

## Spatial Data Infrastructure and the Marine and Coastal Zone

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### Setting the Scene

A Spatial Data Infrastructure or SDI can be described as a framework to govern and enable the acquisition, management and dissemination of geographic information (i.e. spatial data) at any level, national, regional or global, in a coordinated and consistent way for multiple purposes. In SDI, spatial data is defined as data or information that identifies the properties of geographic features and boundaries on Earth, such as natural landscape, manmade constructions and administrative limits. Observations and simulations of real world phenomena, such as temperature and wind speed can be incorporated or referenced, together with imagery as a result of Earth observation, as part of an overall representation of the real world.

There are alternative definitions of SDI. However, they comprise comparable components and operate to the same guiding principles. It is these principles that universally characterise SDI and arguably it is the adoption of these principles, not the SDI, that deliver the immediate benefits of SDI. SDI itself is a method by which these principles can be implemented in a meaningful way. They are of course embodied in the UK's Location Strategy and are presented, in adapted form, below:

1. All relevant spatial data is identified, described appropriately and this information – known as metadata – is published. Unnecessary replication of identical or similar data is avoided.
2. Reference information is used to describe common features. This information is maintained as close as possible to source by an authority with the means and competency to do so.
3. Similar spatial data is created to the same technical standards to ensure consistency (and quality) and to allow records (e.g. from different areas) to be combined and referenced.
4. Spatial datasets are shared and accessed through a common infrastructure of standards, technologies and business relationships.
5. There is strong governance and common objectives to encourage participation.

### SDI Nirvana

So, what would a fully developed SDI look like in 2015? There would be a functional governance and management structure in place and all stakeholders will be fully engaged. Common objectives and

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performance indicators will have been set and stakeholders will be collaborating to meet these objectives. Internally facing objectives will have been replaced by business objectives that include collaborative working and data sharing. Any obstacles to data sharing would have been removed and common licensing conditions would mean data accessible via the SDI could be aggregated and used as input to added value products and services easily and efficiently. There would be a fully functioning infrastructure allowing data providers to publish their data and potential users to identify and access it. Users would be commenting on the data (and experience) to aid performance monitoring and improvement. The SDI would be fully funded either centrally or from the subscriptions of users and from the creation value added services and products.

Organisations responsible for each feature type relevant to the scope of the SDI will be identified and will be willing and technically able to publish their data to the SDI, either themselves or via a delegate. Metadata would be available to a consistent standard, current and published via a common portal. Domain specific portals e.g. for the marine science community would be available to make the information available more accessible and the experience relevant to these users. Metadata would allow users to discover then evaluate SDI content and, importantly, be able to access it given the appropriate user rights. Geographic information accessible via the SDI would be as close to the real world it represents as practicable. Associations between features in the real world would be present in the SDI so that similar related datasets could be discovered and incorporated into a common user environment. Unique identifiers would allow other data providers and users to reference additional information to relevant geographic features and there would be a large degree of interoperability. The usefulness, quality and interoperability of data would improve as issues are exposed and corrected by data providers.

This SDI nirvana is a long way from the current situation. How close we get to it in 2015 will depend mainly on political understanding and will, translated into organisational objectives that include data sharing and SDI participation. Whilst there are design choices and funding difficulties, the greatest challenge to SDI creation is the existing culture and work practices that support a myriad of individual projects and legacy applications. Some design choices may uncover further challenges, such as whether feature types should be coordinated within designated authorities or whether the provision of national datasets should be competed within a free market economy or kept within the public sector. It is generally accepted though that professional users demand accuracy, reliability and support from organisations that are accountable. Services that are unregulated and allow data to be published by the citizen and 'mashed up' will continue to and meet a particular need. However, these tools will also be able to integrate official content if and as required by the user.

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### Content Management

Almost all organisations acquire, create and publish spatial information of one form or another. The management of this data in 2009 is generally haphazard and many organisations would benefit by improving their data management practices in line with SDI principles (above) and communicating these in the form of a Data Management Plan. Of course, organisations must manage their data assets according to their business objectives. However, for public bodies faced by new legislation, such as the INSPIRE Directive, or willingly or otherwise engaging in SDI, these objectives are expanding from being internally facing to meeting the needs of the wider community. These new objectives are encouraging many organisations to review and update their data management. In 2015, authorities will have identified the data themes they are responsible for as part of their 'public task', will have created catalogues and metadata for these datasets and will be actively working in collaboration with other authorities to remove duplicates, transfer and reconcile conflicts and associate higher level data with reference features. But whose reference features?

In the marine environment hydrographic offices collate data from various organisations to support charting and assess this data from the perspective of navigational safety. Often however this renders it less useful for wider use and as reference information to support SDI. For example, hydrographic surveys destined for charting are processed to include only shallowest soundings. As a designated authority for bathymetry within SDI, hydrographic offices will need to store and manage this data to support a multitude of interpretations, products and services. For other data themes, this will mean ensuring all data is comprehensive, accurate and up to date, not a just a modified subset to support charting. As a minimum, features will need to be continuous across chart and other boundaries.

In many cases, hydrographic offices may hold data captured from paper charts where in reality they are not the competent authority. In these cases, a sensible approach would be to acquire this data directly from source, thereby increasing efficiency and lowering the risk of inaccurate or features being missed, as is often currently the case between use bands. Where data is obtained from third parties, SDI principles can be applied so that this data can be incorporated into products and value added services, as required. Chart production and the provision of navigational services become a value added activity on top of the SDI (see below).

### Funding Models

So what needs to change to get to the above model? The Government will have scrapped the trading funds. The UKHO will have been divided into two – one part meeting the needs of Defence and acting like other hydrographic offices worldwide, the second part a private company – Admiralty Publications Limited – which would compete in the open market. Any carriage requirement for vessels to have onboard official Electronic Navigation Charts (ENCs) will have been challenged in court and the private sector will be providing navigational products to merchant shipping, and probably the Royal Navy too.

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These standard navigational products would be augmented by defence specific products and services funded through NATO.

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