Latest technological developments in vessel tracking and monitoring

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VTS equipment is rapidly evolving following trends set in onboard navigation systems as well as trends expanding from other sectors such as the military and air traffic management.

Traffic image

Today it is common for a traffic image to consist of a fusion of many different sensors including radar, AIS and other Hydrographic and Meteorological sources.

In particular, AIS has revolutionised the way in which VTS interacts with traffic. In the past VTS would have been aware of a vessels approach only by a raw radar return on the traffic image prompting questions such as "Who is this?", "Where is she bound?", "Will she cause me trouble!" AIS now provides VTS an advanced insight into the vessel, enabling a VTS to prepare for the vessel in terms of advance traffic management:

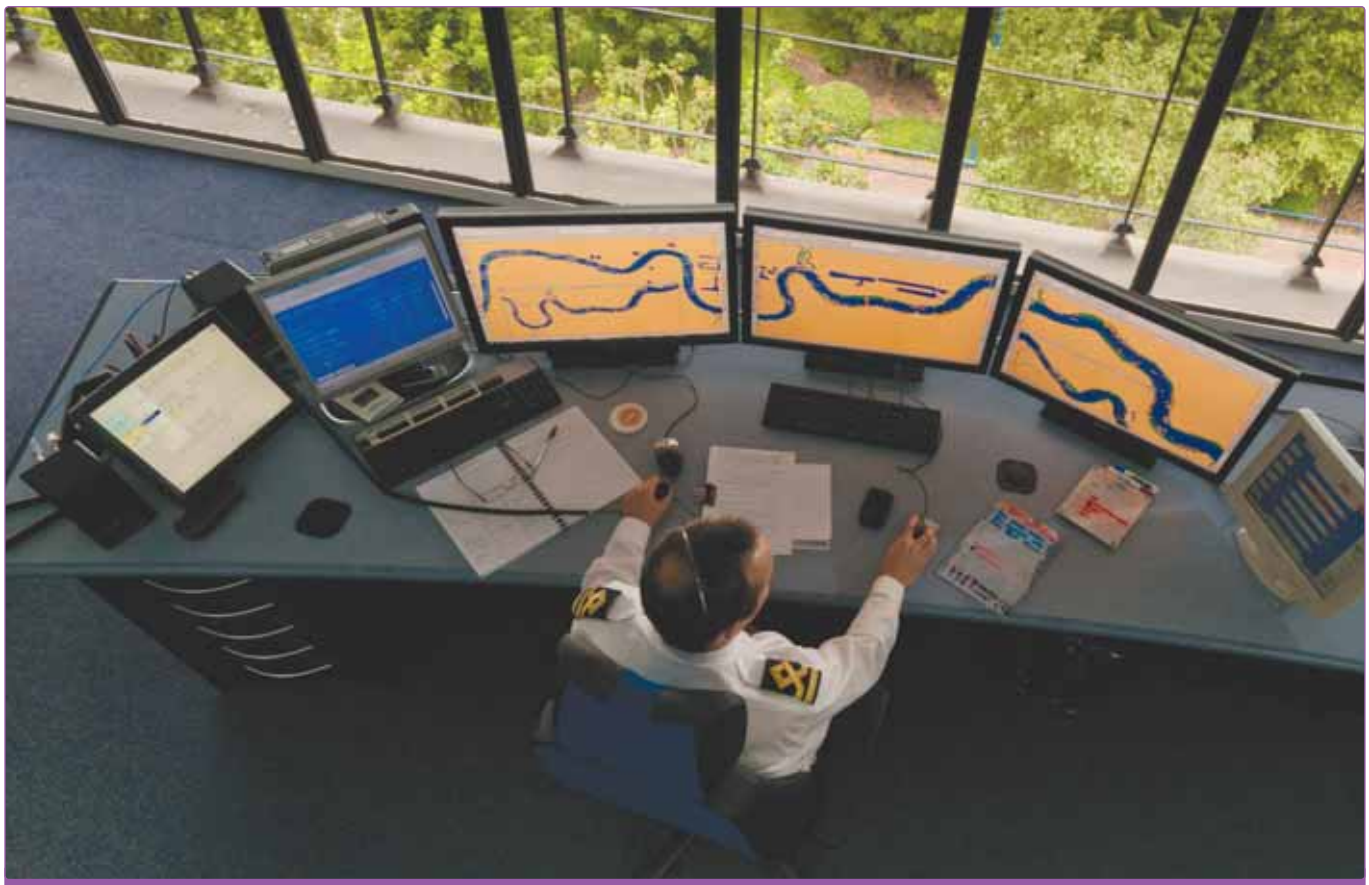
- Is the berth ready
- Is the pilot ordered
- Is the vessel early or late
- The vessel will need to be directed to anchor
- The vessel will interact with other vessels at a later stage.

AIS also gives VTS an insight into the vessel itself. Information from the bridge of the vessel such as heading and speed data gives VTS a near real-time insight into the actions of the vessel, which is vital in terms of traffic management and navigation assistance.

The close VTS integration of AIS and radar serves to perform a quality management function. Received AIS signals can be correlated against VTS radar which readily identifies problems with either AIS data or VTS radar. A VTS should actively challenge vessels transmitting defective AIS signals to ensure correct information is presented. In recent years, the quality of AIS signals has increased significantly to such an extent that in many cases AIS is a primary tracking source for VTS systems.

AIS has also enabled a VTS to hold a traffic image where it is not practicable or cost effective to install radar systems. AIS carriage has been mandated in city centre and inland waterways in the UK and Europe, where radar coverage would be expensive or impracticable. Such AIS networks enable the provision of a high quality VTS to increase safety and efficiency in often busy and restricted areas of waterway.

A significant impact of AIS has been the provision of a mobile traffic image onboard vessels giving the mariner significant



The Port of London Authority is responsible for monitoring vessel traffic along the length of the River Thames.

PLA Port Control Centre London – Duty Port Controller Workstation.

situational awareness through the provision of a localised traffic image. Although this can never replace the full role of a VTS, the provision of greater and higher quality information onboard reduces the volume of VTS communications required, particularly in the provision of routine traffic information. This, as a consequence, results in VTS communications being related to the provision of essential information, which may not be readily apparent to the bridge team.

AIS is still an under-used resource. The data transmission properties of the system can be further enhanced to facilitate the transmission of other navigational information such as tidal data, weather data and other text-based information. This is already be exploited in city centre and inland waterways where passenger numbers, tidal data and lock scheduling information is being transmitted successfully by AIS, thereby reducing further the VHF loading on VTS frequencies.

CCTV and VTS

Modern CCTV systems are routinely integrated with VTS equipment being configured so that is integrated with radar and AIS tracking. This enables VTS operators to select the point or vessel of interest with a simple mouse click on the traffic image, the CCTV then automatically pans to the desired point or vessel of interest. Often, in the case of a vessel underway, the CCTV has the ability to automatically follow the vessel, handing over to the next available camera in range at the appropriate time.

As offshore infrastructure is developed it is common place for radar installations to be placed on offshore wind farms or other infrastructure to provide localised surveillance to mitigate against the risk of any interference to shipboard radar. VTS radar is continuing to evolve with the introduction of new solid state 'HD radar' technologies developed from military applications enabling enhanced surveillance, particularly with the identification of smaller vessels coupled with lower running costs and increased reliability.

VTS charting

VTS charting is also increasing in sophistication. From a simple chart-like graphical representation VTS centres are now commonly equipped with ECDIS-style charting along with the capability to manage the chart to display appropriate levels of data. In common with shipboard applications this ability to filter charting can present hazards, but unlike shipping, VTS operators work with the same equipment day-to-day which results in greater familiarisation through the provision of comprehensive training and procedural requirements.

Commonly VTS personnel will be responsible for monitoring numerous vessels in their area of responsibility, it can therefore be challenging for VTS to provide a full level of oversight equivalent to that offered by a vessels individual bridge team. As such, a concept of behavioural recognition has been adopted by many VTS manufacturers. VTS areas often consist of defined areas of waterway including fairways, routes, anchorages and areas of special interest. All of these factors are currently monitored by a human VTS operator. The provision of active background rule-based monitoring within VTS equipment will be of significant benefit to VTS, this will provide an increased level of automated surveillance of maritime traffic and support to VTS operators.

Such surveillance may consist of automatic monitoring against pre-defined parameters of track and speed. Such monitoring may even be increased to include 'what if' scenarios such as UKC monitoring. If sufficient live tidal data is combined with accurate electronic charting data, it would be feasible for the vessel's draft to be automatically monitored against the planned passage, and advance warning given of future constraints enabling early corrective action to be taken.

Management Information Systems

In simple terms, a management information system is a database detailing the end to end process, covering many aspects of a vessels voyage within a VTS area. Such processes may include:

- Pilot bookings
- Sail planning – routes to be followed – ETAs at critical points
- Berth allocations
- Tug allocations
- Pilot transportation
- End billing.

The new Port of London Authority Thames Barrier Navigation Centre, managing the Central London area of the River Thames.

Accurate information is paramount, not only to enable the safe and efficient movement port management but also for other stakeholder groups such as Customs, border protection, berth operators and cargo handlers. The thirst and utility of such data has been widely recognised through the development of international vessel traffic monitoring systems such as the European 'SafeSeaNet'.

In order to increase efficiency, many VTS authorities are now opting for the online notification of vessel movements. In such systems agencies representing vessels, towage providers, berth operators and other interested parties contribute to an online portal which results in a two-way flow of data. VTS receives good quality and up-to-date information regarding the vessel's planned transit, and in return stakeholders receive live progress reports and other data to optimise their operations and the onward transportation chain.

It is beneficial to VTS operators to have advance warning of vessels that may require a higher degree of oversight. A high volume of data is available from a range of freely available sources including Port State Control Authorities, accident investigation bodies in addition to commercial data providers. Therefore, when a vessel notifies a VTS of its intention to transit their area, often some hours or days in advance, it is feasible that an automated process may be undertaken which facilitates a search of the vessels name against a number of sources to assemble a navigation safety risk profile for the vessel. Such an assessment will take account of a number of factors: the vessel's Port State Control history. For example, defects related to charts not being up-to-date or passage plan defects may influence the level of VTS oversight. A vessel with minimal Port State Control history, whilst still receiving VTS oversight may not necessitate a higher level of attention as a vessel with numerous detentions and regular deficiencies may.

Additional data such as frequent changes of vessel name, vessel owner or flag may be useful from a commercial perspective highlighting a possibility of arrest, detention or difficulties in areas such as port fee recovery.

ABOUT THE AUTHOR

Kevin Gregory LLB (hons) HND JP MRIN was appointed Deputy VTS Manager for the Port of London Authority in 2007. Kevin has responsibility for the management of two VTS Centres covering an area in excess of 600 square miles. Kevin is responsible for ensuring the safety and efficiency of navigation in the diverse River Thames. Kevin is also responsible for the management and operation of the PLA's in house MCA accredited VTS training programme.

ABOUT THE ORGANISATION

The **UK VTS Association** seeks to develop and establish itself as a professional body within the maritime community for qualified Vessel Traffic Services personnel in the United Kingdom. The Association aims to encourage and promote the highest standards of knowledge, competence and qualifications among personnel responsible for VTS and Local Port Services. The Association works to facilitate the exchange of good professional practice, and encourage, foster and develop collaboration and good relations among VTS Centres nationwide.

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