



CROWD CONTROL

THE INTERNET OF THINGS COULD SOON ENABLE REAL-TIME CORRECTIONS OF BATHYMETRIC DATA USING CROWDSOURCING. BUT HOW BEST TO ENCOURAGE PARTICIPATION? TIM THORNTON AND DUNCAN KENT EXPLAIN HOW THEIR COMPANY IS DEVELOPING HARDWARE AND AN APP DESIGNED TO SHARE THE BENEFITS WITH PARTICIPANTS

Over the next few years, the launch of 5G mobile Internet will bring the Internet of Things (IoT) inexorably closer. Soon, our houses, domestic goods and cars will be networked together – for good or evil, depending on your outlook.

Inevitably, this complete intercommunication will move into the marine field, too, with vessels becoming electronically 'aware' of each other 24/7. All sea-going vessels will be mandated to carry data transceivers, much like the AIS sets today, but working on a wider bandwidth and thus able to transmit and receive huge amounts of data almost instantaneously. The proposed VHF Data Exchange System (VDES) is a step in this direction.

We foresee every ship not only making its entire instrument system data available to a common cloud-based control hub, but also being able to download the same data from all ships in its safety range. Within a decade, all this data might be collected and transmitted in the background, with ships' navigational systems automatically alerted to collision risks, storm warnings, geophysical alerts such as tsunami warnings, and other information vital to the safe passage of the vessel.

Essential to this will be the ability of every vessel to collect, record and process its own data, particularly the valuable bathymetric data that nearly every vessel could gather during its travels. A constantly updating bathymetric data feed will enable corrections to be obtained almost in real-time for poorly surveyed sea areas or those with a frequently changing seabed due to shifting sandbanks and tidal erosion. This 'crowdsourced' database will provide invaluable

information for hydrographic organisations, cartographers, shipping companies, harbour authorities and environmental specialists.

There is a variety of hurdles that will need to be jumped before this 'network of all things maritime' can be seamlessly linked, not least the restriction on the bandwidth of the communications technology. But as the infrastructure is improving by the day, aided by the launch of new satellite constellations and the freeing up of radio frequencies previously restricted by the need to allow for the 'spillage' created by the old analogue channels, things are changing – fast.

Joining the dots

TeamSurv is already taking advantage of this innovative technology. The company was formed to exploit the possibilities of crowdsourcing data from just about every type of seagoing vessel, gathering position, time and depth data from their existing instrument networks to collect massive amounts of data. We then enhance and refine by blending it with other bathymetric resources to create a high-resolution, gridded picture of the seabed in areas from one to 2,000m deep. Once received, the logged data is processed using a network of cloud-based computers, combining each vessel's tracks to update or create an entirely new bathymetric survey.

The company uses various techniques to record the required data. These currently include simple black box data loggers that connect with the vessel's instrument network through a NMEA data link, using the NMEA-0183 and NMEA-2000 protocols. As vessels improve their



navigation systems, TeamSurv is also able to use the integral wireless facilities provided by the more modern multi-functional display (MFD) 'Glass Bridge' networks, which assists in both recording and uploading the data.

The company is also working hard on expanding and improving the methods by which data can be transmitted to its terrestrial servers. Currently, the requirement to connect to the internet can be a little limiting, particularly on small vessels, where the participant must either remove a USB memory stick to connect it to a PC or collect the data wirelessly on an internet-connected smartphone or tablet.

However, TeamSurv is currently undergoing trials on larger ships using the relatively inexpensive VSAT fleet communications network to transmit the data. As most ships have a fixed-price contract for this service, costs can be kept to a minimum as data transmission needn't necessarily be immediate. Instead, these compressed data packets can be sent during the equipment's idle time, when more important communications aren't being transmitted.

TeamSurv has also been experimenting with the satellite AIS company, ExactEarth, to find the best way to transmit the data as binary messages over the Class-A AIS system. As all commercial ships are mandated to carry an AIS transceiver, there are no hardware costs other than the small interface box that collects data from the instruments, compresses and encodes it, before sending it to the AIS transceiver. This means there is only a small annual cost in handling the data and, more importantly, no interaction required from the crew – often an issue with the generally high workloads facing crews today.

User benefits

To help the crew benefit more from collecting data and so motivate more vessels to participate, TeamSurv has been developing an app (currently in beta) that acts as a mobile

repeat display for the vessel's instruments and gives the crew access to the latest bathymetry. Data is displayed from all instruments, not just the GPS and depth sounder, and it can be viewed in several ways to assist with navigation and general situational awareness: as numerical values, in graphical displays and time plots, or as a simple chart that has TeamSurv's bathymetry overlaid onto it.

The data is stored on the phone or tablet until the user wants to upload it to TeamSurv's servers – normally once they are back in port and can benefit from free Wi-Fi connections. At the same time, they can download the latest bathymetry for their area. Initial feedback from testers shows that this should be very popular with mariners of all types.

One challenge we faced when looking at developing the app was that Wi-Fi interfaces to instruments typically cost several hundred euros. Bluetooth is out of the running because of the heavy restrictions Apple imposes on how it is used on their devices. This would make the app an expensive proposition for most vessels, as they don't already have Wi-Fi-enabled instruments, and make the total cost much higher than people are used to when purchasing an app.

However, we found we could bring a NMEA-0183 device to market for under £100, which will greatly increase user uptake. This will be available from next month, with a NMEA-2000 device following on afterwards. These are generic devices that will work with any software needing a Wi-Fi connection to NMEA instruments, not just the TeamSurv app.

With high costs leading to low uptake of Wi-Fi, apps for mariners have either concentrated on basic navigation using only the GPS built into phones or tablets or they have been specialist tools targeted at specific sectors, such as yacht racing. By producing a low-cost interface with an attractive and easy-to-use app that is free to those who send us their logged data, we believe we can recruit many more vessels than at present.



The approach is similar to Google's: it offers the free Waze satnav app, which is good in its own right but also sends the user's speed and any traffic incidents you report back to Google to include in its traffic information services, including working out the best journey times in Waze.

Currently, around half the world's coastal waters are poorly or very poorly surveyed, with some cartography so out of date it relies on soundings taken almost a century ago. With the assistance and co-operation of every vessel owner, TeamSurv is confident this situation can be changed for the better within a matter of years, rather than decades.

THIS SITUATION CAN BE CHANGED FOR THE BETTER WITHIN A MATTER OF YEARS

Tim Thornton is director, Duncan Kent is head of media relations at TeamSurv (www.teamsurv.com)