

Maximising the Value of IHO Data



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Marketing Director, OceanWise

Content

- About OceanWise
- Effective Data Management
- Marine Spatial Data Infrastructure (MSDI)
- Marine Spatial Planning
- OceanWise Products and Services
- Case Study - Ports and GIS
- Conclusions

About OceanWise

Independent UK based company specialising in all aspects of marine environmental data acquisition, data and knowledge management and GIS

- Expertise in gathering and applying marine data to solving offshore environmental and engineering challenges
- Off-the-shelf software provision and system development
- Key partners – instrument manufacturers, software vendors, public service data holders, standards bodies & distributors
- Provides customers with comprehensive and efficient end-to-end coastal and ocean data management solutions
- International Consultancy Services: Technical and Managerial Training, Capacity Building and Change Management
- Vector and Raster Marine Mapping Products and Services (e.g. WMS, WMTS)

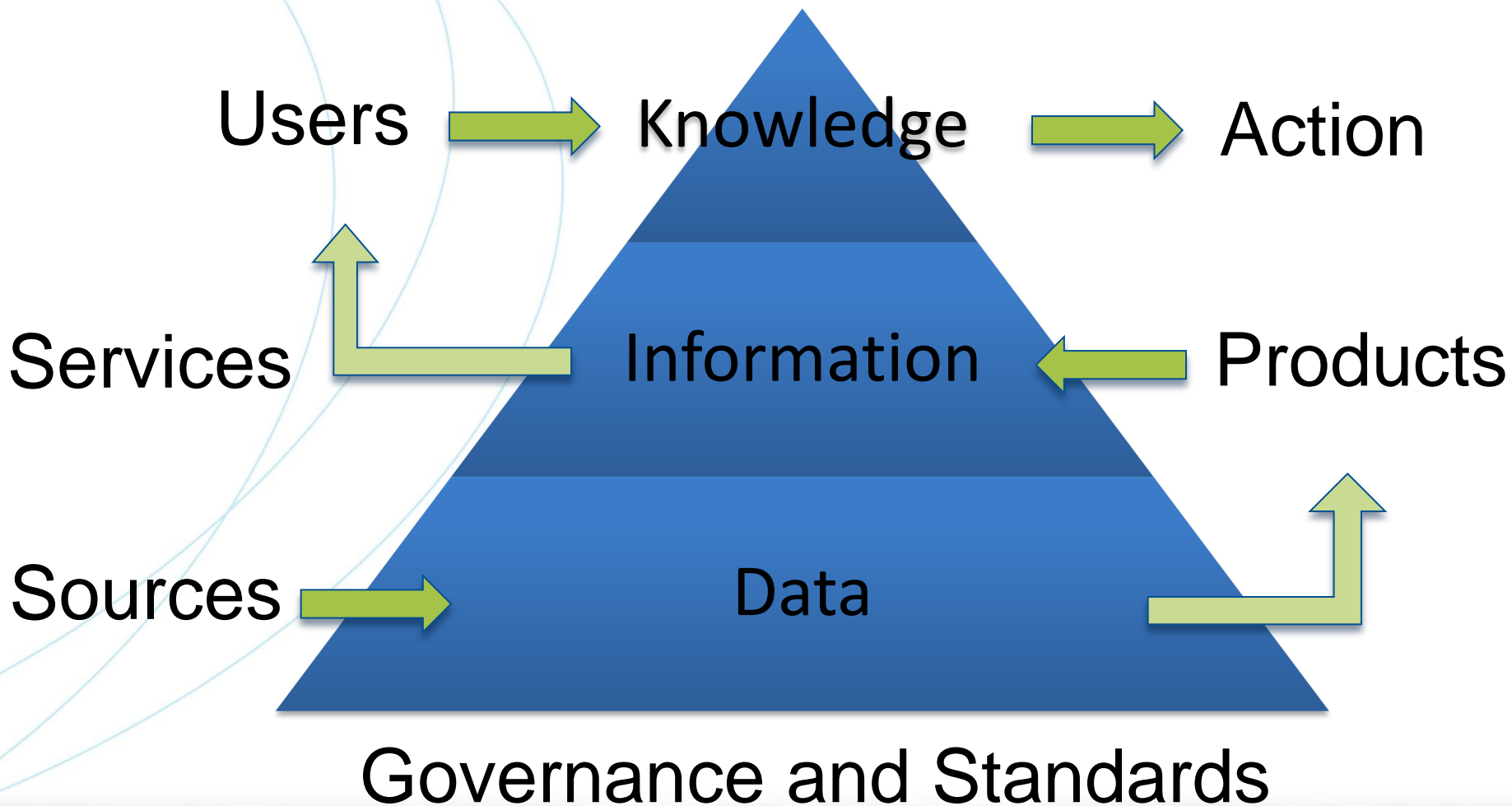
OceanWise Customers

- Peel Ports Group
- Defra
- Dorset County Council
- Environment Agency
- Natural England
- NERC (UK)
- Arup & Partners
- Royal Thai Navy
- The Crown Estate
- Isle of Man Government
- UK Hydrographic Office
- Welsh Government
- Natural Power Consultants
- Metropolitan Police
- KHOA (South Korea)
- Scottish Natural Heritage
- Cefas
- Centrica
- EU (EMODNet)
- BP Shipping Ltd
- Titan Environmental Surveys
- Subsea Asset Technology
- NARA (Sri Lanka)
- Partrac
- Vattenfall Wind Power
- Geodata Institute UK
- Synergy
- Associated British Ports
- SeaRoc
- Port of London
- E-ON
- DOE Northern Ireland

Elements of Good Data Management

- Capture once, use many times
- Manage data as close to source as possible
- Minimise work on input
- Maximise work on outputs (multiple products and services)
- Interoperability of systems, standards and specifications
- Data Exchange and Sharing using agreed standards and protocols
- Implement data strengthening with stakeholders

Data - Information - Knowledge



Data Management Approaches

1) Process Management
Driven or Product Centric

2) Data Management
Driven or Data Centric



What is MSDI?

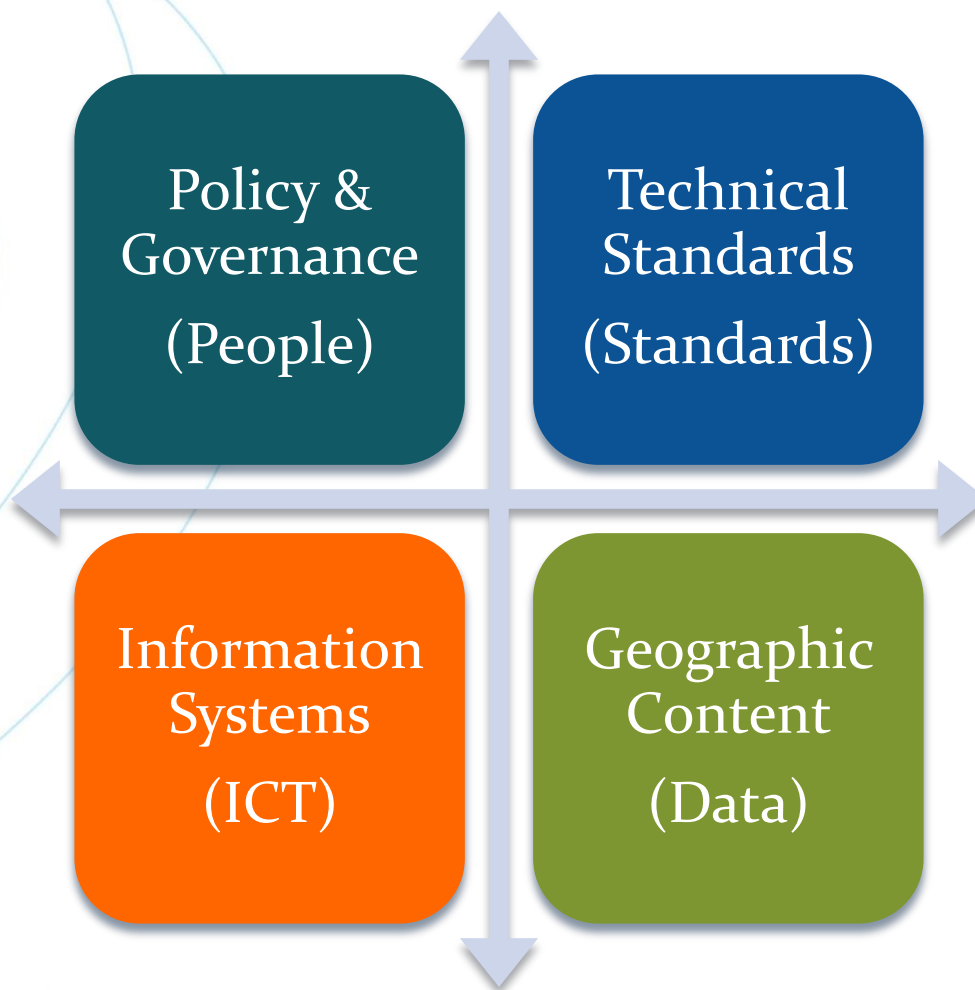
MSDI is the component of an SDI that encompasses marine geographic and business information in its widest sense and could typically include:

- seabed topography (bathymetry)
- geology and geomorphology
- marine infrastructure (e.g. wrecks, offshore installations, pipelines and cables)
- administrative and legal boundaries
- areas of conservation and marine habitats
- physical oceanography
- maritime transport and ports

Why is MSDI important?

- Stimulates organisations to make data accessible
- Improves data management practises
- Increases market exposure for information
- Generates social and economic benefits
- Allows better use of public funds
- Eliminates organisational isolation
- Enables co-operation and working together
- Improves security and reduces risk
- Brings cost savings
- Stimulates access to additional resources and funding

Key MSDI Components



SDI Issues and Challenges

People

- Data inaccessible or restrictive licensing conditions
- Little or no requirement to collaborate or share data

Standards

- Data acquired or processed to differing standards
- Standards used are incomplete or misunderstood

ICT

- Creation and discovery of metadata difficult
- No basic data management or publishing facilities

Data

- Data often captured from product and used inappropriately
- Data acquired or processed for single use only



Wider Use of Hydrographic Office Data

- Marine Spatial Planning (MSP)
- Integrated Coastal Zone Management (ICZM)
- Strategic Environmental Assessment (SEA)
- Shoreline Management Plans (SMP)
- Emergency Response
- Offshore Renewable Energy
- Aggregates Extraction
- Oil and Gas
- Infrastructure Development (e.g. Ports and harbours)
- Economic Development (e.g. Tourism)
- e-Navigation



MSDI



MARINE SPATIAL PLANNING



Maritime Transportation



Renewable Energy



Marine Conservation & Protection



Aggregates Extraction



Fisheries



Aquaculture



Oil & Gas exploration



Defence



Leisure & recreation

Benefits of Marine Spatial Planning

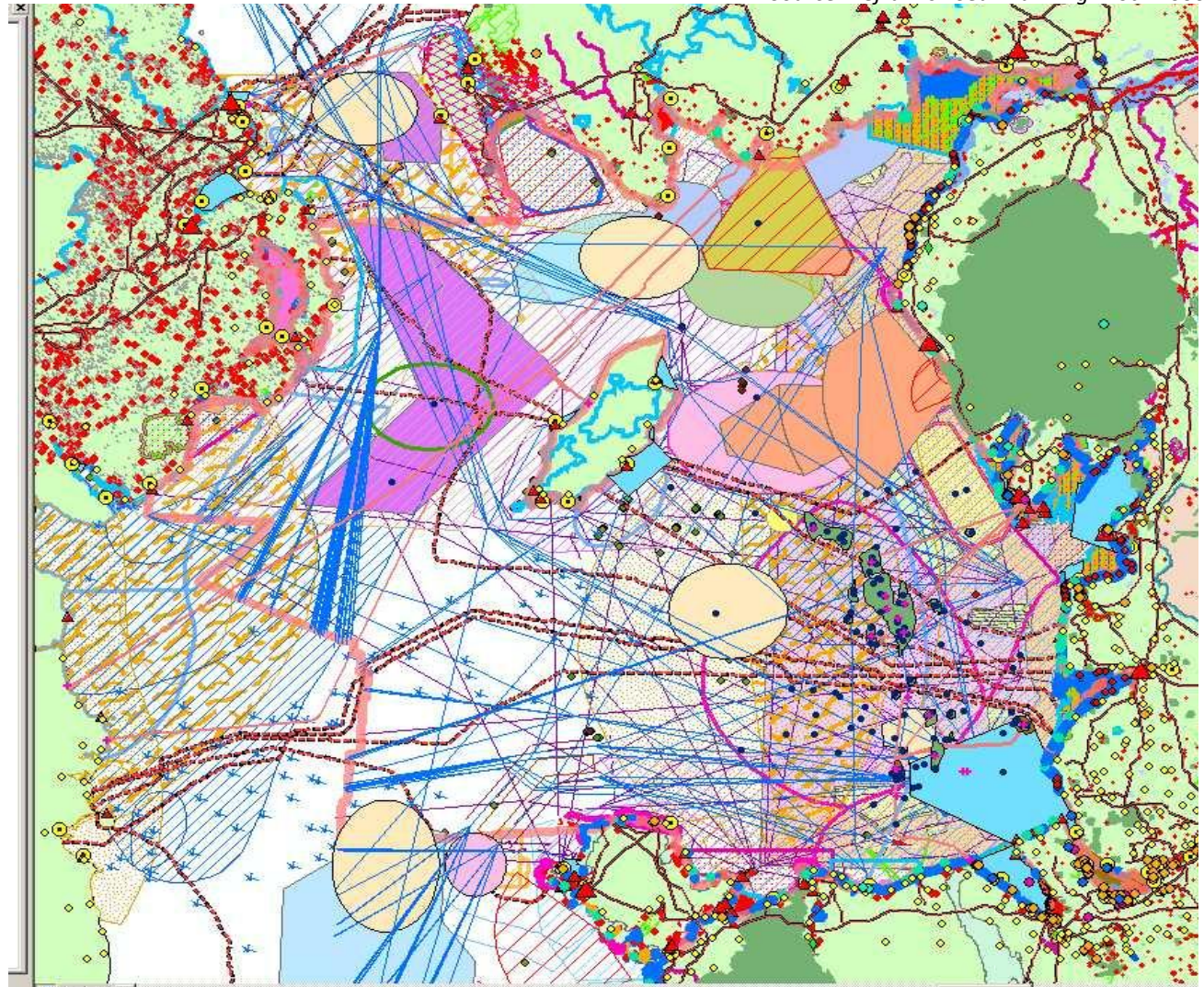
- Ecological benefits through an ecosystem based management approach
- Management and monitoring measures
 - Input measures (e.g. shipping vessel size, fishing activity)
 - Process measures (e.g. best environmental practise)
 - Output measures (e.g. tonnage limitation for aggregates)
 - Spatial and Temporal measures (e.g. designation of commercial activities , conservation areas)
- Social and community participation and “ownership”
- Economic benefits

...delivered through a Vision and Implementation Plan

Economic activity in the Irish Sea and coastal hinterland

Source: Defra Irish Sea Planning Pilot - 2006

- Land Use
- Tourism
- Oil & Gas
- Mariculture
- Coastal Defence
- Ports & Navigation
- Military Activities
- Culture
- Conservation
- Dredging & Disposal



■ Submarine
Cables

■ Fishing

■ Renewable
Energy

■ Marine
Recreation

■ Mineral
Extraction

What should be the goal?

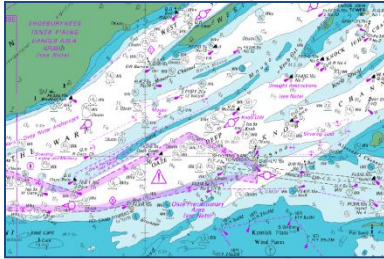
An MSDI populated with authoritative spatial data that will facilitate effective wider marine stewardship thereby enabling countries to achieve the goal of having

“clean, safe, healthy, productive and biologically diverse” oceans and seas

OceanWise Products and Services

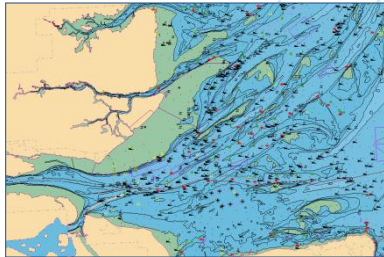
- **Digital Marine Mapping**
Data designed for immediate use as a reference map in GIS
- **Ocean Database**
Proven management solution for all common types of marine data
- **Port-Log.net**
Quick and easy storage and publishing of environmental data
- **Maritime Toolbar and Workflow Extensions**
Powerful tools for manipulating maritime data directly in GIS
- **Marine Data Management, GIS , Training & Mentoring**
Capacity and capability building, policy and strategy, integration

Marine and Coastal Mapping



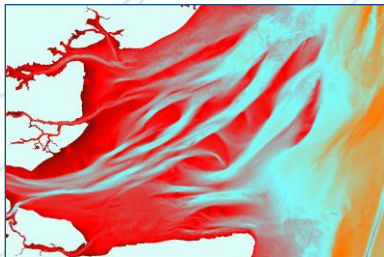
- **Raster Charts**

Popular Admiralty Chart series supplied as GeoTIFFs so no need for additional software



- **Marine Themes**

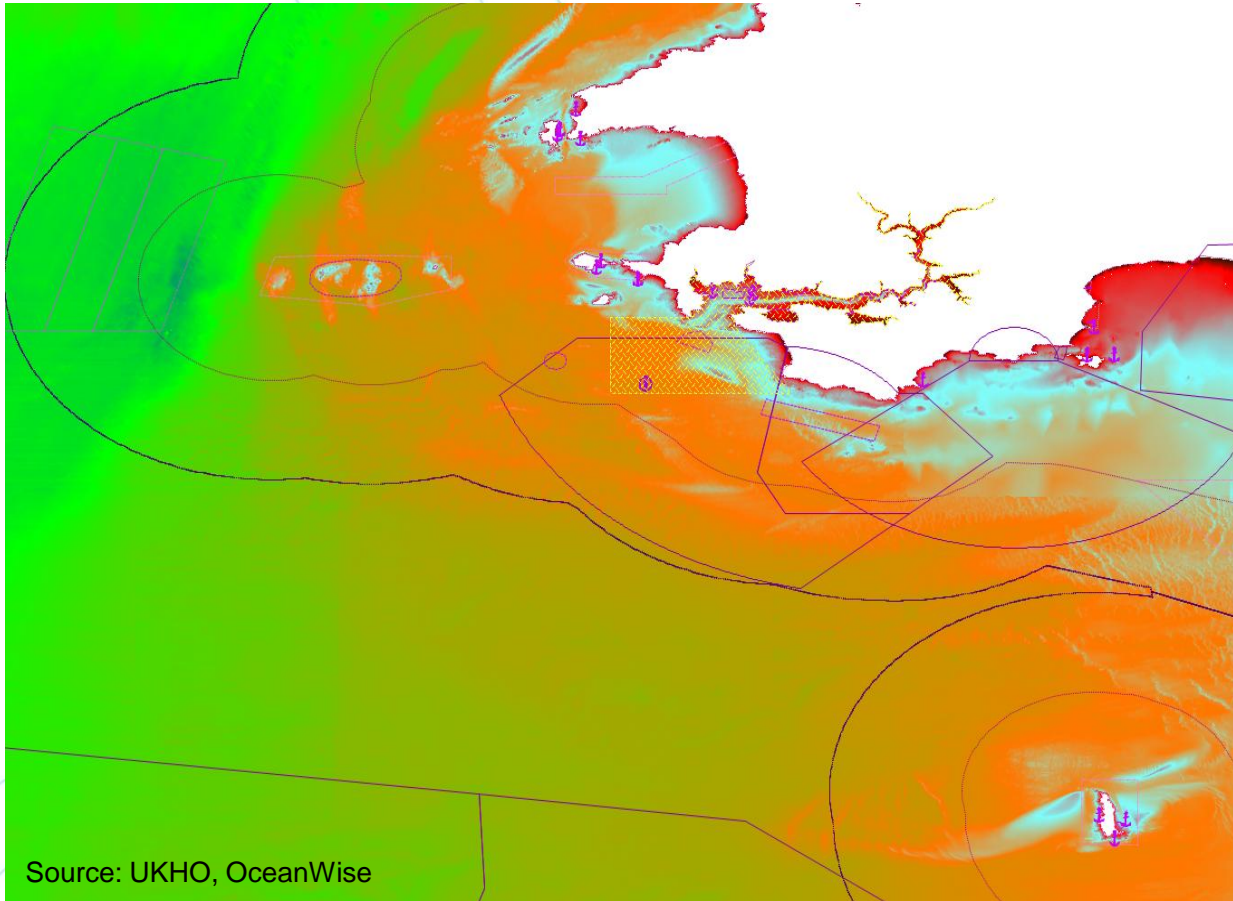
Hydrographic Office (and other) data engineered into logical layers for easy use in GIS



- **Marine Themes DEM**

1 & 6 arc second gridded dataset created from de-conflicted surveys, backfilled with chart data

Marine Themes



- Best available chart derived or source data used as input
- Improved de-confliction
- Contiguous feature geometry
- Uncomplicated easy to use attribution
- Retains scaled Elevation Layers

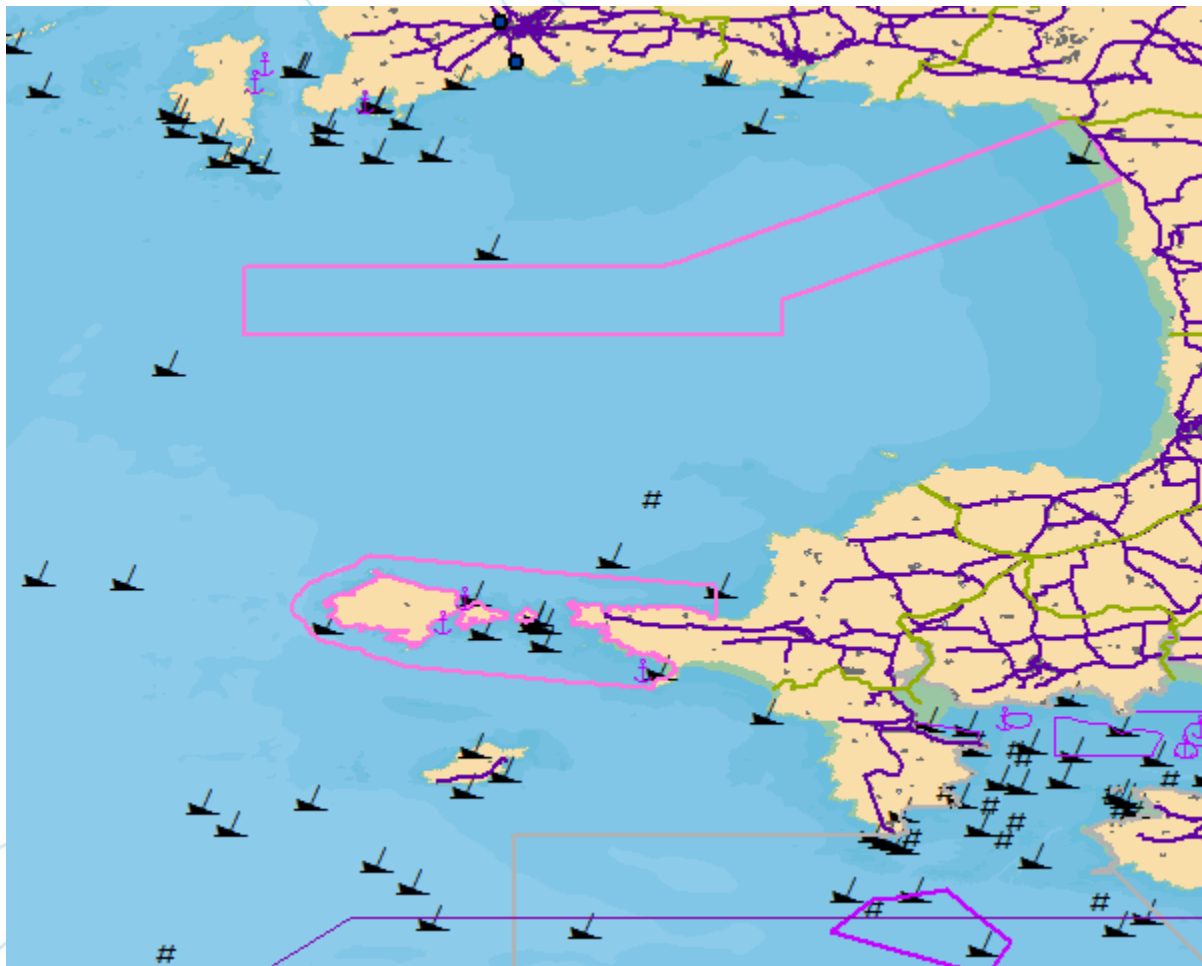
Specification

- Themes developed according to EC INSPIRE Annexes
 - Elevation (always scaled)
 - Industrial Facilities (somewhat simplified/defined by regulator/asset owner)
 - Administrative & Management Units (somewhat simplified/defined in law)
 - Geographical Regions (areas hierarchical plus points on interest - gazetteer)
 - Shipwrecks and Obstructions (position/multiple geometry/attributes)
 - Geology (scaled)
 - Tides (hierarchical)
- Elevation data aggregated into three scale bands
 - Small (<1: 150,000)
 - Medium (1:30001 to 1: 150,000)
 - Large (> 1: 30,000)

Marine Themes - Features

- Third Generation Digital Marine Mapping
- Converts HO source data formats e.g. S-57 to GIS
- Starts to address problems of re-engineering data from product i.e. ENC's to seamless GIS layers i.e. no fragmented geometry
- Categorised according to INSPIRE Annexes (Themes)
- Simplified and easily understood attribute structure
- Supports MEDIN vision of definitive reference data sets
- Shared Public Sector pricing model
- Land – Sea harmonisation “ready”

Marine Themes – Feature Layers



- Elevation --
Small Medium &
Large Scale
- Shipwrecks &
Obstructions
- Industrial Facilities
- Transport
- Administrative &
Management Units
- Geographical
Regions (L/M/S)

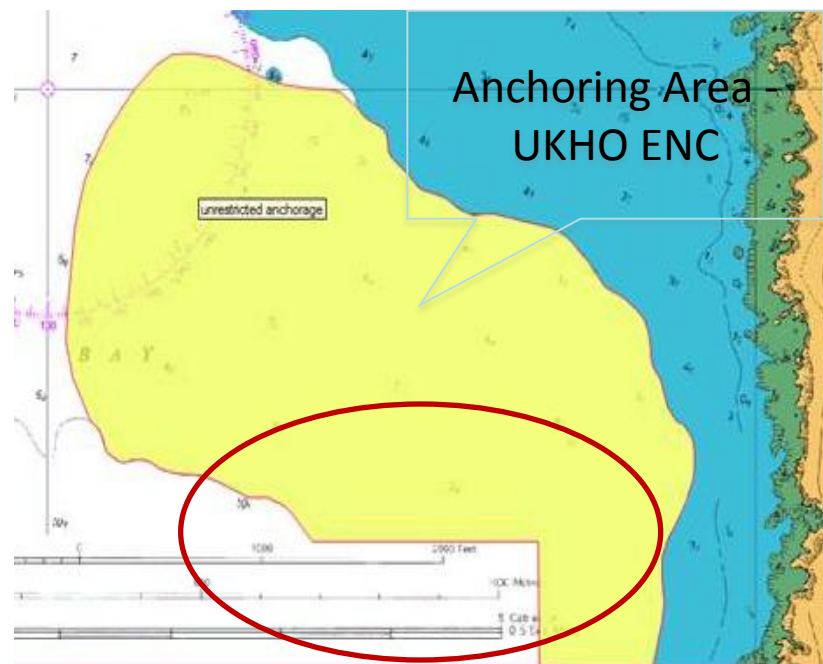
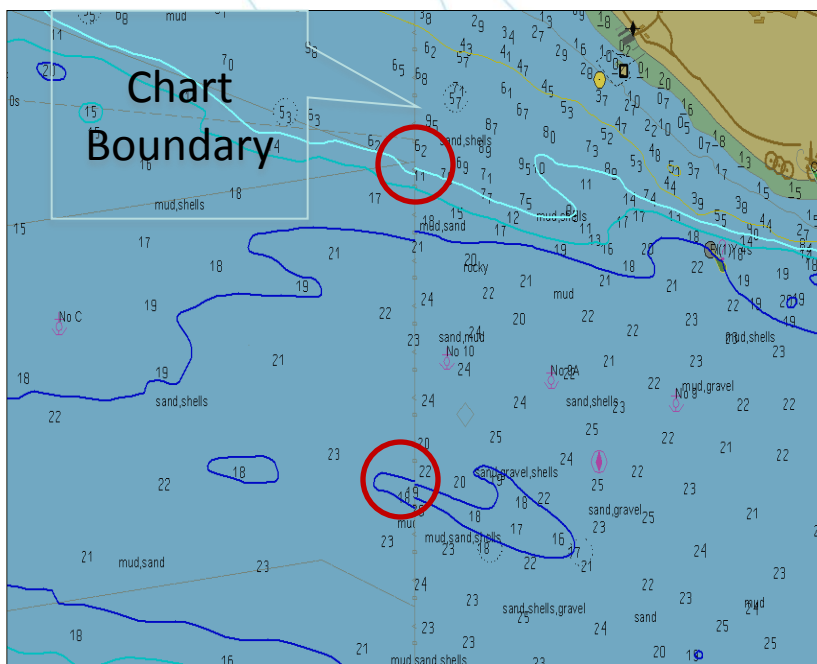
© Ordnance Survey 2012, Vector Map District

Marine Themes – Attribution

Description	Value
CATEGORY	port-hand lateral mark
CONDITION	
DESCRIPTION	Beacon, Lateral, Port
FEATURE_CODE	31041
GID	1001334568
INFORMATION	
MATERIAL	
NAME	
RESTRICTIONS	
SOURCE_DATE	20090228
SOURCE_INDICATION	GB,GB,Reprt,FODB-00013795-0000-DB,3274 N...
STATUS	
THEME	TRANSPORT
UPDATED	20111206

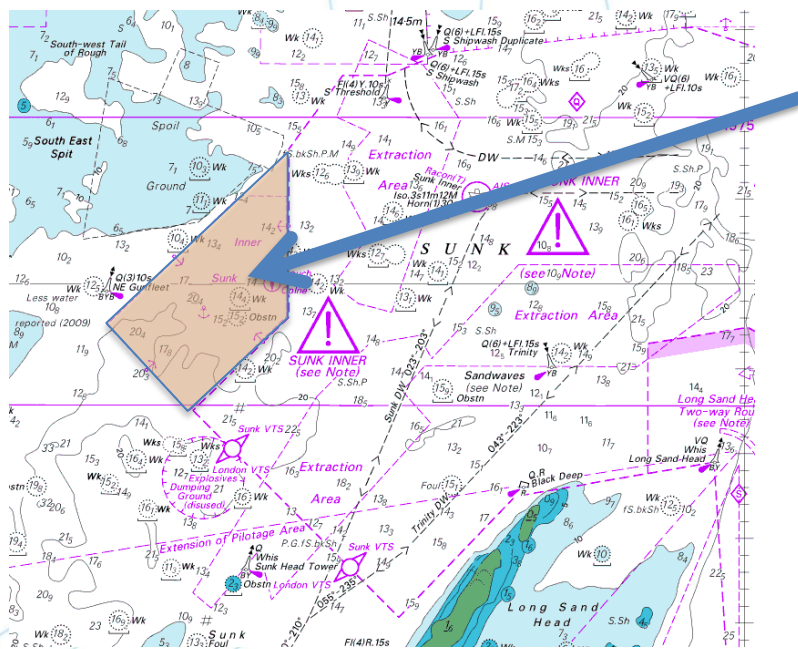
- Supplied as GML
- Simplified attribute structure
- Akin to OS MasterMap Topography Layer
- Understandable names
- Descriptive terms for easier querying
- Unique IDs (GIDs)
- Source information where available

Legacy Issues – Data from Product



- Individual charts contain inconsistent and discontinuous features
- Many important features only exist in ‘paper’ form and appear in re-purposed products unless resolved carefully
- Ultimate solution is to go back to source records and re-create

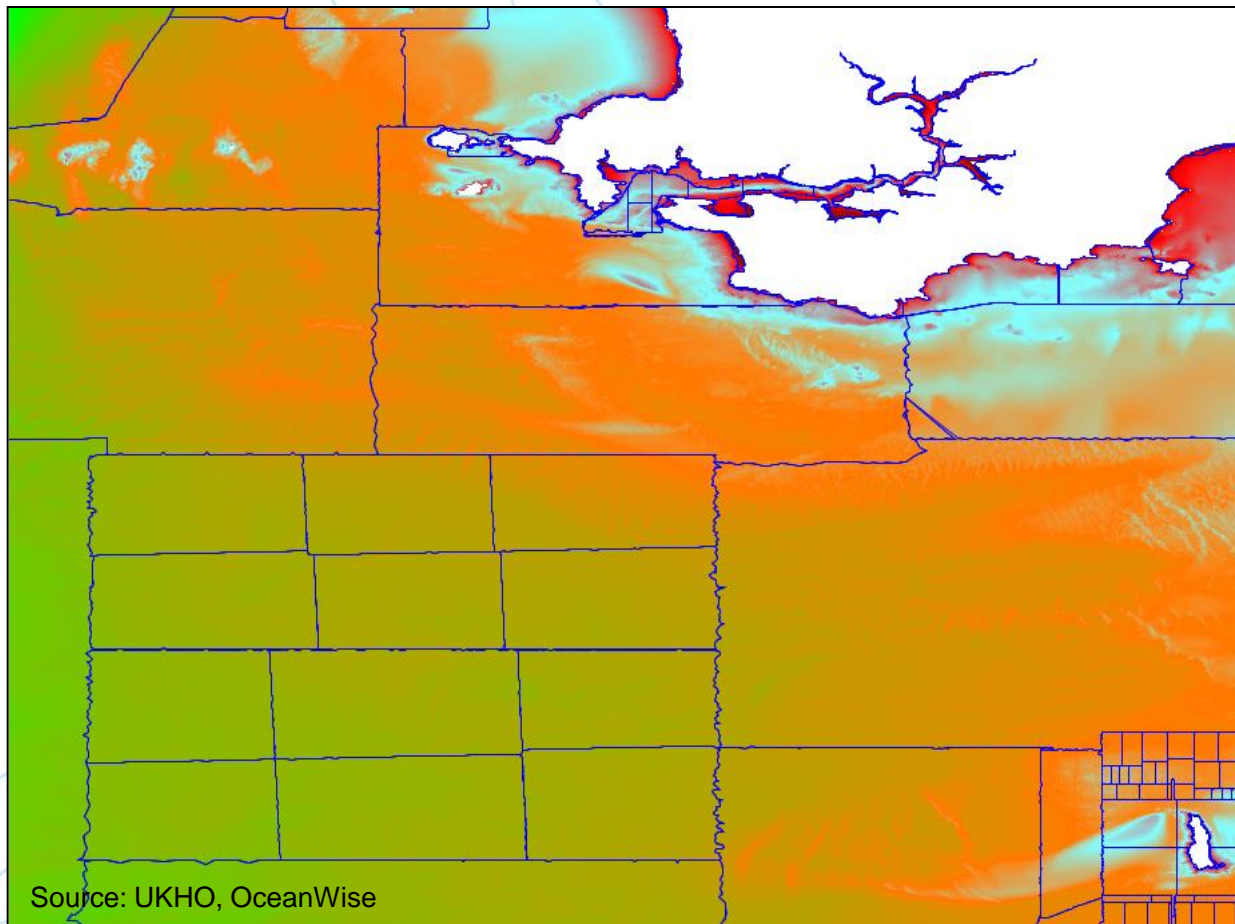
Linking Digital Mapping to Legislation and Policy



Anchor Area:
An area in which vessels anchor or may anchor. (IHO Dictionary, S-32, 5th Edition, 130)

But how real is the constraint, can it be amended or restrictions and risk mitigated? How do I find out more and who do I contact? What am I missing?

Marine Themes DEM - UK & Ireland



- Up to date data from CHP / UKHO
- Contiguous and accurate coastline
- Height attributed coastline (VORF)
- Improved de-confliction
- Nearest neighbour interpolation
- Comprehensive evaluation metadata

DEM Creation & Maintenance

- Data Sources (in order of preference):
 - Surveys received digitally from UKHO (visually inspected & assessed)
 - Single-beam surveys (SBES) – 1: 25,000 or 1: 50,000 compilation scale
 - Multi-beam surveys (MBES) & LiDAR – 1m, 2m, 5m or 10m bin size (depth dependent)
 - Survey data captured from analogue survey sheets, rigorously checked and quality controlled. Inshore surveys now being digitised.
 - Depth contours and soundings derived from largest available scale of Electronic Navigation Charts (ENCs)
- High density multi-beam (RAW or GSF) thinned (by UKHO)
- Original datum of input data (i.e. Chart Datum) retained

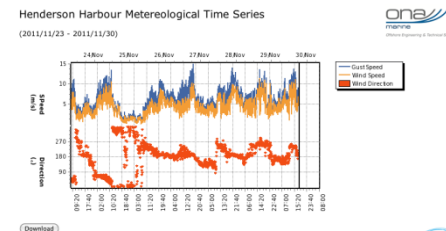
Port-Log.net

- Quick and easy storage and publishing of environmental monitoring data
 - Service provided is proven and low risk
 - Instrument and manufacturer independent
 - RS232, TCP/IP and FTP data uploads
 - Standard and customised web interfaces
 - Cost effective and quick to set up
 - Range of oceanographic interfaces
 - E-mail and SMS alerts as standard
 - Extensible data model
 - Available as a System or hosted Service



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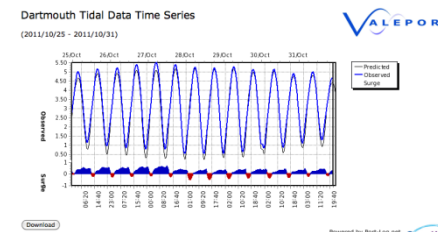
 Site: [Henderson](#)
 Dataset: [Sea](#)
 Chart: [Time Series](#)
 Display: Latest Week



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 Site: [Dartmouth](#)
 Dataset: [Tides](#)
 Chart: [Time Series](#)
 Display: Latest Week

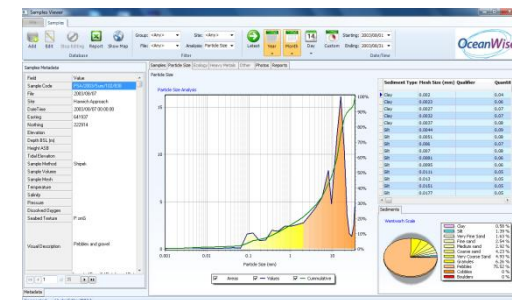
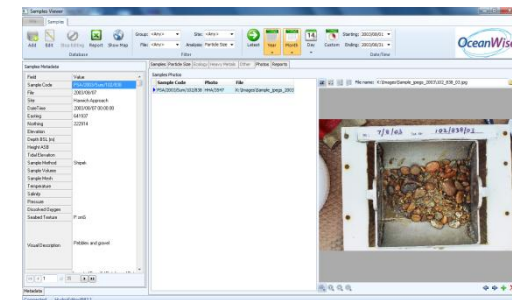


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Ocean Database

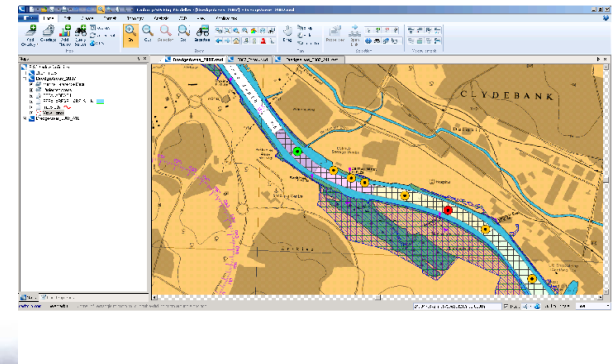
- Flexible data management solution for ALL common types of data:
 - Instrument and manufacturer independent
 - Flexible and extensible data model
 - Integrated metadata to industry standards
 - Imports and applies calibration records
 - Accessible to 3rd party applications
 - Proven low risk solution

- Includes:
 - IT infrastructure and operation environment
 - Ocean data model
 - Management and data loading software



Maritime Toolbar

- Powerful and easy to use tools for manipulating maritime data directly in GIS
 - Common and complex tasks made easy
 - Simple handling of bathymetric data
 - Handles all common maritime datasets
 - Batch tools to simplify repetitive tasks
 - Designed specifically for marine GIS user
 - Connects directly to Ocean Database
 - Extensible operating environment...
 - Infrastructure
 - Bathymetric surveys
 - Infrastructure
 - Environmental
 - Asset Management



Case Study - Port Environment

- Multi faceted business
- Land and marine operations
- Responsible for safety, security and environment
- Wide range of stakeholders
- Data is key to business and operational success
- Majority of port data has a spatial component
- Range of spatial data sources



Ports Operations and GIS

- **Planning & Communication**

Situation awareness; access to reference data and associated policy and compliance documents; licensing; environmental reporting

- **Marine Operations**

Hydrographic survey planning, data management and chart production; management and publishing of weather and tidal information e.g. to pilots

- **Asset and Facilities Management**

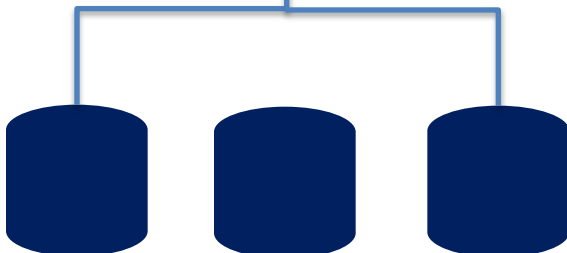
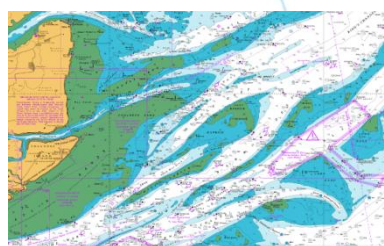
Location and details of assets; building and infrastructure planning and maintenance; navigational aids, details and allocation of berths and moorings

- **Safety and Security**

Wrecks and obstructions; information exchange e.g. with UKHO; contingency planning; emergency response; ISPS code planning and monitoring

GIS Components

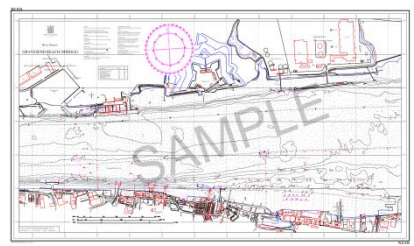
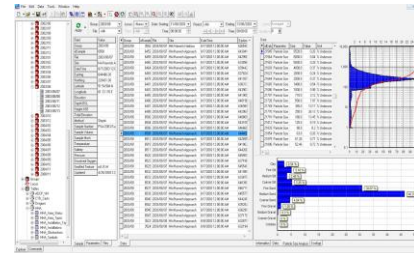
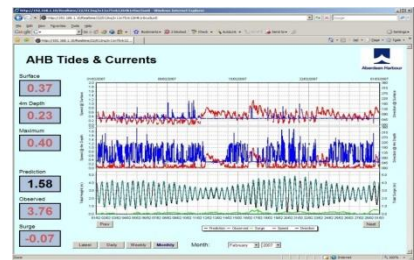
Data inputs



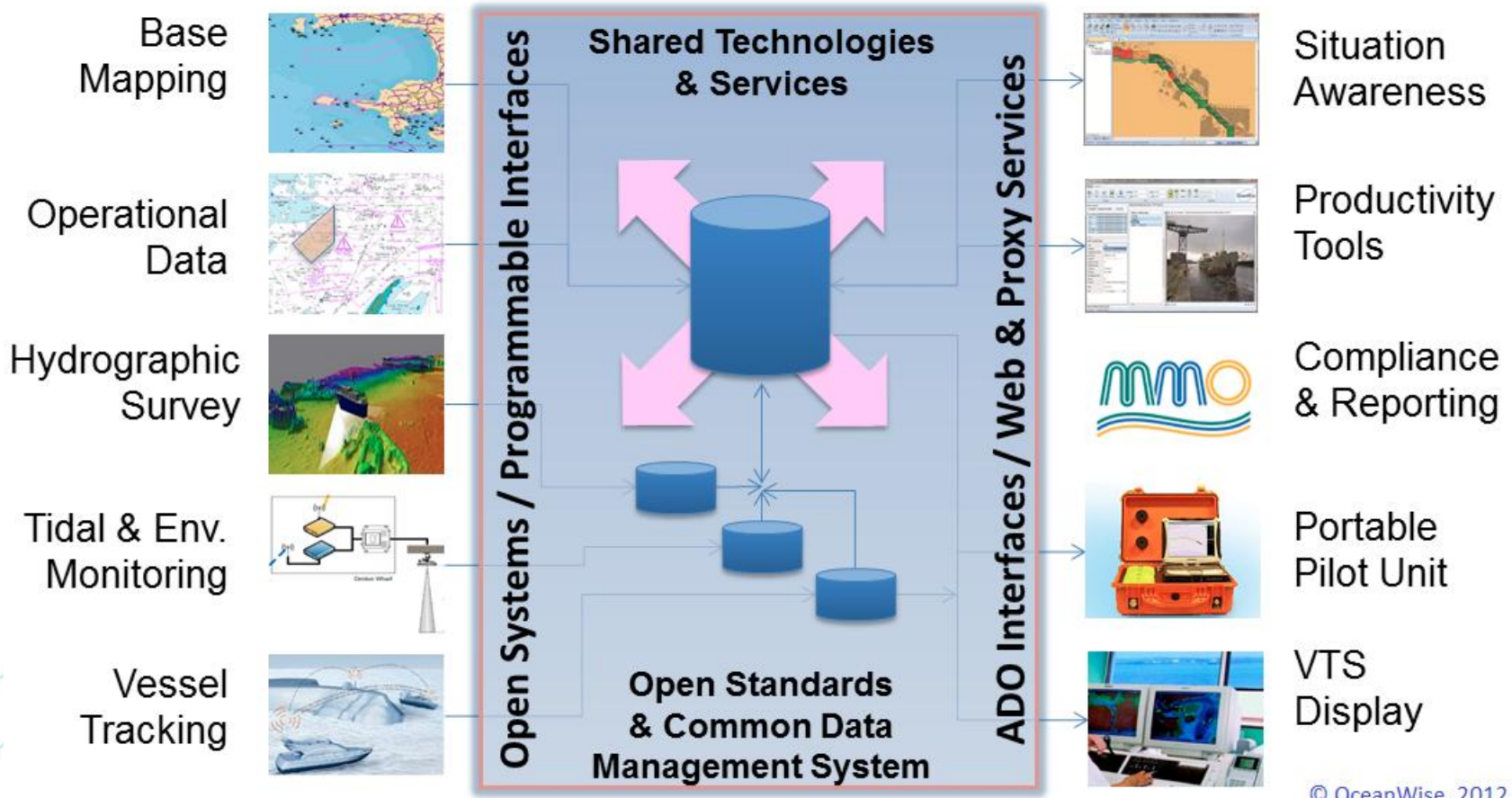
Linked Business Data



Productivity tools

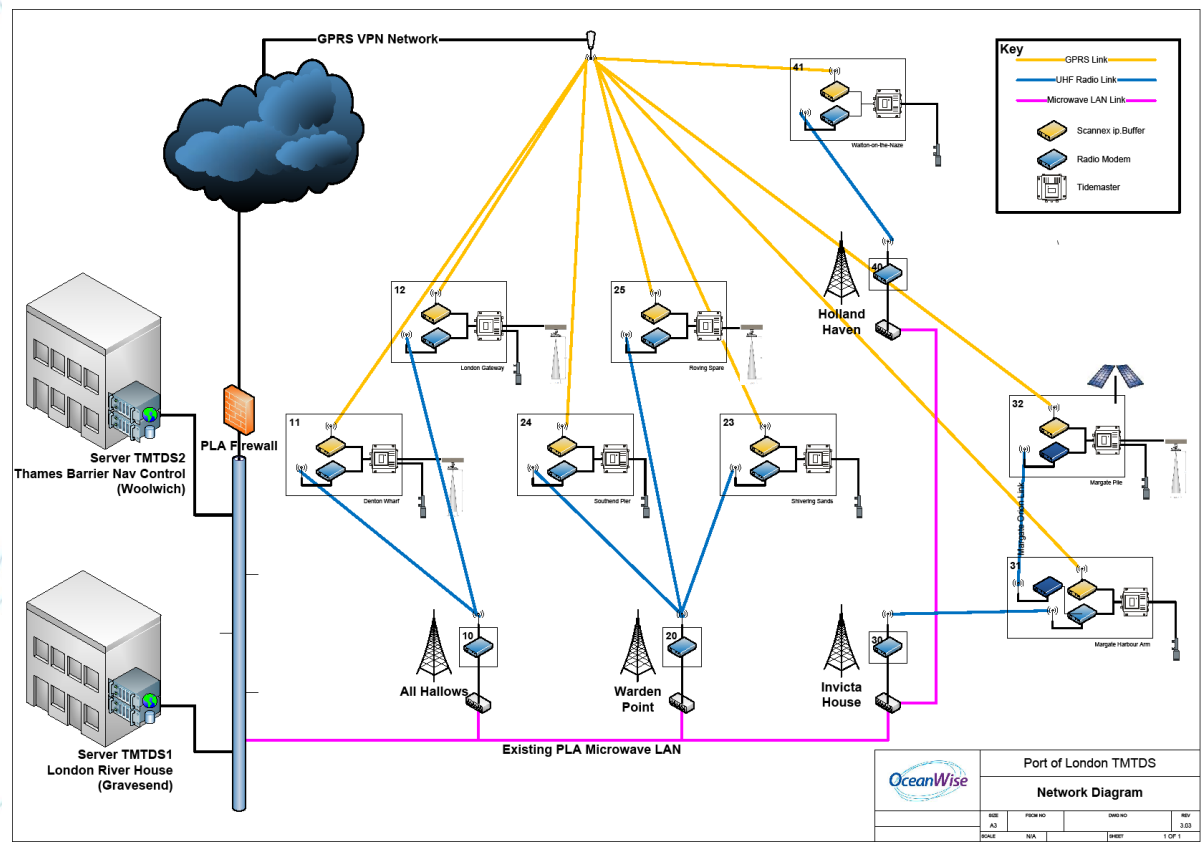


Maritime Information Infrastructure



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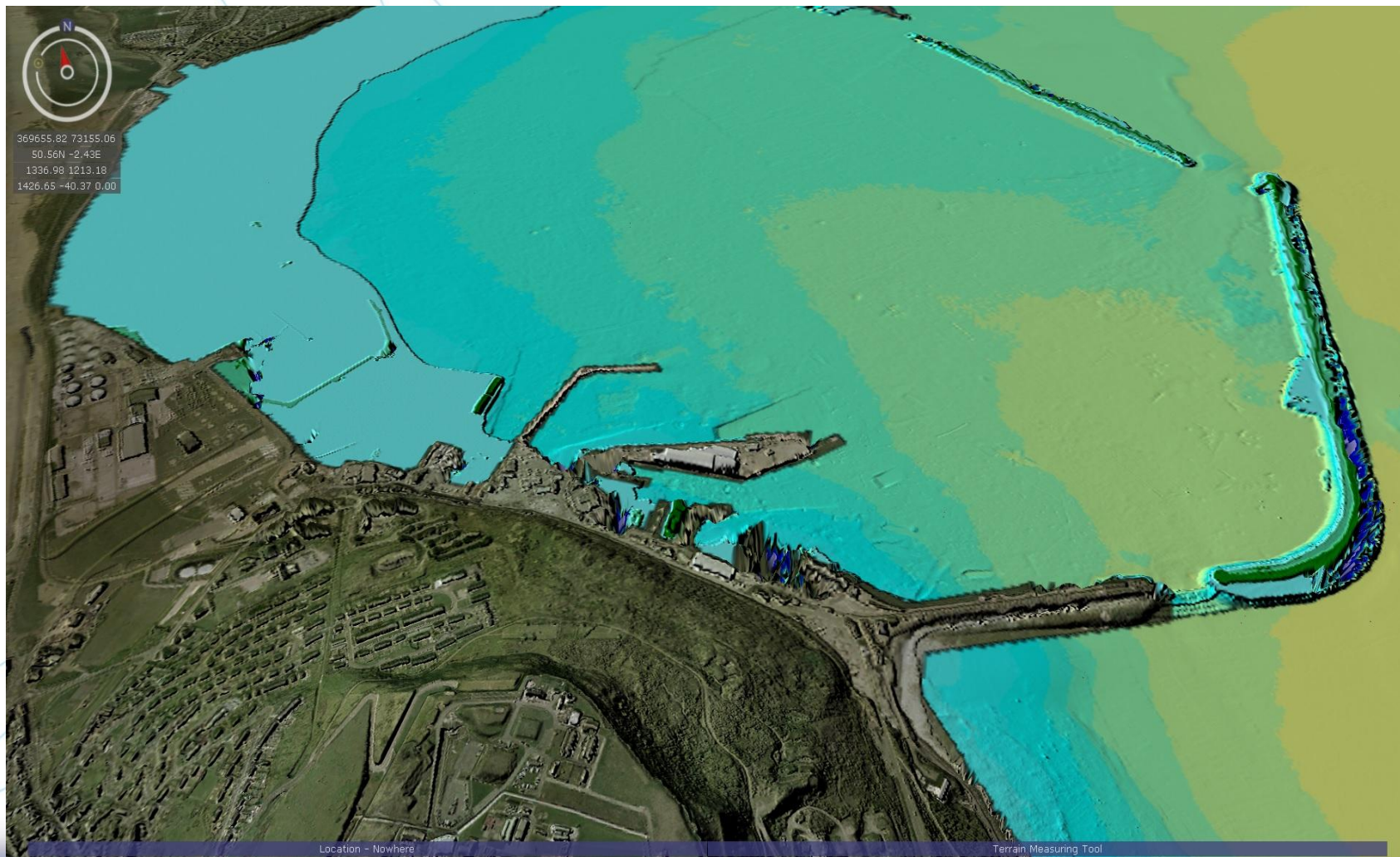
Thames Estuary TMDMS Wiring Diagram



3D Land-Sea Terrain Model Portbury, Bristol, UK



3D Land-Sea Terrain Model Portland Port, Dorset, UK



Conclusions

- There is an urgent need for quality spatial data services to satisfy growing demand in our marine space
- Data is still difficult to access, share and exchange
- The need still exists to re-purpose chart product data
- Core Reference data is a “must” for asset management and decision support
- MSDI allows stakeholders to act together to deliver interoperability
- The HO’s are valuable stakeholders...so get involved **now!**

...OceanWise has unparalleled access to data sources globally and is satisfying customers across the World!



Thank You

www.oceanwise.eu

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OceanWise

End-to-End Marine and Coastal Data
Management and Decision Support.



Intelligent Marine
and Coastal Mapping Data



Data Policy, Strategy
and Management Systems



Enterprise GIS
and Productivity Tools



Environmental Data
Sharing and



Capacity Building,
Training and

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