



**SeaDataNet, Pan-European infrastructure for  
ocean and marine data management  
&  
EMODNET Preparatory Actions  
Hydrographic Lot**

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# Unified access to distributed data centres

- SeaDataNet is a 5 year project, funded by EU via FP6, and has succeeded Sea-Search
- SeaDataNet aims to set up and operate an efficient Pan-European distributed infrastructure for managing marine and ocean data by connecting:
  - 40 National Oceanographic Data Centres (NODC's), national oceanographic focal points, and ocean satellite data centres, in Europe
  - these Data Centres are mostly divisions of major national marine research institutes and based in 35 countries, surrounding the European seas
- SeaDataNet aims to ensure a comparable quality of data sets and to make data sets easily accessible on-line through a unique portal, while the data sets are stored and managed at the Data Centres.



# Participating Countries



49 Partners = 40 Data Centres + ICES + IOC-IODE + JRC + specialists in statistics, products and informatics



# Interoperability

Interoperability is the key to distributed data management system success. This is achieved in SeaDataNet via:

- Adopting the ISO 19115 metadata standard for all metadata directories
- Providing XML Validation Services to quality control the metadata maintenance
- Using common and controlled vocabularies, including international content governance
- Providing standard metadata entry tools
- Using harmonised Data Transport Formats for data sets delivery
- Using common quality control protocols and flag scale
- Adopting of OGC standards for mapping and viewing services
- Using SOAP Web Services in the SeaDataNet architecture
- Organising training and instruction workshops for transfer of expertise and hands-on training

# SeaDataNet portal



## Pan-European infrastructure for Ocean & Marine Data Management



Home Overview Metadata Data Access Products Standards & Software Education Meetings Publications Partners Links Extranet

SeaDataNet

### SeaDataNet

SeaDataNet has federated open digital repositories to manage, access and share data, information, products and knowledge originating from oceanographic fleets, new automatic observation systems and space sensors.

By use of standards for communication and new developments in information technology, in-situ and satellite marine data platforms are providing metadata, data and products as a unique virtual data centre.



The SeaDataNet partnership is assuring the archival and preservation of data for their re-use for new research, retention of unique observational data which is impossible to re-create; enhance existing data available for research projects as well for marine environment management, education, history and other uses

#### News

- » **IMDIS 2010 Conference**  
March 29-31, 2010, Paris, France, Abstracts submission
- » **MIKADO**  
New release V1.6 available
- » **NEMO**  
Solaris and Linux versions available
- » **Seadatanet Newsletter n°5 - June 2009**
- » **SeaDataNet, adopted as basis for EMODNET pilots**
- » **Geo-Seas – expanding SeaDataNet with geological and geophysical datasets**
- » **CDI V1 Data Access Service operational**

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

# SeaDataNet from data discovery to data download to analysis



SeaDataNet Common Data Index (CDI) V1 - Windows Internet Explorer

http://seadatanet.maris2.nl/v\_cdi\_v1/browse\_step.asp

SeaDataNet Common Data Index (CDI) V1

Pan-European infrastructure for Ocean & Marine Data Management  
Common Data Index (CDI) V1 - Access to Datasets

SeaDataNet

Cart: 0 Dataset(s) Proceed to check out Reset basket Summary Show on map ?

Reset all steps

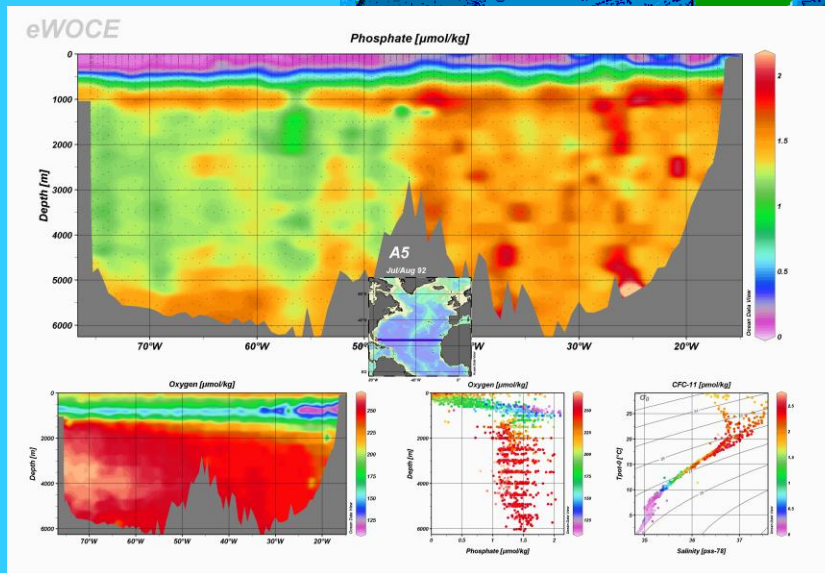
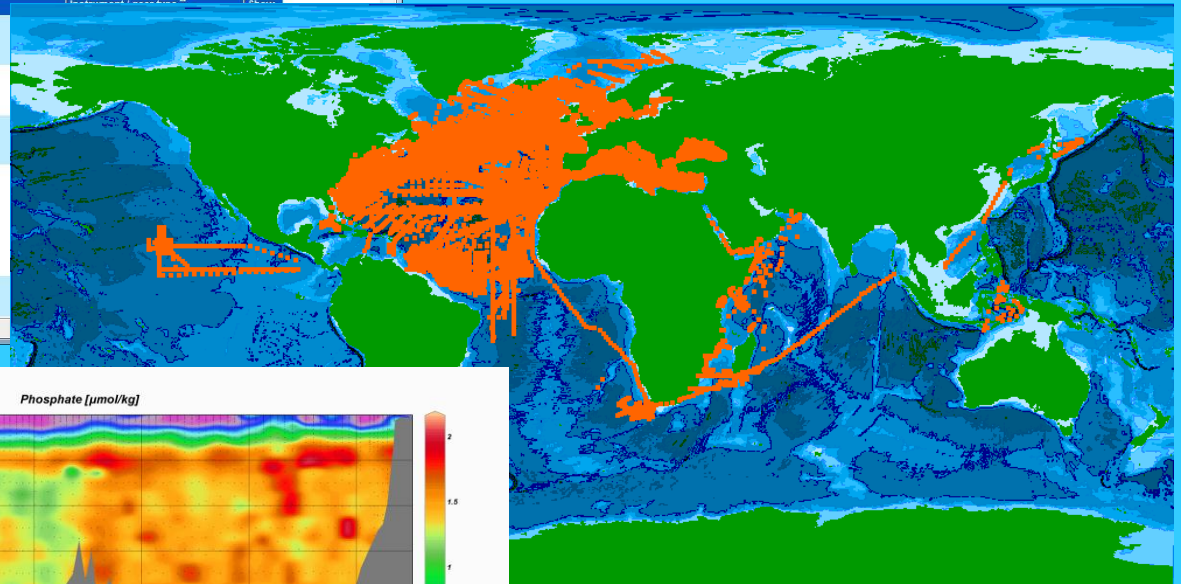
Search by:

Add to basket 20 50 100 Records Go

[ Found 386743 | Show (1-20) | Previous | Next 20 ]

Geographical Box	Data set name	Variables measured
	<input type="checkbox"/> RVODC_Bottle_10855	Administration and dimensions > Administration and dimensions Physical oceanography > Water column temperature and salinity
	<input type="checkbox"/> RVODC_Bottle_10855	Administration and dimensions > Administration and dimensions Physical oceanography > Water column temperature and salinity
	<input type="checkbox"/> RVODC_Bottle_10855	Administration and dimensions > Administration and dimensions Physical oceanography > Water column temperature and salinity
	<input type="checkbox"/> RVODC_Bottle_10855	Administration and dimensions > Administration and dimensions Chemical oceanography > Carbon, nitrogen and phosphorus > Carbonate system > Dissolved gases > Nutrients Physical oceanography > Water column temperature and salinity
	<input type="checkbox"/> RVODC_Bottle_10855	Administration and dimensions > Administration and dimensions Physical oceanography

Done





# Access to Data – Common Data Index (CDI)

- The Common Data Index (CDI) is a fine-grained index to individual data measurements (such as a CTD cast or moored instrument record).
- CDI XML Schema is based upon the ISO 19115 standard
- Common Data Index (CDI) system including a Shopping and Transaction mechanism for direct online data access through file downloads



- Using harmonised Data Transport Formats for data sets delivery
- Authorisation and Authentication Services, based upon a Central User Register and vocabulary of Data Access Restrictions

# Data Policy and implementation



## ■ Metadata

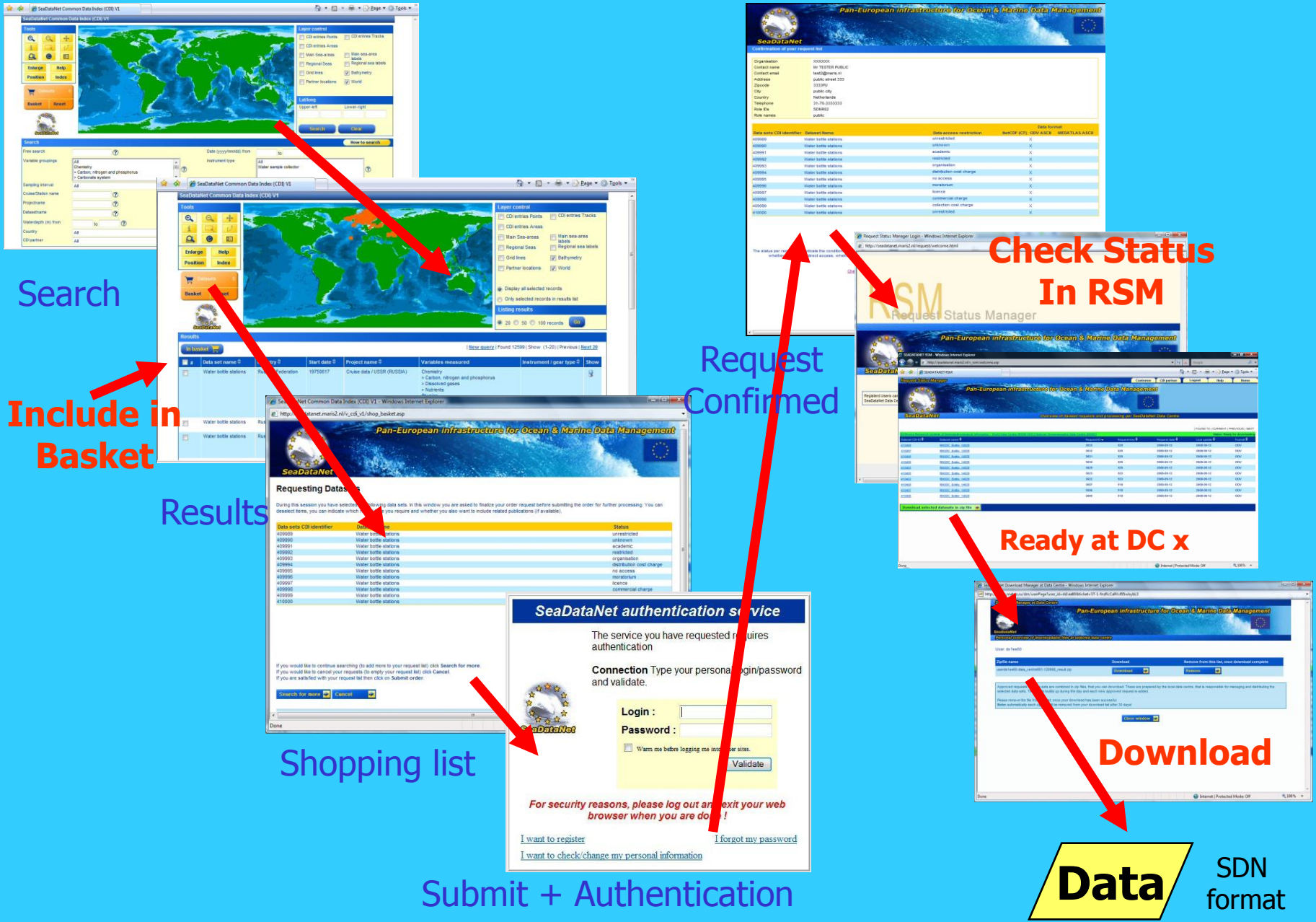
- free and open access, no registration required
- each data centre is obliged to provide the meta-data in standardized format to populate the catalogue services

## ■ Data and products services

- the general case is free and open access
- however user must register once in order to get a personal login - password
  - Web form to provide necessary information
  - User agrees with "**SeaDataNet User Licence**"
  - After processing, login/password sent by email (email check)
- Licence is part of the **SeaDataNet Data Policy**, that is intended to be fully compatible with the Directive of the European Parliament and of the Council on public access to environmental information, the INSPIRE Directive, IOC, ICES, WMO, GCOS, GEOSS and CLIVAR data principles.
- SeaDataNet Data Policy is an overarching policy, respecting any local policy
- Each user gets a SeaDataNet Role; while each CDI record has a 'Data access restriction' label. The combination of role and access label determines '**access OK**', '**access to be discussed**' or '**access denied**'

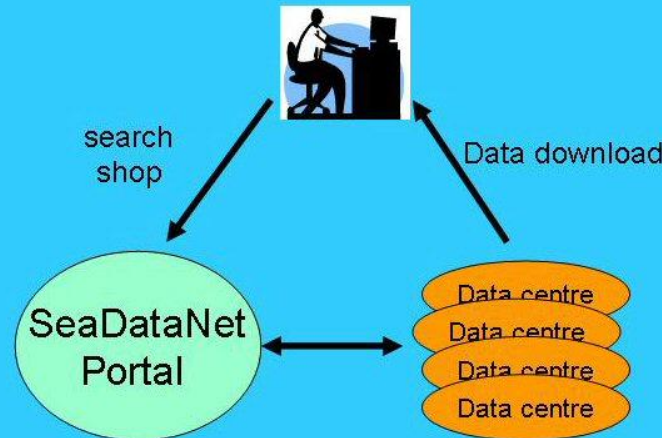
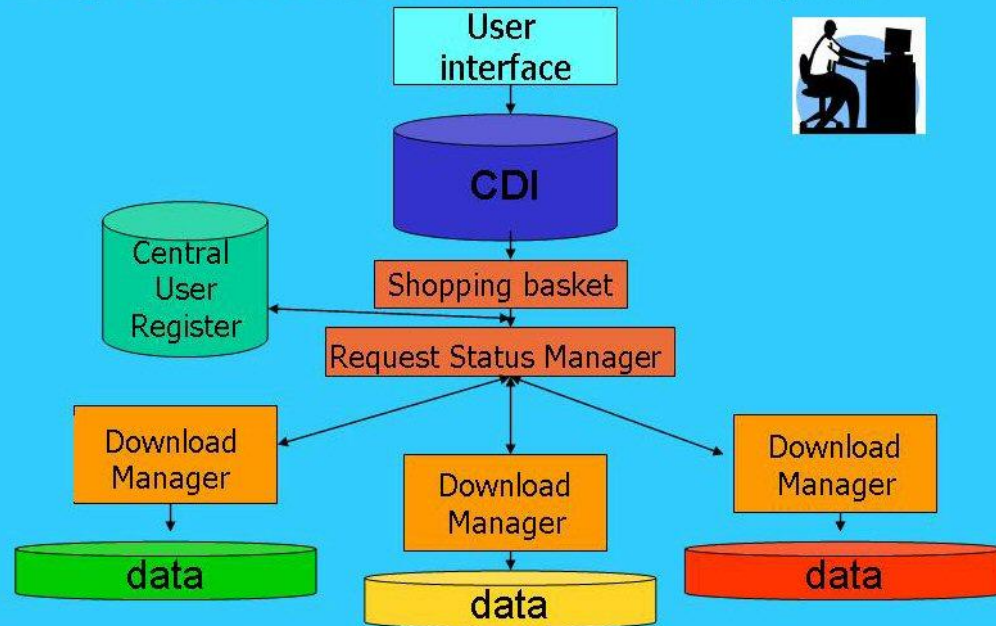


# SeaDataNet CDI V1 – Data retrieval and downloading





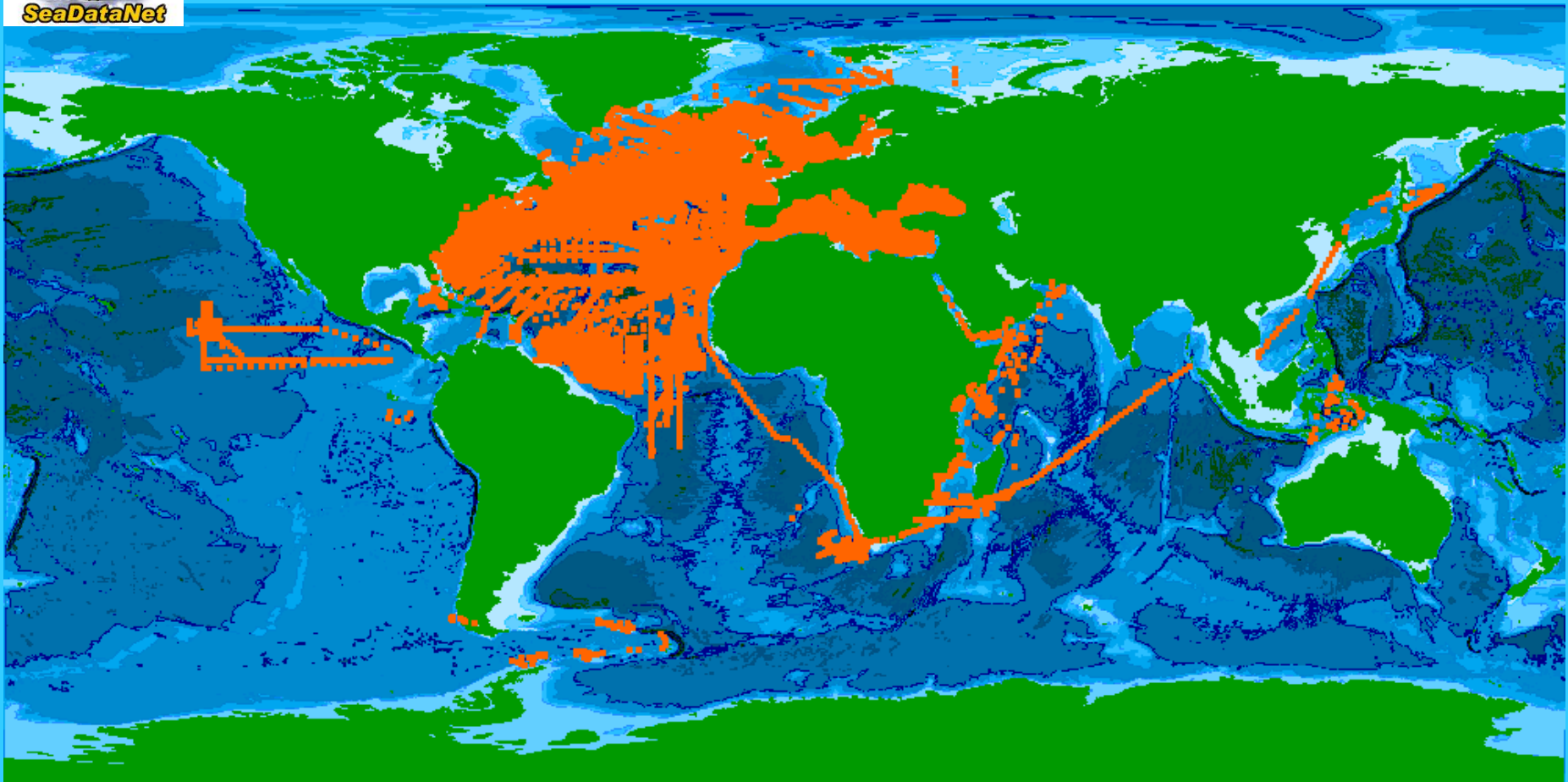
# Delivery Services – system set-up and process



Metadata + transaction data



# CDI V1 – Data Coverage



CDI V1 coverage at mid Sept 2009: ca. **462.000** CDI entries from 11 countries; connecting other SeaDataNet partners is well underway



## Cross sector involvement

- SeaDataNet cooperates and provides services for many other European and international groups and projects, contributing and safeguarding good data management. Examples:
  - **EuroGOOS**, maintaining the European Directory of Ocean observing systems (EDIOS) and improving access to real-time data. See [www.edios.org](http://www.edios.org)
  - **POGO**, collecting and providing information on ocean-going research vessels, and their operators, planned and completed cruises. See [www.pogo-oceancruises.org](http://www.pogo-oceancruises.org)
  - **GMES Marine Core Services** for streamlining the provision of long-term archives for optimising marine forecast services
  - Partners in the **Humboldt** project (GMES) contributing to a European Spatial Data Infrastructure
  - Services for the international oil & gas industry for metocean data (**SIMORC**). See [www.simorc.org](http://www.simorc.org)



# Expansion

- SeaDataNet V1 standards and tools are being adopted by new EU-funded projects, that will have a dedicated Portal, but also will be fully integrated in the SeaDataNet infrastructure:
  - **Up-Grade Black Sea SCENE project**, (2009 – 2011) involving 6 NODCs and 35 other data holding institutes from the 6 Black Sea countries, to provide metadata and data access and to strengthen their national NODC networks. EU-funding 3.4 Million Euro.
  - **CASPINFO project**, (2009 – 2011) involving 12 institutes and private industry from the Caspian Sea region, to provide metadata and data access and to build their capacity for data management and user services. EU-funding 0.8 Million Euro.
  - **Geo-Seas project**, (2009-2012) involving 24 geological and geophysical data centres from 16 European countries (EuroGeoSurveys), to provide metadata and data access. EU-funding 4.9 Million Euro.
  - **EuroFleets project**, (2009-2012) involving 24 research institutes and data centres from 17 European countries, to optimise the management of research vessels and to streamline the flow of data from the research cruises to the data centre infrastructure. EU-funding 7.2 Million Euro.
- In each project several SeaDataNet NODCs are participating for transfer of knowledge & expertise, to secure interoperability and to learn from new developments



- EU has adopted a new Marine Directive and Maritime Policy, which includes a requirement for an overarching **European Marine Observation and Data Network** (EMODNET), based upon a 'systems of systems' approach
  
- EU Taskforce active, that has produced a draft Roadmap. This includes a number of 3 year data pilots, started in June 2009:
  - Geology – undertaken by EuroGeoSurveys consortium
  - Chemistry – undertaken by SeaDataNet consortium
  - Biology – undertaken by EurOBIS – MARBEF consortium
  - Hydrography – undertaken by sub SeaDataNet consortium
  
- All 4 pilots will adopt SeaDataNet standards and interconnect to the SeaDataNet CDI V1 Directory.
  
- This provides an excellent opportunity for SeaDataNet to become a core element in EMODNET and as such to upgrade its status from project to sustained operational infrastructure.



- The overall objective is to create pilots to migrate fragmented and inaccessible marine data into interoperable, continuous and publicly available data streams for complete maritime basins.

The specific objectives of the pilots are:

- collating existing data from public and private organisations relating to the state of maritime basins; processing them into interoperable formats which includes agreed standards, common baselines or reference conditions;
- assessing their accuracy and precision and assembling them into common datasets;
- developing, testing, operating and maintaining a **portal** allowing public access and viewing of these data
- The results will help to define processes, best technology and approximate costs of a final operational EMODNET. It will also provide the first components for a final system which will in themselves be useful to the marine science community.



Hydrography	North Sea	Celtic Seas, the Western Mediterranean, the Ionian Sea and the Central Mediterranean
Geology	North Sea	Baltic and Celtic Seas
Chemistry	North Sea	Black Sea + Med spots
Biology	North Sea	Bay of Biscay and the Iberian Coast
Habitats	North Sea	Baltic, Celtic Seas and the Western Mediterranean





- The following geographical information system layers will be produced:
  - water depth in gridded form over whole of maritime basin on a grid of at least quarter a minute of longitude and latitude.
  - water depth in vector form with isobaths at a scale of at least one to one million.
  - depth profiles along tracklines
  - coastlines
  - underwater features – wrecks, seabed obstructions etc
  
- It is accepted that the accuracy and precision of the gridded data will vary over the basins in question. No new data will be collected specifically for this project. The aim is to provide access to data from existing monitoring programmes.



- The following SeaDataNet strategy was formulated, which is applied for the EMODNET Hydrographic pilot development:
  - Develop **a high-end Hydrographic portal**, outfitted with a powerful spatial database, that is complemented with WMS, and WFS services (OGC) to serve users and to provide layers for e.g. the other EMODNET portals, the prototype European Atlas of the Seas, and the broad-scale European Marine Habitats map;
  - Involve research institutes, monitoring authorities, and HO's, in providing hydrographic data sets for producing **Digital Terrain Models (DTM)** with specific resolution for each geographical region, that are loaded and integrated afterwards into the portals' spatial database
  - Include in the portal a metadata discovery service, by adopting the **SeaDataNet CDI metadata standard**, that gives clear information about the background data used for the DTM, the access restrictions and distributors; this also ensures the connection of the Hydrographic portal with the SeaDataNet portal..



- Bathymetric surveys are undertaken by 4 groups of organisations, thereby partly overlapping and mostly complementing their geographical coverages. Data are collected at different frequencies and even date back to previous centuries.
  - **Hydrographic Offices**, that are responsible for surveying the navigation routes, fairways and harbour approach channels and producing from these the nautical charts on paper and as Electronic Nautical Charts (ENC), that are used for navigation. The HO's are members of the International Hydrographic Organisation (IHO).
  - **Authorities**, responsible for management and maintenance of harbours, coastal defences, shipping channels and waterways. These authorities operate or contract regular bathymetric monitoring surveys to assure that an agreed nautical depth is maintained or to secure the state of the coastal defences.
  - **Research institutes**, that collect multibeam surveys as part of their scientific cruises.
  - **Industry**, especially the energy industry, that contracts multibeam surveys for pipeline and cable routes (in case of windfarms) and the telecommunication industry for phone and internet cable routes.
- Part of these data is already included in SeaDataNet, because its data centres belong to some of the authorities and research institutes.



- The EMODNET Hydrographic Lot is undertaken by members of the **SeaDataNet** consortium together with other organisations from marine science, the hydrographic survey community, and industry.
- The partners combine expertises and experiences of collecting, processing, and managing of bathymetric data together with expertises in distributed data infrastructure development and operation and providing OGC services (WMS, WFS and WCS) for viewing and distribution.
  - **MARIS – NL** (Management, DM and IT expertise)
  - **IFREMER – FR** (Research institute)
  - **ATLIS – NL** (IT expertise, DM hydrography)
  - **IEO – ES** (Research institute)
  - **NERC-NOCS – UK** (Research institute)
  - **GSI – IE** (HO – Ireland)
  - **SHOM – FR** (HO – France)
- Plus Data provider agreements with **HO's from Germany, Norway, Denmark, Netherlands and Belgium**



- The HO's have agreed to supply:
  - Bathymetric survey data from which a grid coverage of at least a quarter of a minute of longitude and latitude can be generated for their area of responsibility in Europe;
  - Samples of multibeam surveys
  - Selected objects from relevant Electronic Nautical Charts which include objects that together form the coastline and underwater features like wrecks, obstructions and pipelines.
- Conditions, that the data stay the property of the HO's, and that it must be explicitly advertised at the EMODNET portal, that the data products are not to be used for navigation.
- The Research Institutes IFREMER, IEO and NERC-NOCS will supply:
  - Multibeam surveys as part of their scientific cruises.
- Data from the cruises combined with data from the HO's make it possible to cover most of the requested EMODNET pilot regions. Gaps might be filled using data from international databases, such as the NGDC, USA database GEODAS and GEBCO.

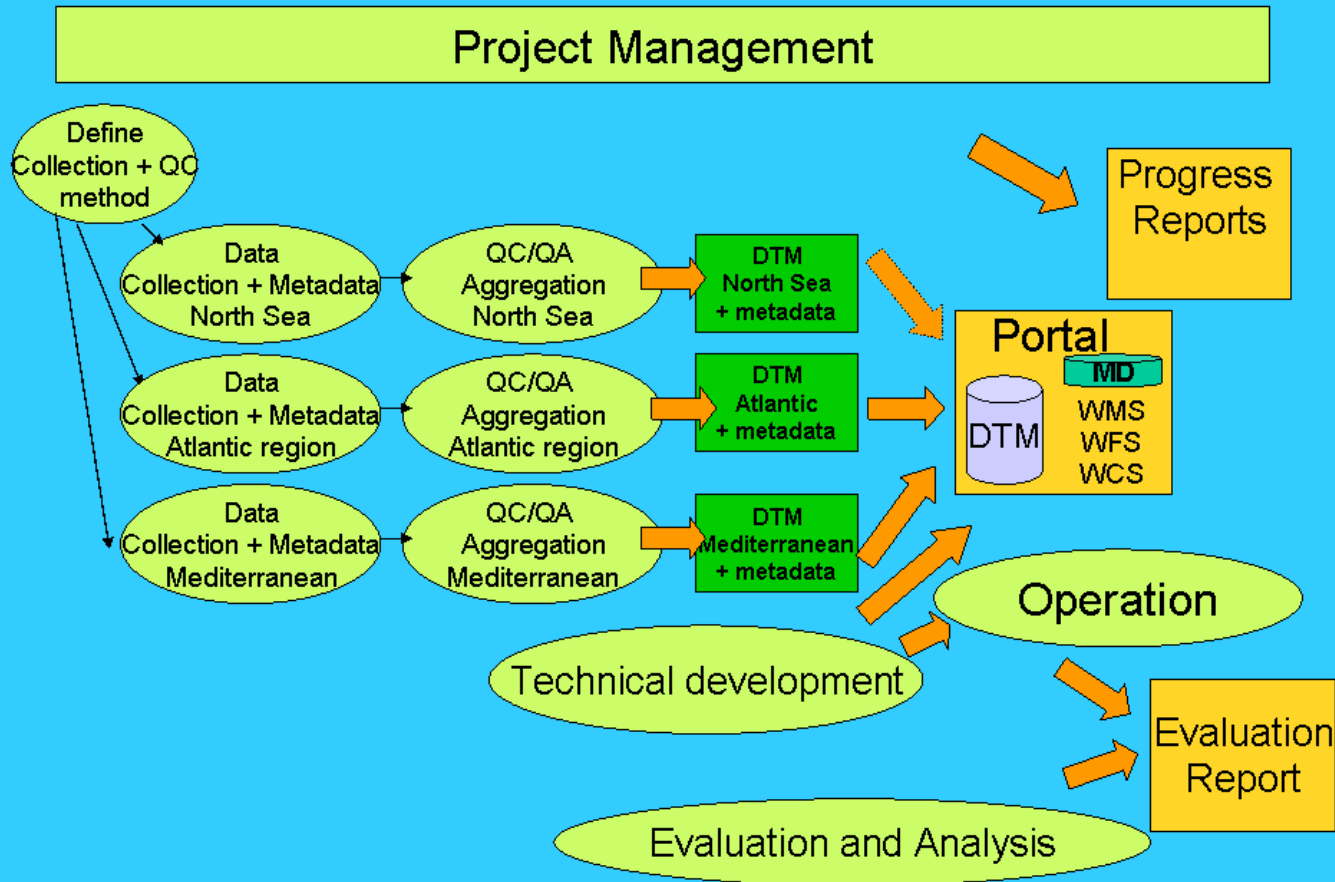


- water depth in gridded form over whole of maritime basin on a grid of at least quarter a minute of longitude and latitude: Digital Terrain Models (DTMs) will be produced from the available bathymetric data sets from all partners for each of the 3 regions, including indications of accuracy per cell; for the DTM grid a cell width of 500 meter will be feasible;
- water depth in vector form with isobaths at a scale of at least one to one million: Contours will be created from the DTMs.
- depth profiles along tracklines: Will be created from the DTMs for pre-defined transects and possibly via the portal for user defined transects
- multibeam surveys along tracklines: the tracks of the multibeam surveys will be included as layer via the CDI metadata, while the access to the actual data sets will go through the SeaDataNet CDI shopping mechanism
- coastlines: will be derived from the data supplies by HO's; from the ENC's a coastline of 1: 150.000 can be provided, which is an improvement in comparison to the World Vector Shoreline (WVS) with a scale of 1:250.000; for specific regions a higher resolution of 1:75.000 might be achieved;
- underwater features – wrecks, seabed obstructions etc ; these will be derived from the data supplies by HO's and will comprise those underwater features, that are included in the nautical charts and ENC's.



- The metadata in the EMODNET pilot will be public domain and freely available for all users.
- The DTM data products (GIS layers) will be freely available for all users as OGC services.
- For data access (= downloading in particular the background data as detailed in the data inventory and as used for the products) the data copyrights of owners must be respected. The CDI metadata includes a value for data access restriction for every data set it manages, as well as a clear indication of the distributor. The SeaDataNet CDI shopping mechanism is fit for dealing with different access restrictions.

## EMODNET Hydrographic lot – flow diagram



Phase 1 - Months 1-12 - Development and build

Phase 2 - Months 13-18 - Test and monitor

Phase 3 - Months 19-24 - Upgrade

Phase 4 - Months 25-36 - Maintenance and operation





- The Hydrographic portal will be a dedicated website with background, progress information about the project and standards info.
- The Digital Terrain Model (DTM), produced for each region, is integrated into an Oracle Spatial database. The Hydrographic portal services will be based on the SENS Distribution solution by ATLIS, that will be configured on top of the integrated DTM database.
- The web portal will show an ENC map with the bathymetry. Both the ENC and the bathymetry are served by a WMS (Web Map Service). The coastline and underwater features will be added as additional WMS layers.
- The Common Data Index (CDI) services will be integrated into the portal, including its services for requesting background data sets from their distributors.



- Organisations, managing hydrographic data for the focus regions, are invited to contribute their data to the project. It will improve the quality of the DTM's and the overall service.
- The hydrographic data will be referenced to the DTM products as metadata via the Common Data Index. This will provide a shop window for data providers. Users can follow the references to the data owners.
- The Terms of Reference of the pilot state a low resolution. However many user applications will require higher resolutions. The pilot serves to build up experiences in producing regional products and serving users, but also to encourage users to bring forward their further requirements and to assess the related efforts and costs.
- The pilots will thus be followed by additional tenders and projects to expand the regions, to improve the resolution and to acquire additional data for areas with low or no coverage. This will provide opportunities!