



KEEPING TRACK IN SOUTHAMPTON

RICHARD SPOONER RELATES HOW ASSOCIATED BRITISH PORTS (ABP) IS BUILDING ON ITS REPUTATION AS AN INNOVATOR BY USING WEB GIS TO ENSURE SAFE NAVIGATION IN AND AROUND ONE OF BRITAIN'S BUSIEST AND MOST SUCCESSFUL HARBOURS

The Operations Room of the Vessel Traffic Services (VTS) Communications Centre occupies a prominent position overlooking the Eastern Docks in ABP's Port of Southampton. This quiet and dimly lit room is manned 24 hours a day, every day of the year. It exists to provide information, advice, and direction to marine traffic in the Solent approach channel and in the port itself.

Southampton maintains its crucial services to shipping with a combination of radar, radio, Automatic Identification System (AIS) technology, and CCTV. Among the banks of computer and CCTV screens, one in particular stands out. It is larger than the rest and its map display is superimposed with a depiction of vessels and other activities in and around the port. If you look closely, you might see vessels shifting their location. This is because the screen shows port and vessel status in real time.

William Heaps, ABP Assistant Marine Advisor, Southampton, describes the role of this port and vessel display system, in the context of the different information systems deployed by the harbour authority.

"Many things are happening at the same time in a busy international port, especially in the docks area. Vessels are coming and going. They are loading and unloading. Some will be refuelling. Others may have welding operations taking place on them. Divers may be in the water. There are potential hazards everywhere. While we have information systems in place to monitor all these events, there



remains a danger from information overload that we fail to identify potential conflict between different activities. That's where Geographic Information Systems technology comes in. It can provide us with a map-based representation of these activities, in a single consolidated real-time view."

Shared vision

The vision for the system was shared by William with his colleagues David Stewart-White and Martin Thomas. David, as VTS Watch Manager at the time, had front-line knowledge of the information requirements of the VTS. He relied for his overview mainly on a variety of electronic status boards, the content for which was generated from two databases, namely the Port and Vessel Information Systems (PAVIS) and Southampton Operational Port Information System (SOPIS).

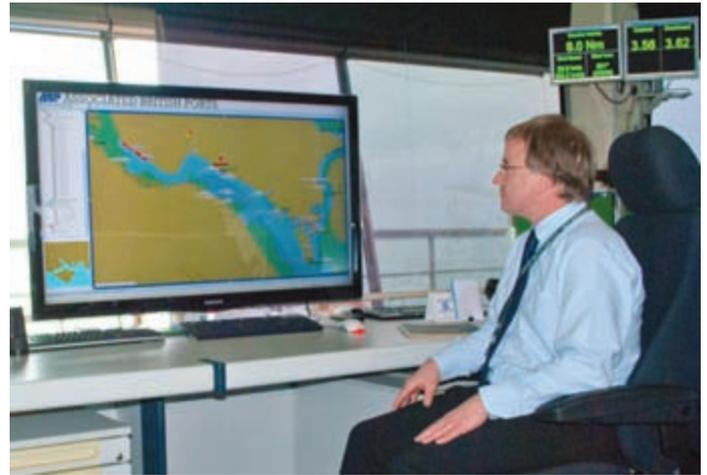
Although these databases did a good job of aggregating information from a number of sources into one place, there was no mechanism to display it as a map. The Port of Southampton had been users of the Cadcorp SIS suite of GIS products for a number of years, and William, who had worked with the system in the port hydrographic survey department, thought that Cadcorp GIS technology might be capable of providing the map viewing capability they were missing.

Working very much in their spare time, William, David and Martin set about specifying what a port and vessel display system might look like. William provided the geographic knowhow and practical experience as VTS Watch Manager, while David and Martin provided in-depth knowledge of the PAVIS and SOPIS databases respectively.

Challenges

William explains some of the challenges they faced. "It was clear to us that the entities we were dealing with all had a geographic location, whether they were hydrographic features, land-based topography, ships, or events being played out in the port. Our first task was to geo-reference all this data and to transfer it into our GIS.

"For hydrographic data we could draw upon our own survey data. For land-based maps, we could use Ordnance Survey data. We could track vessels underway using GPS readings attached to vessel details held in AIS. Provided we worked to a common projection system, we



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Harbour authorities know well in advance of the estimated time of arrival of vessels



The hydrographic team at the Port of Southampton has been using Cadcorp desktop GIS for many years in the production of maps created from survey data. Such maps are invaluable in communication clearances, and in guiding dredging work.



could pull all this locational information into a single system. We also recognised the need for a live connection to PAVIS and SOPIS as these held a record of all important activities going on in the port."

They set about defining the features that they wanted to display in the system, and found that these fell into two types: static layers, represented by background maps and charts; and dynamic layers, represented by vessels, berth events (such as diving, hot-work, and bunkering), and security details relating to the cruise terminal.



Occupying a prominent position in the Operations Room, the Port and Vessel Status Display (top and centre) flags potentially hazardous events happening in or around ship berths. The display comprises both static and dynamic feature layers (lower left) and ships are represented as objects in plan view, have length, beam, colour, and orientation (lower right)

Getting underway

They road-tested their product on a small number of users, and identified some failings. The most important of these from an end-user perspective was the absence of an automatic refresh to update the visual display when dynamic changes were reported live from either PAVIS or SOPIS.

Users also wanted more screen real estate to be devoted to content as opposed to menu. The team decided that they needed a web-based solution, so they contacted Cadcorp to see if it could deliver a customised version of a browser-based product operating on the GeognoSIS web services engine and web map server. Within two months of signing a contract, a port and vessel status display was providing real-time information 24/7 via a large plasma screen in the VTS Operations Room.

The screen display has been tailored to meet ABP's requirements. With minimal instruction, operators can pan and zoom, query coordinates, and turn layers on and off. Most important of all, the dynamism of port work is now accommodated by Cadcorp's implementation of an automatic refresh of dynamic layer data. The periodicity of this refresh can be varied by feature type, reflecting the fact some objects and events are more dynamic than others.

The ability to vary these settings is entirely under the control of the system manager, who is free to edit the parameters within a configuration file. The system has proved to be reliable and easy to use and is widely accepted by staff in ABP Southampton.

Ship-shape

William and his team are especially proud of the capability of the port and vessel display system to represent individual named vessels not as points, but as recognisable ship shapes, of given length, beam, and colour. This information is contained in the SOPIS database and obtained by decoding ships' AIS transmissions. Cadcorp GeognoSIS takes live feed of this text-based information, and translates this on the fly to a graphic representation of each ship.

By combining this information with GPS values on position and heading, the system is able to accurately display scaled representations of ships in their correct position and orientation.

William is keen to iterate the role that the port and vessel display system performs in Southampton.

"It doesn't provide any new data. Nor does it serve as an additional surveillance system. What it does is to take existing data and generate map representations in real-time. Having access to the 'big picture' allows us to visualise relationships and identify and mitigate potential conflicts. That is an invaluable capability for a port authority where risk management informs everything we do."

Richard Spooner is Marketing Manager for Cadcorp (www.cadcorp.com) based in Stevenage, UK



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