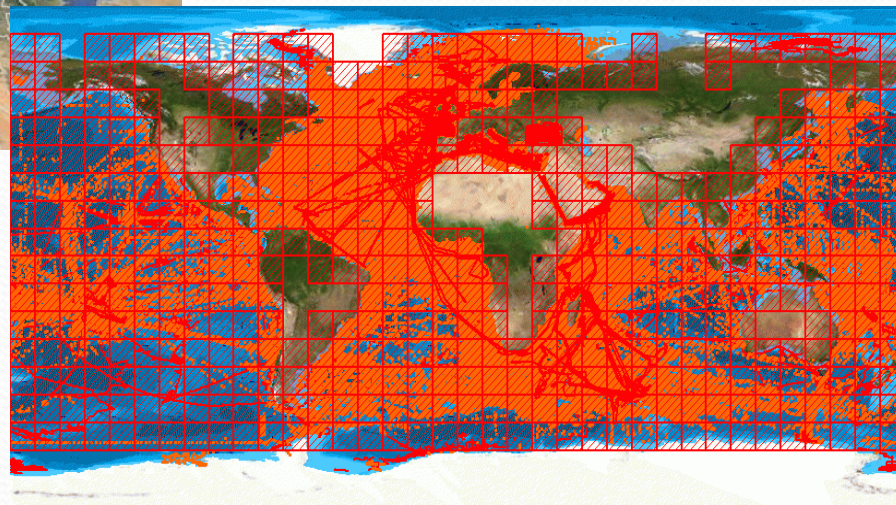
# GEO-DAB Brokerage service implementation

- The GEO-DAB Brokerage Service at CNR harvests XML entries and converts these following a Generic Brokerage Reference Schema, adopting prevailing vocabs





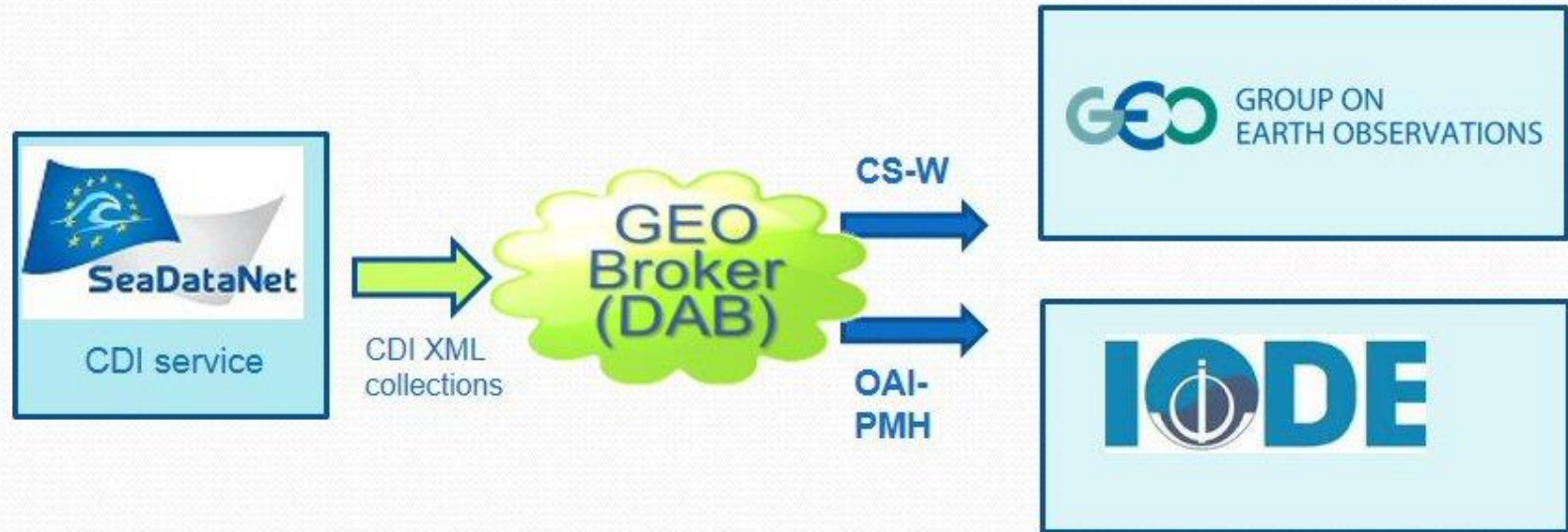
# pan-European infrastructure



May 2017: **102** data centres connected; > 1.9 million data sets



# ODIP 1 prototype:



- Aggregation of SeaDataNet metadata CDI granules to CDI collections (ISO 19115 – 19139) (1.9 million => 450 collections), conversion to Common Brokerage Model, and harvesting via CS-W and OAI-PMH services



# ODIP 1 – SeaDataNet in ODP

- RIHMI-WDC, operator of IODE ODP portal, has harvested SeaDataNet CDI collections and included in ODP
- OAI protocol used in combination with jOAI harvester (also used in WIS)


The screenshot shows the Ocean Data Portal (ODP) website. The top navigation bar includes links for HOME, COMMUNITY, DATA, and SERVICES. The main heading is "OCEAN DATA PORTAL". Below the navigation bar, there is a "METADATA SEARCH" section. On the left, a "Simple search" box contains a search bar with "seadatanet" entered, a "Dataset:" dropdown menu, and a "Geography:" section with a "Show/Hide" button. The search results are displayed in a table with columns for Title, Dataset, and Modification date. The table lists several datasets, including "Terrestrial from Geological Survey of Norway (NGU), point observations", "Marine geology from Geological Survey of Ireland, surface observations", "Chemical oceanography from Ankara University, point observations", "Biological oceanography from Ankara University, point observations", "Chemical oceanography from International Council for the Exploration of the Sea (ICES), point observations", "Biological oceanography from Swedish Meteorological and Hydrological Institute, curve observations", and "Atmosphere from National Institute of Meteorology and Hydrology, Pakistan Academy of Sciences". To the right of the table, there is a "Show 20" button and a pagination bar with links for First, Previous, 1, 2, 3, 4, 5, Next, and Last. Below the table, there is a "Layer control" panel with a map of the North Atlantic region. The map shows various geographical features and data points. The "Layer control" panel includes checkboxes for "CDI entry points", "CDI entry Tracks", "CDI entry Areas", "Old Lines", "Regional sea", "Regional sea labels", "Main sea", "Main sea labels", "Bathymetry", and "Blue Marble". There are also buttons for "Expand", "Add layer", "Display all selected records", and "Only selected records in results list". At the bottom of the page, there is a "SEARCH BY:" section with a "Geographical Box" and a "Time period" filter. The "Geographical Box" section includes a "Data set name" dropdown menu and a "Disciplines - Parameter groups" section. The "Time period" section includes a "Data set name" dropdown menu and a "Disciplines - Parameter groups" section. The bottom right corner of the page shows a status bar with the text "Found 94 | Show (120) | Previous | Next 20".

## Node 2: US NODC

- Activities extended to include US NODC services:
  - US NODC already provides web services at [collections](#) level as CSW, OAI-PMH and OpenSearch endpoints for discovery. All metadata contain at least FTP and HTTP links to the data, and many also have Hyrax, THREDDS Data Server, and Live Access Server links.
  - 1<sup>st</sup> analysis of definition of US NODC collections => use of ISO19115 – 19139 metadata
  - US NODC has circa **28.000** collection entries which relate to > 1.3 million granule data sets



# US NODC web page collection

**NOAA** NATIONAL OCEANOGRAPHIC  
DATA CENTER (NODC)  
UNITED STATES DEPARTMENT OF COMMERCE

NOAA Satellite and Information Service

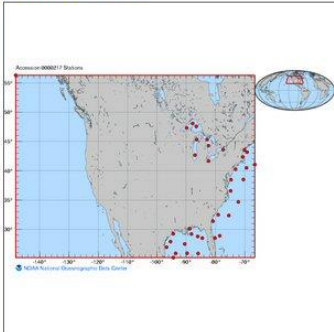
Search the NODC Archives for

You are here: [Home](#) > [Data](#) > [Metadata](#) > gov.noaa.nodc:0000217

Alternate Views: [HTML](#) · [FAQ](#) · [Text](#) · [Rubric](#) · [XML \(Plain\)](#)

## Wind waves spectra and other data collected using moored buoy in the Great Lakes, Gulf of Mexico, South Pacific and East/West coast of US from 01 June 2000 to 30 June 2000 (NODC Accession 0000217)

[gov.noaa.nodc:0000217](#)



Wind wave spectra and other data were collected using moored buoys in the Great lakes, Gulf of Mexico, South Pacific and East/West coast of US from June 01, 2000 to June 30, 2000. Data were submitted by National Data Buoy Center.

### Get the Data

Access	Distributor(s) / Contact Information
<p><b>download</b></p> <p><a href="#">HTTP</a> Navigate directly to the URL for data access and direct download.</p> <p><b>search</b></p> <p><a href="#">NOAA Marine Environmental Buoy Database</a> Search for data by user-specified criteria and optionally download data.</p> <p><b>information</b></p> <p><a href="#">Details</a> Navigate directly to the URL for a descriptive web page with download links.</p>	<p>Email: <a href="#">NODC User Services</a> US National Oceanographic Data Center 301-713-3277 8:30-6:00 PM, EST</p>

### Instructions / Constraints

**Use Limitations**

Please note: NOAA and NODC make no warranty, expressed or implied, regarding these data, nor does the fact of distribution constitute such a warranty. NOAA and NODC accept no liability for any errors or omissions in the data.

Data access  
URLs



## Node 3: AODN - Australia

- Activities extended to include AODN services:
  - AODN makes use of GeoNetWork and already provides web services at [collections](#) level as CSW, OAI-PMH and OpenSearch endpoints for discovery.
  - Collections are defined somewhat differently from SeaDataNet and US NODC
  - Circa **110** collections, defined by IMOS facilities (similar to data originator), geometric object, timeliness (real-time or delayed mode)



# AODN - Australia

The screenshot displays the AODN 123 web interface. The header includes the AODN 123 logo, navigation links (Home, Contact us, Links, About, Help), and the IMOS Integrated Marine Observing System logo. A search bar is located at the top right, with fields for Username, Password, and a Login button. Below the header, there are tabs for Simple Search, Advanced Search, and Remote Search. The main content area is divided into two columns. The left column contains a 'WHAT?' section with a search input field and a 'WHERE?' section with a world map and a dropdown menu set to '- Any -'. Below these are links for Applications, Audio/Video, Case studies, best practices, Conference proceedings, Datasets, Directories, Interactive resources, Maps & graphics, Other information resources, Photo, Physical Samples, Registers, and Z3950 Servers. The right column displays search results. The first result is 'IMOS - ACORN - SOUTH AUSTRALIA GULFS HF OCEAN RADAR SITE (SOUTH AUSTRALIA, AUSTRALIA) - REAL-TIME SEA WATER VELOCITY'. It includes an abstract, keywords, schema (iso19139.mcp-2.0), and extent (133.0 -37.4 137.4 -34.8 2009-09-24). The second result is 'SRS SATELLITE CONTRIBUTED OCEAN COLOUR - MODIS - AQUA CHLOROPHYLL CONCENTRATION IN THE SOUTHERN OCEAN: MONTHLY, JOHNSON ET AL 2013'. It includes an abstract, keywords, schema (iso19139.mcp-2.0), and extent (-180 -90 179.9 -29.999999999999996 2002-07-01T15:04:00). Both results have links for Metadata and Interactive Map.

Catalogue with collections

# Results: GEOSS portal – SDN, AODN and US-NODC entries

- <http://www.geoportal.org/>

AODN  
→

The screenshot displays the GEOSS Portal interface. At the top, the logo for the Group on Earth Observations (GEO) is visible alongside the text "GEOSS Portal" and the tagline "Discover, Access, Contribute Earth Observations, Information and Services". Navigation links include HOME, VIDEO TUTORIAL, SEND FEEDBACK, and SIGN-IN. A search bar is present with a "SEARCH" button. Below the search bar, a list of "Earth Observation Catalogs" is shown, with "Australia AODN Collections" selected. The main content area features a map of the world with a grid overlay. Below the map, a "Legend" section indicates "Total Results: 108". The results list includes:

- IMOS - SRS SATELLITE - SST L3S - 03 day composite - day time
- CARS 2009 - World monthly sea water salinity
- IMOS - ACORN - Capricorn Bunker Group HF ocean radar site (Great Barrier Reef, Queensland, Australia) - Delayed mode sea water velocity



# Results - ODP portal -- SDN, AODN and US-NODC entries

<http://www.oceandataportal.net/portal/portal/odp2/interoperability>

US NODC  
SeaDataNet  
AODN



The screenshot shows the Ocean Data Portal website with the URL <http://www.oceandataportal.net/portal/portal/odp2/interoperability> in the browser address bar. The page features a blue header with the Ocean Data Portal logo and navigation tabs: HOME, DATA, MAPS, and EXTERNAL SYSTEMS. Below the header, there is a 'Metadata search' section with a 'Simple search' form. The search results are displayed in a table with columns: Title, Dataset, and Modification date. The table lists 10 datasets, including FM 21-V SHIP global synoptic observations, Basic measurements of radiation at station Boulder, Expanded measurements from station Lindenberg, Secchi disk data of Russian expeditions, Basic measurements of radiation at station Boulder, Radiosonde measurements from station Lindenberg, Climatic data for the Black sea, water temperature, salinity, oxygen [SAMPLE], Basic measurements of radiation at station Boulder, and Meteorological synoptical observations from station Lindenberg. The 'Dataset' column shows entries like ODP 19139, WIS, and ODP 19139. The 'Modification date' column shows dates like 2014-04-01T13:54:02, 2013-12-18T22:43:06, 2014-06-17T20:38:42, 2014-04-01T13:55:12, 2013-12-18T22:43:06, 2014-05-24T20:56:07, 2014-04-01T13:57:01, 2013-12-18T22:43:06, and 2014-05-24T20:56:07.

Title:	Dataset	Modification date
FM 21-V SHIP global synoptic observations. Includes air temperature, water temperature, wave height, wind speed. Period-since the beginning of the year to current date	ODP 19139	2014-04-01T13:54:02
Basic measurements of radiation at station Boulder (1994-06)	WIS	2013-12-18T22:43:06
Expanded measurements from station Lindenberg (2002-05)	WIS	2014-06-17T20:38:42
Secchi disk data of Russian expeditions	ODP 19139	2014-04-01T13:55:12
Basic measurements of radiation at station Boulder (1994-05)	WIS	2013-12-18T22:43:06
Radiosonde measurements from station Lindenberg (2002-06)	WIS	2014-05-24T20:56:07
Climatic data for the Black sea, water temperature, salinity, oxygen [SAMPLE]	ODP 19139	2014-04-01T13:57:01
Basic measurements of radiation at station Boulder (1994-04)	WIS	2013-12-18T22:43:06
Meteorological synoptical observations from station Lindenberg (2002-06)	WIS	2014-05-24T20:56:07

# ODIP Prototype 1+ - Development underway

- US NODC portal is being upgraded as part of the new NCEI organization with a new discovery and access service, including more harmonized vocabularies
- AODN portal also upgraded
- Expand the core metadata model to include more distinction for platforms, parameters, instruments
- Include semantic interoperability ('Rosetta Stone')
- Explore implementing also **horizontal** interoperability between the 3 regional systems, using OpenSearch and/or WMS-WFS, considering granules vs collections



Lead: MARIS





## ODIP 2 prototype:

- ODIP 2: Establishing interoperability between cruise summary reporting systems in Europe, the USA and Australia and also towards global POGO portal
- Led by Rolling Deck to Repository (R2R) partners (USA)
- SeaDataNet Cruise Summary Report (CSR) adopted with ISO19115 – 19139 Schema and supporting Common Vocabularies

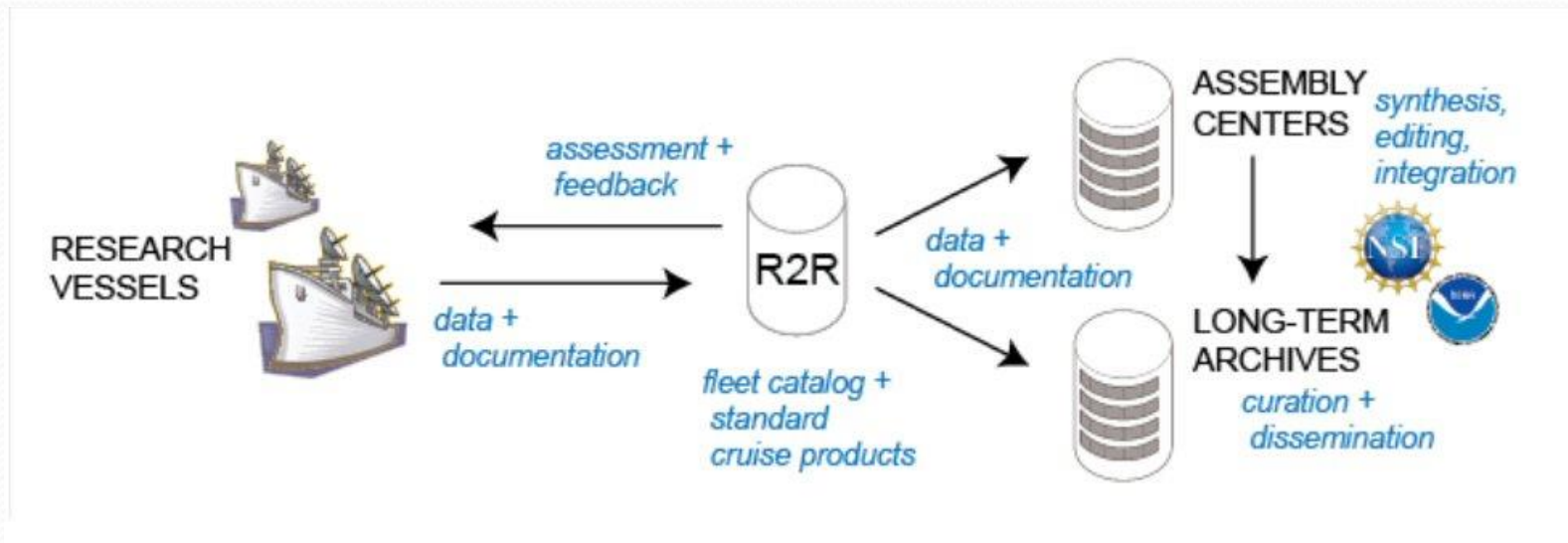
# ODIP Prototype 2 - Context

- Europe, USA and Australia administer cruises and related data acquisition activities undertaken by their research vessel fleets:
  - In Europe via SeaDataNet Cruise Summary Reports directory
  - In USA via Rolling Deck to Repository (R2R) project
  - In Australia via Marine National Facility (MNF)
- All 3 regions are participating in the Partnership for Observation of the Global Oceans (POGO).
- A POGO portal is maintained for sharing information on planned, current and past cruises to enhance awareness of opportunities, and to improve the cost-effectiveness of cruises.



# ODIP Prototype 2 - USA

- The mission of the Rolling Deck to Repository (R2R) project is to provide uniform stewardship of routinely-collected environmental sensor data from the US academic research fleet. It publishes Cruise records in multiple formats.



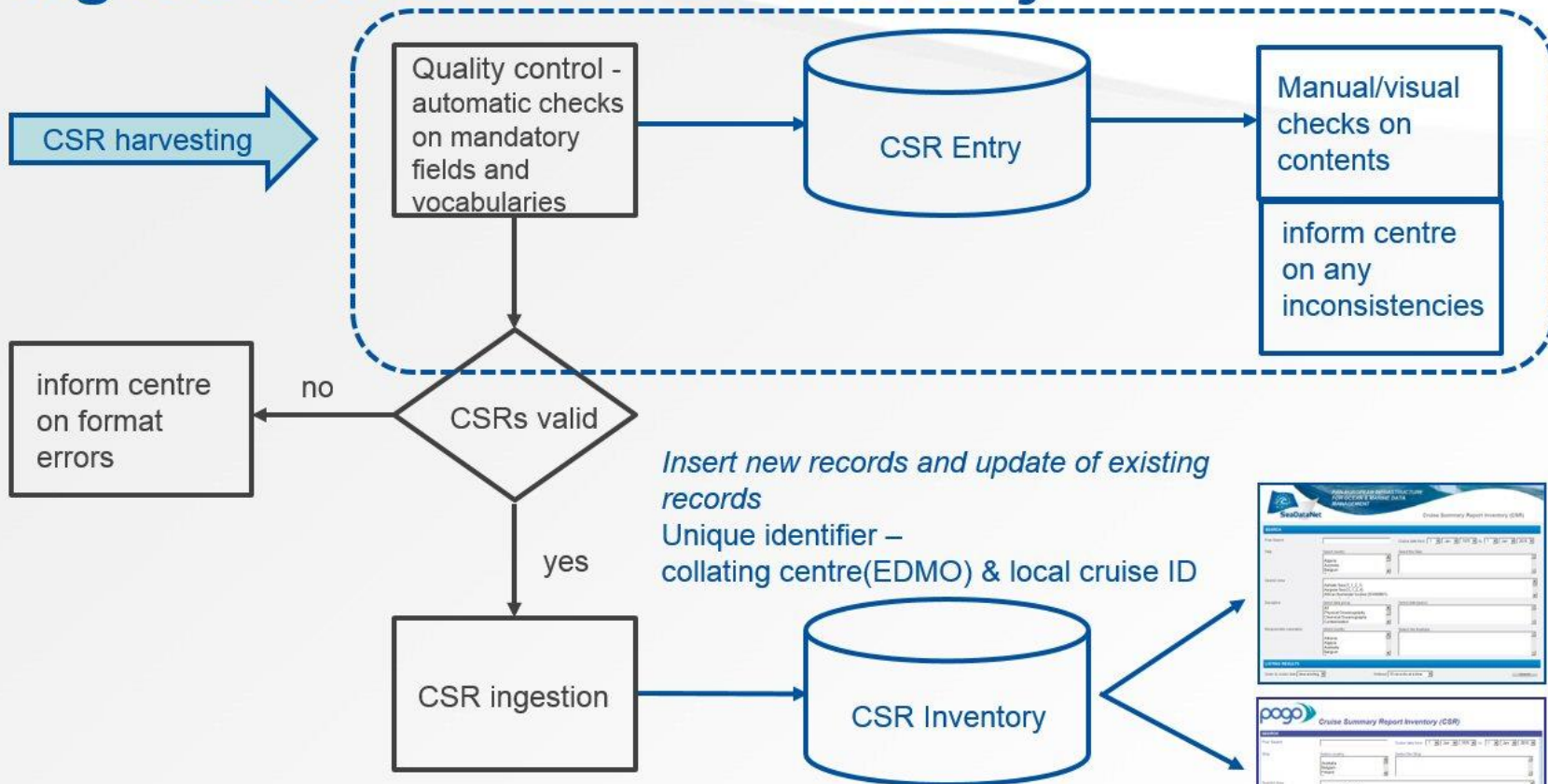
# ODIP Prototype 2 – Activities

- **ISO Cruise Summary Reports published at regional nodes:**
  - Europe: Cruise Summary Reports (CSR) service, operated by SeaDataNet
  - USA: Rolling deck to Repository (R2R) catalogue, operated by R2R group
  - Australia: Marine National Facility (MNF) service, operated by CSIRO
- **GeoNetwork catalogs deployed at regional nodes to provide both GUI (Web portal) and API (CSW service)**
- **GeoNetwork nodes harvested into POGO global catalog to provide integrated search**



# ODIP Prototype 2 – Activities

## Ingestion into central inventory



20.04.2015

# ODIP Prototype 2 - results

- R2R team has prepared and published by its GeoNetwork node until recently 750 CSRs for a number of USA research vessels
- First CSR entries prepared by Australia
- These were harvested and successfully integrated by BSH into the POGO CSR Catalog service.



## Cruise Summary Report Inventory (CSR)

SET OF RESULTS				
<a href="#">New Query</a>   Found 1229   Show (1-10)   <a href="#">Next 10</a>				
Platform Name	Cruise Name	from	to	Show
Kilo Moana	Hawaii Ocean Timeseries (HOT)	15.12.2014	19.12.2014	
Kilo Moana	C-MORE 2014, Leg 5	08.12.2014	12.12.2014	
Kilo Moana	Hawaii Ocean Timeseries (HOT)	12.10.2014	16.10.2014	
Kilo Moana	Hawaii Ocean Timeseries (HOT)	13.09.2014	17.09.2014	
Kilo Moana	Pelagic Food Web Connectivity in the Central North Pacific	29.08.2014	11.09.2014	
Kilo Moana	U.S. Extended Continental Shelf (ECS) Survey: Kirin Ridge	09.08.2014	22.08.2014	
Kilo Moana	Transit	07.07.2014	17.07.2014	
Kilo Moana	Hawaii Ocean Timeseries (HOT)	29.06.2014	03.07.2014	
Kilo Moana	C-MORE 2014, Leg 4	16.06.2014	27.06.2014	
Kilo Moana	C-MORE 2014, Leg 3/Summer Course (AGOURON-10)	09.06.2014	16.06.2014	
<a href="#">New Query</a>   Found 1229   Show (1-10)   <a href="#">Next 10</a>				



# ODIP Prototype 2+ - Development underway

- Further population of the CSR system and going to weekly harvesting
- Follow-up and upgrading of the CSR legacy records for USA, Canada and Australia as received through ICES
- Upgrading the CSR schema in a number of ways: (lead: SeaDataNet group)
  - Introduce gmx:Anchor to support links to vocabularies
  - Introducing ORCID for chief scientists in the CSR format
  - Publishing CSR also as Linked Data – SPARQL endpoints
  - Include station lists with event documentation
  - Automatic CSR generation from ship system – link with Eurofleets
- Lead: BSH



# ODIP Prototype 3+ - Development underway

- Develop marine SWE profiles (syntax and semantics) in concertation with many projects and interacting with INSPIRE and OGC
- Build an overview/directory of SOS servers
- Demonstrate interoperability by integrating SOS servers into a common demo server
- Metadata/SensorML Editors → Synchronise the efforts
- Analyse handling large, heterogeneous observation data sets



Lead: 52North





# ODIP Prototype 4 development underway

- Set up a '**digital playground**' or Virtual Research Environment to explore and demonstrate standard solutions for:
  - discovery and retrieval of data from data archives and SensorWeb systems
  - processing and product generation using workflow management systems (e.g. Kepler or Taverna), standard OGC interfacing and various tools
  - visualisation and publishing (incl metadata and DOIs) of created data products
  - Focus on methodology, not on completeness of data

Lead: CSIRO + MARIS



## ODIP II: Cross-cutting topics

- Data citation and publication
- Persistent identifiers: DOIs, ORCiDs etc.
- Vocabularies: RDF, SPARQL endpoints, mappings etc.
- Big data and model workflows





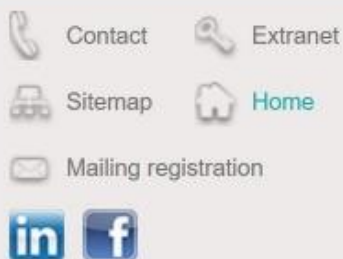


# Ocean Data Interoperability Platform

[OVERVIEW](#) | [AGENDA](#) | [WORKSHOPS](#) | [PROMOTION](#) | [PARTNERS](#)



## Tools



[Home](#)

## Welcome

The **Ocean Data Interoperability Platform (ODIP)** contributes to the removal of barriers hindering the effective sharing of data across scientific domains and international boundaries. ODIP includes all the major organisations engaged in ocean data management in EU, US, and Australia. ODIP is also supported by the IOC/IODE who participates in its implementation and operation, closely linking this activity with its ODSBP project.

The ODIP platform organises international workshops to foster the development of common standards and develop prototypes to evaluate and test selected

## News

ODIP presented at the EGU 2017 conference

Successful 7th Workshop

ODIP presented at IMDIS 2016 Conference

ODIP presented at the Oceans 2016

[www.odip.org](http://www.odip.org)