Vessel Traffic Services (VTS): Are We Ready For The New Millenium?

Capt. Terry Hughes

(*Marine Consultant – VTS*)

1. DEVELOPMENT OF VTS. In 1948, the port of Liverpool was probably the pioneer of European VTS, when they set up a radar station, in order to facilitate the boarding of pilots from the cutter. In 1951, Long Beach in California established a radar and VHF to facilitate port operations. Le Havre established another system and so, gradually, other ports followed. At this time commercial radar was comparatively new, and made it possible for the first time, under almost all weather conditions, to observe vessel traffic from the shore. In combination with VHF radio, a traffic surveillance system was achieved and real-time information exchange between the shore and ships became possible. Nevertheless, it was not until 1985 that the role of VTS in connection with navigation safety, traffic efficiency and environmental protection gained international recognition. This recognition is contained in an IMO resolution, which constitutes the VTS guidelines.

2. CURRENT LEGISLATION. In November 1997, the International Maritime Organisation (IMO) adopted Resolution A.857(20), Guidelines for Vessel Traffic Services and its associated Annexes, namely: 1. Guidelines and Criteria for VTS; and 2. Guidelines on Recruitment, Qualifications and Training of VTS Operators. These Guidelines are associated with SOLAS Regulation V/8-2, and together with the Annexes, set out the objectives of a VTS, outline the responsibilities and liability of the governments involved and give guidance for planning and implementing a VTS as well as recruiting and training of VTS Operators. The Guidelines note that a VTS is particularly appropriate in areas that include such characteristics as high traffic density, traffic carrying hazardous cargoes, conflicting and complex navigational patterns and difficult hydrological and meteorological elements.

The Guidelines urge:

> Member Governments to ensure that VTS within their territorial seas are operated in accordance with national law and applicable international law and do not prejudice the right of innocent passage through such waters and to ensure that ships outside territorial waters are able to use, on a voluntary basis, the service provided.

The IMO also recommends Member Governments to encourage masters of ships navigating in areas, for which a VTS is provided, to make use of such service.

In April 1996, the Port of Rotterdam hosted the eighth International Symposium on VTS. A very high standard was set at this symposium and many excellent papers presented. The symposium conclusions were directed at four

https://doi.org/10.1017/S0373463398007954 Published online by Cambridge University Press

areas: (i) a need for further development of international standards on VTS, taking into account the specific requirements in the establishment and operation of VTS in confined waters and inland waterways; (ii) more discipline is required with respect to operational procedures, particularly as the use of automated processes are becoming more readily available; (iii) the use of transponders in VTS areas will lead to the use of interactive data-links between VTS and on-board equipment and further research is necessary, so that development on international standards on the use of data-communication in the area of vessel traffic management, can be promoted; and (iv) the use of simulation techniques is considered to be extremely important in the training of VTS operators.

3. COMPETENT HARBOUR AUTHORITIES AND THE VTS GUIDELINES. The newly adopted IMO guidelines have defined a number of terms and responsibilities associated with VTS:

> VTS is a service implemented by a Competent Authority, designed to improve safety and efficiency of vessel traffic and to protect the environment. The competent authority is the authority made responsible, in whole or in part, by the Government for the safety, including environmental safety, and efficiency of the vessel traffic and the protection of the environment.
>
> The Government or Competent Authority should ensure that the VTS Authority is provided with sufficient staff, appropriately qualified, suitably trained and capable of performing the tasks required, taking into consideration the type and level of services to be provided and the current IMO Guidelines on the recruitment and training of VTS operators. They should also establish appropriate standards for shore and off-shore based equipment.
>
> The VTS Authority is the Authority with the responsibility for the management, operation and co-ordination of the VTS, the interaction with participating vessels and the safe and effective provision of the service. Such an Authority may include a governmental maritime organisation, a single port authority, a pilotage organisation or any combination of them.
>
> A VTS Operator is an appropriately qualified person performing one or more tasks contributing to the services of the VTS.

The UK Pilotage Act 1987 shifted the responsibility for pilotage from the General Lighthouse Authorities (GLAs) to Competent Harbour Authorities (CHA). This means that, in the UK and some European ports, pilots and VTS are now in a common area of interest. However, not all VTS centres are managed by Port Authorities. In the UK, the Coastguard Agency oversees the Dover Straits. In Sweden, the Port of Göteborg and its Harbour Master are managed by the City, whilst the Pilots and VTS are managed by the National Maritime Board.

Unfortunately, there is currently no common performance standard between the various ports, or even their Authorities. If one takes the VHF radio call signs as an example; 'Port Control London', 'Southampton VTS', 'Milford Haven Radio' and 'Göteborg Traffic' are all offering a Vessel Traffic Service and yet the call signs are seen to be very confusing, particularly for inbound Masters.

4. PROJECTED ACRONYMS. Vessel Traffic Management Systems (VTMS), Vessel Traffic Information Service (VTIS), Vessel Traffic Management Information Systems (VTMIS), Mobile VTMIS (MOVIT), Vessel Traffic System (VTS) and Vessel Traffic Services (VTS) are all acronyms used by manufacturers to describe the equipment they wish to sell to prospective buyers, by port authorities who are describing their total VTS system and by various research projects which are endeavouring to develop solutions which integrate new technologies for the benefit of available human resources. One can see from these acronyms that Vessel Traffic is the common theme. It is important to remember however, that the only definition mentioned in the official IMO documentation is Vessel Traffic Service.

Manufacturers are selling systems designed to fulfil customer requirements. These systems may entail just a simple radar display and scanner through to a package consisting of multi-radar displays and scanners, radar data processors, target tracking processors, ship data-processing systems, full communications and the complete infrastructure for such a system. It is an unfortunate fact of life that, very often, a prospective buyer of a VTS system will not know exactly what they require and end up by purchasing too much or too little to satisfy a port's requirements.

The Port of Rotterdam has produced an excellent booklet, which describes their Vessel Traffic Management System. The Rotterdam VTMS is especially designed to coordinate all the port's services and allows compliance with regulations to be monitored. The Harbour Coordination Centre is the heart of all operations and traffic control. However, the whole VTMS comprises the port buildings, radar tracking system, integrated communication system and the data handling system.

The Port of London Authority (PLA) also prides itself in having one of the most advanced and versatile vessel traffic management systems in the world, which means the ports on the estuary can offer services which compete with ports having free access to the sea. Their computer system POLARIS (Port Of London Authority River Information System), has been developed for the PLA to monitor the movements of vessels and craft within the area of its jurisdiction. The vessel traffic management information system supports the navigation and pilotage services provided by the Authority.

5. RESEARCH PROJECTS. There have been, and still are, a number of European research projects encompassing VTS within their terms of reference. One of the earliest projects was COST 301, set up in 1983, which lasted for about three years. The objectives were to assess the potential benefits which Vessel Traffic Services (VTS) would bring to the safety and efficiency of traffic and the reduction of pollution risk in European waters, and to make recommendations on a co-ordinated European approach to VTS based on results obtained from this assessment. A further objective was to foster the spirit of European co-operation in the field of research in maritime safety and operational efficiency.

Built on the recommendations of COST Action 301, two research projects (RTIS and TAIE) were funded under EURET, Framework II of the Transport R & D Programme. RTIS, now completed, was aiming at the design and assessment of a regional traffic management system. TAIE, also completed, was aiming at the

development of tools to enhance and assess the efficiency of VTS. An important part of the work of TAIE developed on a case study where a risk assessment for maritime traffic in the North Sea was performed.

A follow-up study was made on Vessel Traffic Management and Information Systems (VTMIS). This study has now extended within the VTMIS concerted action under the EU Framework IV maritime transport telematics programme. This programme includes research into new applications for VTS, the use of transponders for vessel tracking and course prediction, the tracking of fast, low, radar cross-section targets, improvements in environmental information for vessel traffic safety and enhanced ship-to-ship and ship-to-shore communications. Other shared cost activities address other parts of this scientific area, one being training requirements for VTMIS operators.

A better known European project is POSEIDON (Project On integrated VTS, Sea Environment and Interactive Data On-line Network). The project objectives are to establish the principles, standards and architecture for the interoperability of maritime VTS at local, regional and European level by the integration with advanced vessel communications, information and tracking technologies in order to improve the safety and efficiency of maritime transport.

For all these different projects and their confusing acronyms, the Master bringing his/her ship into a VTS area only knows about VTS. As far as the Master is concerned, management and information are part and parcel of the service he receives, which will depend on the type of port or area the ship is in and the professionalism of the personnel concerned.

6. VTS AND PILOTAGE AUTHORITIES. At their annual conference in 1990, the UK Pilots' Association (Marine), adopted a Policy which stated that VTS operators must have suitable qualifications in order to understand the operational requirements of Masters and Pilots; such qualifications should be as a Pilot, for the area concerned, or a Master Mariner. In 1996, the European Maritime Pilots Association adopted a Charter on Pilotage to take up the dual challenge of the pilotage service regarding the safety and the competitiveness of maritime traffic. The Charter had regard to IMO Resolution A578 (14) on guidelines for VTS and, whilst Section 1.4 of the Charter stated that Pilots' participation should be organised in the interests of safety and the efficiency of maritime traffic, there was no direct statement concerning the qualifications of VTS personnel. Section 1.6 of the Charter deals with the provision of Shore-Based Pilotage (SBP), stating that, whilst SBP is an extension of the Pilot's task to improve the safety and efficiency of maritime traffic, its limitations should be understood. This section also states that SBP cannot be a substitute for pilotage performed by a Pilot on board, but that it consists of advice which is intended directly to influence the course to be steered and the speed or engine movements to be executed. Both IMPA and EMPA define SBP as,

> an act of pilotage carried out in a designated area by a Pilot licensed for that area from a position other than on board the vessel concerned to conduct the safe navigation of that vessel.

In Resolution A.857(20) – Guidelines for Vessel Traffic Services, Section 2.2.3.5

states that 'In operating a VTS, the VTS Authority should... consider, where appropriate, the participation of the Pilot both as a user and provider of information'; Section 2.3.3.2 states 'When the VTS is authorised to issue instructions to vessels, these instructions should be result-orientated only, leaving the details of execution – such as course steered or engine manoeuvres to be executed – to the Master or Pilot on board the vessel. Care should be taken that VTS operations do not encroach upon the Master's responsibility for safe navigation, or disturb the traditional relationship between Master and Pilot'.

This IMO document confirms that the control of the ship lies with the ship itself and not with the shore. Pilots have an important role to play within the framework of VTS as a both user and provider of information. However, a Pilot employed in an operational VTS centre and communicating with a vessel does not have control of the particular vessel as such and is therefore only giving navigational assistance. The Pilotage Act 1987, defines a Pilot as having the same meaning as in Section 742 of the Merchant Shipping Act 1894, *viz*. 'any person not belonging to a ship who has the conduct thereof'. This particular phrase has been misinterpreted as meaning that the Pilot may be remote from the ship and still have the conduct of same. Whereas, in fact, it means that although the Pilot is not part of the permanent crew, he/she is actually on board said vessel. *Shore Based Pilotage* and *Remote Pilotage* are misnomers and one should be cautious when attempting to classify such expressions as an act of pilotage.

An eminent 18th century authority on maritime law wrote;

> The name of a pilot or steersman, is applied either to a particular officer, serving on board a ship during the course of a voyage and having the charge of the helm and the ships' route, or to a person taken on board at a particular place for the purpose of conducting a ship through a river, road, or channel, or from or into a port.

In 1995, as a result of the 1993 UKPA(M) Delegate Conference, a Policy Statement was produced on Pilot recruitment and training. Item 8 in the document stated;

> UKPA(M) are of the opinion that where a port operates either an active or passive VTS system, there should be full positive Pilot involvement.

In spite of Charters and Policies being adopted by the various Pilotage organisations, the infrastructure in some ports excludes Pilots from shore-based VTS. This may be because, in some instances, the Pilots themselves do not wish to be employed in the VTS centre. However, the relevant Competent Authorities are the ones who apparently decide whether to use the knowledge and experience of a Pilot, in the VTS centre itself. One of the major disadvantages with Pilots performing VTS duties on a part-time basis, is that they lose valuable pilotage time and experience.

7. VESSEL TRAFFIC SERVICES (VTS). There are three main types of VTS, namely; coastal, estuarial and harbour. Coastal VTS may be for surveillance purposes, carried out in sensitive areas where some form of traffic management is required to ensure that vessels, passing through an area, comply with traffic separation schemes. For example, the English and French Traffic Surveillance

authorities assist specific types of vessel transiting the Dover Straits, imparting information as and when required.

Currently, a very large and long bridge is being constructed in the Great Belt, and a VTS surveillance system has been set up to ensure the safe passage of traffic in that area. A similar system is now operating in the Flint Channel area, off Malmö, Sweden, where another bridge is being constructed. In this latter area, there are two VTS centres, one run by the Swedish authorities, the other by the Danish.

Estuarial VTS is provided to ensure the safe transit of vessels in rivers or estuaries, on their way to a port; for example, the River Thames for London and the Solent for Southampton.

Harbour VTS is provided for vessels entering or leaving a port with little or no pilotage – run in, for example, Dover or Portsmouth. There are some areas which overlap – London/Medway and Southampton/Portsmouth, to name but two.

There are now a number of areas throughout the world where mandatory reporting is required. Australia, for example, has two reporting systems, namely; AUSREP and REEFREP. The latter system covers the Torres Strait and Great Barrier Reef, whilst the AUSREP system covers the western and southern approaches to the Continent as well as most of the Australian coastline. Eventually, similar reporting systems will operate on a global basis.

The role of VTS personnel varies considerably with respect to the type of VTS in existence. The content of the work is determined by the age, scope and sophistication of the equipment in which the CHA has invested and on the type of operation in which the Operator is involved. In some ports, the VTS personnel are expected to communicate information to ships which are using the harbour area, whilst in others they assume the role of traffic managers. The nature and sophistication of equipment being used tends to encourage VTS personnel to become involved in the navigation of ships. This is not necessarily a good thing, and the personnel concerned must endeavour not to get involved in collision avoidance or ship handling manoeuvres. However, in the ordinary course of their work, the personnel are providing a service on behalf of their employer, the Competent Authority, and it is upon this service that those who have the conduct of their vessels are increasingly coming to rely.

8. TRAINING FOR VTS. VTS personnel are gradually acquiring, by virtue of the nature of their work, the ability to assist in preventing maritime casualties within harbours, port limits and even offshore. Unfortunately, they are also acquiring, unwittingly, the ability to contribute to the cause of such casualties through improper, or even lack of, professional training. The consequence of such casualties, given the close proximity of the shore and the possible resulting environmental damage, could be very serious, particularly in terms of the liability of the Authority employing the personnel.

In spite of these individual facts, many VTS Operators are working with no clear guidance from their employers on the extent of their role. One of the main purposes of investing large capital sums into modern harbour surveillance and communications equipment is to enhance the efficiency of the port. Having invested in the equipment, the money for a well-structured training package for

these important personnel would also be a worthwhile investment. It would ensure that the equipment did in fact contribute to the safety of shipping and not, as some fear, merely to provide another potential for disaster.

One of the anomalies in the present system is that, unlike the aviation industry where the air traffic controller has an internationally recognised qualification, his maritime counterpart does not yet officially have a specific qualification related to VTS, even though the work involved is highly specialised. Large ports may have as many as three people on duty at any one time in the VTS centre. These may comprise two VTS Operators, and a Duty Port Controller. The Duty Port Controller may have a Master Mariners' certificate of competency and may even be a qualified Pilot for that port. The VTS operator/assistant may have a maritime background but no recognised qualifications as such. Smaller ports may only have one VTS operator on duty, working entirely on his/her own for a twelve-hour shift. The operator concerned may not have a navigational background but may have graduated through a career scheme run by the port concerned.

Experience gained by those running VTS courses has emphasised the necessity for personnel to have a good general-knowledge background, with possibly some important skills relating directly to their work. Currently, many would-be operators throughout the world are recruited from widely differing backgrounds and disciplines, and this situation is likely to continue into the next century. To have a nationally, or indeed internationally, recognised qualification, a standard is required that will be recognised by all VTS Authorities. The common requirements for the majority of VTS operators at different ports, are communication skills, radar interpretation and both specific and general nautical knowledge. To qualify fully for a particular port, an endorsement should be obtained, which would include local knowledge of the area, types of shipping using the port, emergency procedures and the local bye-laws concerned. The Officer responsible for the VTS centre would, in addition to his normal maritime qualifications and those required for a VTS operator, be required to have port and risk analysis management experience, together with legal knowledge, concerning the bye-laws and the liability of the work involved.

9. THE USE OF SIMULATORS FOR TRAINING. Simulators are extremely powerful tools for both initial and promotional assessment, as well as for continuation training. They offer an excellent interactive environment to acquire the necessary skills and attitudes for the job. Scenarios can be introduced that would be difficult to encounter in the normal everyday situations in port. If an incorrect decision is made, no great damage is done except, perhaps, to one's pride! Certain pressures can be applied, and emergencies introduced, in order to determine how the individual concerned reacts. Performance standards can be evaluated under different conditions. Any weaknesses or errors can be discussed at debriefings, these being the most important sessions during training. Repeated exercises can enhance any particular skill that may be lacking.

Simulator exercises may last from half an hour to two hours, depending on the objectives. The two main areas of importance in most exercises are communication skills and interpretation of the radar and data displays. There is no doubt that communication skills are sadly lacking and yet, without

communication, there can be no VTS. The important use of message markers is stressed, particularly with respect to communicating with ships having language problems. The VTS course may commence with a discussion on how the various radar and tracking displays should be interpreted, both from the ship and the shore. The principles of VTS and Resource Management should be discussed together with the legal aspects. Case studies should be used to enhance such discussions. A certain amount of time needs to be devoted to the familiarisation of equipment to be used during the various exercises. As the exercises progress, so should their difficulty, with emergencies occurring as and when necessary, enabling assessment of personnel's reaction to quick thinking and decision making. Even watch handovers can be carried out and assessed. Exercise debriefings should be carried out immediately after each exercise, with the instructor replaying the exercise at fast or real time, stopping where necessary to highlight particular objectives or problem areas. The course participants must play an active role in the debrief sessions, highlighting their own negative and/or positive points. Voice tape recordings can be particularly useful with respect to learning communication skills.

Student distribution on the course will depend on simulator configuration. Simulators having own ships are particularly useful in creating realistic interaction between ship and shore. If no own ships are available, role-playing is necessary to create the realism in communication control. In this latter case, any alterations required by other vessels, are made by the instructor. Currently, some VTS courses are tailored to meet particular customer requirements, including duration. However, recommendations being made by IALA will mean that training, particularly for those without a professional marine background, will be of statutory length. Exercises may be run in the geographical area from which the course participants originate, which gives them a good opportunity to learn their home area thoroughly. On the other hand, the use of a neutral area is particularly useful when the participants are from different ports.

The revised STCW (Standards of Training, Certification and Watchkeeping for Seafarers) Convention comes into force in its entirety in February 2002, although transitional provisions allow certain sections to be applied well before that time. Radar/ARPA training on simulators is now included and will be mandatory for watchkeepers in the deck department. Similar training and updating is almost certain to be a specific requirement in future for VTS personnel.

10. ON THE JOB TRAINING (OJT). This is probably one of the most important aspects of training for VTS personnel. Unfortunately, in many cases, OJT is programmed by well-meaning managers who really do not have the time, due to commercial pressures in their own work place, resources or know-how to construct a proper training programme. New employees are paired with experienced personnel and exhorted to watch what happens and replicate it. The major disadvantage of OJT is that it also passes on the bad habits of those experienced personnel. For example, if a VTS Operator has been taught that the ship track data being shown on the radar display represents Heading and Speed, he/she may transmit that same information to other vessels in the area; whereas, in fact, the track information being shown relates to the ground and *not* to the water.

VTS personnel not trained correctly in the interpretation of their displays could lead to bad decision-making and possible traffic incidents. OJT should be formal, well structured and carried out by a specially-designated VTS instructor who has patience and is skilful in communication.

Some port authorities incorporate simulator and classroom facilities in their external training programme, to complement OJT. Simulator courses provide a safe tool for the participant to learn new skills, be tested for aptitude and attitude to the particular work and enable hazardous scenarios to be tested and evaluated. A continuous assessment procedure should be in force and, on successful completion of particular levels of competence, endorsements will be made in the Operator's Log Book. The long-term objective is to achieve a common performance standard.

11. THE AVIATION MODEL. Although the aviation world is younger than its maritime counterpart, it is well organised and regulated. The International Civil Aviation Organisation (ICAO) is the aviation equivalent to IMO. The UK Civil Aviation Authority (CAA) is one of many members of ICAO and, as such, is responsible for enforcing Safety Regulations, Standards and Policy in the UK. One major advantage is that there is a single governing body, with standardised rules and procedures. Direct control is maintained over all commercial traffic, in the air and on the ground, using English as the universal language.

The Authority will not issue a licence to a person who cannot speak English fluently, 'without undue accent or impediment'. Most importantly, the Air Traffic Controllers are properly trained and have internationally-recognised qualifications. Training is continuous, with regular updating. The Air Traffic Services Standards Department of the CAA's Safety Regulation Group is responsible for the licensing of air traffic controllers within the UK. It is also responsible for:

(a) Establishing the national standards and determining procedures for regulating courses of training in air traffic control.
(b) Ensuring that the national standards for training, leading to the issue of an ATC licence, are updated as necessary, in order to reflect operational needs.
(c) Inspecting and granting recognition to colleges to conduct training.
(d) Evaluating and approving courses of UK ATC training offered by recognised colleges.
(e) Noting ICAO requirements and taking action as necessary.

From the above, one can see that requirements are very strict and quite rightly so. Article 82 of the Air Navigation Order states:

> Without prejudice to any provision of this Order the Authority may, for the purpose of this Part of the Order, either absolutely or subject to such condition as it thinks fit:
>
> (a) approve any course of training or instruction,
> (b) authorise a person to conduct such examinations or tests as it may specify; and
> (c) approve a person to provide any such course or training or instruction.

12. ASSESSMENT AND COMPETENCY. Being assessed during training, on or off the job, is extremely important and requires a high level of experience and skill by the person carrying out the assessment. The assessor should ideally have an appropriate knowledge and understanding of the competence to be assessed. They should, likewise, be qualified in the task for which the assessment is being made, have received appropriate guidance in assessment methods and practice and have gained practical assessment experience. This applies equally to those using simulators. All training institutions should be approved and conform to a common standard. The competency level tables shown in the 1995 STCW Convention give an excellent breakdown as to what is required by participants in order to perform their particular role successfully. Similar VTS competency levels have been drawn up by IALA, relevant to the work carried out by VTS personnel. Every candidate who requires a VTS Operator and VTS Supervisor endorsement will have to demonstrate competency in all the various subject areas. Assessment can require the VTS personnel to demonstrate the related competency at their place of duty, or at an approved training establishment. The criteria for evaluating this area of competence will be taken from particular legislative requirements and the ability to carry out the task safely and effectively.

13. VTS QUALIFICATIONS. One of the objectives in Annex 2 of Resolution A.857(20), is to provide authorities with a logical process to follow in selecting and recruiting VTS operators and in establishing qualification and training standards. The authorities also have to establish training requirements for their VTS operators. The revised STCW Convention includes several references to expanded English language requirements for seafarers, in so much that officers of the navigational watch will require knowledge of written and spoken English adequate to understand messages concerning the ship's safety and operation and adequate to communicate to other ships and coast stations and use the IMO Standard Maritime Communication Phrases. This is particularly important for VTS personnel. Some ports do not have English as a prime language, whilst others use both their national and English languages. There are certain disadvantages with respect to using two or more languages, in that some vessels arriving at a particular port will not understand fully what is going on in their area. The *Estonia* incident in the Baltic highlighted the problem of using more than one language in an emergency. Whatever the language used, particular attention must be given to the interpretation of the terminology used, hence the need for a common standard.

The IALA VTS Committee has just completed its current four-year session, during which time various working groups will have drawn up Recommendations concerning the operation and procedures for VTS. During this session, an Ad Hoc Committee was tasked by the Secretary General with drawing up Recommendations for training and qualifications of VTS personnel. This has been successfully completed and passed by Council. The Recommendations for VTS qualifications allow for two main grades, *viz*. VTS Operator (Fig. 1) and VTS Supervisor (Fig. 2). The VTS Operator entry level will require that trainees have a reasonable level of education and a good command of the English as well as the national language of the Country in which the post is held. There could be different grades of

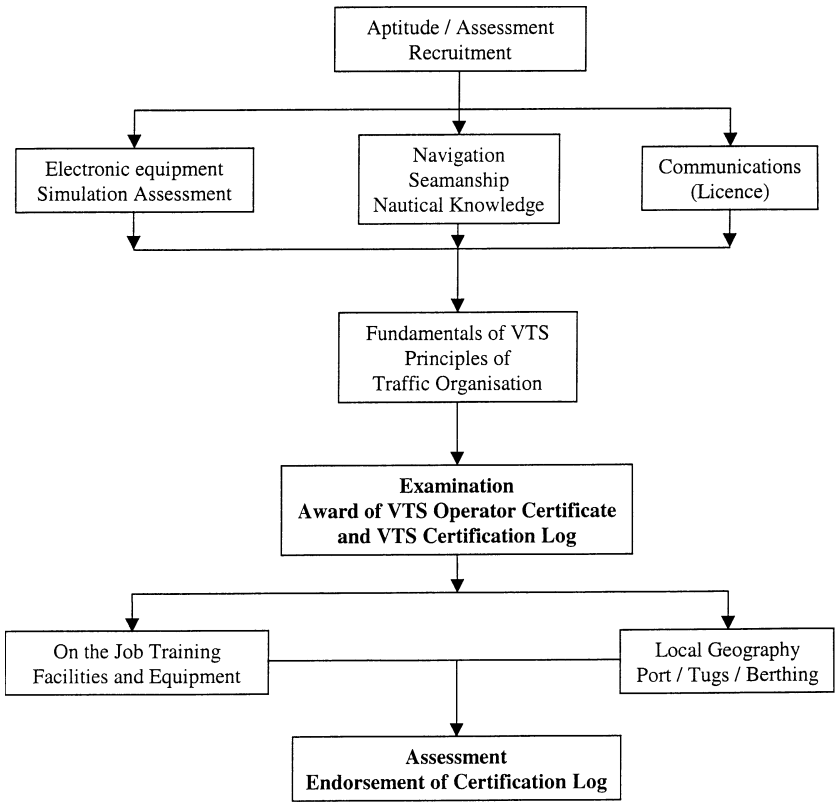

Fig. 1. The VTS Operator

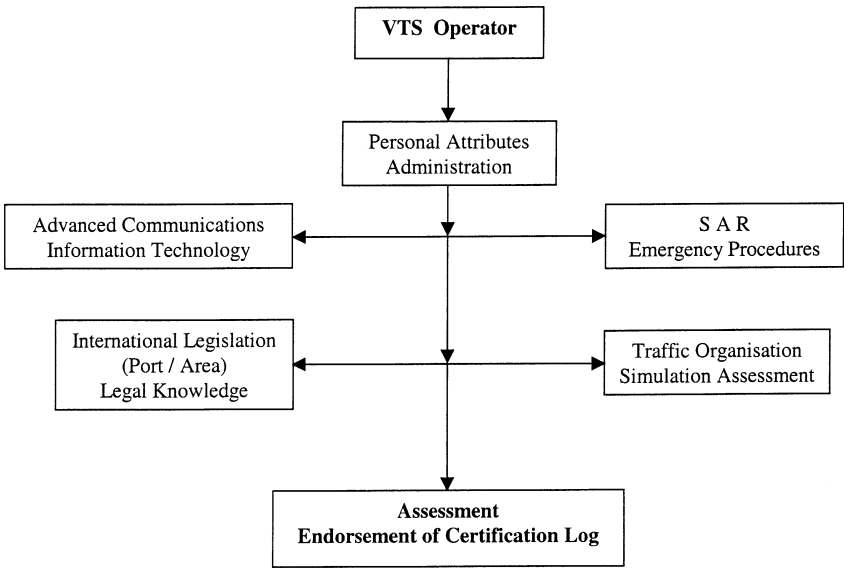

Fig. 2. The VTS Supervisor

https://doi.org/10.1017/S0373463398007954 Published online by Cambridge University Press

Operator, depending on the classification of the VTS centre itself; however, this point has yet to be resolved. These VTS qualifications should ensure an efficient career structure (Fig. 3) and enhance the quality and determination of the VTS personnel concerned. By ensuring their VTS personnel are well qualified, the port authorities would likewise enhance the quality and professionalism of the port itself. Should a qualified VTS person wish to move to another port, his/her existing qualification and experience will contribute towards acceptance of the post, but an endorsement will be required before the operator can finally take the post. Such qualifications mean that a common performance standard can be achieved worldwide, with the endorsement being used only for the port at which the operator works.

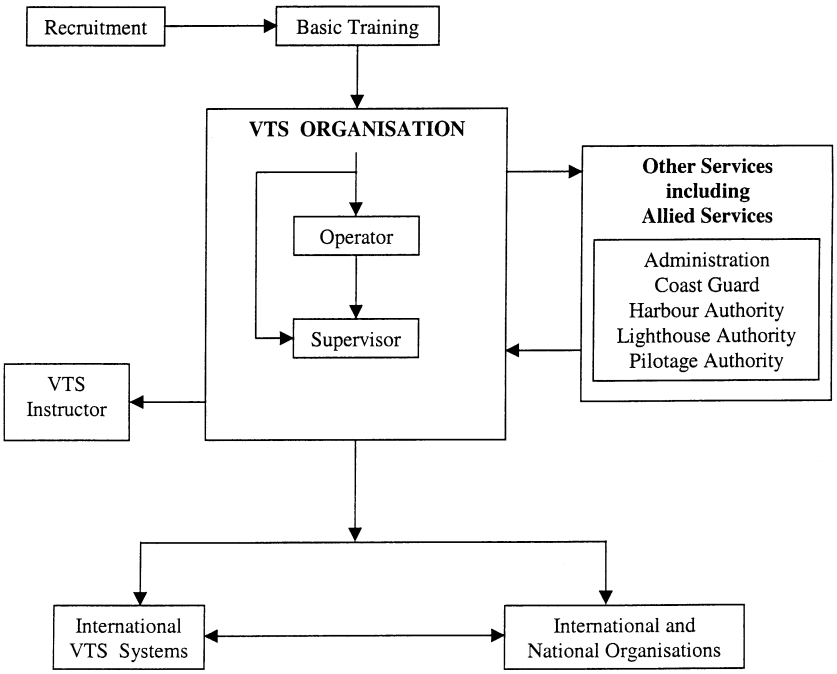

Fig. 3. Possible Career Structure

Non Vocational Qualifications (NVQs) were introduced in the UK to meet the demand for industry-led, flexible and competence-based qualifications. In the NVQ system, competence is defined as: 'the ability to perform activities within an occupation or function to the standards expected in employment'. It encompasses both skills and knowledge, the organisation and planning of work, coping with non-routine activities, as well as those qualities of personal effectiveness that are required to deal with other people. The latter requirement is most important as the majority of time spent by VTS personnel revolves around communication skills.

14. VTS QUALITY STANDARDS. Training must always be ongoing in order to enhance the professionalism required in a VTS centre. Likewise, it is very important that quality performance audits are carried out at regular intervals to ensure that the quality of that professionalism is maintained. The quality audits and VTS inspections should be carried out by an independent agency, in co-operation with the authority responsible for the particular VTS. Currently, there are no official guidelines with respect to the management of a VTS quality system. ISO 9002 is an international standard that lays down the framework that a service provider can use to achieve a consistent level of service to its customers. It is the standard most frequently interpreted for use in developing and implementing quality systems in service industries.

The International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code), is a management system standard designed with the objective of ensuring safety at sea, prevention of human injury or loss of life and avoidance of damage to the environment, in particular to the marine environment and property. A quality management system that complies with ISO 9002 should fulfil the requirement of the ISM Code.

The two standards, though focusing on separate objectives, are complementary in nature and may be implemented as one system, thus being very suitable for VTS purposes. The qualifications and experience of instructors and assessors should also be included in the relevant quality standards.

15. MARINE CASUALTIES. Major maritime disasters have occurred throughout history and are still occurring with monotonous regularity. Some of these disasters are causing ports to suffer not only severe pollution within their immediate environment, but also loss of life on the ships themselves. The knock-on effect is quite substantial and may even enforce the closure, albeit temporary, of the port itself. Of course, no amount of training can account for the human factor, but it can go a long way in reducing the risk involved. One aspect of VTS training is crisis management. Most ports have procedures to follow in case of an emergency, and exercises are carried out on a regular basis. The following are given as examples of marine casualties which could have been avoided:

15.1. A collision between two tankers, under the Golden Gate Bridge in San Francisco, during heavy fog in the early morning of 18 January 1971, nearly caused a major catastrophe. Ironically, the introduction of the Harbour Advisory Radar (HAR) in San Francisco, and elsewhere, had met with considerable opposition from Pilots and Masters. It was seen as an attempt to impose guidance and advice by unqualified Coast Guard officers on the navigation of vessels. Resentment may explain why the master of *Oregon Standard*, one of the two tankers involved, ignored the services of the HAR after leaving the berth. However, it does not excuse his failure to obtain information about the other vessel, *Arizona Standard*, within the Bay area, relevant to the navigation of his own vessel. This case clearly demonstrated the value of VHF communication as a valuable means for averting such a casualty.

15.2. A catastrophic collision between two Ro-Ro ferries, *European Gateway* and *Speedlink Vanguard*, occurred in the approaches to the Port of Harwich, on the night of 19 December 1982. The *European Gateway* was

outward bound and the *Speedlink Vanguard* was inbound. Both vessels were reporting to Harwich Harbour at the respective reporting points. However, the final message to Harwich Harbour, passed by the outbound ship, also included that vessel's navigational intent. The Master of the inbound vessel did not hear this message, neither was it reported to him. Subsequent confusion arose on the inbound ship, as to what the outbound vessel was doing and shortly afterwards the *Speedlink Vanguard* collided with the side of the *European Gateway*, the latter vessel eventually capsizing due to severe flooding. It was the belief of the UK Department of Transport that, 'this collision occurred because of a degree of over-complacency on the bridge of both vessels in the performance of what may have appeared routine and inexacting navigation'. It would appear that neither vessel communicated directly with the other, nor did Harwich Harbour inform the vessels of any navigational intent received. Although the bridge personnel would endeavour to assimilate all VHF information, as best as they were able, the common law duty of care really only extends to listening for signals addressed to the receiving vessel or all ships. 'It may also extend to listening to all VHF traffic in special circumstances where it is foreseeable that general VHF traffic will be likely to have implications on the safety of the listening vessel.'

15.3. The *Western Winner* was in collision with *British Trent*, in the vicinity of the Wandelaar pilot station, off the Belgium coast on the morning of 3 June 1993, which resulted in fire and the loss of nine lives. The following quotes are taken from the MAIB Report:

> (6.4) Vessel Traffic Service. 'A pamphlet issued by VTS-SM (Vessel Traffic Service – Scheldt Mondingen) states the main task of the VTS-SM is to provide information to shipping and, if necessary, traffic organisation could be implemented. The failure to report to VTS-SM resulted in *Western Winner* not being identified on the VTS radar until the Master made a call to the Pilot, less than three minutes before the collision.'
> (7.5) Radar control and monitoring of the situation by VTS. 'Radar control knew the position, course and speed of *British Trent* and that there was reduced visibility in the pilotage area. They were also aware that an unknown vessel was proceeding on an easterly course towards the pilotage area at a relatively high speed. Unfortunately the potential hazard of this situation was not recognised and no warning information was passed to *British Trent* or to her Pilot.'
>
> (11.4) Control at the scene of the accident. 'When incidents such as this occur it would be prudent to introduce, immediately, the procedures which apply when pilotage is suspended. This would give remote pilotage advice to vessels through the VTS-SM system so that they could be kept clear of both the casualty and one another. The VTS-SM system has the ability to readily identify and communicate with all vessels in the area.'
>
> Findings (12.5) 'He (the Master of *Western Winner*) did not participate in the Vessel Traffic Service system which meant his vessel was not identified on the Traffic Service radar.'
> (12.6) 'VTS-SM did not monitor the traffic situation and did not give information about the developing dangerous situation when an unidentified relatively fast moving vessel entered a manoeuvring area in restricted visibility.'

Recommendations (13.2) 'The Bermuda Registry of Shipping should liaise with the Belgian and Netherlands Authorities responsible for the operation of the Vessel Traffic Service, in order to make it more effective in traffic control.'

Should the duty of care of those on duty at (VTS-SM) have extended voluntarily to communicating with *Western Winner*, without that vessel officially participating in the VTS system, even though they apparently knew about the existence of an unidentified vessel in the area? It would appear that had the *Western Winner* participated in the VTS system, VTS-SM may well have communicated with her and advised on the developing situation. The remote pilotage advice is purely *advice* and not pilotage as such.

15.4. The *Sea Empress* grounded in the approaches to Milford Haven in the evening of 15 February 1996. A pilot was on board and the vessel was entering the Haven via the West Channel. The following quotes are taken from the MAIB Report:

(7.4) 'As there was no agreed track, it would have been impossible for a watch officer monitoring the radar to warn the Pilot since he would not know what the Pilot's intended track was. As the vessel closed with the Channel entrance, a set by the tide towards one side or the other would probably not have been apparent on radar unless the bearing and range discrimination was unusually good. In any case, it is unlikely that warning given at such a late stage in the approach to the entrance, probably less than half a mile from it, would be timely enough to avoid a grounding in the entrance. It is considered that the existing radar installation, had it been operational and manned, would not have prevented this grounding.'

(21.16) 'Although considered to be an important part of best ''practice'' in safe operations, the fact that the port radar installation was not operational did not contribute to the initial grounding.'

The report states that the non-operational aspect of the port radar installation did not contribute to the initial grounding. However, had it been working properly, the personnel concerned may well have been in a position to communicate with the vessel in good time and prior to the pilot boarding. Whilst it is not inferred that the VTS authorities concerned contributed to any of the above four casualties, they all occurred in areas where VTS was present. In each case, communications, or the lack thereof, was an important aspect. Interestingly enough, a considerable number of aircraft accidents are caused by improper use of, or lack of, communications.

16. FUTURE LEGISLATION. The 1995 STCW Conference adopted Resolution 10, which reads as follows:

'Having adopted the 1995 amendments to the International Convention on Standards of Training, Certification and Watchkeeping for seafarers (STCW), 1978.

Bearing in mind the contribution made to safety of life at sea and property at sea and to the protection of the marine environment by maritime pilots, vessel traffic service personnel and maritime personnel employed on board mobile offshore units.

Noting that time constraints have prevented full consideration to be given to the possibility of including provisions on the training and certification of such personnel in the amendments to the 1978 STCW Convention adopted by the Conference.

> Invites the International Maritime Organization to consider developing provisions covering training and certification of maritime pilots, vessel traffic service personnel and maritime personnel employed on mobile offshore units for inclusion in the 1978 STCW Convention or in such other instrument or instruments as may be appropriate.'

In October 1997 IMO adopted, in accordance with Article VIII(b)(iv) of the International Convention for the Safety of Life at Sea, amendments to the Convention, in the form of Regulation 8-2. When such amendments are finally accepted, they are due to come into force, under tacit acceptance, on 1 July 1999 as Regulation 12 of SOLAS Chapter V. The Regulation reads as follows:

> 1. Vessel traffic services (VTS) contribute to the safety of life at sea, safety and efficiency of navigation and the protection of the marine environment, adjacent shore areas, work sites and offshore installations from possible adverse affects of maritime traffic.
> 2. Contracting Governments undertake to arrange for the establishment of VTS where, in their opinion, the volume of traffic or the degree of risk justifies such services.
> 3. Contracting Governments planning and implementing VTS shall, wherever possible, follow the guidelines developed by the Organisation. The use of a VTS may only be made mandatory in sea areas within the territorial seas of a coastal State.
> 4. Contracting Governments shall endeavour to secure the participation in and the compliance with, the provisions of vessel traffic services by ships entitled to fly their flags.
> 5. Nothing in this regulation or the guidelines adopted by the Organization shall prejudice the rights and duties of Governments under international law or the legal regimes of straits used for international navigation and archipelagic sea lanes.

The guidelines mentioned in (3) above, are associated with this SOLAS Regulation and describe the principles and general operational provisions for the operation of a VTS and participating vessels.

17. CONCLUSION. During the earlier work of COST 301, concern was expressed by shipmasters, amongst others, regarding the quality and competence of shore-based VTS Operators and the manner in which information was provided. This concern still exists and will continue to do so in many circles, until VTS personnel can obtain a professional qualification, which is recognised nationally and internationally. It is about fifteen years since the IALA VTS Committee was formed and yet there are still no internationally-recognised VTS qualifications. With less than two years remaining in this century, it is imperative that by the year 2000, all VTS personnel will, through training, have achieved a common performance standard, with internationally-recognised qualifications of the highest professional quality, thereby achieving a status similar to their counterparts in the aviation industry. This aim will also secure the core objective of VTS, which is to improve the safety and efficiency of navigation, safety of life at sea and the protection of the marine environment and/or the adjacent shore area, worksites and offshore installations from possible adverse effects of maritime traffic.

REFERENCES

British Trent/Western Winner. *MAIB Report*.
Cahill, Richard A. *Collisions and Their Causes*.
European Gateway/Speedlink Vanguard. *Report of Court No. 8072*.
Koburger, C. W. Jr. *Vessel Traffic Systems* (COST 301).
Resolution A.857 (20) – Vessel Traffic Services. IMO, November 1997.
Sea Empress. *MAIB Report*.
Standard Marine Navigational Vocabulary. IMO.
STCW 95 Convention. IMO.
Vessel Traffic Services Manual. IALA, 1993.

KEY WORDS

1. Sea Navigation. 2. Safety. 3. Vessel Traffic Services.