Marine Spatial Data Infrastructures – What, Why and How

by James Rapaport

SeaZone Solutions Ltd

Introduction

- What?
  - Marine SDI in the context of SDI
  - Components
- Why?
  - Applications
  - Benefits
- How?
  - SeaZone Hydrospatial

What?

Definition – Spatial Data Infrastructure

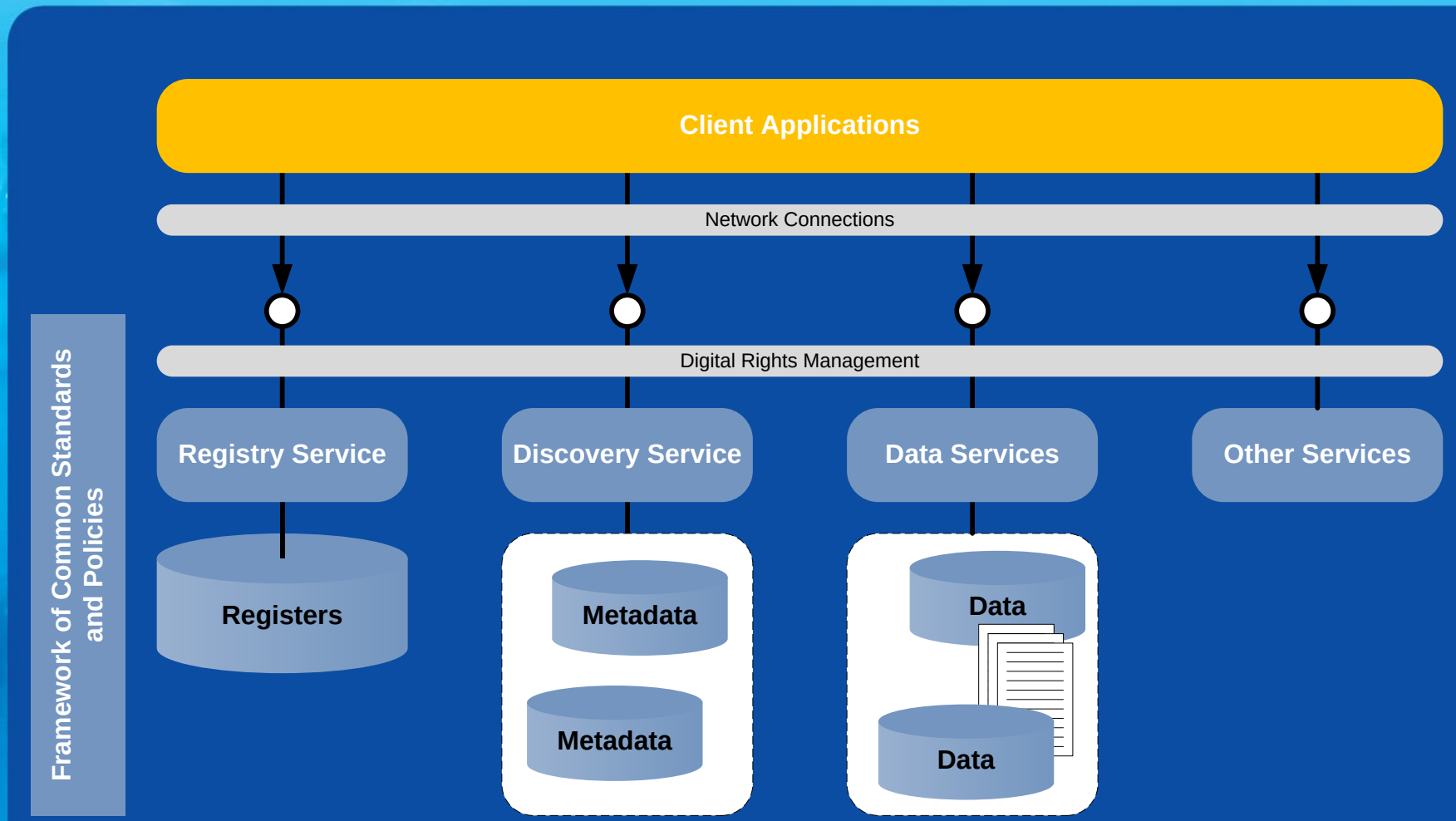
- A Spatial Data Infrastructure provides data over computer networks
  - Data are distributed across more than one repository
  - Data are managed by more than one organisation

- Additionally provides application services
  - Discovery service
  - Web coordinate transformation service

- Bound together by a common set of standards and policies
  - Data standards
  - Metadata standards
  - Data quality standards

Marine Spatial Data Infrastructure

- A manifestation of an SDI for the marine geographic domain
- This implies interoperability between marine and land data of the same thematic type
- Domain specific datasets
- Need for extension to standards (eg metadata for bathymetry)
- Third dimension perhaps used more widely than on land
- Temporal and dynamic environment
- Abstractions relied upon more so than on land (eg predictions of tides)



> BETTER DATA, BETTER SCIENCE, IMPROVED DECISIONS <

Content – A Differential

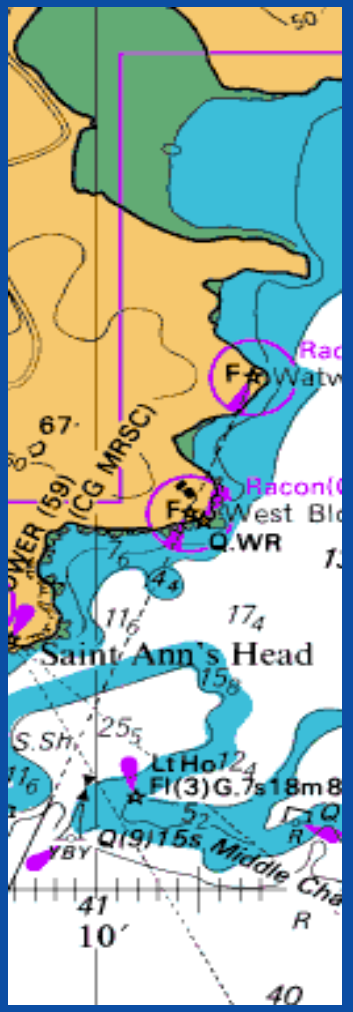
- Coordinate Reference Systems
  - Vertical CRS are referenced to dynamic surfaces
- Data sources
  - Navigational bias to marine reference data
- Feature catalogues
  - Conflict with topographic data at the coast
- Dynamic environment
  - Temporal components

Coordinate Reference Systems

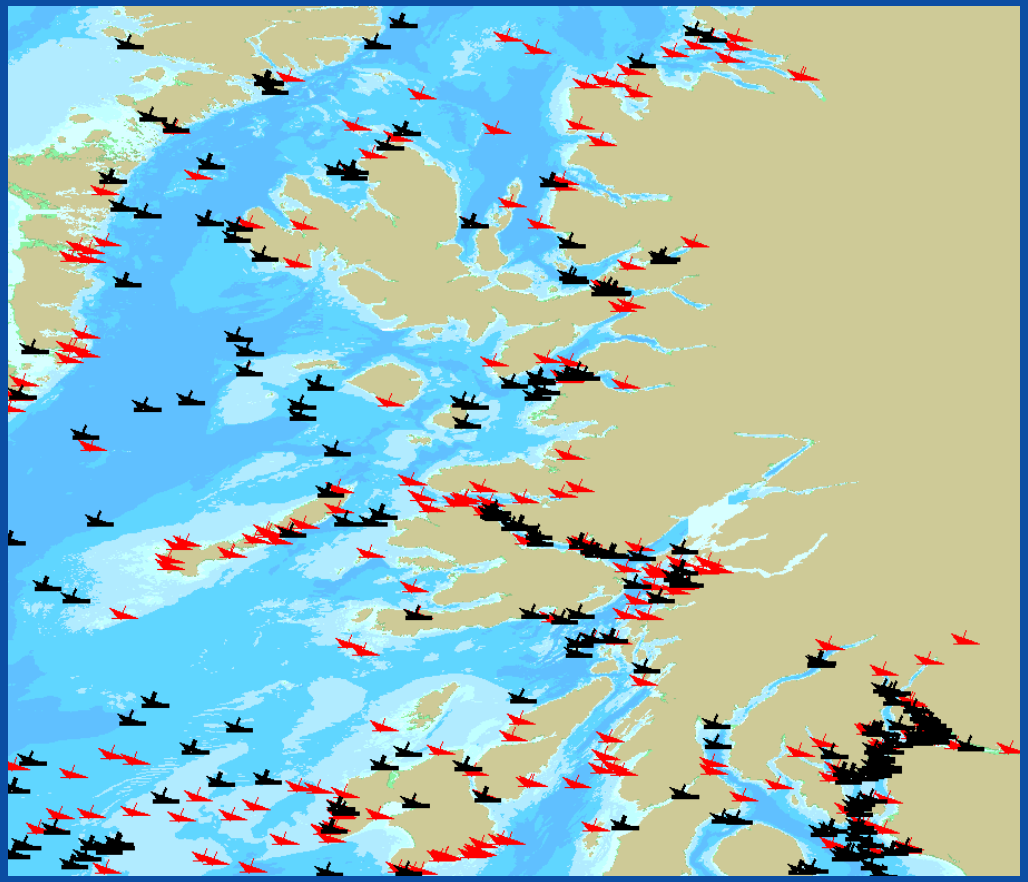
- The key to geographic data interoperability
- This is frequently overlooked
- Identifiable definitions of vertical CRS and coordinate transformations are lacking

Data Sources

- Designed solely for navigators
- Depicts a safety biased view of the world
- Charts are compiled as separate datasets
- Contain generalisations and conservative depths
- No interoperability with other datasets
- Electronic charting suitable for display only
- A small proportion of data are presented



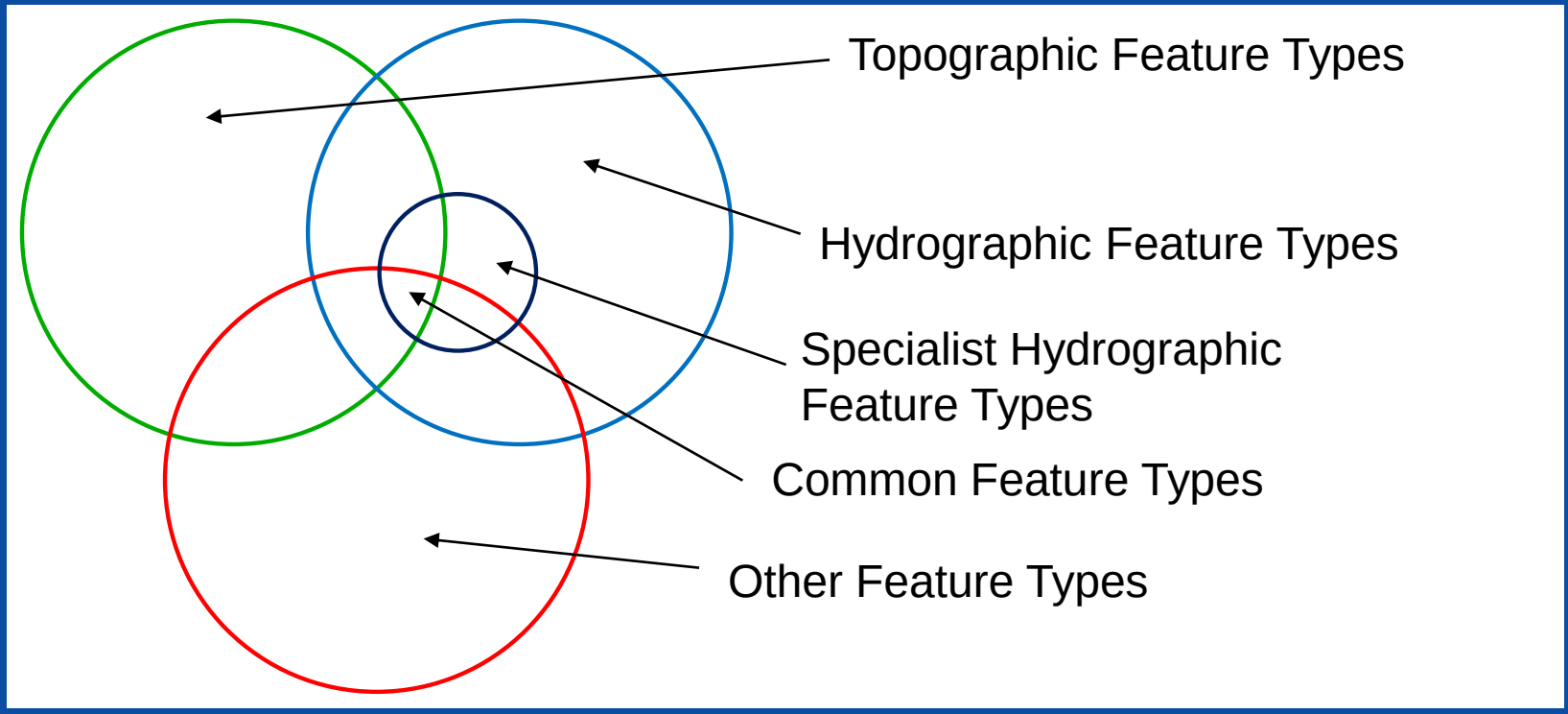
Wrecks Data



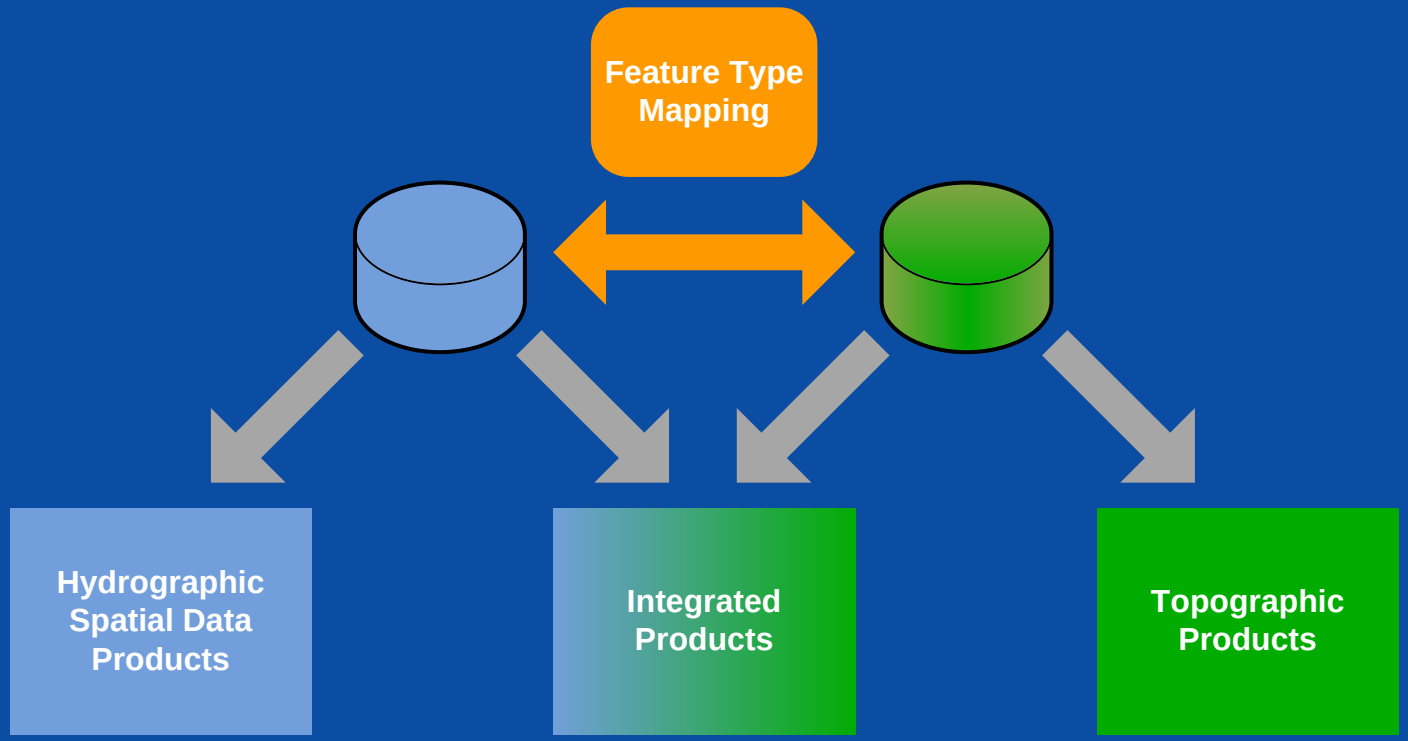
- Charted wrecks are shown in black
- Compare this with known wrecks shown in red

Feature Catalogues

- Overlapping features from land and marine organisations

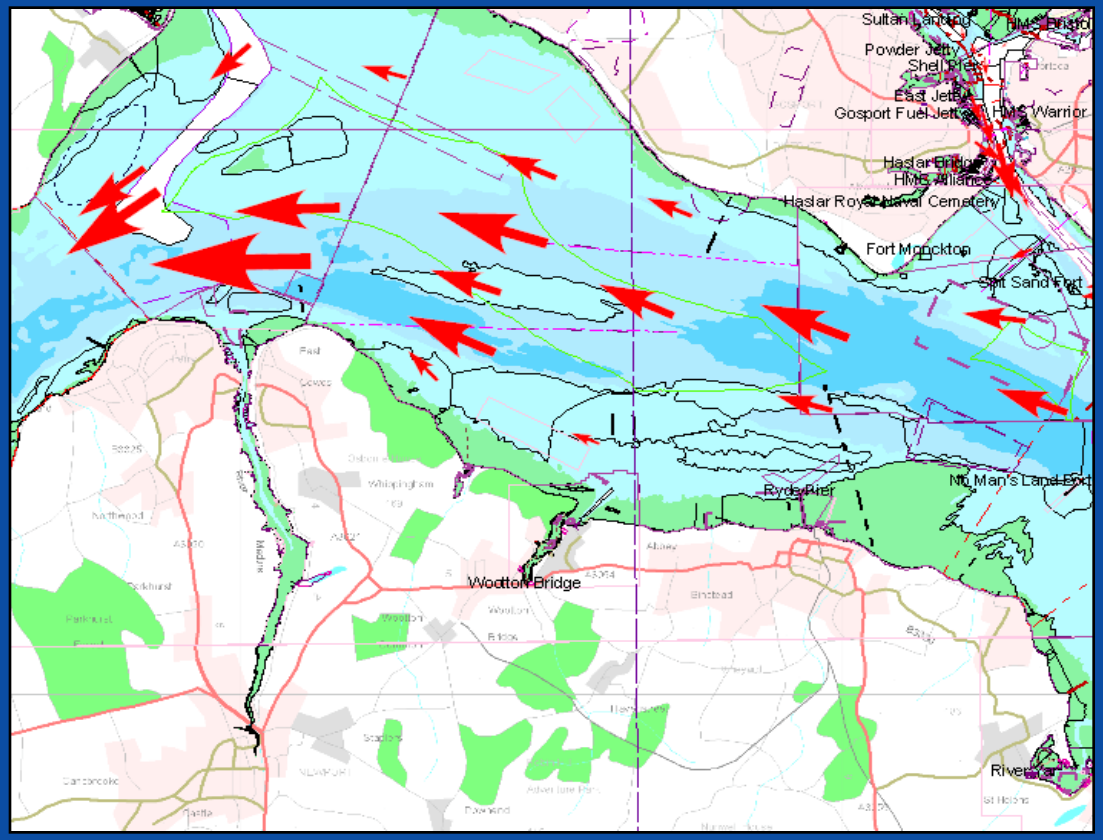


Feature Type Mapping



Temporal Data

- Consideration of dynamic data



Why?

Application Areas for MSDI

- Environment Protection
  - The protection and conservation of rich biodiversity against pressures from human activity and development
- Economic Development
  - Justification, planning, management and compliance of offshore and coastal development
- Risk Management
  - Management and mitigation incidents at sea, coastal erosion, flooding, rising sea levels, shipping and other activities

ALL THESE ACTIVITIES REQUIRE

ACCESS TO COMPREHENSIVE

FIT FOR PURPOSE

DATA AND INFORMATION

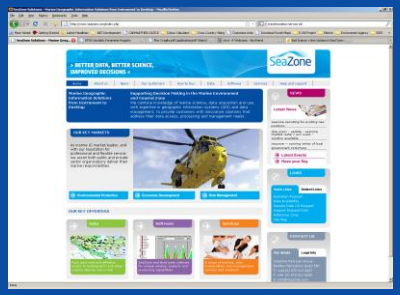
Benefits of MSDI

- Understanding what data we have
- Avoidance of data duplication
- Common reference data are used so we know we are talking about the same places
- Supporting the sharing of location-related information easily
- Facilitates the creation and dissemination of coherent and comprehensive data themes
- Facilitates inter-organisation working

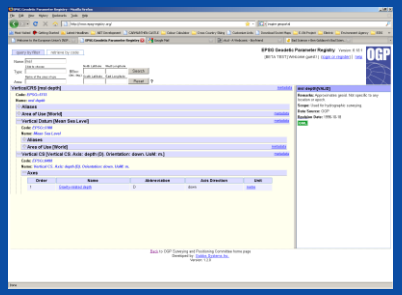
A Use Case

Web Coordinate Transformation Service

Discovery Service



Data Download Service

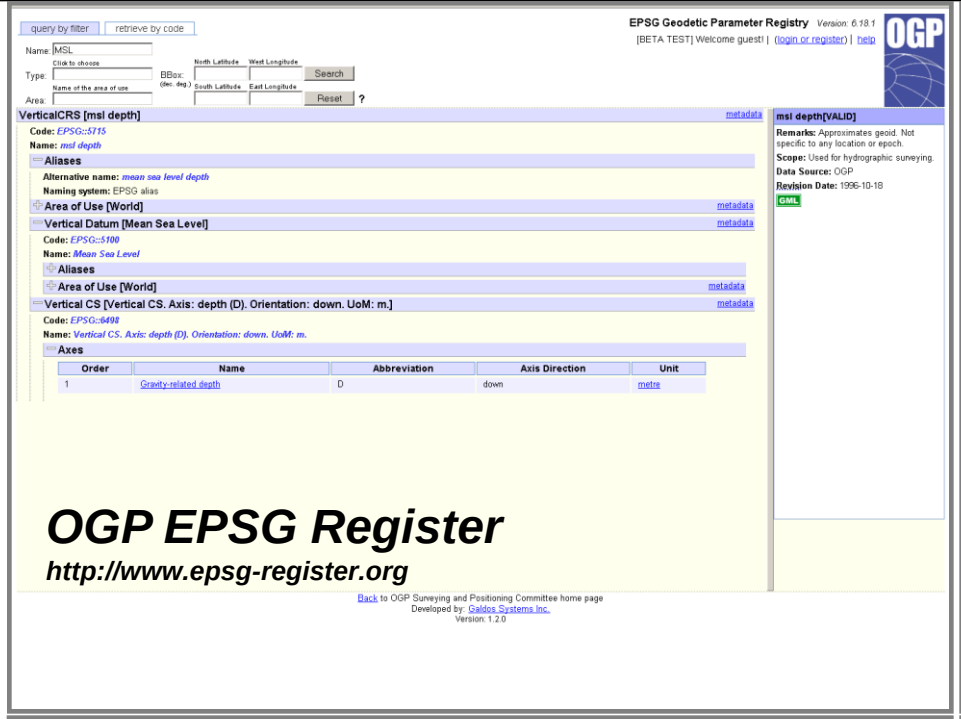


CRS Register

How?

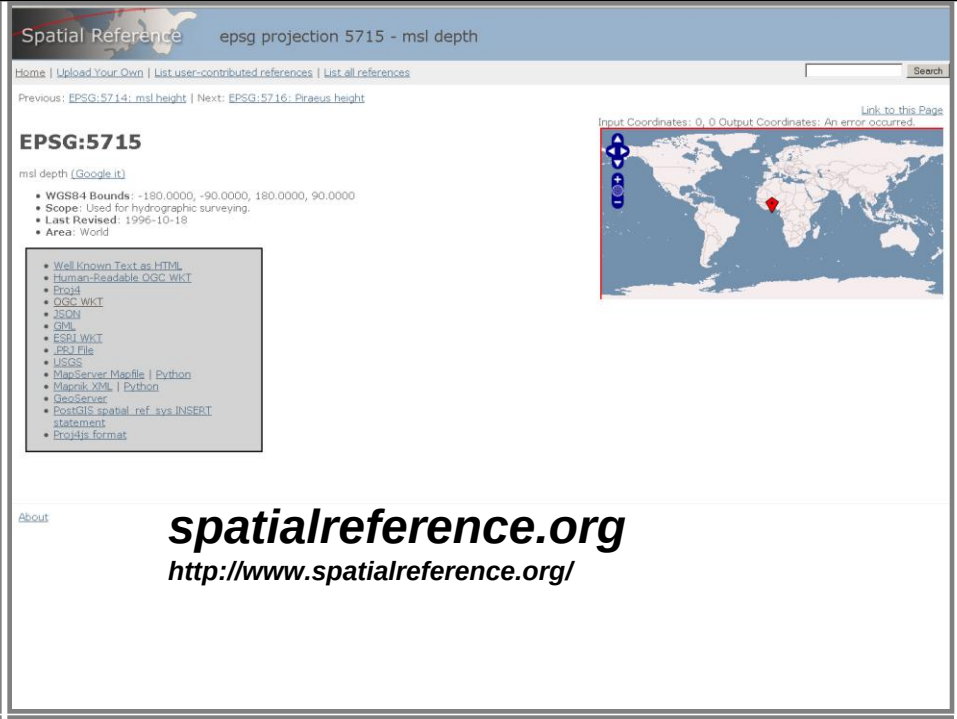
Scope and Policy Development

- Who are the stakeholders?
- Who are the data / service providers?
- Who are the data / service users?
- Develop a road map for the SDI
- Develop the conceptual design of the SDI
  - Identify register and service needs
  - Identify and organise reference data



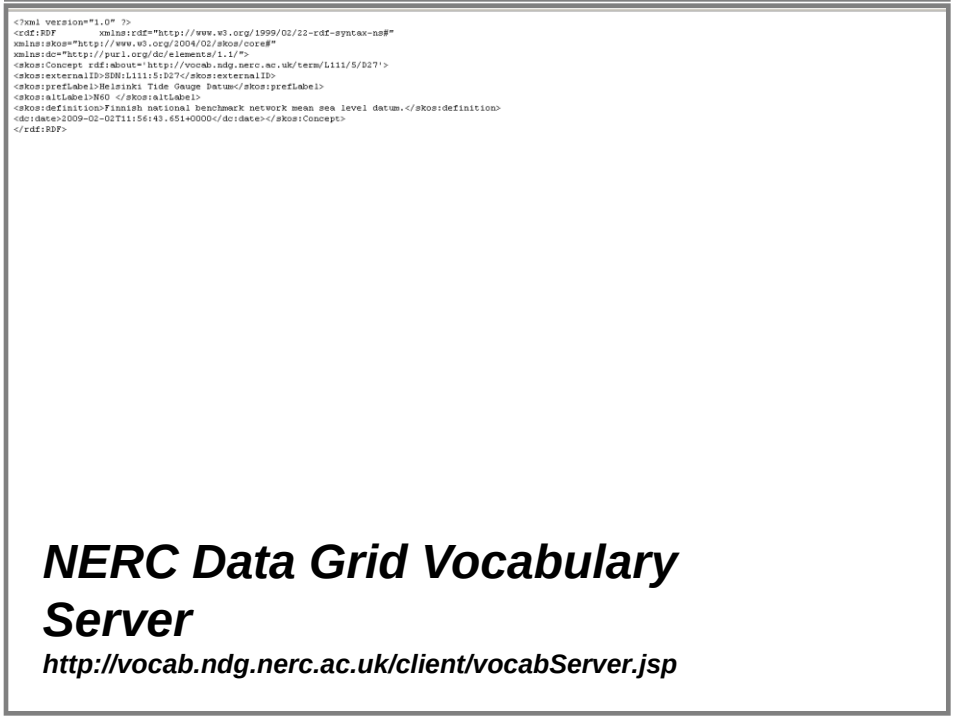
OGP EPSG Register

http://www.epsg-register.org



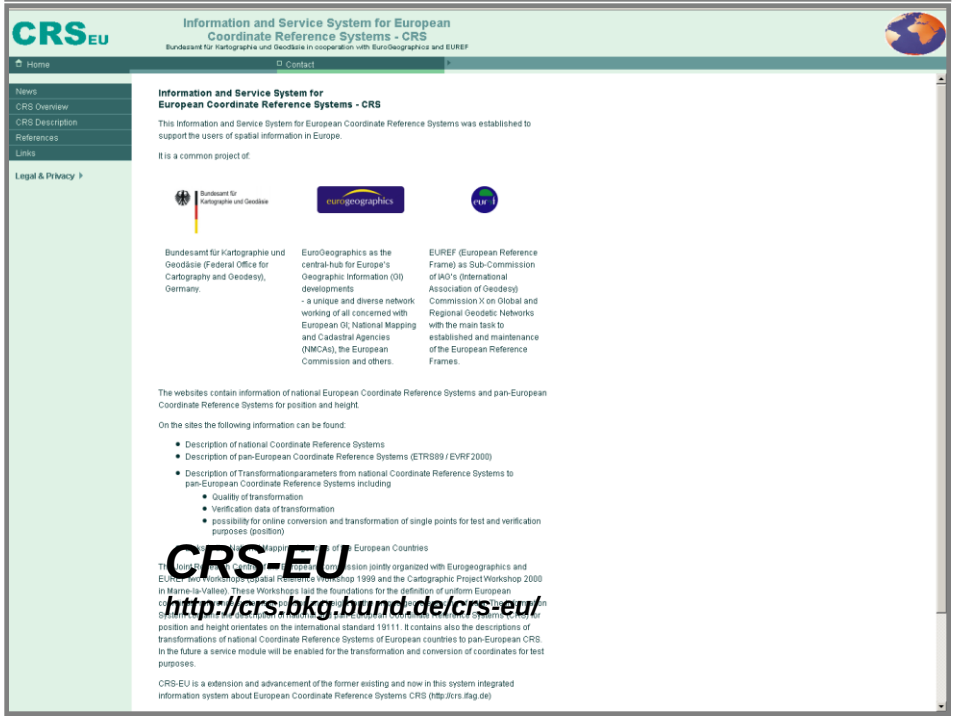
spatialreference.org

http://www.spatialreference.org/



NERC Data Grid Vocabulary Server

http://vocab.ndg.nerc.ac.uk/client/vocabServer.jsp



CRS-EU

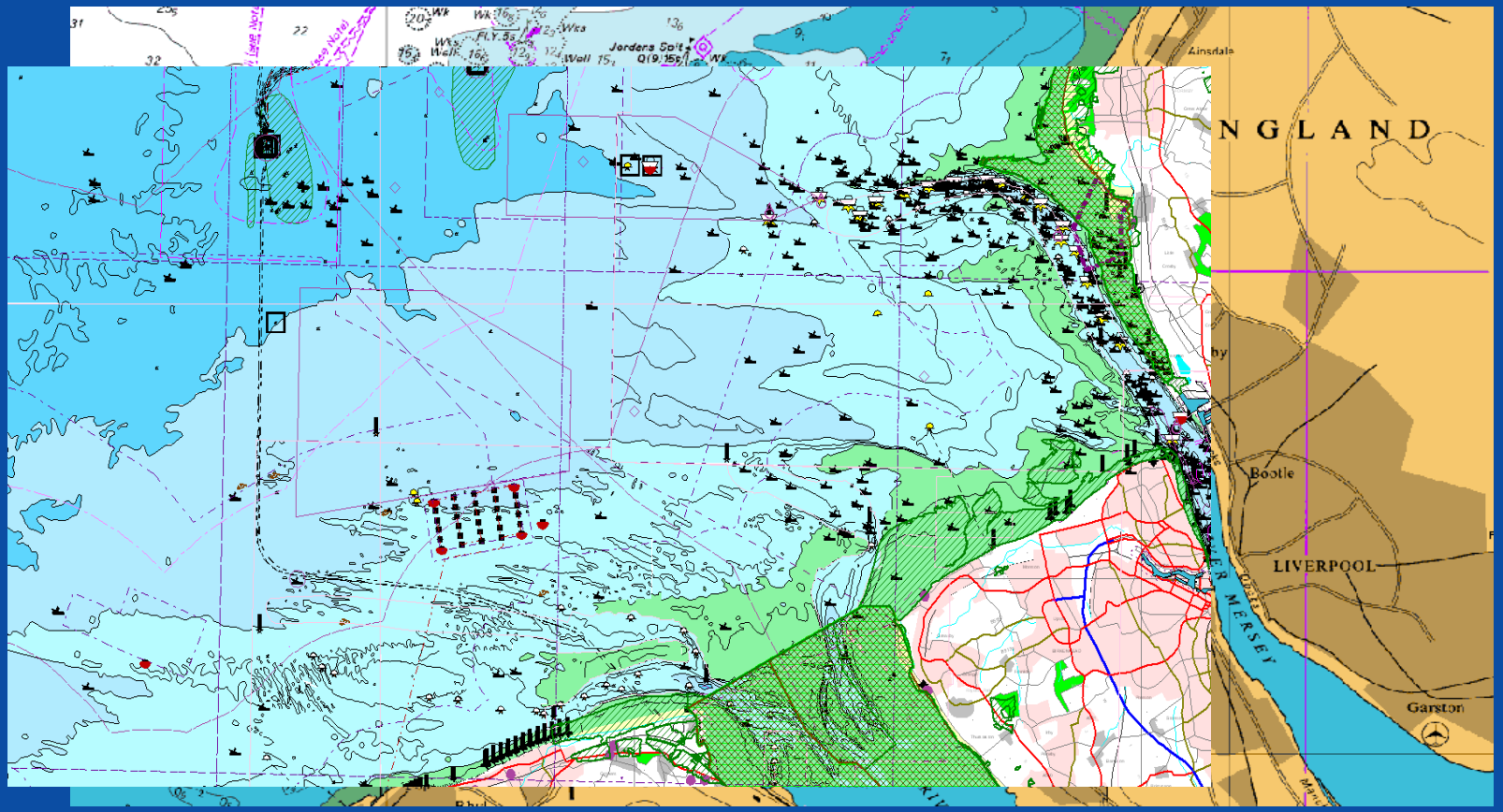
http://crs.bkg.bund.de/crs-eu/

Marine Reference Data – SeaZone Hydrospatial

- First stab at creating a marine reference base
- Comparable with digital land topography and elevation data
- Suitable to a wide range of applications
- Established user base across public and private sectors
- Committed to improvement to meet future marine data needs

DATA

SeaZone Hydrospatial

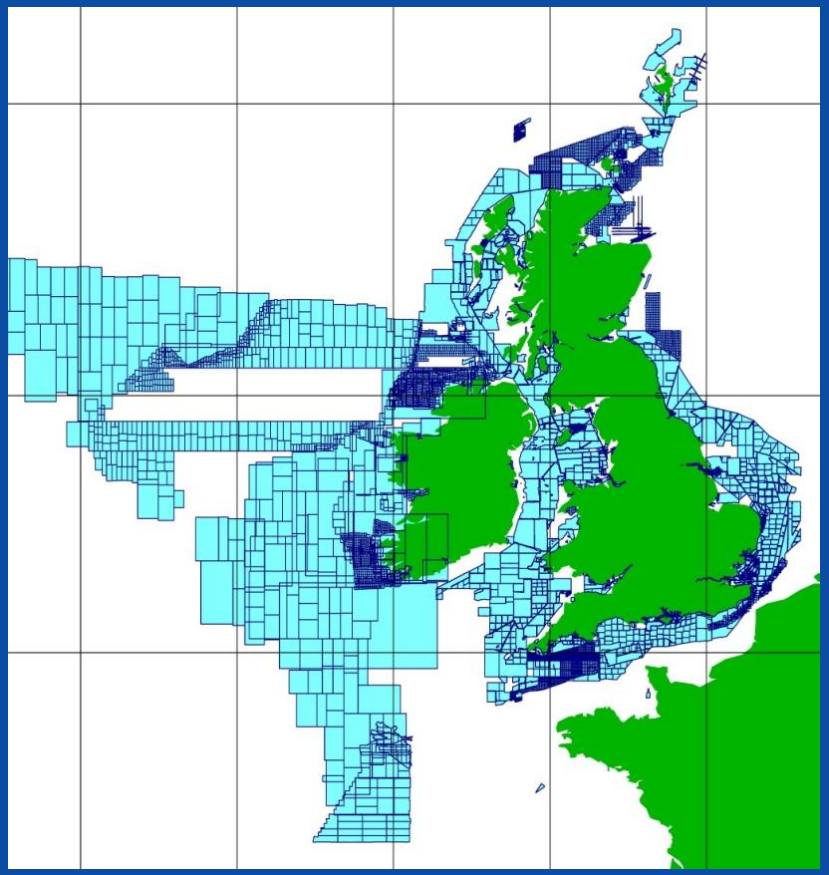


> BETTER DATA, BETTER SCIENCE, IMPROVED DECISIONS <

Digital Survey Bathymetry

- High resolution survey data in XYZ format
- Quality controlled and assessed by UKHO
- Improved metadata creation & publishing
- Capturing paper survey sheets
- Extending coverage overseas
- Input to SeaZone Hydrospatial version 2

DATA



Investing in Data Improvement

- Engineering navigational and source data into a coherent, consistent, seamless marine base map
- Capturing depth soundings from survey sheets to create high resolution bathymetry surface
- Collaborating with BGS to create new generation high resolution 'Sea Bed Geology' dataset
- Harmonising marine and land data within Coastal Mapping Improvement Programme
- Working with OS and BGS to create and deliver interoperable reference base to support UK SDI

DATA

Coastal Mapping Improvement Programme

- Harmonising SeaZone HydroSpatial with OS MasterMap Topography Layer and Profile Plus
- Uses OSMM MHW line as base reference shoreline and UKHO Vertical Offshore Reference Frame (VORF) as input
- Key component of SeaZone's vision for HydroSpatial and to provide interoperable reference base for UK SDI
- First demonstration dataset for Thames Estuary in use by key customer with GB major ports delivered or planned
- Roll out for entire GB coastline scheduled over next few years with call for priority areas

DATA

Summary

- What?
  - Marine SDI has little to distinguish it from SDI in general.
  - Key factors are CRS and data sources.
- Why?
  - Application requirements.
  - Benefits from efficient data management
- How?
  - Establish registers of marine CRS (eg Vertical)
  - SeaZone's contribution to providing a definitive marine base reference map.