Hiding Behind "Tradition"? Should U.S. Vessel Traffic Centers Exercise Greater Direction and Control over Vessels in Their Areas?

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Hiding Behind “Tradition”? Should U.S. Vessel Traffic Centers Exercise Greater Direction and Control over Vessels in Their Areas?

Craig H. Allen*

In the aftermath of the 2007 COSCO BUSAN allision and oil spill, some asked whether United States Coast Guard Vessel Traffic Service (VTS) operators monitoring the developing incident should have intervened explicitly to warn the vessel or even order it to take avoiding action. The controversy called to mind a speech by a former IMO secretary-general in which he suggested that those resisting greater shore-based control were “hiding behind tradition.” In its investigation of the COSCO BUSAN incident, the National Transportation Safety Board (NTSB) urged the Coast Guard to better define its expectations regarding the exercise of VTS control authority, and several federal legislators cosponsored a bill to “clarify” the VTS authority to direct a vessel to change its course or speed. This Article examines existing international materials, federal legislation, regulations, and Coast Guard policies on VTS services and concludes that additional legislation is neither necessary nor wise. It also concludes, however, that current VTS regulations and policies should be amended to better conform to international guidance documents and standardized terminology. Additionally, VTS operator and supervisor qualification and training programs should be expanded to ensure competency across the entire continuum of vessel traffic management activities.

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I. INTRODUCTION

On November 7, 2007, the 901-foot, Hong Kong-flagged containership COSCO BUSAN, outbound in dense fog from Oakland, California, to Busan, South Korea, allided with the fender system protecting the Delta Tower support for the San Francisco-Oakland Bay Bridge. The impact tore a 212-foot-long gash in the vessel’s hull, breaching two of the vessel’s fuel tanks and spilling over 50,000 gallons of oil into the bay. The oil contaminated twenty-six miles of shoreline, killed an estimated 2500 birds, and temporarily closed a fishery in the Bay. Although negligence by the vessel’s crew and embarked pilot seemed clear, subsequent investigations by the San Francisco Bay Board of Pilot Commissioners, U.S. Coast Guard, Department of Homeland

Security (DHS) Inspector General, and NTSB left some readers wondering whether the Coast Guard’s San Francisco VTS center should have taken more assertive action as the vessel deviated from its reported sailing plan. Among its recommendations, the NTSB urged the Coast Guard to provide guidance to its VTS personnel that “clearly defines expectations for the use of existing authority to direct or control vessel movement when such action is justified in the interest of safety.” In an unusual dissent, Safety Board member Deborah Hersman voted against the report, arguing that the Board’s probable cause determination should have included the Coast Guard’s failure to warn the COSCO BUSAN that it was dangerously close to the bridge. She wrote, “Although I accept that my single vote against the final report will not prevent its issuance by the Board, I will continue to view the report as a regrettable missed opportunity to thoroughly address marine safety issues that I expect we will see again.”

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5. Id. at 137 (NTSB Recommendation M-09-3).
6. Id. at 139-41 (Board Member Statement: Member Deborah A.P Hersman, dissenting). Foreshadowing the later findings by a majority of the NTSB, the Inspector General of the Department of Homeland Security concluded that intervention by the VTS would not have prevented the allision:

The VTS watchstanders on duty before the accident could not have taken any additional action that would have prevented the casualty. A time lag between a maneuver that a vessel is executing and the vessel movement data displayed in the VTS operations center precluded this possibility. For example, the VTS contacted the pilot onboard the M/V COSCO BUSAN pilot at 8:27 a.m. (see Table 1) to advise him that the VTS center’s equipment indicated that the vessel was on a 235-degree heading; the pilot informed the VTS operations center that the vessel was executing a turn and that he was steering 280 degrees. By the time the VTS watchstanders recognized that the M/V COSCO BUSAN appeared to be out of position to pass between the Delta and Echo columns of the San Francisco-Oakland Bay Bridge, the vessel had already started to execute its turn towards the bridge column.

DHS INSPECTOR GEN. REPORT, supra note 3, at 7.
7. NTSB REPORT, supra note 4, at 144-45.
Even before the NTSB report was released, some members of Congress introduced bills to “clarify” the authority of Coast Guard VTSs to issue navigation orders to vessels. One such bill, introduced by Senator Lautenberg of New Jersey and six cosponsors, would expressly authorize the Secretary (acting through the Coast Guard) to issue directions to a vessel to “change the vessel’s heading and speed” and arguably move the United States away from a traffic services model and closer to a traffic control model.\footnote{See Oil Spill Prevention Act of 2009, S. 685, 111th Cong. § 3 (2009) (cosponsors include Senators Begich, Boxer, Cantwell, Rockefeller, Snowe, and Vitter). The Bill contains other provisions addressing fuel oil tank protection, mariner medical standards and credentials, causation studies, tractor tugs, pollution investigators, and protection of seafarers, none of which are examined in this Article. See also REPORT OF THE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION ON S. 685, S. REP. No. 111-026, at 2, 7 (2009). The new Bill is largely based on S. 2699, introduced in but not enacted by the 110th Congress.}

The COSCO BUSAN incident and the legislative response have rekindled the debate over the appropriate balance between vessel and shoreside control over vessel movements, a debate that began even as the first VTS was established. For some, like former International Maritime Organization (IMO) Secretary-General William O’Neil, the air traffic control regime strikes a more appropriate balance between internal and external control than does the current ship-centric approach, particularly in light of the increasing volume of marine traffic, vessel size, speed and passenger capacities, and the enhanced and more accurate operating picture now available to shoreside VTS center operators.\footnote{Two technologies—Differential Global Positioning System (DGPS) and Automatic Identification Systems (AIS)—have significantly enhanced the operating picture available to vessels and VTS Centers. DGPS—an enhancement of basic GPS available in some areas—is an all weather satellite-based navigation system that provides position information generally accurate to within one to three meters. See U.S. Coast Guard Navigation Ctr., DGPS General Information, http://www.navcen.uscg.gov/dgps/Default.htm (last visited Sept. 2, 2009). AIS is a shipboard information broadcast system that acts as a digital signal transponder in the VHF maritime band, transmitting and receiving vessel identity, position, and other information to and from similarly equipped vessels and shore stations. See 33 C.F.R. § 164.46 (2008); 47 C.F.R. § 80.5 (2008); NATHANIEL BOWDTUCH, U.S. NAT’L IMAGERY & MAPPING AGENCY, PUB. NO. 9, THE AMERICAN PRACTICAL NAVIGATOR §§ 2711-2712 (2002). When added to the new generation of solid state radars that incorporate Doppler technology and high resolution displays, the DGPS-AIS combination provides VTS operators with a vastly improved operating picture of their area of responsibility.} For their part, however, vessel operators and harbor pilots are unlikely to support any meaningful transfer of vessel control to shoreside VTS controllers, most of whom do not hold master or pilot licenses\footnote{In some foreign locations, VTS operators hold master’s or pilot’s licenses. See Int’l Mar. Org. [IMO], Guidelines for Vessel Traffic Services, IMO Res. A. 857(20) (Nov. 27, 1997), annex 2, para. 1.1.2 [hereinafter IMO VTS Guidelines]; see also CHARLES W. KOBURGER JR.,
the necessary situational awareness to make, execute, and monitor critical navigation, collision avoidance, and ship-handling decisions.

In failing to move from a traffic services approach to a traffic control approach—and therefore closer to the aviation safety model—are we "hiding behind tradition," as Secretary-General O'Neil charged in a 1999 address to Trinity House? This Article will explore the legal regime that currently defines the relationship among vessel masters, watch officers, pilots, and VTSs, proposed amendments to that regime, and the policy and implementation issues that any alteration to that relationship would entail. Although the Article draws on background international materials, the focus is on the U.S. vessel traffic management system. The Article concludes that the legislative change proposals are both unnecessary and unwise. The existing statutory and regulatory authority strikes the optimal "control" balance between the vessel and shoreside components and provides needed flexibility. At the same time, however, the Coast Guard's national and internal VTS standard operating procedures should be further developed and aligned with international standards, and then used in conjunction with case studies and scenarios across the full range of the "continuum of vessel traffic management" activities to train those same vessel and shoreside operators.

II. BACKGROUND

VTSs are a vital tool for managing risk in the marine transportation system. Establishment of a cabinet-level Committee on the Marine Transportation System (CMTS) in 2004 and the promulgation of the National Strategy for the Marine Transportation System in 2008 reaffirmed the critical importance of both maintaining an effective, efficient, and safe Marine Transportation System (MTS) in the United States and of approaching MTS policy and management from a systems...
point of view. The marine transportation “system” comprises vessels, waterways, ports, intermodal connections, related infrastructure, and system users. The MTS national strategy document calls for measures to strengthen marine safety by providing timely, relevant, and accurate navigation safety information to mariners. VTSs are one of the marine risk management measures cited by the MTS strategy. In fact, they are one of the more active external marine risk management measures. Accordingly, this Part of the Article begins with a brief description of the risk assessment and management principles that inform our design of the marine safety regime. It then turns to the international and U.S. frameworks for marine safety, including the frameworks’ provisions for VTSs.

VTSs are only briefly defined by international and U.S. authorities. The IMO defines VTS simply as “a service implemented by a Competent Authority, designed to improve the safety and efficiency of vessel traffic and to protect the environment.” It then adds that “[t]he service should have the capability to interact with the traffic and to respond to traffic situations developing in the VTS area.” Similarly, in the United States, the term VTS refers to services implemented by the Coast Guard (as the competent authority) that are “designed to improve the safety and efficiency of vessel traffic and to protect the environment.” At the very least, the services provided by a VTS include

13. A systems approach to MTS safety, security, and efficiency would, for example, recognize that vessel traffic services are a tool that supports not just waterways safety, security, and management, but other systems components as well. Their service to the entire “system” should be considered in any policy discussion and in cost-benefit analyses.


15. MTS STRATEGY, supra note 12, at 45. Among other things, the national strategy recognizes that

data integration of Vessel Traffic Services, Automatic Identification Systems (AIS), electronic charts, and real-time navigational and weather information can create a comprehensive navigational safety system that significantly improves the quality and timeliness of safety information.

Id. The strategy does not, however, suggest shifting the responsibility to act on that information from the mariners to the government.

16. See generally U.S. COAST GUARD, VESSEL TRAFFIC SERVICE NATIONAL STANDARD OPERATING PROCEDURES MANUAL, COMMANDANT INSTRUCTION M16630.3 (2009) [hereinafter VTS NATIONAL SOP]. For an examination of VTS performance issues in the COSCO BUSAN allision, see NTSB REPORT, supra note 4, at 112-16.

17. IMO VTS Guidelines, supra note 10, annex 1, para. 1.1.1.

18. Id. (emphasis added).

19. 33 C.F.R. § 161.2 (2008); see also U.S. NAT’L IMAGERY & MAPPING AGENCY, supra note 9, §§ 2707-2710.
information services. In addition to information services (INS), many VTSs provide navigation assistance services (NAS) and traffic organization services (TOS). VTS services are designed to both reduce risk and facilitate maritime commerce. The latter goal may be accomplished in partnership with port and vessel operators and marine exchanges. In the United States, VTS "services" are distinguished from VTS "management activities," which refer to the means by which the services are carried out. Management activities include monitoring, informing, recommending, and directing.

VTSs and VTS management activities are carried out by shoreside vessel traffic centers (VTCs). VTCs are responsible for such services in their "Vessel Traffic Service area"; that is, the geographical area encompassing the specific VTS area of service. In contrast to the air traffic control system, where coverage is widespread, only a fraction of the ports and navigable waters in the world (or in the United States) fall within a VTS service area. Typical VTS architecture includes a range of VTS services, regulations, guidance documents, and management measures, along with vessel operating, reporting, communication, and equipment requirements. A VTC is typically equipped with communications equipment; a radar system; automatic identification system (AIS) equipment; closed circuit television cameras (CCTV); meteorological and hydrological equipment; and a data integration, management, and display system, which may also include decision support tools.

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20. See IMO VTS Guidelines, supra note 10, annex 1, para. 2.3. Each of the "services" is defined in paragraph 1.1.9 of the Guidelines. See also VTS NATIONAL SOP, supra note 16, para. 2.B.2-B.3, at 2-1 to 2-2. Under the Coast Guard's SOP, information, advice, and warnings fall within the navigation assistance service category. Id. para. 2.B.2, at 2-1 to 2-2, para. 3.B.4, at 3-2. The Coast Guard SOP also indicates that the level of service may vary from one CGVTS to another. Id. para. 2.B, at 2-1 to 2-2.

21. VTS NATIONAL SOP, supra note 16, para. 2.C, at 2-2. This terminology differs slightly from the IMO VTS Guidelines. In calling for clarity in communicating VTS intent in any communications with the vessel, the IMO Guidelines use the terms "advice" where the SOP uses "recommend"; "instruction" where the Coast Guard SOP uses "direct", and adds a separate "warning" category. IMO VTS Guidelines, supra note 10, annex 1, para. 2.4.2. The IMO Guidelines distinguish information from advice in that the former concerns facts while the latter includes "professional opinion." Id. para. 2.5.2.3. The author of one VTS study concluded that the verb "recommend" was more appropriate than "advice." See Terry Hughes, When Is a VTS Not a VTS?, 62 J. Mar. 439, 441 (2009).

22. 33 C.F.R. § 161.2.

23. Id.

24. See id. §§ 161.10-.12. VTSs may also support the search and rescue, maritime law enforcement, and national security missions and monitor aids to navigation and anchorages. The IMO VTS Guidelines refer to these as "allied services." See IMO VTS Guidelines, supra note 10, annex 1, para. 1.1.10.

25. The "VTS" acronym is, on occasion, also used to refer to vessel traffic systems—that is, information integration, display, and management and decision support systems adapted to
Finally, no VTS system could function without a trained professional staff.

A. Risk Assessment, Analysis, and Management Principles

Risk assessment refers to the systematic approach to risk identification, analysis, and management. Risk identification generally begins with actual and hypothetical accident scenarios that are used to scope the parameters of the risk. In the risk analysis step, the accident scenarios are evaluated to estimate risk probabilities and consequences. Risk management refers to the process of establishing risk tolerance criteria and selecting and implementing risk elimination and reduction measures.

Marine risk management incorporates both internal measures undertaken by the risk-creating party engaged in the activity and external measures taken by others. Internal risk management measures can be voluntary or required by law. External risk management measures may be provided by private service providers or by a government agency. The government agency may or may not impose user fees to defray the cost of its services. The current approach to risk management is often
described as "layered," with responsibility for some of those layers assigned to risk generators, such as ship operators, while other layers are established and maintained by other service providers or those whose property or resources are vulnerable. Risk management "layers" may be active or passive.

In order to determine what kind and level of management measures are appropriate in a given risk environment, public and private organizations dedicated to marine safety have employed a variety of risk assessment approaches. In the 1990s, the IMO formulated the Formal Safety Assessment (FSA) approach to risk management, which provided the IMO member states with a common language and approach to regulatory risk management. FSA, as further developed and refined in 2002, is a rational and systematic process for assessing the risks associated with any sphere of activity and for evaluating the costs and benefits of the various options for reducing those risks. FSA consists of five steps: (1) identification of hazards/accident scenarios, (2) risk analysis, (3) generating risk control options, (4) cost-benefit assessments of the options, and (5) recommendations for the decision maker. Because FSA is grounded in rational cost-benefit analysis, regulatory measures justified by FSA are more likely to attract buy-in by states and private entities who will be asked to fund the implementation of those measures.

The government may choose to provide a service justified by cost-benefit analysis when "market failure" would otherwise result by not providing the service. Market failure is commonly found in the case of public goods. See David L. Weimer & Aidan R. Vining, Policy Analysis: Concepts and Practice ch. 5 (4th ed. 2005). The cost of public goods can, however, be funded in whole or part by user fees. For example, in the United Kingdom, vessel operators pay "light dues" to defray the cost of aids to navigation. See Alistair Osborne, Shipping Lines 'Aghast' over UK Light Dues Rise, The Telegraph, June 14, 2009 (on-line version), available at http://www.telegraph.co.uk/finance/newsbysector/transport/5533692/Shipping-lines-aghast-over-UK-light-dues-rise.html (reporting ship operators' complaints over proposed significant increase in light dues based on ships' tonnage).

29. The origin of the "layered" approach concept—sometimes likened to multiple layers of Swiss cheese, each serving as a barrier against risk—is generally attributed to James T. Reason. See James T. Reason, Managing the Risks of Organizational Accidents 9 (1997). A risk vector must penetrate each "layer" of the safety or security system in order to reach its "target."


32. See id. annex, para. 3.1.1.
Consistent with DHS's risk-based approach to decision making, the Coast Guard employs a variety of risk assessment and management tools to promote the safety and security of the marine transportation system, including the system's waterway components. The Coast Guard also practices risk management in its own operations. Examples of Coast Guard operational risk management tools can be found in several U.S. Coast Guard instructions on the subject promulgated by the Commandant, partly in response to recommendations by the NTSB.

Some navigation risk management decisions are strategic, such as whether the Long Range Navigation (LORAN) system should be maintained as a backup to the Global Positioning System (GPS). Others are operational, such as whether vessel movements in San Francisco Bay should be delayed or restricted on a particular day due to dense morning fog. The longer lead times available for strategic risk management decisions enable the use of more formal tools. For example, in carrying out the waterways management mission, the Coast Guard's Ports and Waterways Safety Assessment (PAWSA) tools provide a disciplined approach for identifying major waterway safety hazards, estimating risk levels, evaluating potential mitigation measures, and setting the stage for implementation of selected measures to reduce risk. The assessment evaluates both current risk mitigation measures and potential new ideas. Such measures may include a mix of visual and electronic aids to navigation and vessel traffic management measures designed to provide the optimal level of safety for that waterway. A similar but less comprehensive tool, the Waterways Analysis and Management System (WAMS), focuses on aids to navigation issues. Other situation-specific approaches used by the Coast Guard include the congressionally

34. See, e.g., U.S. Coast Guard, supra note 26, para. 4 (pointing out that the instruction was promulgated in response to NTSB recommendations arising out of four major marine mishaps between 1991 and 1993).
mandated Port Needs Studies focused on VTSs (discussed below) and Port Access Route Studies (PARS).\footnote{37}

B. The International Framework

For more than two decades, the United States has joined with other concerned states and the maritime community to develop a coherent, consistent, and efficient approach to VTSs sourced in international law and internationally agreed upon guidance documents. Any examination of the international framework for vessel traffic management must begin with the 1982 U.N. Convention on the Law of the Sea (UNCLOS). The Convention is widely viewed as a constitutive instrument which provides a basic legal framework that was designed to be complemented by additional international agreements, most of which are developed through the IMO. The two IMO-sponsored conventions of principal relevance to VTS issues are the International Convention on the Safety of Life at Sea (SOLAS) and the Convention on Standards of Training, Certification and Watchkeeping of Seafarers (STCW), both of which are briefly examined below. The IMO Assembly issued its first guidance on vessel traffic services in 1985.\footnote{38} In the ensuing quarter century, VTS provisions were added to the SOLAS Convention, incorporated into more recent IMO Assembly and committee resolutions, and further developed through joint efforts by the IMO and the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA).\footnote{39}

\footnote{37. Port Access Route Studies (PARS) are employed in designating offshore fairways and traffic separation schemes. See 33 U.S.C. § 1223(c) (2006) (requiring the secretary to designate necessary fairways and traffic separation schemes to provide safe access routes to and from ports or other places in the United States).

38. IMO, Guidelines for Vessel Traffic Services, IMO Res. A.578(14) (Nov. 20, 1985). The 1985 Guidelines, which built upon the foundation laid by a 1968 resolution (IMO, Recommendations on Port Advisory Services, IMO Res. A.158(ES.IV) (1968)), were updated in 1997. See IMO VTS Guidelines, supra note 10. They now make it clear that decisions concerning effective navigation and maneuvering of the vessel remain with the ship's master. The Guidelines also highlighted the importance of pilotage in a VTS and reporting procedures for ships passing through an area where a VTS operates. Id. annex 1, para. 2.6; see also G. Kop, General Principles of VTS and the IMO Guidelines, in THE NAUTICAL INSTITUTE ON PILOTAGE AND SHIPHANDLING 205, 207-08 (David J. Sanders ed., 1990).

39. See INT'L ASS'N OF MARINE AIDS TO NAVIGATION & LIGHTHOUSE AUTHS. (IALA), VESSEL TRAFFIC SERVICES MANUAL (4th ed. 2008) [hereinafter IALA MANUAL].}

UNCLOS, completed in 1982 and in force since 1994, assigns primary responsibility for vessel navigation safety to the vessel's flag state. At the same time, coastal states and port states have the jurisdiction and, in some cases, a duty to undertake marine safety and pollution prevention measures. The Convention provisions applicable to vessel traffic management and control are principally concerned with the ocean areas lying seaward of the coastal state's baseline. It is therefore of limited relevance to VTS measures within the internal waters of a state, where the state generally enjoys broad jurisdiction over foreign nonpublic vessels. The Convention imposes a limited duty on coastal states to provide information services to vessels in their territorial sea. Beyond such information services, however, the Convention limits the applicability of coastal state vessel traffic management measures in the state's territorial sea or exclusive economic zone. For example, UNCLOS restricts coastal state jurisdiction over foreign vessels in innocent passage through the state's territorial sea or in transit passage through an international strait. Article 21 of UNCLOS permits a coastal state to adopt laws and regulations relating to foreign vessels in innocent passage through the territorial sea where, inter alia, such laws respect the safety of navigation and the regulation of maritime traffic. Those laws must, however, be in conformity with other relevant provisions of UNCLOS and other applicable international law, and they cannot have the effect of denying or impairing the right of innocent
passage. 47 Similar limitations apply to coastal state measures applicable to vessels transiting international straits lying within the state’s territorial sea. 48 Article 25 of the Convention recognizes the coastal state’s right to prescribe conditions for entry into its internal waters and ports and to take necessary steps to prevent a breach of those conditions by foreign vessels. 49 Although compulsory VTSs cannot be established beyond the coastal state’s territorial sea, the Convention requires all states to promote, through the IMO, the adoption of ships’ routing systems where needed to minimize the threat of accidents which might cause environmental pollution. 50 Thus, UNCLOS provides the overall framework for navigation safety measures within or beyond a coastal state’s territorial waters, while other treaties or conventions—most notably the SOLAS Convention—provide greater detail.

2. The Safety of Life at Sea Convention (SOLAS)

The 1974 International Convention on the Safety of Life at Sea, 51 together with its 1978 Protocol, amendments, and codes, is the best-known source for the generally accepted international standards pertaining to vessel construction, design, equipment, and manning (CDEM). Within the SOLAS CDEM framework, vessel navigators have witnessed a rapid proliferation and integration of sensors (radar, fathometer, GPS, electro-optical, infrared, and television) and displays (radar, automatic radar plotting aids (ARPA), Electronic Chart Display and Information Systems (ECDIS), 52 and AIS), and vessel status monitors and alarms. At the same time, there has been an effort to network those sensors and displays into distributed ship-to-shore networks.

47. Id. art. 24(1).
48. Id. arts. 41 (sea lanes and traffic separation schemes), 42 (coastal state laws relating to transit passage).
49. Id. art. 25(2); see also 33 U.S.C. § 1228 (providing authority for the Secretary to prescribe conditions for entry to ports in the United States).
50. UNCLOS, supra note 40, art. 211(1).
53. In 2004, Congress granted the Coast Guard authority to promulgate regulations requiring the carriage of electronic charts on certain vessels. See Act of Aug. 9, 2004, Pub. L. No. 108-293, tit. IV, § 410, 118 Stat. 1042, 1045 (codified in 33 U.S.C. § 1223a). In 2009, the IMO Maritime Safety Committee adopted amendments to SOLAS Regulation V/19 to make the carriage of ECDIS mandatory. The requirement will be phased in from 2012-2014. IMO Res. MSC.282(86), para. 5 (June 5, 2009). In the meantime, ECDIS is recognized as an alternative to the paper chart carriage requirements. Id. para. 3.
intelligence systems. In response to these trends, the emerging “e-Navigation” concept, under development by the IMO and IALA, envisions “the harmonized collection, integration, exchange, presentation and analysis of maritime information onboard and ashore by electronic means to enhance berth to berth navigation and related services, for safety and security at sea and protection of the marine environment.”

Although the first goal—enhancement and integration of on board sensors and displays into a virtual alphabet soup of information devices spanning DGPS, ARPA, AIS, and ECDIS—is rapidly developing, the second goal—distributing that information to shoreside centers—has generally not kept pace, resulting in asymmetrical access to information.

The SOLAS Chapter V regulations that address operational safety of navigation measures reflect the IMO member states’ acknowledgement that marine risk management efforts must extend beyond vessel CDEM measures. Accordingly, SOLAS now includes, inter alia, provisions for offshore vessel reporting and routing systems established in compliance with international standards and procedures, along with more active vessel traffic service measures. Requirements for voyage planning (discussed below) were also added to SOLAS in 2002.

In addressing the role of VTSs in the international marine safety regime, SOLAS Regulation V/12, which was adopted by the IMO in 2002, states:

1. Vessel traffic services (VTS) contribute to safety of life at sea, safety and efficiency of navigation and protection of the marine

54. For an early description of the future vision, see Martha R. Grabowski, Distributed Intelligent Navigation Systems, MARINE TECH., July 1999, at 175-82.


56. Offshore ship routing and reporting schemes are authorized, subject to IMO approval, by Regulations 10 and 11 of Chapter V of the SOLAS Convention. If approved by the IMO, such measures can extend beyond the territorial sea. The IMO has set out general principles and guidelines on ship reporting systems in IMO Resolution A.851(20) (Dec. 2, 1997). “Ships’ routing systems” refers to any system of one or more routes or routing measures aimed at reducing the risk of casualties, including traffic separation schemes, two-way routes, recommended tracks, areas to be avoided, inshore traffic zones, roundabouts, precautionary areas, deep-water routes, and, for certain waters, archipelagic sea lanes. See Introduction to IMO, Ships’ ROUTEING, at xi (9th ed. 2008). Some reporting and routing measures are administered by vessel traffic centers, leading some mariners to confuse what is only a reporting or routing scheme, which is generally considered “passive,” with the “active” VTS scheme, which generally includes services not ordinarily available under reporting and routing schemes. See Hughes, supra note 21, at 442 (observing that some centers administer mandatory ship reporting systems, but do not provide all VTS services to vessels, potentially misleading participating vessels who assume such services will be provided).

57. See SOLAS, supra note 51, reg. V/34.
environment, adjacent shore areas, work sites and offshore installations from possible adverse effects 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 Organization. The use of 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 compliance with, the provisions of vessel traffic services by ships entitled to fly their flag.

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.\(^5^8\)

International standards for VTSs are further established by the VTS Guidelines set out in IMO resolutions, most recently updated in 1997.\(^5^9\) In recognizing the need for internationally approved guidelines for VTSs, the IMO drew attention to the fact that use of differing VTS procedures might confuse masters of vessels whose voyages take them from one VTS area to another.\(^6^0\) The IMO VTS Guidelines are designed to be implemented in conjunction with other IMO guideline documents and the IALA Vessel Traffic Services Manual.\(^6^1\)

Internationally recognized guidance on VTS watchstander training has been promulgated by both the IMO and IALA. The IMO guidance is set out in Annex 2 of the IMO VTS Guidelines.\(^6^2\) IALA guidance is set out in IALA Recommendation V-103.\(^6^3\) In 2000, the IMO noted the development of the IALA recommendations and invited member states to bring those recommendations to the attention of their VTS authorities.\(^6^4\) As a result, the IALA standards are now generally

\(^5^8\) Id. reg. V/12. Although SOLAS indicates that participation in a VTS may only be made mandatory where the VTS lies within the coastal State's territorial sea, SOLAS does not limit a State's jurisdiction to establish mandatory VTSs within its internal waters.

\(^5^9\) **IMO VTS Guidelines**, supra note 10. Annex 1 of the resolution establishes the Guidelines and Criteria for VTS.

\(^6^0\) Id.

\(^6^1\) **IALA VTS Manual**, supra note 39.


\(^6^3\) IALA, **Standards for Training and Certification of VTS Personnel**, IALA Recommendation V-103 (May 1998). It describes three model courses: operator basic training, supervisor advancement training, and on-the-job training. Id. ch. 6.

recognized as the primary training and certification standards for VTS personnel.

3. The STCW Convention and Code

The 1978 Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) entered into force in 1984.65 The Convention was completely revised in 1995, when the STCW Code was added.66 As its title suggests, the STCW Convention establishes international standards for mariner license qualifications and training, as well as deck and engineering watchstanding standards. The STCW Convention imposes obligations on the shipowner or operator, the ship’s master, and watch officers.67 As such, STCW prescribes internal risk management measures that must be considered in any examination of existing or proposed external risk management measures, such as VTS.

The STCW Code is divided into two parts. Part A contains mandatory provisions, while Part B consists of recommended guidance. The STCW Convention and Code, like SOLAS, make it clear that responsibility for navigation safety is shared by the vessel’s master, watch officer, and embarked pilot, with the master bearing ultimate responsibility.68

Chapter VIII of the STCW Code sets out the standards regarding watchkeeping. The Code includes requirements regarding voyage planning, principles to be observed in keeping a navigational watch, performance of the navigational watch, watchkeeping in restricted visibility and in congested waters, and navigation with a pilot on board. Although VTS issues are certainly relevant to many of the watchkeeping practices described in the STCW Code, the Code does not directly address navigation within a VTS.

The evolving requirement for predeparture vessel voyage planning, as an integral component of a vessel’s internal risk management,69

67. STCW Convention, supra note 65, reg. I.
69. In the course of e-Navigation discussions, some have suggested a future where voyage plans are produced by shoreside “slot management” authorities and transmitted to the vessels for uploading and execution.
extends to the vessel’s navigation through areas covered by a VTS. Requirements for voyage planning are incorporated into both the SOLAS and STCW Conventions, as well as in implementing IMO resolutions. SOLAS Regulation V/34, which was added to SOLAS in 2002, imposes a duty on the master to ensure that the intended voyage has been planned using the appropriate nautical charts and nautical publications for the area concerned, taking into account the guidelines and recommendations developed by the IMO. SOLAS thus works hand-in-hand with overlapping risk assessment and management measures set out in the STCW Code’s provisions on watchkeeping. Voyage or passage planning is divided into four stages: appraisal, planning, execution, and monitoring. Requirements for voyage planning extend from “berth-to-berth”; that is, from the point where the vessel gets underway from a pier or anchorage until it arrives at the destination pier or anchorage. Accordingly, for vessels engaged in voyages that extend beyond a state’s internal waters, the voyage planning requirements extend to waters within VTS areas and to each stage of the ship’s passage from appraisal and planning to execution and monitoring.

C. The U.S. Framework

Although not yet a party to the 1982 Law of the Sea Convention, the United States is a charter member of both the SOLAS and STCW Conventions and is fully engaged in developing the marine safety regime with the other member states of the IMO and IALA. At the same time, the United States has, since 1983, recognized that the UNCLOS navigation and overflight provisions confirm existing maritime law and...
fairly balance the interest of all states. Thus the foregoing discussion of
the international legal framework and the involved international
organizations serves as an overarching framework for the U.S. regime.

At least since 1972, Congress has charged the Coast Guard with
responsibility for promoting marine safety and regulating vessel traffic
on the navigable waters of the United States. In describing the Coast
Guard's role in protecting and promoting the nation's marine
transportation system, the Transportation Research Board identified two
distinct levels of management: active and passive.

The most common is passive management, in which the Coast Guard
establishes the navigation aids and "rules of the road." The second, more
active level of management requires vessels of a certain size and function
to report their locations to the vessel traffic service (VTS) center and to
monitor certain radio frequencies while operating in designated areas. The
VTS centers provide marine advisories and traffic information; they also
advise on routing and vessel separation distances.

Adopting the systems approach set out by the MTS strategy
introduced above, the Coast Guard and its federal, state, and local
partners implement a variety of risk management measures applicable to
vessels, waterways, and adjacent infrastructure, such as ports, terminals,
and bridges. Waterways management measures include services like
dredging, fixed and floating aids to navigation, electronic navigation
services, bridge administration, the provision of navigational charts and
publications, and meteorological, hydrographic, hydrological, and
oceanographic data services. In addition, the federal government has
established an elaborate regulatory system that includes—consistent with
the international framework—rules of the nautical road, navigation safety
regulations, vessel CDEM standards, and mariner licensing qualifica-
tions and requirements.

The principal authority for the Coast Guard's waterways
management program is the Ports and Waterways Safety Act (PWSA) of
1972. The Act applies to the navigable waters of the United States (out

77. See Statement by the President on U.S. Ocean Policy, 19 WEEKLY COMP. PRES. DOCS.
383 (Mar. 10, 1983).
78. See generally 6 U.S. COAST GUARD, MARINE SAFETY MANUAL, COMMANDANT
INSTRUCTION M16000.11 (series) [hereinafter MARINE SAFETY MANUAL], available at http://www.
of the manual describes the service's vessel traffic management activities; section 4.G addresses
VTSs.
79. TRANSP. RESEARCH BD., supra note 14, ch. 3.
(codified as amended at 33 U.S.C. §§ 1221-1236 (2006)) [hereinafter PWSA]. Selected legisla-
to twelve nautical miles) and, in some cases, to the "marine environment," which includes the 200-nautical-mile exclusive economic zone of the United States. The PWSA, as amended, provides authority for the Coast Guard to prescribe vessel equipment and operating requirements, as well as vessel traffic management and control measures. Those measures include a variety of vessel reporting, routing, and management measures in both internal and offshore waters.


Exercising its authority under the PWSA, the Coast Guard promulgated the navigation safety regulations (NSRs) in 1977. The NSRs were originally applicable only to vessels of 1600 or more tons while operating on U.S. navigable waters. In response to several high profile pollution incidents involving towed oil barges, selected requirements of the NSRs were extended to certain towing vessels in 1996. Because the NSRs apply to vessels operating in all navigable waters of the United States (except certain waters of the St. Lawrence Seaway), the equipment requirements and procedures they prescribe must be considered in any examination of the VTS role in marine risk management in the United States.

The NSRs require that vessels (depending on type and tonnage) carry designated charts and nautical publications and be equipped with certain equipment, including radar, ARPA, compasses, fathometer, electronic position fixing devices, and AIS. They also require that the wheelhouse be constantly manned by persons who evaluate the danger of...
each closing visual contact and fix the vessel’s position, plot that position on a chart, inform the person directing the movement of the vessel of the vessel’s position, and provide certain ship maneuvering information to the pilot.89 Fixes are to be obtained using electronic and other navigational equipment, external fixed aids to navigation, geographic reference points, and hydrographic contours.90 In addition, the NSRs include detailed criteria for determining safe speed.91 The NSRs complement the standards regarding the master-pilot relationship prescribed by the STCW Code and IMO resolution and likewise require the crew to take and plot fixes and to notify the person directing the movement of the vessel of the results.92

2. U.S. Vessel Traffic Service Framework

Privately operated marine exchanges provided an early version of VTSs in the United States, receiving advance reports on vessel movements and relaying them to pilots, tugs, and port agents. The concept of monitoring and even managing ship movements using shore-based radar was first established by the British Admiralty in Liverpool, England, in the late 1940s; it was more fully developed in Rotterdam in 1956.93 The United States first experimented with a radar surveillance system in Long Beach, California, in 1950,94 which was followed by the voluntary Harbor Advisory Project (HARP) in San Francisco in 1968. The 1971 collision between the tankers ARIZONA STANDARD and OREGON STANDARD under the Golden Gate Bridge, which resulted in the discharge of over 800,000 gallons of oil while the HARP “advisory” watchstanders stood helplessly by, served as a catalyst for congressional

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89. Id. § 164.11(a)-(c).
90. Id. § 164.11(d).
91. See id. § 164.11(p) (listing eight factors to be considered in determining safe speed). In addition, Rule 6 of the international and inland rules of the road sets out a nonexhaustive list of twelve factors to be considered by radar equipped vessels in determining “safe speed.” These factors, and how the necessary information is determined, should be considered in any analysis of the practicality of a shoreside VTS operator directing a vessel to change its speed. Pilots and ship masters are also more likely to understand speed reductions and, in particular, the all-back-full order is generally an ineffective means of avoiding collision. See JOHN W. DEVANNEY III ET AL., TANKER SPILLS, COLLISIONS AND GROUNDINGS, MASS. INST. OF TECH., SEA GRANT PROGRAM, REPORT NO. MITSG 79-14, at 2-8 (June 1979) (“The fact that slowing down the engines is a completely ineffective maneuver once a ship is in trouble is hardly an original observation.”).
92. 33 C.F.R. § 164.11(c).
93. See U.S. Coast Guard Navigation Ctr., History of Vessel Traffic Services, http://www.navecn.uscg.gov/mnw/vts/history.htm (last visited Sept. 6, 2009); NTSB REPORT, supra note 4, app. B.

The PWSA authority for VTSs is further implemented by regulations. The Coast Guard substantially revised the VTS regulations in response to OPA 1990, shortly after the 1989 EXXON VALDEZ incident.\footnote{U.S. Coast Guard, Final Rule, National Vessel Traffic Services Regulations (VTS Final Rules), 59 Fed. Reg. 36,316, 36,316-17 (July 15, 1994). The reorganized regulations are now divided into subparts on (1) general rules, (2) vessel movement reporting system, and (3) geographic descriptions and local regulations pertaining to VTS areas, VTS special areas, the Cooperative VTS area, and reporting points. Related regulations are also contained in 33 C.F.R. pts. 26, 160, 162, 164, and 165.} In its 1994 VTS rulemaking, the Coast Guard addressed comments regarding the need for additional VTSs. In doing so, it
described the criteria used and process followed by the service in making its resource allocation decisions, while also providing important insights into the nature and purpose of a VTS. It began by noting:

Some comments questioned why VTSs are not being established in other specific waterways. This issue must be addressed in both an operational and an economic context. Vessel Traffic Services provide the most active form of vessel traffic management on the waterways. However, the cost and benefit of such services need to be weighed to determine if a VTS is the most effective management system or if other measures are more appropriate for a particular waterway.

Section 4107 of the Oil Pollution Act of 1990 mandated a study to determine and prioritize those ports in need of new expanded or improved VTS systems based on certain risk factors. This study was completed in August 1991 and is known as the “Port Needs Study” (PNS). . . . The PNS provides a cost-benefit analysis wherein the costs of establishing and operating a VTS in a port or waterway are compared to the potential benefits of avoided vessel casualties and the consequences of those casualties. It provides an economic framework necessary to evaluate the need for new or expanded VTSs in the U.S. Various ports reviewed in the study are currently under consideration for VTSs. The Coast Guard intends to establish VTSs and, in a separate rulemaking, make them mandatory in those ports which show a clear benefit from the presence of a VTS.102

Consistent with the more general description above, Coast Guard Vessel Traffic Services (CGVTSs) consist of some combination of vessel monitoring and communication components, a vessel movement reporting system, vessel operation requirements, routing measures, and trained watchstanders. Regulations for the various CGVTSs are promulgated in 33 C.F.R. part 161.104 Definitions included in those


103. A typical vessel movement reporting system (VMRS) requires covered vessels to provide the VTS with a sailing plan, periodic position reports, a final report, and notification if the vessel deviates from its sailing plan. For vessels so equipped, AIS transmissions substitute for required position reports, lessening the need for, or largely automating the once mostly voice radio-based process of, the VRMSs. See 33 C.F.R. §§ 161.15-.23.

104. Because these regulations are promulgated under authority of Title I of the PWSA, any preemption analysis respecting those regulations would be conducted under the second prong of the test established by the United States Supreme Court in Ray v. Atlantic Richfield Co., 435 U.S. 151, 175, 1978 AMC 527, 544-45 (1978) (holding that a state "may not impose higher safety standards than those prescribed by the Secretary under Title I" of the PWSA). See also United
regulations distinguish between vessel movement centers and vessel traffic centers, the latter of which operate the vessel traffic service for the VTS area or a sector within a VTS area.  

Current internal guidance for CGVTSs is contained in the relevant volume of the Coast Guard Marine Safety Manual and the Vessel Traffic Service National Standard Operating Procedures Manual (VTS National SOP). The latter document requires that CGVTS watchstanders complete an internationally recognized and standardized training program, including a National VTS Certification Course (aligned with IALA-recommended VTS training standards), along with on-the-job, supervisor, and professional maritime training components.  

The PWSA requires certain designated vessels that operate in a CGVTS area to utilize and comply with the VTS. The regulations apply to "VTS Users" and to other vessels on U.S. navigable waters and within the VTS area, to the extent the VTS considers necessary. Vessels that fail to comply with any applicable CGVTS requirement or regulations promulgated under the authority of the PWSA may be denied entry into U.S. navigable waters. Although the Coast Guard's VTS
regulations make provision for deviations from those regulations, nothing in the CGVTS regime relieves vessel owners, masters, or embarked pilots of their responsibility for safe navigation. Moreover, the Coast Guard’s VTS regulations make it clear that the regulations do not lessen the mariner’s obligation to comply with the applicable rules of the road. On occasion, however, the VTS regulations may impose limits on a vessel’s maneuvering and collision avoidance options. For example, the regulations may require prior VTS approval before a vessel in the system meets, crosses, or overtakes another vessel in the system.

D. The Master-Pilot Relationship

VTSs operate in waters where federal or state law requires most commercial vessels to employ a local pilot; therefore, any adjustment to the vessel-VTS relationship must be mindful of the closely related vessel-pilot relationship. Pilotage services vary from port to port, and even within particular ports. The titles “bar pilot,” “river pilot,” “harbor pilot,” and “docking pilot” suggest the range of possible services. Pilotage is both a marine professional service and a regulatory requirement and does not fit neatly into either the internal or external risk management category. To the extent that pilotage is, like escort tug services in some waters, imposed upon vessels by regulation, and

114. 33 C.F.R. §§ 161.5, .12(b). Even where a law expressly sanctions a departure from the ordinary rules, in the interest of safety, courts may narrowly construe the authority to depart. See Crowley Marine Servs. Inc. v. Maritrans Inc., 447 F.3d 719, 727, 2006 AMC 1246, 1253 (9th Cir. 2006) (construing COLREGS Rule 2(b)—the so-called “rule of special circumstances”—and limiting any departure from the rules for special circumstances to cases where the departure is “necessary to avoid immediate danger” and thus excluding departure by agreement); see also RESTATEMENT (SECOND) OF TORTS § 288A (1965) (stating that violation of a statute may be excused, and therefore does not constitute negligence, when, inter alia, compliance would involve a greater risk of harm to the actors or to others or the actor is confronted by an emergency not of the actor’s own misconduct).

115. 33 C.F.R. § 161.1(c). Similar admonitions are set out in COLREGS Rule 2(a). By making it clear that the mariner’s obligations extend beyond the rules of the road and in some cases may even require a departure from the rules, Rule 2 is viewed by some as the linchpin of the current ship-centric paradigm.

116. See id. § 161.1(d).

117. Id. § 161.13(3). This courtesy facilitates radar tracking of converging vessels within the system.


119. See NTSB REPORT, supra note 4, at 95-96 (“Responsibilities of the Master and the Pilot”); see also MARINE BD., supra note 26, at 333-34 (setting out four VTS-specific recommendations).

120. Not considered here are “deep-sea pilots” who operate in certain offshore waters.

embarked pilots do not become a member of the vessel's crew,"122 pilotage may be viewed as an external measure. Innovations by some ports permitting, under limited circumstances, vessels to be piloted by licensed pilots located on shore fall more closely in the category of external risk management measures.123 However, from the VTS perspective, viewing pilotage as an external risk management measure suggests a certain dichotomy in the nature of control on board the vessel that can be dangerously misleading. One of the hazards of that point of view—that the pilot and vessel master and crew are two distinct entities—was intimated in the COSCO BUSAN incident, when communications by the VTS directed to the pilot (rather than to the vessel by name) might not have been understood, or its importance not appreciated, by the vessel's master or watch officer.124

Early federal decisions, including several by the United States Supreme Court, described an embarked pilot as the “temporary master” of the piloted vessel and set strict limits on the master’s power to override the pilot’s decisions.125 Those early cases have been superseded in part by U.S. ratification of the STCW Convention and Code. The relevance of international standards for watchkeeping now codified in the STCW Code was highlighted in the M/V SUMMIT VENTURE-bridge allision case, where the court condemned the vessel owner’s failure to instruct the master and crew on their continuing responsibility for navigation despite

122. The American Pilots’ Association generally agrees that navigation safety is a shared responsibility but at the same time rejects the suggestion that an embarked pilot becomes a member of the vessel’s “bridge team.” See Am. Pilots’ Ass’n, Pilotage in the United States: Role of the Pilot, http://www.americanpilots.org/PilotageInUS.aspx (last visited Sept. 14, 2009). By contrast, the NTSB has repeatedly stressed the importance of pilots undergoing training in bridge resource management. See, e.g., NTSB, Marine Accident Brief, DCA-06-MF-013, NTSB Recommendation M-07-3 (Mar. 8, 2007), available at http://www.ntsb.gov/publictn/2007/MAB0702.pdf (grounding of Hong Kong-registered container ship NEW DELHI EXPRESS on April 15, 2006).

123. Rotterdam is one the best-known ports permitting remote pilotage. See Shore Based Pilotage, Port of Rotterdam, The Netherlands, Area Procedures, RTM 9 (May 15, 2000), available at http://www.worldvtsguide.org/Ports/Netherlands/Rotterdam%208/RTM9.pdf. Other locations selectively permitting remote pilotage include Belgium, Germany, France, Italy, and Malta. See Karl Bruno & Margareta Lützhöft, Shore-Based Pilotage: Pilot or Autopilot? Piloting as a Control Problem, 62 J. NAV. 427, 427-28 (2009); Patrick van Erve, Can the Shipping-Aviation Analogy Be Used as an Argument To Decrease the Need for Maritime Pilotage?, 59 J. NAV. 359 (2006) (discussing pilotage in European ports); see also MARINE BD., supra note 26, at 186 (discussing shore-based pilotage).

124. The NTSB recommended that Coast Guard VTSs communicate with covered vessels by vessel name, rather than only by the embarked pilot's identifying call letter or number. See NTSB REPORT, supra note 4, at 137 (NTSB Recommendation M-09-2).

the presence of a pilot. Recognizing that a layered safety management approach entails shared navigation responsibility, the STCW Code established the following rules:

49. Despite the duties and obligations of pilots, their presence on board does not relieve the master or officer in charge of the navigational watch from their duties and obligations for the safety of the ship. The master and the pilot shall exchange information regarding navigation procedures, local conditions and the ship’s characteristics. The master and/or the officer in charge of the navigational watch shall cooperate closely with the pilot and maintain an accurate check on the ship’s position and movement.

50. If in any doubt as to the pilot’s actions or intentions, the officer in charge of the navigational watch shall seek clarification from the pilot and, if doubt still exists, shall notify the master immediately and take whatever action is necessary before the master arrives.

A 2003 resolution by the IMO Assembly reaffirmed these principles and added that “[m]asters and bridge officers have a duty to support the pilot and to ensure that his/her actions are monitored at all times.” The intent behind the rule is to take advantage, to a greater extent, of the risk management “layers” available on board the vessel by providing clear, ongoing responsibilities for the master and crew. Prudent shipowners should demand nothing less. Shipowners and operators who dispatch their vessels to ports throughout the world know full well that pilot competency varies from one location to another. They also know that vessel navigation and collision avoidance equipment vary by manufacturer and even model, particularly with regard to the location of equipment controls and their displays. Finally, shipowners know that no one is more familiar with the ship’s equipment and operational procedures than the master and crew (certainly not pilots, who in some ports compensate for their lack of familiarity by bringing

126. In re Hercules Carriers, 566 F. Supp. 962, 982, 1983 AMC 2409, 2436-37 (M.D. Fla. 1983) (denying shipowner’s petition to limit liability after finding that the owner failed to adequately train the vessel’s master and crew in their responsibilities when a harbor pilot was employed, a relationship defined at the time by a precursor to the STCW Code), aff’d, 768 F.2d 1558 (11th Cir. 1985).

127. STCW Code, supra note 66, § A-VIII/2, pt. 3-1, paras. 49-50.

128. IMO, Recommendations on Training and Certification and on Operational Procedures for Maritime Pilots other than Deep-Sea Pilots, IMO Res. A.960(23) (Dec. 5, 2003), annex 2, para. 2.3.

129. See JOHN MCPHEE, LOOKING FOR A SHIP 222 (1990) (suggesting the ship’s master could “see a courtroom full of lawyers” reflected in a nonchalant and inexperienced pilot’s eyes).
aboard a specially equipped laptop computer, sometimes referred to as a “personal piloting unit” or PPU). 130

The pilot is selected and employed because of his or her knowledge of the pilotage waters (including any VTS operating in those waters), not of the vessel, its equipment, or crew. The modern navigation safety regime recognizes that if the ship is to be navigated with precautions appropriate to the prevailing circumstances, the master and crew must be fully integrated into, and engaged in, vessel navigation and collision avoidance at all times, even while a pilot is aboard. The prudent shipowner will therefore prescribe a policy requiring a thorough master-pilot exchange of information, during which the master provides the pilot with, among other things, information on the vessel’s maneuvering characteristics, and the pilot and master agree on the vessel’s “passage” plan. 131 Any differences between the voyage plan, prepared by the master in accordance with SOLAS and the STCW Code, and the pilot’s intended passage plan must be reconciled. The master-pilot information exchange is designed to facilitate a shared understanding of the risk factors and risk management considerations pertinent to the vessel’s passage.

It would be disingenuous to suggest that actual practices on the water completely or even mostly conform to the legal standards. The sad truth is that the actual master-pilot relationship too often looks quite different from the STCW vision, and the notion of the decisive, semiautonomous master, exercising peremptory command over the

130. In Puget Sound, for example, roughly twenty percent of the pilots use portable personal piloting unit (PPU) laptops. Delmar Mackenzie, After Cosco Busan: A Fresh Look at Safety in Puget Sound, PAC. MAR. MAG., Aug. 2008, at 32. Proposed federal and state legislation would put additional pressure on the remaining pilots to carry PPUs. See, e.g., H.R. 1100, 111th Cong. (2009) (Vessel Navigation and Safety Improvement Act) (permitting the Coast Guard to require pilots operating under the authority of their federal license to carry “portable electronic navigation devices”); S. 300, 2009 Sen. (Cal. 2009) (imposing similar requirements on pilots operating under authority of their California-issued pilot’s license). A pilot using a PPU will almost certainly relate to the vessel’s bridge team and bridge equipment differently than a pilot not so equipped, perhaps widening the gap between them.

131. See IMO Res. A.960(23), supra note 128, annex 2, para. 5 (describing elements of the master-pilot exchange). The resolution distinguishes between “passage” planning as part of the master-pilot exchange, and the independent requirement for berth-to-berth “voyage planning” under SOLAS Regulation V/34, STCW Code, section A-VIII/2, part 2, and IMO Resolution A.893(21) (Nov. 25, 1999). IMO Res. A.960(23), supra note 128, annex 2, para. 5.6. Resolution A.960(23) describes the master-pilot “passage plan” as “a basic indication of preferred intention” regarding the vessel’s passage through the pilotage area, and goes on to explain that “both the pilot and the master should be prepared to depart from it when circumstances so dictate.” Id. para. 5.5. Maritime Administrations, such as the U.K. Marine Accident Investigation Branch, and the NTSB now carefully scrutinize the master-pilot exchange in the course of marine casualty investigations. See NTSB REPORT, supra note 4, at 133, 137-38 (Recommendation M-09-8); THE NAUTICAL INSTITUTE ON PILOTAGE AND SHIPHANDLING, supra note 38, at 11-13; THE NAUTICAL INSTITUTE ON COMMAND: A PRACTICAL GUIDE 33-39, 114-17, 142-47, 189-93 (2d ed. 2000).
vessel, may be a relic. Shipowners, charterers, and operators are increasingly involved in day to day administrative and operational decisions involving their vessels, and masters are more likely to be found answering the owner’s emails or satellite phone calls than studying the ARPA user’s manual or poring over the second mate’s voyage plan for the upcoming transit. Too many masters behave as though the pilot is responsible for, and in control of, the vessel’s navigation as soon as the “Hotel” flag goes up. However, the fact that we have not yet achieved the competent and diligent bridge team vision set out by the STCW Code does not suggest the vision is wrong. Rather, it should serve as a reminder that effective implementation of a policy is nearly always more difficult than making the policy decision.

The evolving relationship between vessel masters and embarked pilots, along with such innovations as remote, shore-based pilotage, provides important lessons for those engaged in similar decisions regarding the relationship between vessels (and their pilots) and VTSs. Pilots have a vital stake in any decision to reallocate responsibility for the control of vessel movements. While they cannot control the direction or magnitude of any change, as professionals who provide the critical link between the bridge of the ship and the port community, pilots can certainly influence the decision makers.

III. THE VTS CONTROL DEBATE

Arguments for expanding shoreside monitoring and control of vessels are neither unexpected nor irrational. For some, the air traffic control model and shore-based pilotage innovations demonstrate the feasibility of shoreside control. Control advocates point out that the capacity to monitor vessel positions and movements accurately has been vastly expanded by the introduction of differential GPS and AIS transponders, which have the combined capability to transmit, among other information, the vessel’s identity, GPS position, course, and

132. See, for example, the papers presented at the Tulane Law School Admiralty Law Institute’s conference on “Admiralty Law at the Millennium,” including Joseph C. Sweeney, Collision Law in the Next Millennium, 73 Tul. L. Rev. 1803, 1804 (1999) (spinning a 2025 scenario in which the featured “vessel’s open ocean navigation is under the direction of the IMO’s International Safety Enforcement Directorate (ISED) which controls the mandated multi-lane highways for vessels crossing the Atlantic Ocean in either direction”), and Panel Discussion of Collision, Towage, Salvage, and Limitation of Liability, March 18, 1999, 24 Tul. Mar. L.J. 405 (1999).

133. See sources cited supra note 9.
Such improvements in shoreside capability, argue some, move the vessel traffic operating picture ever closer to the air traffic model. In his widely quoted 1999 address to the Trinity House (London) referred to earlier, former IMO Secretary-General William O’Neil—one of the world’s most respected maritime authorities—commented to an audience of master mariners and pilots:

Despite all the qualifications and restrictions, the trend is unmistakable. It is towards more and more shore-based control. Comparisons are frequently made between shipping and aviation and although the two forms of transport are very different, the idea of aircraft operating without being subject to control from the ground is somewhat terrifying. When it is recognized that all forms of transportation except ships are controlled remote from the vehicle, it is hard to sustain any valid argument that vessels should continue to be exempted.

In addition, when we consider that high-speed ships carrying several hundred people at speeds upwards of 50 [miles] an hour are becoming more commonplace on many of our short-sea routes, the very routes where congestion and the risk of collision are greatest, can we afford to hide behind “tradition”? What will happen when the appetite for higher speeds moves more and more into other segments of the merchant fleet?

Because he brushes broadly, it is easy to find fault with Mr. O’Neil’s criticism of those who believe vessels should not be subject to the kind of remote, ground-based control common to aircraft. One might begin, for example, by challenging his assertion of an “unmistakable” trend towards shore-based control and his reliance on the aviation analogy to support the conclusion; an analogy thoroughly examined (and largely rejected) by both the NRC’s Marine Board in 1994 and the Swedish Maritime Authority in 2006 (this second issue is addressed in Part III.B of this Article). On the other hand, the mere fact that the comparison between the air traffic control model and shore-based pilotage might be a poor analogy does not in itself mean that greater shoreside control over vessel

134. See IMO, Adoption of Amendments to the International Convention for the Safety of Life at Sea, 1974, as Amended, IMO Res. MSC.99(73) (Dec. 5, 2000) (adding, among other changes, Reg. V/19/2.4 to the SOLAS Convention); see also 33 C.F.R. § 164.46 (2008).
135. O’Neil, supra note 11.
136. There does appear to be a trend toward a geographic expansion of vessel traffic management services seaward beyond ports and the territorial sea. See David Patraiko, Ship/Shore Coastal Relationships, SEAWAYS, June 2009, at 5-7. But evidence of an “unmistakable” trend toward greater shore-based control of vessels (in contrast to providing more information) is lacking.
137. See MARINE BD., supra note 26, ch. 5.
138. See Bruno & Lützhöft, supra note 123, at 435. The author is not aware of an English language translation of the report.
movements is a bad idea. Nor does a belief that issuing mandatory directions to vessels should not be a common practice mean that such directions should not be used as a "layer of last resort" when the other layers prove inadequate. In order to evaluate these arguments and others, a more comprehensive examination is needed.

A. More Than Tradition: The Present VTS Control Regime

More than tradition underlies the present vessel control regime. The international and U.S. authorities discussed above not only authorize establishment and operation of VTSs in selected waterways, but to varying degrees they also allocate the respective responsibilities for vessel direction and control among the ship-based and shore-based actors. Although both lines of authority address VTS "directions" to vessels, they repose ultimate responsibility for the vessel's navigation in the master, thus conditioning their use of the term "control" when they refer to VTS interventions.

1. International Guidance on VTS "Instructions"

The purported trend "towards more and more shore-based control," adverted to by Mr. O'Neil is not reflected in current international guidance on VTS. For example, the IMO Guidelines, updated just two years before Mr. O'Neil's speech and still in force, urge national authorities to take the following into account when issuing VTS "instructions":

When the VTS is authorized to issue instructions to vessels, these instructions should be result-oriented only, leaving the details of execution, such as course to be 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.\(^{139}\)

Four points made or implied by the guidelines should be noted. First, the Guidelines acknowledge that not all VTSs are even authorized to issue "instructions" (in contrast to information, advice, or warnings) to vessels. Second, although the IMO's use of "instruction" closely parallels the

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139. In this Article, "directions" refer to VTS actions that go beyond the role of monitoring and providing information, advice, or recommendations (where compliance is not required). Rather, a VTS "direction" refers to an order to a vessel to take, not take, or cease taking a particular action. See Koburger, supra note 10, at 25-26.

140. IMO VTS Guidelines, supra note 10, annex 1, para. 2.3.4.
PWSA's use of the term "direction," the word "control" is not used in the IMO Guidelines. Third, the IMO Guidelines include a nonencroachment norm that affirms that "[d]ecisions concerning the actual navigation and manoeuvering of the vessel remain with the master." Neither a VTS sailing plan (the term used in the IMO Guidelines and Coast Guard VMRS regulations) nor "requested or agreed changes to the sailing plan can supersede the decisions of the master concerning the actual navigation and manoeuvering of the vessel." Finally, even when "instructions" are authorized, they should be composed in phrases taken from the IMO Standard Marine Communication Phrases (SMCPs). They should also be "result-oriented." The Guidelines then go on to recommend that any VTS message directed to a vessel should include "message markers" that make it clear whether the message contains information, advice, a warning, or an instruction.

Relying in part on the IMO's guidance, the U.K. Marine Accident Investigation Branch (MAIB) recently rejected a call for more direct VTS control over vessel movements. In its report on the 2002 collision between the DIAMANT and the NORTHERN MERCHANT—three years after Mr. O’Neil described an “unmistakable” trend—the MAIB concluded:

In the case of all types of VTS, giving execution details, such as specific helm and engine orders, is unacceptable, because they could be inappropriate, given the limited knowledge of the prevailing circumstances and the particulars of the vessels involved, and could result in legal action against the VTS.

The current U.K. approach is summed up in Marine Guidance Note 401, which states—consistent with the IMO Guidelines—that “[w]hen a VTS is authorised to provide NAS to vessels, communication should be result-oriented; leaving the details of execution, such as course to be steered or

141. Id. para. 2.6.2 (reinforcing the admonition by reaffirming that the decision remains with the master).
143. IMO VTS Guidelines, supra note 10, annex 1, para. 2.6.2.
144. IMO, Standard Marine Communication Phrases (SMCP), IMO Res. A.918(22) (Nov. 29, 2001) [hereinafter SMCP].
145. IMO VTS Guidelines, supra note 10, annex 1, paras. 2.3.4, 2.4.1.
146. Id. para. 2.4.2.
engine maneuvers to be executed, to the master or pilot on board the vessel."\(^{148}\)

2. Current U.S. Statutory Authorization for VTS Directions

In examining Coast Guard directions to vessels, it is important to distinguish between vessel-specific safety orders and more general area- or activity-based measures. The PWSA authorizes both, but authority to issue such orders has been selectively delegated. The COSCO BUSAN incident raised questions regarding both types of orders: (1) should the Coast Guard restrict or even forbid vessel movements in the harbor when restricted visibility renders such navigation unsafe (a general measure), and (2) should the Coast Guard have ordered the COSCO BUSAN to change course, stop, or anchor to avoid an allision with the bridge (a vessel-specific direction or order)? This Article focuses on the latter type of order.

Within the United States, authority to control vessel movements is authorized by the PWSA, as amended. 33 U.S.C. § 1223(b) provides the Secretary of the department in which the Coast Guard is operating with authority to "order" a vessel to "operate" in a "manner" the Secretary "directs" in any of three circumstances. The first circumstance arises when the Secretary has reasonable cause to believe the vessel does not comply with any regulation issued under the PWSA (such as the navigation safety regulations or the VTS regulations) or any other applicable law or treaty (such as the international or inland rules of the road).\(^{150}\) The second circumstance, which is not relevant here, occurs when the Secretary determines that the vessel does not satisfy the conditions of port entry.\(^{151}\) The third and most relevant circumstance arises when, "by reason of weather, visibility, sea conditions, port congestion, other hazardous circumstances, or the condition of such vessel, he is satisfied that such directive is justified in the interest of safety."\(^{152}\) It bears repeating that not all of the vessel control authority...
provided by the PWSA has been delegated to the Coast Guard VTSs. Most of that authority is lodged in the relevant Coast Guard sector commander, in his or her capacity as the captain of the port. Thus close attention to the “delegations” set out by statute and regulation is always necessary.


The Coast Guard carefully examined VTS direction and control issues in the course of its post-EXXON VALDEZ grounding rulemaking. When it issued final rules on July 15, 1994, the Coast Guard expressly addressed “vessel control” and noted that the issue garnered the most comments in the course of its rulemaking. In promulgating the final rule, the Coast Guard reported that the new rule “does not change the Coast Guard’s authority or policy on vessel traffic management.” The rule did, however, include two delegations of vessel control authority: the first applicable to captains of the port and the second to VTSs. In doing so, the Coast Guard explained that “[t]hese provisions define the relationship between the VTS and the Captain of the Port, and also assure that, when necessary, a VTS has the legal authority to establish VTS measures and vessel operating requirements to enhance vessel traffic management.”

The current Vessel Traffic Management regulations delegate to CGVTSs the authority to provide “services” and to impose “measures or directions” and “operating requirements.” In addition, CGVTSs are charged with administering the vessel movement reporting system if

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153. See U.S. Coast Guard, Final Rule, National Vessel Traffic Services Regulations (VTS Final Rules), 59 Fed. Reg. 36,316, 36,316-17 (July 15, 1994) (33 C.F.R. pts. 1, 26, 160-165). At roughly the same time, the Coast Guard was preparing a report summarizing its study on whether there was a need for additional authority, as required by Congress in OPA 1990. See Oil Pollution Act of 1990 (OPA 1990), Pub. L. No. 101-380, tit. IV, § 4107(a), 104 Stat. 484, 514 (codified as amended at 33 U.S.C. § 1223(a)(2)).


155. Id.

156. The new delegations were codified in 33 C.F.R. §§ 1.01-30 and 160.5.

157. VTS Final Rules, 59 Fed. Reg. at 36,317. The relationship between the captain of the port and the VTS was later changed with the advent of the Coast Guard “sector” organization. See infra note 167 and accompanying text.

158. 33 C.F.R. § 161.10; see also VTS NATIONAL SOP, supra note 16, para. 2.B, at 2-1 to 2-2. VTS “services” include information services (INS), navigation assistance services (NAS) and traffic organization services (TOS). NAS include providing information, recommendations, and warnings. Id. paras. 2.B.2.b, at 2-2, 3.B.4, at 3-2.

159. 33 C.F.R. § 161.11(a).

160. Id. § 161.12.
such systems are in place in the VTS area. As described earlier, the amended PWSA authorizes the Secretary to “order” a vessel to “operate” in a “manner” the Secretary “directs” under the circumstances specified in the Act. The Coast Guard’s implementing regulations somewhat confusingly mix several verbs and nouns to describe the more active VTS activities, including “measures,” “directions,” “control,” and “orders” (but not “recommendations”). In prescribing the CGVTS authority to issue “measures or directions,” the regulations recognize that “under certain circumstances, a VTS may issue directions to control the movement of vessels in order to minimize the risk of collision between vessels, or damage to property or the environment.”

The authority for a CGVTS to issue measures or directions (including the apparently redundant “directions to control”) in the Vessel Traffic Management regulations (33 C.F.R. part 161) must be read in conjunction with the “delegations” section of the general Ports and Waterways Safety Regulations in 33 C.F.R. part 160. Under the latter regulations, VTS commanding officers (now called VTS directors) have been delegated broad authority over vessels operating in the VTS. That authority, which “may be exercised by Vessel Traffic Center personnel,” subject to the supervision of the sector and district commander, includes the authority to,

within the Vessel Traffic Service area, provide information, make recommendations, or, to a vessel required under Part 161 of this chapter to participate in a Vessel Traffic Service, issue an order, including an order to operate or anchor as directed, require the vessel to comply with orders

161. See id. § 161.15.
163. One could add “operational requirement” and the IMO term “instruction.” The term “order” is also associated with an exercise of the captain of the port authority under 33 U.S.C. § 1223(b) and 33 C.F.R. § 160.111.
164. New rulemaking that included definitions of the various VTS actions and aligned those terms and definitions with IMO-IALA terminology would promote uniformity and reduce confusion.
165. 33 C.F.R. § 161.11(a). 33 C.F.R. § 161.11(b) authorizes the VTS, in times of congestion, restricted visibility, adverse weather, or other hazardous circumstances, to “control, supervise, or otherwise manage traffic, by specifying times of entry, movement or departure to, from, or within a VTS area.”
166. Id. § 161.1(b).
167. With the advent of the Coast Guard “sector” organization initiative, VTSs are now a component of the sector. As a result, VTSs are no longer commanded by a VTS commanding officer, but rather supervised by a “VTS director” who is under the command of the sector commander. See VTS NATIONAL SOP, supra note 16, para. 1.D.3, at 1-1.
168. 33 C.F.R. § 160.5(d).
169. Id.
170. Id.
issued; specify times of entry, movement or departure; restrict operations as necessary for safe operation under the circumstances; or take other action necessary for control of the vessel and the safety of the port or of the marine environment.\textsuperscript{171}

VTS users are required to "comply with all measures established or directions issued by a VTS."\textsuperscript{172} At the same time, however, the regulations provide what might be deemed a safe harbor provision:

The owner, operator, charterer, master, or person directing the movement of a vessel remains at all times responsible for the manner in which the vessel is operated and maneuvered, and is responsible for the safe navigation of the vessel under all circumstances. \textit{Compliance with these rules or with a direction of the VTS is at all times contingent upon the exigencies of safe navigation.}\textsuperscript{173}

The authority conferred by the PWSA, as fleshed out and further delegated by regulations promulgated by the Secretary, is further controlled by Coast Guard internal directives and guidance documents. The Coast Guard, in response to findings and recommendations by the DHS Inspector General and NTSB following the COSCO BUSAN incident, has focused its attention on these policy and procedure directives.

4. Current Coast Guard Policy on VTS Directions

In implementing the authority delegated by the amended PWSA through the agency’s regulations, the Coast Guard VTS National SOP’s “Concept of Operations” section recognizes four VTS management activities: monitoring, informing, recommending, and directing.\textsuperscript{174} It will be noted that the terminology differs somewhat from that used in the IMO Guidelines and the IMO Standard Marine Communication Phrases.\textsuperscript{175} The Coast Guard’s VTS National SOP emphasizes that these

\begin{itemize}
  \item \textsuperscript{171} \textit{Id.} (emphasis added).
  \item \textsuperscript{172} 33 C.F.R. § 161.12(a) (emphasis added); \textit{see also} 33 U.S.C. § 1223(a)(2) (2006).
  \item \textsuperscript{173} 33 C.F.R. § 161.1(c) (emphasis added). No mention is made of "measures" or "orders.” Section 161.1(d) adds:
  \begin{itemize}
    \item Nothing in this part is intended to relieve any vessel, owner, operator, charterer, master, or person directing the movement of a vessel from the consequences of any neglect to comply with this part or any other applicable law or regulation (e.g., the International Regulations for Prevention of Collisions at Sea, 1972 (72 COLREGS) or the Inland Navigation Rules) or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.
  \end{itemize}
  \item \textsuperscript{174} \textit{See VTS NATIONAL SOP, supra note 16, para. 2.C, at 2-2.}
  \item \textsuperscript{175} The IMO VTS Guidelines and SMCPs add the phrase “warning” and use the term “instruction” instead of “direction.” \textit{See infra} note 269 and accompanying text.
\end{itemize}
four terms—often described as establishing a “continuum of vessel traffic management” framework—encompass the entire range of VTS management activities. Although the four activities are listed in order of increasing VTS control, the SOP makes it clear that the actions may be implemented in any order. For example, if while monitoring a vessel the CGVTS operator or supervisor observes a hazardous situation (for example, a vessel straying into the oncoming traffic lane), the VTS might issue a direction to the vessel without first informing or warning the vessel or making a recommendation (though in most cases a timely warning would accomplish the same goal).

The VTS National SOP distinguishes “directions to control the movement of vessels” from other forms of directions, including directions that designate temporary reporting points or procedures, establish traffic routing schemes, enforce exclusion areas or speed restrictions, or relay captain of the port orders. Consistent with the IMO VTS Guidelines, the SOP also admonishes that “VTS should not normally direct a course to be steered or engine orders to be executed,” but rather “[d]irections to vessels are normally given in the form of a desired outcome.” At the same time, it directs that “VTS Internal Operating Procedures (IOP) [promulgated by sector commanders and/or VTS directors responsible for the various VTSs] will provide detailed procedures for employment of VTS direction.” Standard terminology for VTS directions will also be developed and included in the internal SOPs.

Although the VTS National SOP was promulgated in 2009, after the COSCO BUSAN allision, the continuum of the traffic management measures concept was formulated earlier. The VTS San Francisco User’s Manual explains the steps in the “continuum” concept of operations this way:

177. Id. “Control” over vessels—the fourth level in the continuum—is common in one Coast Guard VTS: Berwick Bay (near Morgan City, Louisiana), where the nature of the waterway and its associated bridges has led to the VTS directly controlling the movement of the 4000 or so vessels that transit the VTS area each month. Kathryn Lulaga, VTS Berwick Bay, COAST GUARD J. OF SAFETY & SECURITY AT SEA: PROCEEDINGS OF THE MARINE SAFETY & SECURITY COUNCIL, Summer 2007, at 12.
178. VTS NATIONAL SOP, supra note 16, para. 2.C.4, at 2-3; see also id. para. 3.B.3, at 3-2 (“Control of Vessel Traffic”).
179. Id. para. 2.B.2.d, at 2-2.
180. Id. para. 2.C.4, at 2-3.
181. Id.; see also id. para. 3.B.1, at 3-1.
182. Id. para. 3.B.3.b, at 3-2.
The primary function of VTS San Francisco is to facilitate good order and predictability on a waterway by coordinating vessel movements through the collection, verification, organization, and dissemination of information. To accomplish this, VTS San Francisco uses the concept of a "continuum of traffic management". This continuum consists of the following levels of control: Monitor, Inform, Recommend, and Direct.

1. **Monitor.** Using AIS, radar, CCTV, and radiotelephone equipment, VTS monitors vessel traffic in the VTS Area. VTS also receives information from various sources on predicted vessel movements, hazards to navigation, aids to navigation discrepancies, and other information of interest to VTS users. Monitoring vessel traffic allows us to ensure that vessels are navigating safely and efficiently in accordance with applicable regulations and Navigation rules.

2. **Inform.** VTS analyses the information gathered then informs participants as applicable. This is done at the user's request, when it appears necessary to VTS personnel, or at regular intervals. The purpose of informing participants is to give them timely information to allow them to make decisions concerning the navigation of their vessels.

3. **Recommend.** Almost all of VTS San Francisco operations are conducted at the monitor and inform levels. However, at certain times the VTS will recommend action be taken by a participant to prevent a potentially dangerous situation. Such recommendations are offered to assist the participant in avoiding hazardous situations early on. Recommendations are made on the pretence [presumption?] that there is information available to VTS of which the participant may not be aware.

4. **Direct.** On rare occasions (and during heightened security conditions) VTS will direct movement or actions of a participant. Direction would be given in cases when the VTC observes obvious violations of regulations or an obvious and immediately dangerous condition of which the participant is not or does not seem to be aware. Directions will normally be in the form of a general objective such as staying out of a certain area or coming no closer than a certain distance from a vessel or facility.

It goes on to remind VTS users:

> The ultimate responsibility for safe navigation of a vessel remains with the master or person in charge. Each of these actions, monitor, inform, recommend and direct are independent of each other and one

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action does not necessarily proceed the other. For instance, VTS may not issue a recommendation prior to issuing a direction. When performing the functions discussed here, VTS is not relieving the master or person in charge of his or her responsibility to control vessel movement. At no time is that person relieved by the VTC of responsibilities assigned by the applicable Navigation Rules and other pertinent laws or regulations.  

B. Criteria and Procedures Applicable to VTS Policy Decisions

Before turning to an evaluation of whether the statutes, regulations, or Coast Guard policies on VTS directions should be changed, it may be helpful to describe the policy analysis framework appropriate for such an inquiry. A typical approach to policy analysis proceeds in five steps: (1) defining the problem, (2) establishing evaluation criteria, (3) identifying alternative policies, (4) displaying the alternatives and selecting among them, and (5) monitoring and evaluating the policy decision's outcomes. Policy implementation takes place after step 4 and overlaps with step 5. Policy analysis and decision making must be seen not as the search for the "solution," but rather as an ongoing and iterative process. In a society that values stakeholder participation and transparency, analysts must be mindful of process requirements and expectations. Thus requirements for notice and an opportunity to be heard or to comment, and the role of advisory committees and interagency partners, must be respected. It is also important to bear in mind that any decision must be effectively announced to those affected by it, and success of the new policy will require careful attention to implementation, training, and periodic reassessment and adjustments. Finally, the question whether a change should be made must be distinguished from the question regarding the level at which such a change is best implemented. Some changes must or should be made at the legislative level, while others call for the greater flexibility and responsiveness afforded through implementing regulations or agency directives to its personnel.

184. VTS SAN FRANCISCO, USER'S MANUAL, supra note 183, at 2.

185. The problem statement identifies the difference between the present state and the desired state. A common error in the problem definition step lies in the inability or reluctance to see the problem from each of the relevant viewpoints. See JAMES L. ADAMS, CONCEPTUAL BLOCKBUSTING 33-34 (4th ed. 2001).

186. The goal of public policy is commonly expressed as the maximization of net social welfare, calculated through a comparison of costs and benefits. Alternative courses are typically compared on the basis of their relative effectiveness in achieving comparable results. Cost considerations include not only the magnitude of the costs of the alternatives under consideration but also who will bear those costs.

187. See generally WEIMER & VINING, supra note 28, ch. 11.
As with any discussion of policy decisions by agencies charged with implementing statutes or treaties, the agency must comply with the text of the enabling statute or treaty (self-executing treaty issues aside). Additionally, the agency’s policy choices should be informed by any statement of policy announced in the statute or treaty. For example, the amended PWSA specifies Congress’ policy objectives in enacting the legislation. The importance of adhering to the statutory considerations and procedures was recently emphasized by the United States Court of Appeals for the District of Columbia in Defenders of Wildlife v. Gutierrez in the context of a challenge to the process of designating offshore vessel routing measures. 188

The PWSA policy objectives are now codified in 33 U.S.C. § 1221, and include, for example, a statement that “increased supervision of vessel and port operations is necessary” for reasons set out in the Act. 189 In addition, any policy choices must be guided by 33 U.S.C. § 1224, which sets out nine nonexclusive factors the Secretary must consider in carrying out his or her responsibilities under the Act. 190 It sets out an early form of risk-based decision making, but requires the Secretary to consider a number of additional factors as well. Finally, 33 U.S.C. § 1231 (and the Administrative Procedures Act) sets out the procedures to be followed and the stakeholders to be consulted in implementing the Act and developing regulations. 191

In carrying out their undertaking, risk management policy analysts must be mindful of the limits of analogical reasoning, whether the analogy is drawn from history (prior marine incidents) or similar systems (air traffic control or shore-based pilotage). On closer examination, apparent historical analogues may prove to differ substantially and materially from the present situation. 192 And, as Mr. O’Neil warns in his “hiding behind tradition” remark, excessive reliance on history may hinder our ability to escape the pull of the prevailing paradigm. 193 Analogies to apparently similar systems may not withstand close scrutiny.

188. 532 F.3d 913, 922-27 (D.C. Cir. 2008) (examining factors the PWSA required the Coast Guard to consider with respect to its decisions regarding offshore vessel routing measures to protect endangered right whales and criticizing the government’s argument that the IMO, rather than the U.S. Coast Guard, has the final authority over such decisions).
190. See id. § 1224(a).
191. See id. § 1231(b).
For example, in a thorough 1994 study, the NRC concluded that the differences between aviation and maritime navigation "preclude the aviation system from serving as an exact or even close operational model for marine traffic regulation, although lessons can be learned and adapted from the aviation experience." Additionally, a recent study revealed that shore-based pilotage, while a useful alternative when conditions preclude boarding by a pilot, raises significant "control" issues that limit its application beyond a narrow set of circumstances.

C. Use of Case Studies in Evaluating VTS Policy Options

When used consistent with the precautions appropriate to analogical reasoning, case studies can serve as a useful tool for formulating and evaluating alternative courses of action. By themselves, or in conjunction with constructed scenarios and simulations, case studies can also be used to test the alternatives and to train operators—including VTS operators, sector watch officers, pilots, and vessel crews—during the policy implementation phase. It is important, however, that the selected case studies and scenarios cover the full range of the VTS continuum of vessel traffic management, including grounding and allision cases, two-ship and multiple-ship collision cases, cases involving vessels impaired by equipment, propulsion or steering casualties, and the presence of vessels not equipped or required to participate in or communicate with VTS. In addition, the full range of environmental conditions should be considered. The task of collecting such case studies, developing scenarios, and preparing simulations to test them on operators might serve as the foundation for a VTS center of excellence, which would facilitate CGVTS operational evaluations and help promote continuous improvement in the VTS program, in conjunction with the

194. Marine Bd., supra note 26, at 185. The report goes on to warn that “although marine traffic regulation analogous to the aviation model is technologically possible, it is not operationally feasible as the marine navigation and piloting system is organized and operated.” Id. at 185; see also id. at 195 tbl.5-1 (contrasting the aviation and marine parameters).

195. Bruno & Lützhöft, supra note 123, at 433 (drawing on cognitive systems engineering approach to identify problems impairing the ability of a person to establish control over a system from a remote location). The authors also point out that, in practice, shoreside remote pilotage is generally only available for ships that are so well equipped and manned that, though legally obligated to take a pilot, “they might not necessarily need one.” Id. In another article, the same authors emphasize that shore-based pilotage (SBP) is not a replacement for an onboard pilot. SBP is strictly limited to vessels meeting certain requirements, is only available when the alternative is for the vessel to wait for better weather, and is provided only over short distances. See Karl Bruno & Margareta Lützhöft, Shore-Based Pilotage, SeaWays, Jan. 2009, at 15.

196. See VTS National SOP, supra note 16, para. 5.A, at 5-1 (requiring operational evaluations of VTSs every three years).
IMO, IALA, and the maritime training facilities. Finally, just as national security strategists must guard against the temptation to prepare only to fight the "last war," policy makers must also resist the temptation to rework the marine risk management system in response to a single incident like the COSCO BUSAN allision, if doing so would, on balance, impair the system's capability to manage the full spectrum of risks effectively.

D. Liability Considerations

Liability concerns often cast a shadow over any effort to recalibrate risk management responsibilities. Although comprehensive analysis of potential government liability for VTS directions, warnings, or advice is beyond the scope of this Article, such an analysis should be provided to the relevant decision makers considering the advisability of changing the existing regime. The IMO VTS Guidelines only briefly address VTS liability before concluding that such issues will be governed by national law. Fifteen years ago, the NRC observed that "[l]iability issues have yet to be resolved concerning VTS intervention to influence operator and vessel behavior, let alone traffic control." In its investigation into the 2002 collision between the DIAMANT and the NORTHERN MERCHANT, the U.K. Marine Accident Investigation Branch cited potential "legal action against the VTS" as one reason it hesitated to endorse arguments for more direct interventions by VTSs. Even more recently, in 2008, the DHS Inspector General warned that any decision regarding a reallocation of responsibility for vessel control must consider the liability implications in the event a casualty involving a compliant vessel occurs.

The choice of terminology in denoting VTS interventions should be carefully considered. Under the IMO SMCP, it is understood that when a VTS issues a "warning" or provides "advice," the vessel master must then decide what action should be taken. If the master fails to act on the warning or recommendation, negligence may be found


198. IMO VTS Guidelines, supra note 10, annex 1, para. 2.2.4.

199. MARINE BD., supra note 26, at 194.

200. U.K. MAIB REPORT, supra note 147, para. 2.6.1, at 43.

201. DHS INSPECTOR GEN. REPORT, supra note 3, at 9 (describing the "implications of potential liability should a mishap occur while a vessel was complying with VTS operations center direction").

202. SMCP, supra note 144, at 46.
if a reasonably prudent master would have taken additional precautions; however, normally no civil or criminal penalties will be assessed for breach of law or regulation. By contrast, the unexcused failure to follow a lawful VTS “direction” (using U.S. terminology) or “instruction” (SMCP terminology) constitutes a regulatory violation, for which a penalty may be assessed (civil liability may also be imposed where the violation constitutes causative fault). While it is true that the master has discretion to take contrary action in spite of the direction, where the “exigencies of safe navigation” require, the burden of proving the necessity of the action will likely be on the master.

The notion of asserting “control” over vessels is more problematic. Assumption of “control” by the government might reduce or eliminate the vessel operator’s responsibility and liability (because the operator is no longer in control) and increase the government’s exposure (because it is in control). Moving closer to the air traffic control model might well lead to the more expansive government liability that characterizes aviation torts in the United States. While no responsible policy maker would reject a measure that would save lives and reduce the total cost of accidents simply because it might lead, by way of civil tort liability, to some of the remaining costs being borne by the government, potential liability and litigation costs will certainly be considered in the government’s overall cost-benefit analysis.

Congress could, as part of its PWSA amendment agenda, enact clear liability provisions applicable to vessel traffic management and control, as some states have done, in order to force those engaged in

203. The standard of care for a vessel master is not that of the ordinary reasonably prudent person but rather a reasonable person with the special training and skills held by a member of that profession. See Restatement (Second) of Torts § 299A (1965).
204. SMCP, supra note 144, at 46.
205. See 33 C.F.R. § 161.1(c) (2008) (“Compliance with these rules or with a direction of the VTS is at all times contingent upon the exigencies of safe navigation.”).
206. But see Allison K. Lawter, Comment, Free Flight or Free Fall?, 1. AIR L. & COM. 915, 952 (1997) (“While technology has improved the air traffic control system and made it more efficient, it has not changed the pilot-in-command concept. Therefore, improved technology should not shift to air traffic controllers the pilot’s burden to fly safely. . .”). See generally James L. Rigelhaupt, Jr., Annotation, Liability of United States for Negligence of Air Traffic Controller, 46 A.L.R. Fed. 24 (1980 & Supp. 1989) (collecting cases holding that federal government may be liable for negligence in providing air traffic services, even in cases falling short of an assumption of “control”).
207. See Marine Bd., supra note 99, app. D, at 22. The NRC reported that there is widespread concern about potential tort liability associated with a VTIS that provides information and/or directions that could be blamed for an accident. This concern has driven some private VTIS operators to seek relief from liability under state law or by working under the aegis of the Coast Guard. California passed legislation
risk-generating activities to better internalize the cost of their activities; but nothing suggests Congress will do so. As a result, the federal government’s liability for maritime torts arising out of an action or failure to act by a Coast Guard VTS will be governed by the existing provisions of the Suits in Admiralty Act (SIAA) and the Supreme Court’s decisions in *Indian Towing Co. v. United States* and the discretionary function exception cases.

The Coast Guard’s Marine Safety Manual suggests that potential government liability for VTS control decisions would fall within the discretionary function exception. The present “permissive” PWSA language, which authorizes directions to vessels when the Secretary or the Secretary’s delegee is satisfied that the direction is “justified in the interest of safety,” does indeed suggest that any decision to issue, or not to issue, an “order” to a vessel would fall within the discretionary function exception to federal tort liability under the SIAA. However, it granting immunity to liability for negligence to employees and representatives of the Marine Exchange and thus to the VTIS operators.


209. 350 U.S. 61, 64-65, 1956 AMC 27, 30 (1955) (reasoning that although the federal government may not be required to provide a particular service, if it chooses to do so and thereby induces reliance on the service, it must exercise due care); see also *Restatement (Second) of Torts* § 323 (1965) (“One who undertakes, gratuitously or for consideration, to render services to another... is subject to liability to the other for physical harm resulting from his failure to exercise reasonable care to perform his undertaking if, (a) his failure to exercise such care increases the risk of harm, or (b) the harm is suffered because of the other’s reliance upon the undertaking.”).

210. See, e.g., United States v. S.A. Empresa de Viacao Aerea Rio Grandense (Varig Airlines), 467 U.S. 797, 808 (1984) (“The discretionary function exception... marks the boundary between Congress’ willingness to impose tort liability upon the United States and its desire to protect certain governmental activities from exposure to suit by private individuals.”).

211. 6 MARINE SAFETY MANUAL, supra note 78, at 1-24. Although the discretionary function exception is not expressly incorporated into the SIAA, as it is in the Federal Tort Claims Act (28 U.S.C. § 2680(a)), all of the federal circuits which have considered the issue have held that the exception is implied in the SIAA. See *McMellon v. United States*, 387 F.3d 329, 337-38, 2004 AMC 2553, 2561-64 (4th Cir. 2004) (en banc), *cert. denied*, 544 U.S. 974, 2005 AMC 2999 (2005).


213. The negligent search and rescue cases, carried out under the permissive authority of 14 U.S.C. § 88, might serve as a useful guide. See Tracy Bateman Farrell, Annotation, *Liability of Coast Guard for Injury to Persons or Property While Engaged in Rescue Activities*, 11 A.L.R. Fed. 2d 779 (2006). On the other hand, recent cases assigning fault to stand-on vessels for failing to take avoiding action permitted but not required by COLREGS Rule 17(a)(ii) demonstrate that government liability might be found where a VTS failed to exercise permissive authority to intervene. For an examination of the Rule 17 cases, see CRAIG H. ALLEN, FARWELL'S RULES OF THE NAUTICAL ROAD 269-75 (8th ed. 2005). Potential liability in such cases could be compounded by the Supreme Court's surprising application of the superseding cause doctrine to
must always be asked when the discretion ends and the affirmative undertaking begins—particularly when the agency’s own directives refer to VTS vessel management activities as a “continuum.” The Court’s decision in Indian Towing demonstrates that in a tort liability analysis the decision whether to assume the Good Samaritan role and provide a discretionary service (aids to navigation or VTSs) must be distinguished from the manner in which the service is carried out.\textsuperscript{216} Negligence in the latter case generally falls outside of the discretionary function exception.\textsuperscript{215}

E. Is New Legislation Needed?

Bearing in mind the policy analysis framework outlined above, the international authorities on the role of VTS, the IMO member states’ concern with divergent and therefore confusing VTS practices,\textsuperscript{216} congressional findings and policies announced in the PWSA and its amendments, the principles of risk assessment and management, and the tentative assumption that our overarching goal is to maximize net social welfare by minimizing the total cost of accidents,\textsuperscript{217} we are at last prepared to confront the question of whether the existing framework for shoreside VTS control over vessel movements should be amended. This is not the first time Congress has raised questions regarding the need for additional authority. As discussed below, nearly twenty years ago, in the Oil Pollution Act of 1990, Congress directed the Secretary to conduct a

\begin{enumerate}
\item[214.] It will be recalled, however, that in the Indian Towing case, the government conceded that its conduct was “operational” and that the discretionary function exception was not in play in that case. 350 U.S. at 64, 1956 AMC at 30.
\item[215.] Amending the statute, regulation, or policy directives to reduce VTS discretion may also expose the government to greater liability. See Berkovitz v. United States, 486 U.S. 531, 536 (1988) (“[T]he discretionary function exception will not apply when a federal statute, regulation, or policy specifically prescribes a course of action for an employee to follow. In this event, the employee has no rightful option but to adhere to the directive. And if the employee’s conduct cannot appropriately be the product of judgment or choice, then there is no discretion in the conduct for the discretionary function exception to protect.”).
\item[216.] See supra note 56 and accompanying text.
\item[217.] See GUIDO CALABRESI, THE COSTS OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS ch. 9 (1970). The total cost of accidents includes the costs of preventing accidents or mitigating their effects plus the cost of those accidents not prevented. Although in a negligence context the law generally does not require a risk generator to undertake accident prevention or mitigation measures where the cost of those measures exceeds the probability-discounted expected cost of the accident if not prevented (as expressed in the familiar Learned Hand formula $B < P \times L$), legislation—even legislation ostensibly grounded on cost-benefit analysis—might require more than the negligence standard of care would call for. The modern trend toward ever greater risk aversion bears that out.
\end{enumerate}
study “of whether the Secretary should be given additional authority to
direct the movement of vessels on navigable waters and should exercise
such authority.” The answer in 1993 was “no.” What might have
changed since then?

I. Is There a Problem?

An amendment to an agency’s authority, in this case either a
clarification of existing authority or an expansion of that authority, is
warranted where the existing statute no longer expresses the will of the
legislature (prescriptive inadequacy or ambiguity) or fails to achieve the
desired result (compliance inadequacy). Such conclusions usually follow
from actual case studies; in this case, the COSCO BUSAN allision. As
to the first possible inadequacy, we can ask “Did VTS San Francisco
have the legal authority to timely direct the movements of the COSCO
BUSAN to avoid an allision with the bridge?” If the answer is “yes,”
the second question is “Was the authority sufficiently clear so that the VTS
understood it had the authority?” A third question which might be raised,
but is not suggested in the pending bills, is whether the VTS had not
merely the authority to direct the movements of the vessel but an
affirmative duty to do so. This last question raises issues relevant to the
application of the discretionary function exception to government tort
liability.

Is additional legal authority needed to clarify or expand VTS
control over vessels? The DHS Inspector General, NTSB, and Coast
Guard do not think so. The DHS Inspector General report concluded:

Current legislation already provides the Coast Guard with the authority
over vessel traffic necessary to protect life, property, and the marine
environment. It would be speculative to suggest that additional Coast
Guard authority over vessel traffic in and of itself would prevent future
mishaps in the San Francisco Bay. The Coast Guard would need to
reevaluate several aspects of its VTS program before a decision can be
made to change the VTS operations center’s role from being primarily a
navigational and advisory service tool to one which exercises direct control
over all vessel movement, similar to that of an air traffic control center.

Stat. 484, 514 (codified as amended at 33 U.S.C. § 1223(a)(2)).
219. U.S. SEC’Y OF TRANSP., DEP’T OF TRANSP., VTS CONTROL STUDY: STUDY
OVERVIEW 1 (Mar. 1993) (copy on file with the author) [hereinafter VTS CONTROL STUDY].
220. Two kinds of lessons can be learned from the incident and then factored into any
“problem” statement. The first and most obvious would come from some combination of fault,
vulnerability, and causation analysis. The second lesson is the public and legislative reaction to
the incident and what that teaches risk managers about risk tolerance levels in the United States.
The Coast Guard would also need to determine whether VTS operations center equipment capability, manpower, training, and funding requirements are adequate for this expanded role, as well as assess the implications of potential liability should a mishap occur while a vessel was complying with VTS operations center direction.221

Similarly, the NTSB recommendations focused on the need for the Coast Guard to define expectations for the use of its “existing authority,” and did not suggest the need for additional authority.222 The Coast Guard itself visited the vessel control issue in response to congressional tasking in OPA 1990 and again in the course of its 1994 VTS rulemaking. The Coast Guard completed the study required by OPA 1990 in 1993 and concluded that “the current level of authority provided by existing legislation is sufficient for the safe direction of vessel movements.”223 It came to the same conclusion in the course of its comprehensive 1994 VTS notice and comment rulemaking project.224 Moreover, the fact that Coast Guard VTSs already assert such control as a general practice in some locations,225 and in particular incidents in others,226 strongly suggests that well before the COSCO BUSAN incident the authority was adequate, understood, and used when appropriate. In 2009, in response to the NTSB report and its VTS recommendations, the Coast Guard asked the Navigation Safety Advisory Council (NAVSAC) to review current VTS authorities, operational procedures to exercise authority, and VTS watchstander training. In addition, after development of new VTS procedures by the Coast Guard, NAVSAC was asked to review the proposed changes. The Council unanimously concluded that the current laws and regulations give Coast Guard VTS sufficient authority to monitor, inform, and direct the movement of vessels.227

221. DHS INSPECTOR GEN. REPORT, supra note 3, at 9.
222. NTSB REPORT, supra note 4, at 137 (NTSB Recommendation M-09-3).
223. VTS CONTROL STUDY, supra note 219, at 1.
224. See U.S. Coast Guard, Final Rule, National Vessel Traffic Services Regulations (VTS Final Rules), 59 Fed. Reg. 36,316 (July 15, 1994) (“This rulemaking does not significantly change Coast Guard VTS procedures or requirements.”).
225. See supra note 177 and accompanying text.
226. For example, in 1990, VTS Puget Sound ordered a foreign flag bulk carrier that was inbound in the Juan de Fuca Strait traffic separation scheme to execute a ninety-degree turn to starboard to avoid immediate danger of collision with an outbound tanker. The incident occurred at approximately 00:35 local time on June 10, 1990, near the Port Angeles, Washington, pilot station. At the time of the VTS intervention, the vessel, which had not yet embarked its pilot, was well clear of any shoal water or other hazards. The embarrassed vessel master promptly complied without objection. No one suggested that the VTS action was ultra vires. See E-mail from Coast Guard VTS Personnel to author (July 29, 2002, 17:01 PST) (on file with author).
If neither the Coast Guard, NAVSAC, the DHS Inspector General, nor a majority of the NTSB believes that additional authority is required, why do some members of Congress apparently think an amendment is needed? Three possibilities present themselves. The most obvious answer is that Senate Bill 685's sponsors simply disagree with others who have reviewed the statute and instead believe additional authority is needed (problem #1). A second possible explanation is that they are concerned that existing legislation is not sufficiently clear or explicit (problem #2). Under that view, a clarification might be intended to allay any lingering doubts individual sector commanders or VTC watchstanders might harbor under the existing regime. A report by the Senate Committee on Commerce, Science, and Transportation suggests this may be the case. It explains the intent of Senate Bill 685 as follows:

Section 3 would clarify the Coast Guard's authority to direct the movement of vessel traffic in a VTS area and would require the Coast Guard to develop and distribute guidance to VTS personnel that clearly defines the authority to direct vessel movement when it is in the best interest of safety. The provision would direct the Coast Guard to conduct an assessment of the need for new, expanded, or improved vessel traffic management measures. The provision also would set forth additional navigational training requirements for Coast Guard VTS watchstander personnel. This provision is based on the National Transportation Safety Board's (NTSB) recommendation from the Cosco Busan incident. A third explanation is that the Bill's sponsors want to override the Coast Guard's current VTS policy on the exercise of actual control over vessels (problem #3). By singling out directions to "change the vessel's heading or speed," the Bill conflicts with, and would therefore supersede, the Coast Guard's policy on such orders. If that is indeed the Bill's sponsors' intent, the Bill would not only override the Coast Guard's VTS policy, it might well have implications for other mission areas, such as search and

Francisco Bay PAWSA concluded that the risks and risk mitigation measures for the Bay, including the area's vessel traffic management measures, were well balanced. See U.S. COAST GUARD SECTOR SAN FRANCISCO, supra note 35, at 21.

228. The Lautenberg bill would affect more than just a VTS's authority to control traffic. By inserting the change in the section 1223(b) chapeau paragraph, the authority to order course and speed changes will apply to all three of the listed circumstances under which the Secretary may exercise the Act's "special powers." See S. 685, 111th Cong. § 3(a) (2009). The new authority would extend to "any vessel, in a port or place subject to the jurisdiction of the United States or in the navigable waters of the United States"—even if not within a VTS area. Id.; 33 U.S.C. § 1223(b) (2006).

229. S. REP No. 111-026, at 7 (2009) (emphasis added). While this characterization of the legislation is generally accurate, close examination of the NTSB Report reveals no recommendation to provide statutory authorization to direct a vessel operator to "change the vessel's heading and speed," as the Bill proposes.
rescue (discussed below), and would put the United States somewhat at odds with the IMO VTS Guidelines.

2. Evaluation Criteria

The policy goals set out in the PWSA, briefly adverted to in Part III.B of this Article, are quite broad. They include the safety and security of ports, waterways, vessels, cargoes, bridges, and personnel, as well as protection of the environment. To achieve these ends, the Act calls for, inter alia, increased supervision of vessel and port operations and authorizes the Secretary to exercise “special powers” to control vessel traffic. At the same time, the Act identifies certain international law considerations applicable to the exercise of U.S. authority. The Act then sets out “[c]onsiderations by [the] Secretary” in exercising his or her duties and responsibilities under section 1223 of the Act. They include “all relevant factors concerning navigation and vessel safety [and] protection of the marine environment,” including, but not limited to, the scope and degree of risk or hazard involved, vessel traffic characteristics and trends, environmental factors, economic impacts and costs, and local practices and customs. The Act also prescribes a duty to consult with and receive the views of key stakeholders and advisory bodies. Consultations are facilitated in most ports through harbor safety committees.

Policy choice evaluations must consider both the likelihood that a new policy will produce a particular outcome and, for those choices that are likely to produce the desired outcome, their relative efficacy. In the case of VTS direction and control, two possible outcomes must be considered: a VTS order to a vessel might (1) prevent an accident that would likely have occurred without VTS intervention or (2) result in an

231. Id. § 1221(c).
232. Id. § 1223(b).
233. Id. § 1223(d). Any change to CGVTS doctrine must be mindful that, at present, one Coast Guard VTS (VTS Puget Sound) is a transnational, “cooperative” VTS, with responsibility shared between the United States and Canada. Any control procedures for CGVTSs must be coordinated by both states.
234. Id. § 1224.
235. Id. § 1224(a); see also IMO VTS Guidelines, supra note 10, annex 1, para. 2.1 (setting out internationally recognized “objectives” of vessel traffic services).
236. 33 U.S.C. § 1224(b).
237. See U.S. COAST GUARD, GUIDANCE FOR THE ESTABLISHMENT AND DEVELOPMENT OF HARBOR SAFETY COMMITTEES UNDER THE MARINE TRANSPORTATION SYSTEM (MTS) INITIATIVE, NAVIGATION AND VESSEL INSPECTION CIRCULAR (NVIC) No. 1-00 (2000); see also VTS NATIONAL SOP, supra note 16, para. 7.1, at 7-3.
accident that would not have occurred had the VTS not intervened. Any
policy choice must weigh both the probability and associated costs and
benefits of each potential outcome.

Criteria specific to the effectiveness of established VTSs, regarding
the full range of VTS services and management activities, may be more
difficult to find—particularly in the case of VTS instructions or
directions to vessels. In its 1994 *Minding the Helm* report, the Marine
Board of the NRC acknowledged that available data demonstrated that
VTS operations have provided substantial benefits, but nevertheless
concluded that an acceptable analytical method had not yet been
developed to fully measure the effectiveness of VTS systems relative to
the factors that affect operational risk.238 Similarly, while not defining
VTS efficiency or providing criteria for assessing it, the IMO's VTS
Guidelines conclude that VTS efficiency does depend on the reliability
and continuity of communications and the ability to provide good quality
and unambiguous information.239 The Guidelines then look beyond the
information services function and assert that “[t]he quality of accident
prevention measures will depend on the system’s capability of detecting a
developing dangerous situation and on the ability to give timely warning
of such dangers.”240 Missing from the criteria for assessing a given VTS's
efficiency in its performance of navigation assistance services is any
mention of VTS instructions or directions to vessels.

3. Identifying and Evaluating the Alternatives

Assuming, without conceding, that the existing legal framework is
inadequate in its prescription or implementation (problem #1 above), and
that our task would be to determine which of the essential features of a
successful and effective VTS navigation assistance service function are
missing from the present scheme, several alternatives present themselves.
Any inadequacy in the prescriptions could be addressed through
legislation, regulations issued under authority of existing legislation,241 or

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238. MARINE BD., supra note 26, at 203.
239. *IMO VTS Guidelines*, supra note 10, annex 1, para. 2.1.3. To some extent, widespread
use of AIS to transmit data formerly exchanged between the vessel and VTS operators by VHF
radio can undermine the effectiveness of communications in an emergency if the absence of prior
radio exchanges leads to diminished rapport or trust.
240. *Id.*
241. Given the broad language of the present statutory authorization and policy objectives,
such regulations would presumably be entitled to deference. See Chevron U.S.A., Inc. v. Natural
statutory provision, fairly conceptualized, really centers on the wisdom of the agency's policy,
rather than whether it is a reasonable choice within a gap left open by Congress, the challenge
clarifying internal agency directives. The latter two options are discussed below. If the goal is to expand the agency's authority or to make some or all of the vessel control function mandatory, legislation is called for. If, on the other hand, the goal is merely to clarify existing authority or to remove ambiguities (problem #2), that goal is more readily and flexibly accomplished through agency regulations, perhaps in conjunction with, or in response to, congressional committee hearings that ask agency officials to confirm their understandings of existing authority.

At first glance, it is tempting to jump to the conclusion that legislation calling for more frequent and/or direct interventions by VTSs would cost little or nothing and has the potential to confer significant public benefits in avoided accident costs. However, those suppositions might not survive close scrutiny across the full range of accident scenarios. Too many analyses fall prey to the presumption that all CGVTS interventions will be successful. The sheer numbers call such assumptions into serious doubt. Taking VTS San Francisco as an example, in a given year the center manages the transit of over 120,000 vessels. An intervention rate of just one percent would mean that VTS operators would be "intervening" (through warnings, recommendations, and directions) in vessel navigation decisions over 1200 times each year. If just ten percent of the interventions involved directions to vessels, VTS operators could be issuing ten such directions each month. Even with additional staff and "intervention" training, it is by no means certain that VTS operators would, under the circumstances, make the correct choice (and override the vessel's choice or pilot's choice) in all of those

must fail. In such a case, federal judges—who have no constituency—have a duty to respect legitimate policy choices made by those who do.”).

242. Under the discretionary function exception analysis set out by the United States Supreme Court in Berkowitz, it does not matter whether constraints on the exercise of discretion are imposed by statute, regulation, or agency policy directives. See supra note 215 and accompanying text (discussing the discretionary function exception).

243. The DHS Inspector General warned that expanding the role of CGVTS would require a reassessment of resources. See DHS INSPECTOR GEN. REPORT, supra note 3, at 9.

244. Any assumption that intervention decisions will always come out well ignores the fact that the actual decisions will always be time-constrained and therefore made under conditions of stress and uncertainty. In approaching historical case studies one must be mindful of the strong tendency for after-the-fact reanalysis to lead to a conclusion that those who were responsible simply failed to "connect the dots" and thereby prevent the incident. Such analyses generally fail, however, to recognize that "[t]he occurrence of an event increases its reconstructed probability and makes it less surprising than it would have been had the original probability been remembered." Malcolm Gladwell, Connecting the Dots, THE NEW YORKER, Mar. 10, 2003, at 85 (quoting psychologist Baruch Fischhoff).

245. DHS INSPECTOR GEN. REPORT, supra note 3, at 2 (reporting that in 2007 the VTS handled 124,762 vessel transits).
interventions. For a variety of reasons, shoreside personnel will generally have less information than those on the vessel and less time to formulate and execute a decision. If, for example, one adopts the familiar OODA loop approach, the time available for a shoreside VTS operator to (1) observe, (2) orient, (3) decide, and (4) act will almost certainly be longer than that available for a person on board the ship, who will likely have completed the first two steps before the VTS operator even becomes aware that a situation that might require a decision to control the vessel is developing. Additionally, more frequent VTS interventions might lead to decision aversion, hesitation, or even paralysis, whereby the master, pilot, and VTS operator or supervisor all wait at the threshold of OODA step 3, while wondering who really has control. Accordingly, a decision calling for a more proactive posture on interventions must weigh not only the “missed opportunities” seen in hindsight in cases like that of the COSCO BUSAN, but also the cost of the occasional wrong VTS decision or of delayed decisions by those on board the vessel.

Finally, if the Bill’s sponsors’ goal is to override the current Coast Guard policy on the use of course or speed orders to vessels, inserting the new language in the current Bill is unlikely to accomplish that goal. Senate Bill 685 would amend 33 U.S.C. § 1223 to read:

(b) SPECIAL POWERS—The Secretary may order any vessel, in a port or place subject to the jurisdiction of the United States or in the navigable waters of the United States, to operate, including direction to change the vessel's heading and speed, or anchor in a manner he directs if—

(3) ... by reason of weather, visibility, sea conditions, port congestion, other emergency or hazardous circumstances, or the condition of such vessel, he is satisfied that such directive is justified in the interest of safety.

Thus, any decision to assert control under this section of the amended statute would still be subject to a discretionary finding by the VTS that

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246. Those who analogize the decision to the “pilot-ashore” practice used (with strict limitations) in ports, and argue that such examples undermine arguments against the practicality of shoreside vessel control, fail to recognize important distinctions between the two situations, including the fact that the “pilot-ashore” is in fact a pilot, not a VTS operator, and at all times the on-board master still bears ultimate responsibility for the vessel’s safe navigation.

247. The “OODA loop” approach to analyzing the human decision making process was developed by U.S. Air Force pilot Colonel John Boyd. In some marine situation awareness models, the first two predecision OODA elements are further broken down into observation, understanding, and forecasting how the situation will develop.

an order to a particular vessel to change course or speed is "justified in the interest of safety."

4. Conclusion: New Legislation Is Both Unnecessary and Unwise

The proposed amendment is neither necessary nor wise. It is unnecessary because the historical record demonstrates that existing authority is adequate and sufficiently clear to guide the Coast Guard in promulgating regulations and internal directives that implement the statute and provide its VTS personnel with guidance that clearly defines the Agency's expectation for the use of its vessel direction and control authority. The COSCO BUSAN experience is not to the contrary. The foggy conditions over San Francisco Bay on the morning of the COSCO BUSAN's allision, like the icebergs and darkness in Prince William Sound at the time of the EXXON VALDEZ's grounding, plainly fall within the circumstances set out in the PWSA for the Coast Guard to conclude that an "order" to the vessel might be justified in the interest of safety. That authority has already been delegated to the Coast Guard sector commander and VTS. Nothing suggests that the VTS San Francisco watchstanders failed to act because they did not believe they had the authority to intervene.

On balance, the proposed legislation is also unwise. Even though it is touted as a "clarification" of existing authority in the accompanying Senate Report, the actual language used in the proposed statute is grammatically awkward, nautically unsound, and would only introduce confusion. Moreover, it emphasizes one step in the continuum of vessel traffic management measures (that is, vessel course and speed control) at the expense of others. A balanced approach would use standard terminology and put greater emphasis on the use of warnings, recommendations, and result-based directions. As presently drafted,
the Bill would put the United States at odds with the IMO Guidelines and would compel the Coast Guard to change the current SOP, which—consistent with the IMO Guidelines—states that VTS should not normally direct a course to be steered or engine orders to be executed.\textsuperscript{255} It bears repeating here that the IMO Guidelines grew out of international concern over potential variability in VTS procedures from port to port and the confusion it would create for vessels that operate in several VTS areas. Additionally, the IMO cited the member states’ belief that safety and efficiency of maritime traffic and protection of the marine environment will be improved if VTSs are established and operated in accordance with internationally approved guidelines. Finally, the proposed change might lead to mariner complacency if it is perceived as a congressional judgment that navigation and collision avoidance responsibility should be shifted from the vessel’s on board “team” to shoreside VTS operators. This might actually reduce the safety level both within VTS areas and even outside those areas, as mariners increasingly look shoreward for decisions and direction. Consider, for example, the COSCO BUSAN master’s statement that because the Coast Guard had not closed the port to navigation due to fog on the day of the allision, he believed that it was safe to get underway. This rationalization by a master mariner should give reformers pause. The same assumption, however misdirected, might be asserted by a master in a future case where a VTS could have, but failed to, take control of a vessel.

If Congress is truly serious about improving waterway safety by enhancing the role of the Coast Guard VTS, it should focus instead on funding the much needed recapitalization of the aging VTS infrastructure\textsuperscript{256} and creating a VTS training program on par with air traffic control training programs. Even if the Coast Guard has ample authority under the amended PWSA to succeed in its VTS mission, it

\textsuperscript{255} VTS NATIONAL SOP, supra note 16, para. 2.B.2.d, at 2-2. Experienced mariners will immediately recognize a host of potential problems with issuing heading (course) or speed orders to vessels. For example, in giving a vessel a course to steer one might need to know: What kind of compass is the helmsman steering by? What is its compass error? Given existing and expected set and drift, what course should the vessel steer to make good the desired course? How much rudder should be used to accomplish the course change? Note, too, that S. 685 authorizes orders to change “heading” not course.

\textsuperscript{256} The DHS Inspector General Report indicates that the 1990-era equipment at the San Francisco VTS at the time of the COSCO BUSAN incident was not up to date and that planned upgrades were not completed due to funding constraints in 2003-04. See DHS INSPECTOR GEN. REPORT, supra note 3, at 7-8.
cannot do so if it lacks the capability or capacity. In assessing the legislative commitment to an effective VTS program, one cannot help but recall how Congress turned its back on the Coast Guard's "VTS 2000" vision in the late 1990s.

F. Should the Coast Guard Amend Its VTS Regulations, Directives, or Standard Operating Procedures?

In the absence of new legislation, any decision to amend existing regulations implementing the PWSA or the agency's internal directives or operating procedures is best treated as an occasion to reevaluate an earlier policy decision, rather than a decision to adopt a new policy. A policy decision should be reevaluated in light of either new observations or data that are materially and significantly different from the data relied upon in the original assessment or new analytical methods or approaches that afford better insight, descriptive or predictive accuracy, or utility. Several VTS developments and approaches since 1994 might suggest a need to revisit the regulations or internal directives and the policies that underlie them. Some of the most significant developments since 1994 are the growing internationalization of VTS policy, procedures, and training standards, the use of offshore reporting and routing measures, and the standards for watchkeeping in the STCW Code. Major Coast Guard reorganizations since 1994 have also rendered parts of the current VTS regulations obsolete. Significant changes in the marine transportation system, particularly the number of vessels, their size, speed, and passenger capacities, and rapid and far-reaching technological developments, present a very different marine safety and traffic management challenge today. Finally, risk managers must always be alert to shifts in public risk perception and risk tolerance. Most would agree that the public and their elected representatives have grown much more risk averse since 1994.

257. In assessing CGVTS issues, it is important to recall that the VTS is part of a larger Coast Guard sector, providing authorities, capabilities, and capacities beyond those of the VTS.

258. The 1997 Department of Transportation appropriations bill prohibited funds for continuing the VTS 2000 program, citing the need for further studies by the General Accounting Office (as it was then called) and Marine Board of the National Academy of Sciences. See H.R. REP. No. 104-871, at 61-62 (1996) (Summary of Legislative and Oversight Activities) (1996); see also H.R. REP. No. 104-631, at 25 (1997) ("It is the Committee's firm intention that [VTS 2000] be terminated by the Coast Guard, and that the service immediately begin exploration of low-cost, off-the-shelf alternatives to VTS 2000 in cooperation and close coordination with affected port authorities, waterway operators, and other system users."). The Marine Board study cited by the Committee was completed in 1996. See MARINE BD., supra note 99; see also MARINE BD., NAT'L RESEARCH COUNCIL (NRC), APPLYING ADVANCED INFORMATION SYSTEMS TO PORTS AND WATERWAYS MANAGEMENT (1999).
1. Amendments to Coast Guard VTS Regulations

Despite those new developments, for the most part the Coast Guard VTS regulations adequately implement the authority for CGVTSs to provide services and carry out their management activities. No major substantive change to the regulations is called for. However, like the navigation safety regulations, which have not kept pace with emerging technologies and related e-Navigation practices, the present VTS rules are in need of an update. Because they do not reflect the service’s current organization, some might question the validity or effect of current delegations. Those regulations are, in some respects, also inconsistent with the IMO’s VTS Guidelines and the wider use of the Standard Marine Communication Phrases in VTS-vessel communications. Finally, although the regulations acknowledge the requirement for and content of VTS user’s manuals, they do not address the role or effect of, or public access to, the national or local standard operating procedure documents. Other than those changes to the regulations (and recognizing how painfully slow and difficult federal rulemaking has become), CGVTS policies, procedures and training, and qualification standards should be established by agency directives and standard operating procedures, and then described in the relevant VTS user’s manuals.

2. Amendments to Coast Guard Directives and SOPs

Precisely because the Coast Guard has discretionary authority to control vessel traffic, and because the PWSA requires the agency to consider a number of local factors in its decision making, it will be important for the Coast Guard to establish—in conjunction with the relevant harbor safety committee—a framework for the exercise of that authority, communicate to VTS users the parameters of such use, and train its VTS personnel to exercise that authority within the framework provided. Such a framework should assign decision control to those to whom the PWSA-VTS vessel traffic management and control powers have been delegated, while ensuring consistency with the PWSA criteria and processes.

259. In response to a serious backlog in its rulemaking, the Coast Guard’s Marine Safety Performance Plan pledges to increase the agency’s rulemaking capacity. U.S. COAST GUARD, MARINE SAFETY PERFORMANCE PLAN 10 (Nov. 2008), available at http://homeport.uscg.mil/cgi-bin/st/portal/uscg_docs/MyCG/Editorial/20081210/MSPerformancePlan.pdf?id=f6f41b564e0c9673f7c465c1650fe08a52ab89c8.

260. See, e.g., KENNETH CULP DAVIS, DISCRETIONARY JUSTICE ch. 4 (1971) (discussing need to structure discretionary authority and the methods commonly used for doing so).
The NTSB recommended that the Coast Guard provide guidance that "clearly defines expectations for the use of existing authority [not an expansion of that authority] to direct or control vessel movement when such action is justified in the interest of safety."\textsuperscript{261} Similarly, the DHS Inspector General concluded that although VTS San Francisco already had the authority to control traffic at the time of the COSCO BUSAN allision, the VTS San Francisco operational procedures in place did not "provide watchstanders with the criteria necessary for determining the specific measures and when they should be implemented during varying conditions of restricted visibility."\textsuperscript{262} The report went on to say that "[w]ithout well-defined criteria, VTS watchstanders could fail to implement vessel movement measures when they are prudent or could implement vessel movement measures that are overly restrictive for the existing conditions."\textsuperscript{263} At the same time, however, it warned that the "Coast Guard would need to reevaluate several aspects of its VTS program before a decision can be made to change the VTS operations center's role from being primarily a navigational and advisory service tool to one which exercises direct control over all vessel movement, similar to that of an air traffic control center."\textsuperscript{264} 

a. Coast Guard Policy on Exercising Control

In deciding whether to adopt a more proactive approach to VTS intervention, the entire MTS should be considered. Any decision to move closer to a shoreside-centered approach to vessel navigation and control must recognize that VTS geographic coverage and participation is not universal. The United States has 360 commercial ports, 95,000 miles of coastline, and 25,000 miles of navigable waterways; yet it has established only a dozen VTSs.\textsuperscript{265} Had the COSCO BUSAN-bridge allision occurred in Boston, Philadelphia, or Miami, where no VTSs have been established, there would be no discussion of the VTS role. Moreover, under existing rules, only power-driven vessels 40 meters (131 feet) or longer, towing vessels 8 meters (26 feet) or longer, and passenger vessels certificated to carry 50 or more passengers are required to

\begin{itemize}
\item \textit{NTSB REPORT, supra note 4, at 137.}
\item \textit{DHS INSPECTOR GEN. REPORT, supra note 3, at 8.}
\item \textit{Id.}
\item \textit{Id. at 9. The report also acknowledged that such a move would require an assessment of VTS equipment, capability, manpower, training, and funding. Id.}
\item \textit{MTS STRATEGY, supra note 12, at 15.}
\end{itemize}
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participate in a VTS. As a result, vessels and their pilots will often find themselves operating beyond the reach of any VTS.

The policy should also recognize that in most of the potential intervention cases, the master, pilot, and VTS will not share a common knowledge or experience base or operating picture, and that each is likely to have information the other does not. Each will also be faced with uncertainties that may or may not be shared by others. Again drawing on the COSCO BUSAN example, only the master and pilot knew the vessel's heading at any given time (such information was not available to the VTS).

Similarly, even in restricted visibility, a vessel keeping a proper lookout will almost certainly see and hear things, such as the sound of cars on a bridge overhead, waves lapping on a breakwater, or the bell on the upcoming turn buoy, of which the VTS operator ashore will be unaware. Accordingly, in developing scenarios to test any new policy, the alternatives should be validated through simulations involving VTS operators, supervisors, and actual masters and pilots with experience in VTS operating areas.

Assuming interventions are inevitable, the terminology used in such actions by VTSs in the United States should, as much as practicable, conform to the IMO VTS Guidelines. The SMCPs were written with the conviction, forged through innumerable accidents and near-accidents, that the choice of terminology matters. Confusing a warning with a recommendation or assuming that all “directions” amount to an assumption of “control” of the vessel fails to respect important differences in the relevant terminology. The IMO Guidelines (as

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266. 33 C.F.R. § 161.16 (2008).
267. For example: What is the turning radius and stopping distance of this ship? What is its present heading? How fast is it turning? How competent is the helmsman? How well/quickly does he execute commands? What does the current feather trailing off buoy 22 tell me? Did the ship ahead just sound two short blasts? Three short blasts? Is the bearing to the approaching ship constant or drifting right or left?
268. See NTSB REPORT, supra note 4, at 69 (“Even though AIS broadcasts a ship’s heading at regular intervals, the [system] in use by VTS San Francisco at the time of the [COSCO BUSAN incident] could not be configured to display heading information to VTS operators.”) (alterations added).
269. The IMO Guidelines also recommend that communications be conducted in accordance with the IMO's Guidelines and Criteria for Ship Reporting Systems (IMO Res. MSC.43(64) (Dec. 9, 1994)). See IMO VTS Guidelines, supra note 10, annex 1, para. 2.4.1. The IMO VTS Guidelines recommend that any message directed to a vessel should use the IMO Standard Marine Communication Phrases where practicable. Id. The SMCP includes a wide variety of VTS terminology and a glossary of VTS special terms. The VTS phrases are organized into (1) information service phrases, (2) navigational assistance service phrases, and (3) traffic organization service phrases. See IMO Res. A.918(22), supra note 144, at 4.
amplified by the SMCPs) recommend that any message directed to a vessel should make it clear whether the message contains:

- **Information**: indicating that the message is restricted to observed facts, situations, etc., and that the consequences of the message are up to the recipient;
- **Advice**: indicating that the message implies the intention of the sender to influence others by a recommendation and that, although the advice should be considered very carefully, it does not necessarily have to be followed and the decision whether to follow the advice stays with the recipient;
- **Warning**: indicating that the message implies the intention of the sender to inform others about danger and that, although the recipient should pay immediate attention to the danger mentioned, the consequences of the message will be up to the recipient; or
- **Instruction**: indicating that the message implies the intention of the sender to influence others by a regulation. Instructions are given only by one with authority to issue them. The recipient has to follow this legally binding message unless s/he has contradictory safety reasons, which then have to be reported to the sender.270

In developing standard terminology in VTS SOPs and understanding the effect of particular phrases, it may be helpful to consider well-established formalities for the passing of conning responsibility on U.S. warships. On Coast Guard cutters and U.S. Navy warships, navigation guidelines distinguish the responsibilities of the officer having the “deck” from those of the person having the “conn,” with the latter assigned the responsibility for “control” of the vessel’s movements.271 As with merchant vessels, the commanding officer of a warship is always in command of the vessel, but does not usually have the conn. That responsibility is usually assigned to a junior officer who has met the necessary qualifications. Formal announcements (for example, “This is Mr. Bowditch, I have the conn”) and log entries accompany a transfer of the conn from one officer to another. Similar formalities should attend any VTS instruction to control a ship. VTS operators and supervisors must understand their authority, the criteria for exercising control over vessels, and the consequences of doing so. They must also understand and clearly inform the vessel of the scope and

270. *See IMO VTS Guidelines, supra* note 10, annex 1, para. 2.4.2.
271. *See JAMES STAVRIDIS, WATCH OFFICER’S GUIDE: A HANDBOOK FOR ALL DECK WATCH OFFICERS* 75 (14th ed. 2000) (explaining that to “conn” means to control the movements of the ship).
duration of that control, to avoid any misunderstanding over when control is restored to the vessel.

b. Coast Guard Policy on VTS Operator Training and Qualifications

Maritime states, including the United States, working through the IMO and IALA, have been instrumental in developing a thoughtful and comprehensive approach to VTS operator and supervisor training and qualification standards. Those standards recognize that any training program must address the respective knowledge and skills required for VTS operators and supervisors. Both knowledge and skills are indispensable to the operator’s ability to make and implement decisions under conditions of uncertainty across all four areas of the continuum. In addition to knowledge and skill dimensions, the prospective VTS operator’s or supervisor’s judgment should be assessed. The existing Coast Guard program for boarding officer training and qualification on the use-of-force continuum could serve as a useful template. Use-of-force training first imparts the necessary knowledge and skill components and then uses realistic scenarios to test the trainee’s knowledge, skill, and judgment.

In drafting the SOPs and in the subsequent training, it will be important to distinguish the role of aiding shipboard decision making from the role of supplanting shipboard decision making with shoreside direction. The VTS National SOP explains that, in providing navigational assistance services, “VTS contributes to the shipboard decision-making process by giving navigational information,” including specific warnings to vessels. The Coast Guard’s long-standing hesitation to attempt to control vessels remotely from shore, or even to advise them on particular courses to steer, is also reflected in internal directives applicable to search and rescue missions. Echoing the VTS

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272. The IMO VTS Guidelines make it clear that training and qualification must address both knowledge and skills. *IMO VTS Guidelines*, supra note 10, annex 2, paras. 5.3.3, 5.4.3.

273. The IMO VTS Guidelines do not distinguish training levels for VTS supervisors. *Id.* annex 2, para. 1.2.19.

274. Use-of-force training employs videos that present the trainee with a series of threat scenarios that require the trainee to determine and apply an appropriate level of force consistent with the continuum concept. See U.S. COAST GUARD, MARITIME LAW ENFORCEMENT MANUAL, COMMANDANT INSTRUCTION M16247.1 (series), ch. 4 (1997). The scenarios demonstrate the dangers of both false positives (Type I errors, where trainees are likely to conclude that deadly force is justified when it actually is not) and false negatives (Type II errors, where trainees are likely to conclude that deadly force is not justified when it actually is).

275. VTS NATIONAL SOP, supra note 16, para. 2.B.2.a, at 2-1.
National SOP, the Coast Guard Supplement to the National Search and Rescue Manual instructs than in cases where a mariner requests navigational assistance:

In all situations, the standard to follow is to make sure any information passed is prudent and based on fact, and never based on opinion or conjecture. The Coast Guard will not provide courses to steer. Additionally, any information passed to a mariner requesting assistance should be reflected in the appropriate communications log.

It then adds the following Note:

The Coast Guard will not assume responsibility for navigating a vessel, but it may provide the master of a vessel certain navigation information if available as charted or published by a reputable source. In the field there is a perception that passing navigational information to mariners is discouraged because of the potential for liability. However, certain types of navigational information may be passed if it is accurate and reliable.

Most organizations have identifiable cultures, which serve as a force for stability rather than a catalyst for change. It might be the case that if the present VTS “culture” is found to be unreasonably biased against intervention—perhaps seeing the VTS role as strictly one that informs and aids others who will make all of the necessary decisions—only training will change it. Training and qualification scenarios that require the VTS trainee to apply established criteria for providing warnings and recommendations, and use the standardized phrases in communicating each, would go a long way toward curing any reluctance to use these less intrusive tools, while also building watchstander confidence and competence. More demanding scenarios, using a variety of environmental and traffic conditions, and even more importantly, multiple vessels, can be used to evaluate the trainee’s judgment in applying the statutory “justified in the interest of safety” standard and improve competency in issuing directions using result-based terminology. Finally, the scenarios should ensure that the decision to exercise control is viewed not as a single discrete act but rather as a process that entails communication, implementation, monitoring, reassessment, adjustment,

276. Id. para. 3.B.4, at 3-2.
277. U.S. COAST GUARD, ADDENDUM TO THE UNITED STATES NATIONAL SEARCH AND RESCUE SUPPLEMENT, COMMANDANT INSTRUCTION M16130.2D, para. 4.5.1, at 4-19 (2004).
278. Id.
279. Too often, policies on the exercise of control and training for the exercise of control are discussed only in the context of single-ship navigation accident (allision or grounding) or two-ship collision scenarios. The policy and training should also prove its adequacy in scenarios involving more than two ships, perhaps including a recreational vessel not participating in the VTS.
and termination. Only those who have demonstrated competency across the full range of scenarios should be authorized to issue directions. 280

Any decision to increase the intervention posture of VTSs in the United States will likely raise additional training and qualification issues. In the course of its 1994 VTS rulemaking, the Coast Guard noted that a number of comments by the public expressed concern about the level of experience and expertise of VTS watchstanders:

Some comments felt that broad seagoing experience was necessary to become a successful watchstander.

The Coast Guard recognizes that special and thorough training is required to qualify as a Vessel Traffic Center (VTC) watchstander or watch supervisor. Although broad seagoing experience is important, it is not necessarily the only indicator or predictor of VTC watchstander performance. Besides good seamanship skills, numerous other factors, such as communications skills, geographic familiarity, and regulatory knowledge make for a competent watchstander. Coast Guard training and qualifications requirements for VTS watchstanders are aimed at ensuring that all of these elements are present.

The Coast Guard ensures that each trainee receives and successfully completes a thorough training and qualification program prior to assuming duties as a watchstander. This training program includes numerous ship rides to familiarize trainees with the VTS area and with local seamanship practices. 281

The concerns raised over the level of seagoing experience required of VTS operators during the 1994 rulemaking are heard much less often today, but they would almost certainly be raised again if CGVTSs began to take a more aggressive posture on directing or controlling vessels. On this question, the example of those foreign VTSs that employ only licensed pilots or masters might well be studied.

IV. CONCLUSION

The existing statutory authority strikes the optimal "control" balance between the vessel and shoreside components and provides needed flexibility for the Coast Guard to implement this important

280. Formal certification following completion of personal qualification standards and board review might be required before a person is authorized to issue control instructions. Such authority might also be restricted to VTS watch supervisors. To ensure actions can be timely made and implemented, decisions to intervene should not require approval beyond the VTS watch.

waterways risk management tool. Similarly, the Coast Guard's current regulations are adequate, if unnecessarily confusing in their use of VTS activity terminology. Immediate "reform" efforts have focused, and should continue to focus, on the Coast Guard's standard operating procedures. The SOPs should be further developed and then used in conjunction with case studies and scenarios across the full range of the "continuum of vessel traffic management" activities to train vessel and shoreside operators.

Intervention decisions must be based on the particular circumstances of the case, which will vary from one port or waterway to another. Accordingly, much of the doctrine for exercising the authority to control vessels must, like pilotage requirements,\(^2\) be developed at the local level, in conjunction with the relevant harbor safety committee, and follow the process and criteria set out in the PWSA. At the same time, we must recognize that a given merchant vessel may call on a number of ports in the United States and abroad and may therefore come within the areas of responsibility of dozens of VTSs each year. Like the expectations regarding the relationship of vessel masters, watch officers, and pilots, expectations regarding the role of VTSs should be coordinated at the international and national level.