Vessel Traffic Services (VTS) are intended to provide enhanced safety of navigation and increase the efficiency of port operations. Modern VTS possess highly accurate and reliable information about all operations within the port and approaches to the port. This provides the VTS operator with full maritime domain awareness. The first VTS systems were installed at the beginning of the 1940s and have come a long way from single standalone coastal radar stations to becoming complex distributed systems, connecting large amounts of sensors and sub-systems. These changes were driven not by technology itself, but by a number of various challenges at that time.

Maritime shipping supports approximately 90 percent of global trade. Therefore, this directly affects shipping traffic. An international study showed that shipping traffic has quadrupled in the past 20 years. The inevitable result of this significant growth would be an increasing number of maritime accidents, increased impact on the environment and an increased volume of constant demands to improve existing technologies in order to provide safe and efficient berth-to-berth navigation. VTS can be considered as one of the key factors in solving these challenges.

The maritime administrations of different countries take action to improve the safety of shipping by increasing the area of VTS responsibility or establishing ‘Coastal VTS Systems’, including the voluntary use of VTS beyond territorial waters. Maritime institutions are researching the possibilities to establish Sea Traffic Management for enhanced voyage planning. Shipping and port operators require an increase in the efficiency of shipping traffic to avoid delays and utilise port facilities at a maximum payload.

But to withstand all challenges, it is necessary to take a step up from traditional VTS, as a standalone isolated authority managing traffic in a port, to a new generation that has the VTS acting as a high-tech system with advanced decision support tools that allows automated interaction with other stakeholders. However, this will not be possible without a modern approach to VTS construction involving modern technologies. It also requires a change in the attitude of all stakeholders involved in ship traffic management and the activities associated with it.

All VTS operations can be split into three categories, as defined by IALA; Information Service (INS), Traffic Organisation Service (TOS) and Navigational Assistance Service (NAS).

Now let us examine some examples of how modern technologies can help VTS operators to perform their duties in today’s shipping environment.

INS is defined as ‘a service to ensure that essential information becomes available in time for onboard navigational decision-making’. This is a basic level of the VTS services and it provides information about:
- Position
- Identity
- Intention and destination of vessels
- Meteorological and hydrological conditions
- Amendments in information concerning the VTS area such as boundaries
- Procedures

VTS IN THE AGE OF DIGITAL INFORMATION

Dmitry Rostopshin, Director of the Ship Traffic Control and Management Solutions, Transas Marine International
Radio frequencies
Reporting points or any information concerning the safety of navigation
INS contains a huge amount of information related to the routine duties, therefore the automation of the delivery of indicated information can significantly reduce the VTS operators’ workload, allowing them to focus on more important tasks. This could potentially include:
• Automatic traffic image delivery to onboard systems, pilots, port operators, and allied services. Traffic image should include real-time position, course, speed, destination and route to the destination for all vessels within the VTS area. This would ensure that all stakeholders are working in the same environment.
• Automatic transmission of local notices. Any specific information related to safety of navigation should be delivered automatically, and also include temporary areas which should be displayed directly in the electronic chart systems.
• Meteo or hydrological sensors available in the VTS should be accessible together with the local weather forecast to avoid routine transmitting of such data via VHF voice communication.
TOS prevents dangerous maritime traffic situations and allows for the safe and efficient movement of vessel traffic within the VTS area. In addition to INS, TOS requires planning or prioritising of vessel movements, establishing a traffic clearance system, allocating space and time slots following special routes and speed limits. Automation in the TOS service could include:
• Route exchange between the vessels and coastal centre, where every vessel has its individual route from berth-to-berth. The tasks of the coastal systems would be in this case to check safety of the route for the risk of grounding and risk of collision and suggest the alternates, if necessary.
• In addition, ETA and RTA data exchange between port and vessel can reduce delays and allow “just-in-time” arrivals of the vessel to the port.
NAS provides essential and timely navigational information to assist in the onboard navigational decision-making process and to monitor its effects. This is one of the most complicated tasks performed by VTS. The purpose of this service is to provide the vessel’s navigational information in case of risk of grounding, a risk of collision, deviating from the passage plan, assistance to anchoring. NAS can also support the vessel if it is unsure of its own position or route to the destination, has defects or deficiencies and can provide assistance in severe meteorological conditions.

NAS on the VTS should be based upon proper alarms and warnings configuration acting as a passive decision-support system. The system should recognise and provide the operator with real-time information about dangerous situations in the VTS area. These are just some of the advantages. Modern technologies can significantly improve the NAS via:
• Enhanced route monitoring. Using individual routes described in TOS, VTS can automatically monitor deviation of the vessel from the passage plan both in distance and in time, which allows for problems to be detected at an early stage.
• Automatic underkeel clearance calculation tools. Based on current and predicted weather level data and the ship model, it is possible to significantly improve the calculation of no-go areas and reduce the risk of grounding. Such systems also allow operators to utilise port facilities in a more efficient way by ‘extending’ the tidal window via more accurate evaluation of available data.
• Active decision-support system. Unlike the passive system, the new generation of decision-support tools not only deliver warnings to the operators about dangerous situations but can also suggest solutions, i.e. optimal route to avoid collision or grounding.
Additional improvements in the NAS delivery would be the automation of the data exchange between onboard and VTS systems, where the data is not only displayed on the VTS operator’s screen but, after his confirmation, is also delivered to the navigator on the bridge and displayed in the onboard electronic chart system.
Data exchange between coastal and onboard systems imposes additional requirements on the communication equipment, however, the number of technological advantages is huge.
Considering the above, it is possible to say that the main advantage of modern maritime systems is the automated data exchange between various stakeholders, allowing for the reduction of routine workload on the personnel, minimising the risk of human errors and increasing focus on primary tasks.
The final step in this approach would be the creation of a native common Sea Traffic Control and Management system. This system would collect information from various data sources and added-value services. It would then process the information, integrating it into a common operational picture and delivering this information to all stakeholders according to their needs and access rights. This will improve the safety of navigation, the efficiency of maritime traffic and protect the environment.

ABOUT THE AUTHOR

Dmitry Rostopchin has been working in Transas since 2000 and today he holds a position of the Director of the Ship Traffic Control and Management Solutions. He is involved in development and installation of VTS projects around the world. He is also a PhD student at the Novorossiysk Maritime Academy.

ABOUT THE ORGANISATION

Transas’ vision is to lead the way in creating an ecosystem of harmonised integrated solutions in safety, navigation and ship operations. In creating these solutions Transas unites global maritime stakeholders in the future of e-Navigation and operations. True to its vision, Transas has introduced THESIS, the Transas Harmonised Eco System of Integrated Solutions. THESIS is a flexible data resource where Ship, Fleet Operations, Academy (simulation & training) and Ship Traffic Control can all be connected to the ecosystem, effectively a community working together on a cloud based shared data platform to enable smarter operations, safety and navigation. United into a single environment, navigation, simulation, vessel traffic, and fleet management systems become a decision support tool using the data provided by Transas software solutions. Transas operates more than 20 own regional offices and has a global network of partners around the world.

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