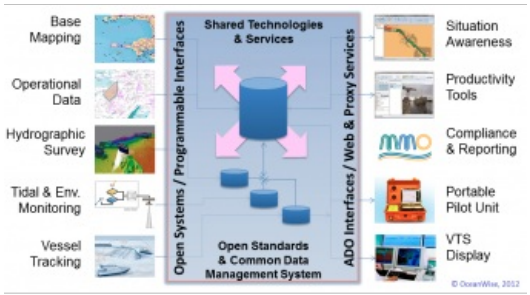
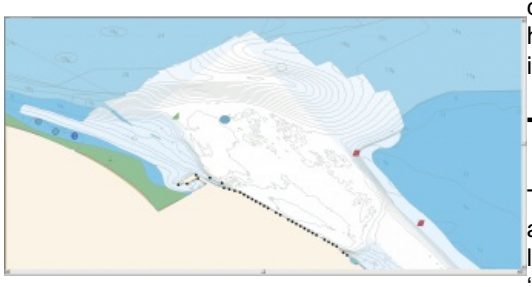
HOW TO CREATE AND MAINTAIN THEM

Multi-purpose ENCs for Ports



Ports require access to a wide range of data and information to function safely and efficiently. Some of that data is acquired from external stakeholders but most is generated internally within the port. It is very often managed and held within a single software application, department or business function. Streamlining how a port manages its data, by adopting a more data-centric approach, can bring major benefits. OceanWise has been working with ports for over five years and has pioneered the concept of a port, when considered more widely, as being a maritime information infrastructure.



The Maritime Infrastructure

There is nothing inherently wrong with managing and holding data within a single software application as long as processes are in place to control, quality assure and manage the life-cycle of this data. However, this often results in the creation of data ‘silos’ or ‘stovepipes’, which characteristically makes the sharing and exchange of data between departments and with external bodies difficult. As a consequence, port personnel spend more time than is necessary requesting, sending, reworking and reformatting data as well as running the risk of using data which is out of date or otherwise unfit for its intended purpose.

A maritime infrastructure is based on best practice data management principles and because much of the data that a port handles has a spatial context, it can be referred to as a Spatial Data Infrastructure (SDI), operating at an enterprise level. The key elements that underpin an effective SDI are data and metadata (data about the data), conformance to standards and specifications, Information Computer Technology (ICT) and governance of the data but also the people and organisations responsible for its development. Of these, data must be considered a key asset. The ability to share data between different applications is a key benefit of this approach. This SDI would typically encompass land and marine assets, as well as commercial and logistical components. By standardising how the data is structured and encoded and by making ‘machine readable’ the information it contains it will be more accessible and more easily understood by all users.

By developing this SDI, a port can consider its data and information as a centralised and valued asset, connecting disparate sources of data (e.g. sensors) thus making data processing and information exchange more effective whilst delivering business improvements to its stakeholders. This also means having a data policy and data management system in place which sits alongside and supplements other business management systems, such as for Quality, Environment, and Health and Safety. Whilst it is feasible to improve how ports manage their data and information without a data policy and management system in place, it does encourage high level buy-in and managerial commitment that is necessary for long-term success. Whilst there is presently no international standard for data management, similar to ISO 9001 for Quality Management, there is plenty of reference material and examples of best practice, including within maritime based organisations, to draw on (Figure 2).

Safety of Navigation

A very important role of a port is to ensure that safety of navigation within its area of jurisdiction is undertaken as effectively as possible by creating charts and other documents e.g. passage plans. These documents are then made available to key people, such as pilots and VTS operators but can also support wider maritime operations. They utilise the same or similar data sources that are used to undertake planning and other administrative tasks, and to comply with legislation. By extending the concept of the information infrastructure, selected documents can be made available to vessels entering the port and, for example, can be provided to pilots to use onboard vessels. One of the more difficult aspects of creating and maintaining safety of navigation documents is being able to locate and collate the input data and then convert it into a form required by the target system e.g. Portable Pilot Units (PPUs). All this is achievable, with minimal investment, using existing open standards and systems and by adopting a data-centric approach.

Port and Bathymetry ENCs

Much of the data used in the creation of ENCs – and Marine Information Overlays (MIOs) or Dynamic Overlays – that can be ingested into off-the-shelf software, already exists within a port and is used daily for other purposes. This data includes the location and properties of coastal infrastructure, the location of dredged channels, including their target and surveyed depths, Aids to Navigation (AtoNs), and clearance, passage and berthing lines (Table 1). These are just a few examples where data are collated and maintained by a particular department e.g. estates, engineering and navigational systems and are used elsewhere for other purposes e.g. asset and facilities management. Initially, some of this data may need to be migrated from legacy systems e.g. CAD, spreadsheets and paper formats, but this is a one-off task, and should be part of an IT Systems modernisation programme.

Centrally Managed Feature Type	**ENC Object Class Description**
Bollard	Mooring/Warping facility
Obstruction	Obstruction
Berth	Berth
Aid to Navigation	Buoy, …; Beacon, …; etc.
Dredged Box	Dredged area

Table 1: *Typical data stored centrally mapped onto ENC object classes.*

Internal to Official ENCs

By managing data centrally and ensuring the required characteristics (or attributes) and metadata are maintained and remain accessible, means that the actual generation and validation of Bathymetry and Port ENCs becomes straightforward using readily available software tools such as OceanWise' Maritime Toolbar ENC Writer Extension (Figure 3) to easily create the ENC. But why stop there? It is often the case that official ENCs for safety of navigation within the port environment lag behind or contain insufficient information to be of use to anyone other than the casual or recreational user. Even where the HO has invested in developing dedicated procedures to update official charts from hydrographic surveys provided by the port, the whole process – from survey to ENC update - takes several weeks. This is too long for a modern port requiring a 24-hour turnaround, and arguably too long for most other users too.

The first step for a port therefore is to streamline the exchange of data with the HO. This may mean providing the elements of the official ENC that the port is best placed to manage at source - a fundamental principle of good data management - to the national HO. This could include port maintained objects such charted depths, controlled areas, AtoNs, and passage-related objects such as passage lines. The exact list of objects, timing and other details, and how these objects relate to similar objects within adjacent and smaller scale ENCs can be agreed and documented in a data protocol between the port and national HO.

There is no technical reason why a port cannot create, maintain and publish its own 'official' ENCs. Many ports have their own producer codes issued by the International Hydrographic Organization (IHO) and, for those that do not, a straightforward application process exists. Indeed, a code is mandatory to publish any specification of ENC and therefore can also form the basis of publishing uniquely named ENCs via the Regional ENC centres. However, it would not at the present time be sensible for a port to publish official ENCs that replicates the function of the national HO. It is suggested that an agreement is reached for a port to work with the national HO to streamline this important function.

Conclusion

Improving how data is managed and being able to access it for multi-purposes becomes an integral part of how a modern or 'smart' port should operate in the future. This includes using the same sets of data for multiple purposes, including the creation of ENCs for internal use by pilots and VTS centres, and exchanging data easily and efficiently internally and externally.

The step to publishing official ENCs is now within the grasp of most modern ports. However, this step should be undertaken with care and by working with national HOs, so the strengths of both organisations are presented to mariners and other users in innovative and fit-for-purpose products and services.

More Information

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- Osborne, M and Pepper, J (2013). Delivering "Maritime Information Infrastructure" to Ports and Harbours -; Geoconnexion Magazine, December 2013)
- Hinton, A (2013). Upper Humber ENC Trial. Digital Hydrography on the Maritime Web, The Hydrographic Society, Southampton, UK, 29 October 2013
- International Hydrographic Organization (2016). S-62 – List of Data Producer Codes. Auto-generated on 29 Dec 2016.