

A BREAKDOWN IN TEAM LEADERSHIP

BY

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Abstract

In 2001 a US Navy nuclear submarine surfaced into a Japanese fishing boat during a routine training mission off the Hawaiian Islands severing the boat, killing nine people and creating an international incident. The submarine was known as one of the best in the fleet, expertly operated by a hand-selected crew and led by a talented and charismatic captain—what went wrong? This essay uses a *Team Resource Management* (TRM) model of analysis as means to understand better ways in which high-risk team performance can break down under stress and time pressure. This essay adds to a growing body of research about the influence of intra-team alliances, the role of team learning in organizational errors and their prevention, and the impact of the environment on team performance during the critical period in which a disaster unfolds.

KEYWORDS: Errors and Accidents • Team Learning • High-Risk Teams • Intra-Team Alliance • Team Resource Management

Commanding Officers have a lot of presence onboard submarines...and for the most part, their judgments are unquestioned. Their decisions are unquestioned. They are the authority at sea. If the CO says it is safe, who is going to question that is it not safe?

Lieutenant Junior Grade Michael J. Coen,
Office-of-the-Deck, USS Greeneville
(NTSB 2001: 150)

On February 9, 2001 a US Navy fast-attack nuclear submarine the USS Greeneville (SSN 772) collided with a Japanese fishing boat, the Ehime Maru (えひめ丸), during a routine training mission off the Hawaiian Islands. The Greeneville's steel rudder, designed to surface through thick ice, sliced through the hull of the Ehime Maru severing the boat in half, sinking it in less than ten minutes and killing nine crewmembers. The Greeneville

was supporting a *Distinguished Visitor Embarkation* (DVE), a Navy program that promotes the service by permitting civilians to observe operations on board its vessels, and struck the Ehime Maru as it completed an ‘emergency main ballast blow’ demonstration for the sixteen embarked guests (COI 2001: 8). This maneuver shot the “seven-thousand-ton Greeneville from a depth of about four hundred feet to the surface in a matter of seconds”—“the ultimate roller coaster ride” (Waddle 2002: 127).

After two extensive investigations, one conducted by the US government’s National Transportation Safety Board (NTSB 2001) and the other by a US Navy *Court of Inquiry* (COI 2001), it was concluded that “the responsibility for collision avoidance rests solely on the submerged submarine” (COI 2001: 8) and the Greeneville Captain Commander Scott D. Waddle was blamed for “the failure of the ship’s watch team to work together” as a fundamental cause of the collision (Admiral T. Fargo, personal communication, April 23, 2001). A preliminary investigation conducted immediately after the incident by Rear Admiral Charles H. Griffiths Jr., Commander of Submarine Group NINE reported “There’s no question that the visitors’ presence, although perhaps a passive deterrent” influenced the watchteam’s performance. Yet, the passengers “were not the only reason” for this accident, Admiral Griffiths observed: “There was *something else* going on. And I’m still not sure in my own mind what that something else was” (Emphasis added; COI 2001: 145).

This essay explores this team break down in performance as means to identify what that “*something else*” might have been. The essay builds upon a growing body of research about the influence of intra-team alliances, the challenge of collaboration and the role of team learning in high-risk team’s errors and their prevention (Branch 2006;

Edmonson 1996, 2003; Edmondson, Bohmer & Pisano 2004; Fraher 2005a, 2005b; Graen, 2010; Kayes 2002, 2004, 2006; Perrow 1984; Reason 1990). In addition, it adds to other research investigating the impact of the environment on team performance and the critical incubation period during which a disaster unfolds (Fraher 2004a, 2004b; Stein 2004; 2007 and Weick 1993, 1995). Together these bodies of research hypothesize that team learning, the ability to manage anxiety and make proper sense of emerging events in a complex and dynamically evolving environment increases the likelihood of preventing or surviving an organizational disaster.

Research Methods

To develop this case study, I analyzed and cross-checked nearly 6,000 pages of primary data about the USS Greenville accident drawn from multiple public sources, including the US government's investigation conducted by the NTSB and the US Navy's COI as well as newspaper articles, professional magazines, journals, online sources and the Greenville Captain's two hundred and forty two page autobiography. The NTSB's investigation consisted of 3,499 pages of data which included engineering, operational and meteorological documents and reports, photographs, transcripts of the human factors board investigation, sixty three sworn statements and transcribed interviews from all personnel involved in the collision from both vessels including the captain, crew, supervising officers and witnesses. The purpose of the NTSB's investigation was to determine root causes of the accident in order to avoid future occurrences, not to assign blame or penalize anyone involved in the accident. As a result, NTSB testimonies are particularly forthcoming.

In addition to the NTSB’s extensive investigation, the Secretary of the Navy ordered a COI, the Navy’s highest form of administrative investigation reflecting “the seriousness of this incident” (Washington Post 2001). The COI spent twelve days investigating this maritime accident, hearing evidence from thirty-three witnesses and comparing four independent graphic reconstructions with detailed timelines. It produced a comprehensive 119 page report based on 1,803 pages of transcription and other supporting documentation. Both the NTSB and COI reports and their supporting documents have been released to the general public under the freedom of information act and are available online with only certain portions omitted due to confidentiality.

Analytic Strategy

Using my *Team Resource Management* (TRM) model (Fraher 2005a) for analysis, this chapter focuses on the roles and actions of five key players on duty aboard the *Greenville* during the collision to understand better ways in which high-risk team performance can break down under stress and time pressure—whether real or artificially imposed: 1) Captain Scott D. Waddle the *Commanding Officer* (CO); 2) Second in command Lieutenant Commander Gerald Pfeifer the *Executive Officer* (XO); 3) Lieutenant Keith Sloan the *Navigator* who supervised the watch teams; 4) Lieutenant Junior Grade (JG) Michael Coen, *Officer of the Deck* (OOD), a rising junior officer and the senior watchstander on duty during the collision and 5) Petty Office First Class Patrick Seacrest the *Fire Control Technician of the Watch* (FTOW), a highly trained enlisted specialist who ran the submarine’s sophisticated sonar equipment.

TRM is an analytic strategy which allows us to consider not only individuals’ contributions, but the influence of group dynamics and systemic factors on the team

breakdown that day. Focusing on the success and failures of the crew's leadership, communication, teamwork and sense-making processes, TRM reveals the complex interrelatedness of factors influencing team performance. By understanding the internal dynamics of groups and the importance of intra-team alliances, people can become more effective leaders, followers and teammates who are better able to analyze factors impacting the success or failure of team efforts.

USS Greeneville Maritime Disaster

Ehime Maru

On January 10, 2001 the Ehime Maru, a 196 foot 500 ton Japanese trawler with a white hull and superstructure, departed Uwajima Fisheries School in Japan for a 74-day training voyage, 'a floating classroom' for high school students interested in engineering and the professional fishing trade. Over the next few weeks the ship steered for Hawaii where the weather was warm, fish were plentiful and waters thought to be safe. On the morning of February 9th, the Ehime Maru exited Honolulu harbor at noon enroute to fishing grounds about 300 nautical miles south of Oahu to conduct students' lessons for the day. Once outside the harbor the captain, who had over 40 years of maritime experience, increased the trawler's speed to 11 knots and engaged the ship's autopilot, steady on magnetic course 166, which the autopilot maintained until the Greeneville collision 28 minutes later. How could a ship—nearly 200 feet long, fifty feet high, and steady on course for almost half an hour on a beautiful clear Hawaiian afternoon—not be detected by one of the most sophisticated pieces of maritime technology available today: A Los Angeles-class fast-attack nuclear submarine?

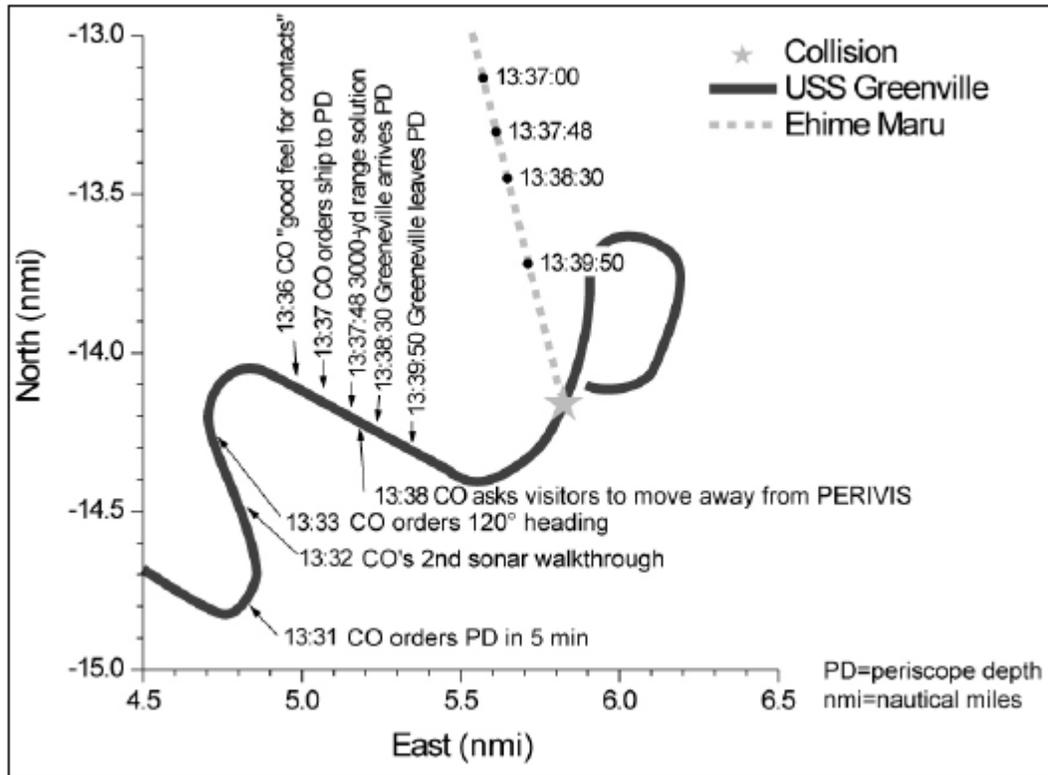


Figure 1: Greenville and Ehime Maru Track

Plot shows the actions of the Commanding Officer (CO) Captain Waddle and the track of the USS Greenville and Ehime Maru prior to their collision on February 9, 2001 (NTSB, 2001: 17).

USS Greenville

The months before February 9, 2001 were eventful for the captain and crew of the USS Greenville. Commissioned in 1996, the Greenville had been pulled from the regular deployment rotation in 1998 in order to be fitted with Advanced SEAL Delivery System equipment providing the submarine with the operational capability to deploy Navy SEAL (sea, air, land) Teams and their equipment in hostile areas. In late December 2000 Greenville underwent sea trials where senior officers reported that the crew “performed well” conducting tests on the new systems and then underwent further training near

Ketchikan, Alaska from January 5 to February 2, 2001 before returning home to Pearl Harbor. Although the crew might have been understandably rusty after months on land, their performance impressed onboard evaluators who noted Greeneville's Sonar Room had "the potential to become the best on the waterfront" and the submarine's captain was eager to achieve this goal (COI 2001: 12-3).

Charismatic and confident, Captain Waddle was a highly decorated officer with a distinguished record of achievement, an excellent reputation, and a 'go navy' attitude—just the man to take 16 'distinguished visitors' on a public affairs outing. As with any at sea period, "getting underway" had the "collateral benefit of providing additional opportunity for crew training" and the captain and crew looked forward to their upcoming WESTPAC, their first major deployment in over two years, with Captain Waddle as commanding officer (COI 2001: 14).

On February 9th Greeneville departed Pearl Harbor on schedule at 0757 carrying 106 crewmembers (11 officers and 95 enlisted), the 16 civilian visitors and the Commander US Submarine Force Pacific chief of staff. Transiting on the surface so the guests could visit the submarine's bridge in small groups and observe the captain and his team in operation, Lieutenant Sloan later reported that there was "a high choppy sea state," resulting in the submarine "rolling more than normal," and a "hazy, off-white sky," which was "probably the worst I've seen" for identifying other vessels through the periscope because "you could actually see a long, long distance, but not see clearly very far at all" (COI 2001: 18). Sloan further noted that during this transit he viewed through the periscope two trawlers about equal distance away on "similar range and bearings, one was dark hulled, the other white". As the ships came closer he noted no problem

acquiring the “dark hulled vessel during periscope sweeps, but concerted effort was required to relocate the white hulled vessel”. Yet, none of this information was passed on to the CO, XO, OOD or other watchstanders (COI 2001: 18).

Once outside the harbor the Greeneville submerged at 1017 and the civilian guests toured the submarine in small groups for hands-on activities until lunch. For example, while in the Control Room guests were allowed to drive the ship and in the Sonar Room they listened to sonar recordings of whales and other marine life typically heard underwater. At 1054, Captain Waddle decided to further demonstrate the ship’s capabilities by taking the submarine to ‘test depth’, a ‘classified’ maneuver not normally done in civilian company and the Greeneville submerged to a depth of 700 feet. His reasoning for this somewhat unorthodox decision was two fold: First, “he thought that the guests would have ‘something special to say’, that you have observed the operational abilities of this ship” and second, to “obtain deep seawater samples at test depth” which he would package as mementos for his guests to take home (COI 2001: 19).

Lunch was scheduled from 1100 to 1200 but because the wardroom could only accommodate ten people, two servings were required and the ship began to fall behind schedule. Meanwhile, Seacrest and the sonar operators worked together to maintain the ‘big picture’ by developing an image of surface contacts in the area by listening to vessel noise. Over lunch, the sonar operators maintained a ‘track’ on two surface contacts, identified as Sierra-12 (S-12) and Sierra-13 (S-13), both of which were assumed to be a safe distance away. S-13 was the Ehime Maru, mistakenly placed at 14,000 yards heading away from the Greeneville when in actuality she was 10,000 yards away and converging, still steady on course 166 at 11 knots.

Although Greeneville's equipment was extremely sophisticated, sonar is not an exact science because slow moving vessels, fiberglass hulled boats or other quiet contacts drifting or fishing with no machinery operating create nearly zero acoustic energy making them undetectable. In addition, the submarine itself makes noise, therefore if the contacts are on either side of the stern's 'baffles' they may be acoustically deafened by the submarine's own noise. To offset these factors, it is important that the OOD drives the submarine in a manner which will facilitate development of a reliable surface picture by turning the submarine then holding steady on course, allowing equipment and operator to update the picture based on reliable new information. Unfortunately this was not being accomplished during lunch and, as a result, the Ehime Maru's relative bearing changed very little, erroneously indicating the ship to be some distance away (COI 2001: 120).

Four Maneuvers

After lunch Greeneville's training plan was to complete four maneuvers demonstrating the submarine and crew's tactical capabilities, and then return to 'P/H' the Pearl Harbor entry point in time for their 1400 reservation. Yet at 1300, the captain and crew still had not started the evolutions. Around 1310 Lieutenant Commander Pfeiffer made an announcement inviting the civilian guests to the Control Room to observe watchstanders during the maneuvers and as a result, thirty-three people crowded into a space about 20 by 20 feet (See Figure 2). In order to further understand the impact of the days' events, the facts surrounding these four maneuvers will first be briefly explained so that the cumulative impact can then be analyzed in the subsequent section.

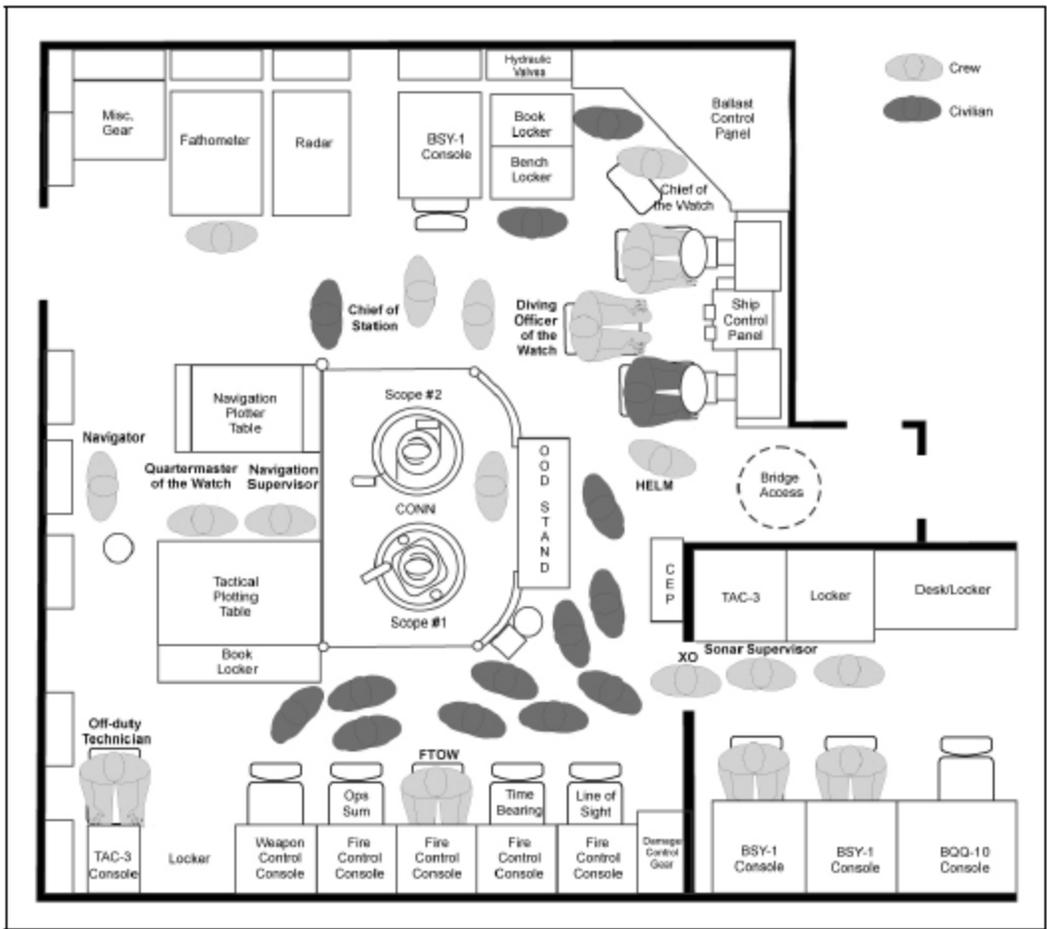


Figure 2: Greeneville Control/Sonar Room Configurations during Collision
(NTSB 2001: 13).

I. Angles and Dangles

At 1316, forty-five minutes behind schedule, Greeneville commenced the angles and dangles evolution, demonstrating the submarine’s ability to rapidly change depth like an airplane, climbing and descending at speeds of 10-15 knots and angles up to 30 degrees between 150 and 650 feet. During this maneuver, Coen was standing immediately behind the submarine helmsmen and Captain Waddle immediately behind Coen. Although Coen was technically responsible for driving the ship, “the CO directed the angles evolution” telling Coen what angle of attack he wanted and the depth to achieve while describing the

evolution to the civilian guests. Coen then parroted the captain's commands to the helmsmen (COI 2001: 31). Seacrest later testified that the "captain was driving the whole evolution" and Coen was just "a mouthpiece" (NTSB 2001: 15).

II. High-Speed Maneuvers

After completing angles and dangles, the ship conducted high speed turns demonstrating the submarine's maneuverability to evade torpedoes in a tactical setting. "As it had been during angles, the attention of the CO and OOD was focused exclusively on ship control," so much that when Coen attempted to leave the immediate area—as he might do to keep abreast of the sonar picture and possible contacts—Captain Waddle "stopped him" by "placing a hand on his shoulder accompanied by words about how his attention needed to be on ship control" (COI 2001: 33). During the high-speed maneuvers, Captain Waddle continued to narrate the evolution for the civilian guests proudly stating he "would challenge any other boat to perform these maneuvers so well" (33). Agreeing with the captain, especially given the crew's long in port period without "a lot of sea time prior to this event", accident investigator Admiral Griffiths noted the "ship's control party demonstrated significant proficiency" completing these maneuvers. "It was a very professional job" (112).

Yet high-speed turns disturb the water, negatively impacting the sonar display, creating what operators describe as "spaghetti noodles moving all over" (COI 2001: 125). As a result sonar contact with S-13, the Ehime Maru, was lost between 1333 and 1335. To regain reliable contact data, Greenville sonar operators needed Coen to order the submarine on a constant course, speed and depth for a three to five minute 'leg' to minimize 'own ship disturbance' and reacquire the contacts. A minimum of two legs,

during which the relative motion of the contacts can be observed, is necessary to determine an accurate picture. Yet for a series of reasons which will be considered shortly, this steady state was not forthcoming and unbeknownst to the captain and crew the Ehime Maru—still steady on course 166 at 11 knots—had now closed to within 6,000 yards.

III. Periscope Depth

At 1330 Greeneville prepared for the final series of training events: An ascent to periscope depth to visually search for contacts, a quick dive called ‘emergency deep’ followed by an emergency surfacing maneuver. These maneuvers might be used to evade detection or as a response to an emergency or threat. To accomplish safely, the submarine still needed to come to a steady course, a shallower depth and a slower speed to reacquire reliable sonar data and update their contact plot after the ‘spaghetti’ created by the high-speed turns. Yet rather than provide Coen and Seacrest the time they needed to develop a reliable picture, Captain Waddle ordered Coen to “get to periscope depth in five minutes,” an impossible order to accomplish legally and safely (COI 2001: 38). Although Pfeiffer heard the captain’s order, and later testified that he thought it to be overly aggressive, he nonetheless said nothing.

At 1335 Seacrest reacquired contact with S-12, S-13 and a new vessel contact: Sierra-14. Mistakenly satisfied that he had an accurate picture on the previously held S-12 and S-13, Seacrest began to concentrate on the unknown target S-14. It was unusual—if not *unsafe*—for the FTOW to still be developing his contact solution as the submarine proceeded to periscope depth and this concerned and distracted him from recognizing the change in S-13, the Ehime Maru. At 1337—a full eight minutes prior to collision—a

reconstruction of system data revealed that Greeneville sonar equipment accurately displayed S-13 on a bearing of 021, range of 2,510 yards and closing. Yet, rushed to prepare for periscope depth and distracted by his new contact S-14, Seacrest failed to notice.

As the submarine ascended Captain Waddle asked some of the visitors in the crowded Control Room to move because they were blocking the view of the video monitor which displayed periscope data called a PERIVIS. At 1338 Greeneville arrived at periscope depth and Coen completed three quick searches in low power from a depth of approximately 60 feet as waves slapped against the viewer. He reported “no close contacts” and was about to begin his next search when Captain Waddle took the periscope, raised the ship a few feet to clear the waves and began conducting his own cursory scan of the area. At 1340—five minutes before impact—Seacrest noticed the new fire control solution for S-13 bearing 022 at 3,000 yards and closing: An accurate solution. Yet he failed to inform anyone of this new information.

IV. Emergency Main Ballast Blow

After just 66 seconds at periscope depth Captain Waddle abruptly ordered ‘emergency deep’ intending to take the crew by surprise, and in response, they quickly dove to a depth of 400 feet. Once level they prepared for the last training event, the *emergency main ballast blow* which shoots 4,500 psi air into the submarine’s forward and aft main ballast tanks for 10 seconds, creating a positive buoyancy which forces the submarine to rise quickly. Once initiated, surfacing is unstoppable (COI 2001: 57).

The captain invited three civilian guests to help facilitate the maneuver under the supervision of qualified watchstanders: One at the helm, one opening air valves and a

third sounding the klaxon alarm. At 1342 Greeneville commenced the *emergency main ballast blow* as Captain Waddle narrated the crew's activities for the visitors. Less than a minute later they reportedly "felt a shudder and two loud thumps" and the captain exclaimed "What the hell was that?" as the submarine collided with the Ehime Maru, slicing the trawler from starboard to port (COI 2001: 58. NTSB 2001: 24).

Individual, Group and System

What happened to cause this accident? Focusing on intra-team alliances, the challenge of collaboration in complex and dynamically evolving high-risk environments and the role of team learning in high-risk team operations we will examine individual behaviors, group dynamics and systemic factors which contributed to this mishap—All forces shaping what that "*something else*" might have been which Admiral Griffiths pondered was influencing Greeneville's team performance that day.

Commanding Officer (CO)

In many ways, Captain Waddle was a model Naval Officer, "one of the strongest COs in the Force" (COI interview: 305). A second generation career military man, Waddle described himself as "part Boy Scout and part rebel" (Waddle 2002: 36). He attended the Naval Academy, majoring in chemistry and, although he excelled at high school football, he participated in cheerleading at the academy, too small for college sports. "Years later, as captain of the Greeneville," Waddle recalled "I'd often find that my cheerleading skills came in handy, especially when motivating my men, speaking to civic groups and colleges on behalf of the Navy, or conducting public relations cruises" (24). Initially focused on becoming a military pilot like his father, Waddle's poor eye sight forced him to select another career path and after a summer cruise on the USS Skipjack in 1978 he

“was hooked” on submarines, not “just the amazing machine” but “the amazing crewmen,” in particular the captain’s power: “*I want that guy’s job*” he wrote in his autobiography (29-30).

After graduating from college in 1981, he rose quickly through the submarine officer ranks finding his “niche” when he discovered that what he “really enjoyed was motivating men, bringing out the best in them, training them, instilling in them standards of excellence, and then turning out an exceptional product for the Navy” (64). Waddle’s future seemed bright until it became apparent that he had issues with conservative leader’s who lacked flexibility, “stickler[s] for the rules and regulations” and he was not afraid to say so. One Captain even issued him a *Non-Punitive Letter of Caution* warning “you need to harness your energy, and apply it in areas that would be more productive” (76).

Conducting a *Distinguished Visitor Embarkation* (DVE) such as the one on February 9th was not at all unusual for the Greenville and, although some COs felt these events were an interruption, Captain Waddle “loved it”: “I lived to tell my ship’s story, and I made a lot of friends that way”. “It wasn’t about me”, it was about showing off my crew, “promoting the men on my ship” (10). And this promotion was an important systemic dynamic. Although some military analysts observe that the US submarine force, or “silent service,” did more to protect American soil and win the Cold War than any single branch of the US military, by the late 1990s severe cutbacks were impacting programs. “Suddenly,” Waddle observed, without Cold War enemies to justify their existence; the nuclear powered submarine program had a new mission: “To survive” (108). And DVE cruises helped accomplish this task.

Executive Officer (XO)

Greeneville's second-in-command, Lieutenant Commander Pfeiffer, was also an experience, highly educated and expertly trained officer with a strong reputation. Yet interviews revealed that Captain Waddle's way of doing things dominated Pfeiffer, who resigned himself to the role of private confidant rather than public confronter. For example, when investigators asked him to describe his "working relationship with the commanding officer before the collision" Pfeiffer stated:

In this submarine your state rooms are adjacent to each other and you share a restroom, and I think that's by design. And I think command must be a lonely, lonely job where you need to be the captain to everybody. And that room affords you proximity to the captain that you can provide him some private criticism or feedback that wouldn't be appropriate publicly in some cases. So, that's better.

(NTSB transcripts 2001, Pfeiffer interview: 16-7)

Later, when asked if he was uncomfortable with the captain's interpretation of Navy policies such as exceeding "classified depths and speeds", Pfeiffer responded: "The first time we did" that "I may have said, 'Hey, is this really' what we are "going to do?" Is this really "what your intentions are"? "And then it became the norm and I kind of accepted it as that's how we're going to" operate. "We probably did it more than once, probably several times" (73-4).

Pfeiffer testified that he was concerned about what was going on aboard the submarine on the day of the collision, feeling uncomfortable that Captain Waddle was rushing Coen to periscope depth and becoming so involved in driving the submarine because: "It reduced the amount of backup we could get when instead of standing back

and watching things he got in the middle.” On “all submarines you should be a little concerned when the captain has the *conn*¹” (NTSB Pfeiffer interview: 139).

When asked to compare Captain Waddle to his previous captains, Pfeiffer noted Waddle was “boisterous” and “a likable guy” who “was probably a better communicator” and better at getting people’s attention when speaking to a group. But Waddle “was a little less knowledgeable in tactical matters than the other guys” (84). *Less knowledgeable in tactical matters*—How could a nuclear powered submarine captain lack *tactical knowledge*?

To understand this statement requires a system-level analysis, becoming familiar with the way the US submarine force trains and promotes its naval officers. An analysis of Commander Waddle’s career path reveals the existence of “a cultural war” that has raged for over two decades between the primacy of “operational” skills such as ship handling, navigation and contact management as OOD versus “engineering” competence such as management of the nuclear power systems as a measure of success and promotion (Wright 2001: 28). Commander Waddle’s first two tours were with commands intimately involved in the construction and testing of new submarines providing an excellent engineering education yet not much operational experience as OOD. In addition, these two tours were aboard *fleet ballistic missile submarines* (SSBNs) not *fast-attack submarines* (SSN) like the *Greeneville*. Some submariners argue that SSBNs are so different from SSNs, they are “not suitable for preparing officers for command of fast-attack submarines” (Wright 2001: 28). As a result, rather than blame Captain Waddle exclusively for the collision, the errors leading to the *Greeneville-Ehime Maru* tragedy

¹ Typically held by the Officer of the Deck (OOD) to “have the deck” or the “conn” means to supervise all functions and maneuvers of the ship and its personnel on watch such as tracking contacts and directing ship’s movement with rudder and engine orders.

may well be in part the avoidable result of some specific systemic flaws in the way the US submarine force trains and promotes its officers. “Commander Waddle obviously believed that he was acting competently” on February 9th 2001. “He apparently lacked sufficient experience as OOD to know otherwise” (Wright 2001: 28).

What remains curious is that although Pfeiffer reported feeling Captain Waddle was less knowledgeable about tactical matters, had a tendency to get over directive, and believed his order for Coen to get to periscope depth in five minutes was overly aggressive, he nevertheless said little and did nothing to intervene. So pervasive was the image in Pfeiffer’s mind of his role as private confidant that although he clearly had valid concerns and, as second in command, the authority to question the captain, he did not.

Navigation Officer (NAV)

Lieutenant Sloan was a mid-grade junior officer highly experienced in all submarine operations. When asked “does the crew feel” that they could confront or “say something to the captain” which would be difficult for him to hear, Sloan recalled Captain Waddle’s three tenants “safety, efficiency and backup” and responded: “We had a very good working relationship when it came to that because I knew if it was really important, I felt he would listen to me. I really felt that” (NTSB Sloan interview: 45-6).

Sloan observed that on the day of the collision, when he alerted the captain that the submarine might be returning to port late, the captain seemed like “He did not want to be late. He wanted to get going.” Yet Sloan recalled Coen was on watch and was “not the fastest guy in the world” (NTSB Sloan interview: 25-6) and “as Captain Waddle left his stateroom” Sloan heard him say “he was going ‘to push the OOD’” (NTSB 2001: 12).

Officer of the Deck (OOD)

Lieutenant JG Coen was newly qualified and although he had a significant amount of submarine schooling, he had limited actual operational experience due to the submarine's extended time in port. Since his arrival aboard the *Greeneville* in 1999, Coen estimated that he had accumulated only "three months of sea time as officer of the deck". Although he had previously observed the four training maneuvers, he had never completed "this series of evolutions" in the role of OOD. Therefore he was assigned watch that day to gain more experience (NTSB Coen interview: 62-6).

As the submarine left Pearl Harbor the morning of the collision Coen was not yet on watch and was instead preparing the submarine to submerge. With "a reputation for being methodical, meticulous, and 'not easily pushed'" (NTSB 2001: 13) Coen "was one of the last" to finalize preparations, delaying the dive which "did not go unnoticed by the senior members of the crew." Coen noted "I got some very high tension from the captain" about that delay (NTSB Coen interview: 5-6). Did this event impact the group dynamics in a way that prohibited optimal team performance later? For example, was the captain intent on pushing Coen because of his slow performance that morning? Did these events hinder Coen's ability to question Captain Waddle's directions to get to periscope depth in an unrealistic timeframe or parrot his commands to the helmsmen during the 'angles and dangles' maneuver?

Captain Waddle admits he rushed Coen because he was "fricking slow...so painfully slow" in his duties sometimes "I just want to shoot myself". "By giving him an 'artificial time constraint,'" I was trying to get him to be more efficient. "I never berated him. I didn't humiliate him. I didn't embarrass him...I tried to teach him" (NTSB Waddle interview: 30-1). In hindsight, Waddle reflected, Coen was simply the "wrong man to

have on the watchbill at that time”; something he blames himself for not recognizing:

(NTSB Waddle interview: 30). I had

A better officer who could have made that thing happen, and if I had laid into him, he would have had the guts to look at me and say, ‘Captain, you’re pushing me, I need a couple more minutes’, and I would have said okay. I’d have backed off.

(NTSB Waddle interview: 30-1)

Sloan recalled “I have been in the situation where” Captain Waddle drove the ship through me: He “wants it done quickly. He wants it done his way”. “I don’t like it and I’m sure” that Coen didn’t like it that day either (NTSB Sloan interview: 57). But would Coen challenge the captain? Sloan observed: “I have seen” Coen “stand up to the XO [Pfeiffer] before” which “I would assume would translate over to the captain as well. Maybe, maybe not” (45).

When investigators asked Coen about the team dynamics he responded with a comment similar to Captain Waddle’s reflections from early in his career, clearly impressed with the skill of his shipmates and their ability to quickly make sense of the plethora of data produced by the submarine’s sophisticated equipment:

The commanding officer has many years of experience, many years of training, as well as the executive officer...It was my understanding that here’s a man with much more experience than I have, much more schooling than I have, and can much more rapidly assess and evaluate information.

(NTSB Coen interview: 27-8)

Coen’s “faith” in their “experience” and “training” is further reflected when he responds to questioning about the captain’s unusual periscope depth order:

I believed it was achievable. I believed it was rapid and rushed, and I was tense and excited basically to be challenged like this...[But] at no time did I feel that...it would be unsafe...I thought the captain and the XO with their experience and their assistance could more easily assimilate the data and evaluate it and make that rapid trip to periscope depth.

(NTSB Coen interview: 27-8.)

And importantly it appears Coen thought, as the captain's three tenants "safety, efficiency and backup" might infer, that these experienced professionals would *back him up*—"assist" him, as he notes above. One might wonder how deeply Coen's faith in Waddle and Pfeiffer, and his aspirations to be like them, influenced his decision making and teamwork that day. Coen told investigators one thing he learned being onboard the *Greeneville* was that "people need to be more aggressive to make their point known to Commander Waddle...I think you need to be aggressive until you're heard" (NTSB Coen interview: 187). Unfortunately, the team learned that lesson too late.

Fire Technician of the Watch (FTOW)

With fourteen years of service on three previous submarines, Petty Officer Seacrest was highly trained and widely experienced operating sonar equipment. He had been aboard *Greeneville* for about a year, hand-picked for this post because of his "professional reputation as a Fire Control Technician" (COI transcript: 1618). During this time Captain Waddle selected him to be the *Command Career Counselor* with the important task of reenlisting the submarine's highly trained nuclear sailors. In this role, Seacrest had "very frequent" exchanges with the captain, who took a personal interest in retaining his sailors. Together they increased first term sailors reenlistment to 65%—more than double the Navy's average—and officer retention to 100%. The envy of the waterfront, Seacrest was awarded the *Navy Achievement Medal* in recognition of this outstanding accomplishment (NTSB Pfeiffer interview: 86; COI 2001: 739).

In this role, it is possible that Seacrest became overly familiar and even enthralled by the charismatic captain. He told investigators that Captain Waddle was "one of the

best CO's I've ever been with", a "very confident" and capable captain with an impressive ability to assimilate a lot of information very quickly (COI transcript: 1618). Recalling the minutes prior to the collision, Seacrest told investigators although he felt rushed, crowded, and his track confidence was "very low" (1564), he nonetheless felt "pretty confident that the OOD and the captain—especially the captain—knew what" they were "doing" (NTSB Seacrest interview: 44). In other words, although Seacrest—who had direct access to all contact tracking information—admitted to feeling hurried to collect data, having low confidence in his contact plot and a weak sense of the big picture, when Captain Waddle stated "I have a good feel for the contact picture" he relaxed (COI transcript: 1566). How could Seacrest possibly believe that others had a better sense of the contact picture? Why wasn't this experienced professional demanding more time?

The captain pondered this point himself, reporting to investigators: "Sometimes I wonder if when I looked out that periscope and I said, 'I hold no visual contacts', that my men let their guard down" (NTSB Waddle interview: 121). What came over this crew? Returning to the TRM model, the next section will unravel this apparently inexplicable team breakdown in performance by analyzing the four key TRM elements: leadership, communication, teamwork and sense-making. .

Leadership

Loss of Situational Awareness

One of the most glaring deficiencies in the Greenville's team performance breakdown was the loss of situational awareness by key players of the submarine's control team, in particular Captain Waddle and Lieutenant Commander Pfeiffer. Although some team members attempted to influence them, Waddle and Pfeiffer remained relatively insulated

from their team's input. For example, Coen testified that shortly before 1300 he realized that they were going to be late and he voiced this concern to Sloan, who calculated that if the submarine immediately surfaced and proceeded directly back, they would arrive on time. However, Sloan knew Captain Waddle wanted to complete the training evolutions and therefore he approached Pfeiffer, who was talking to one of the guests, to remind him about their schedule. Sloan recalled the guest "was being pretty long-winded" so "I waited a couple of minutes, stood there, trying to interject without being rude" and "eventually got the XO's [Pfeiffer] attention and informed him that we wanted to get going" (NTSB Sloan interview: 8).

At 1306 Pfeiffer visited the captain's stateroom and found Waddle autographing pictures of the Greeneville for the guests. "We need to get going" Pfeiffer interrupted, yet Captain Waddle appeared unconcerned responding "well, I guess we are going to be late" (COI 2001: 27-28. NTSB 2001: 28). Shortly after, Sloan also went to the captain's stateroom to inform him of the time and distance to port, receiving a similar response. Why didn't Sloan trust Pfeiffer to accomplish this task?

Coen testified that it was unclear to him whether, or how, the afternoon's plan of events might be modified to avoid being late although he assumed that "some evolutions would be cancelled". In addition, the submarine was now just five miles from the edge of their assigned operating area causing Coen concern about staying within their boundary. Yet, he did not recall voicing either of these concerns to senior officers (NTSB 2001: 12). Why not?

At 1314 Captain Waddle arrived in the Control Room and "seemed frustrated that he couldn't start the maneuvers right away" (NTSB 2001: 14). While he was waiting for

the crew to prepare, Waddle testified that he increased his situational awareness of obstacles in the area by visiting the Sonar Room and looking at displays. But witnesses stated that he also “chatted with the civilians, advising them of the best locations in the control room to observe the maneuvers” (14).

Others within the team were operating under a similar sense of distracted confusion. For instance, as they approached the end of ‘angles and dangles’ Pfeiffer reminded the captain once again about their time constraints politely inferring—although never directly recommending—that the captain cancel the last event and return to port, to which Waddle snapped “I know what I’m doing” (COI 2001: 32). This poor situational awareness culminates with the collision at 1343, just minutes after this statement. Perhaps confusion about the captain’s intentions and the crew’s assumption that some of the evolutions would be cancelled also led Seacrest and the sonar team to be lackadaisical about maintaining their contact plot. After the collision, this team was so disoriented they immediately concluded that the Greeneville must have impacted a floating vessel ‘dead in the water’, not any contacts which the team had previously been tracking.

Resource Management

In addition, two important resources were unavailable during critical moments on the afternoon of the accident: The *Analog-Video Signal Display Unit (AVSDU)* and the *Contact Evaluation Plot (CEP)*. The AVSDU, a small television like screen installed in the Control Room near the periscope platform, duplicates the contact data displayed on the Sonar Room monitors allowing watchstanders to observe the vessels being tracked without leaving the Control Room. Captain Waddle testified that this equipment was so important, “he probably would not have made the errors that he did if the AVSDU had

been working” (46) because as Coen noted, the AVSDU is “probably the easiest way” to see “how long you've been on course, how long you've had data on the contact and to know how much time has elapsed” (86). If the AVSDU had been operable, it is likely Captain Waddle would have noted the need to remain steady on course longer so that Seacrest could develop a more reliable contact picture. To compensate for the loss of the AVSDU, watchstanders such as Coen should have periodically visited the Sonar Room to directly “assay the contact picture” themselves (7). Yet we have already observed that the captain often guided Coen’s attention to ship handling, providing little time for him to visit sonar. Coen recalled he was concerned about this but felt relieved when “The XO told me he went in sonar to help me out”—provide some *back up* (NTSB Coen interview: 81).

The second resource which might have helped avoid the collision that fateful day was the *Contact Evaluation Plot* (CEP), a manually updated visual display of all contacts so watchstanders can ascertain the ‘big picture’ at a glance. Onboard the *Greenville*, it was Seacrest’s responsibility to maintain the CEP but he testified that he “had too many people in the way” so he “couldn't get to it from the time we started the angles and dangles until the accident happened” (10). Yet he failed to ask any visitors to move, request relief from this duty, or inform any one of his decision to stop maintaining the tracks. And apparently, due to the crowd, no one noticed. Especially troubling is the combined impact of the loss of these two pieces of equipment—both designed to offer conning officers like Captain Waddle and Lieutenant JG Coen the wider contact picture from their watch stations at a glance.

In addition to these two *technical* resources being unavailable, the NTSB report further noted “problems were exacerbated when the CO did not use all his [*human*] resources to correctly assess the current operating situation when preparing for the conduct of the evolutions in the control room” (NTSB 2001: 43). Rather than work together with his team to jointly develop a sense of the big picture, the captain “elected to confer with his trusted petty officers” in private. Problems compounded when both Seacrest and the sonar supervisor made assumptions about contacts—in particular S-13, the Ehime Maru—“providing incomplete and erroneous information” to the captain (42). Why did this happen?

Coen testified that while guests toured the ship throughout the morning he drove the Greenville on a straight south/north track so as not “to unnecessarily disturb” them. He was “aware that the combat systems team ‘did not have a great picture’” based on this south/north track but “assumed that some evolutions would be cancelled and that a senior officer would brief him about the changes.” Coen notes “I did not formally discuss this with the CO or XO” but it was clear that “we had to do one or the other, be late or skip these events” (NTSB Coen interview: 10).

As a result of Coen’s ship handling, S-13 showing very little bearing drift for over 40 minutes causing Seacrest to believe the trawler to be “distant” island traffic “up by land” and “probably moving away from the submarine” (43). When, in fact, the reason S-13 showed so little bearing drift was because the two vessels were on a steady collision course. Had Coen discussed his south/north track with the captain, the AVSDU or CEP been available, or Seacrest voiced concern about the lack of bearing drift, Captain

Waddle “might have recognized the potential risk and not taken the operational shortcuts he later did” (43).

In addition to this confusion, the captain noted another human resource that was apparently not available to him: Lieutenant Commander Pfeiffer. Captain Waddle recalled Pfeiffer:

Has always been there for me, and...when I would get too close he'd step back or if he got too close, I'd step back. There was always that balance. On that day, I don't know what went wrong, but we didn't do it right.

(NTSB Waddle interview: 136-7)

Communication

The NTSB found that the failure of key watchstanders to effectively communicate vital information to the conning team directly contributed to this maritime accident. Numerous communication ‘red flags’ can be identified throughout the day such as the crew rushing to complete maneuvers in order to make ‘P/H’ on time, trying something new under pressure with VIP’s watching, ambiguous communications between key players, confusion about the sequence and plan of evolutions, and role ambiguity such as when Captain Waddle drove the submarine by using Coen to parrot his commands. Particularly disconcerting is that little effort seems to have been made to clear up these inconsistencies as the crew seemed to trust that the captain would just take care of things.

One of the advantages of working in a team is using ones teammates to cross-check and compare data to discern what is really going on. To accomplish this, the team must not be afraid to speak up and risk conflict as a way to discover new information and manage errors. Yet, in the Greeneville example there are at least six instances during which crew members noted information or observed teammates actions which caused them concern and they failed to communicate these concerns to their teammates.

First, as Greeneville transits out of Pearl Harbor that morning Sloan notices how the unusually hazy day seems to limit his visibility while looking through the periscope. Particularly disconcerting to him is how he loses sight of a light colored trawler on the horizon but retains sight of the darker colored one about equal distance away. Yet, he fails to mention these visibility restrictions to his teammates.

Second, although Pfeiffer heard the captain order Coen to “get to periscope depth in five minutes” and testified that he believed it to be an overly aggressive if not impossible order to safely follow, he said nothing.

Third, Seacrest decided to stop maintaining the CEP because too many civilian guests are blocking his access to the equipment and he could not gather reliable data during high-speed maneuvers because of the ‘spaghetti’ interference on his equipment. Yet he never asks for permission for relief of these duties, as required by navy regulations, nor shares this decision with his team.

Fourth, the sonar supervisor asked an off-duty sonar technician who happened to return to the sonar room to retrieve his jacket to stay and supervise an ‘under-instruction operator’ who was not qualified but was nonetheless standing watch. The off-watch sonar tech agreed to stay although he is not briefed on the current contact picture and notes guests are distracting some of the sonar techs and he becomes alarmed.

Fifth at 1337—a full eight minutes prior to collision—a reconstruction of system data revealed that Greeneville sonar equipment accurately displayed S-13, the Ehime Maru, on a bearing of 021, range of 2,510 yards and closing. The captain’s “Standing Order 6” stipulates the OOD must be notified of all contacts 4,000 yards or closer, yet Seacrest failed to do this.

Finally, Coen is concerned about being late, voices these concerns to Sloan, and assumes some evolutions will have to be cancelled. Yet he never makes this suggestion nor tests this assumption with Captain Waddle, Pfeiffer or any other team members. As a result, the team is operating under different mental models. Some teammates seem to be going through the motions in their preparation for training activities they believe will be cancelled and are therefore truly surprised when the captain calls ‘emergency deep’ after just 66 seconds at periscope depth. Meanwhile when Greeneville is at periscope depth, Ehime Maru was approximately 2,500 yards from Greeneville and thirty degrees off the starboard bow meaning that only half the length of the trawler would have been visible to the periscope operator.

The crew’s surprise is based on three covert dynamics: First, they are unclear which of the training maneuvers they will have time to complete; Second, by ordering periscope depth in less than five minutes the captain has violated his own “Standing Order 6” which directs that it “would take a minimum of eight minutes” to accomplish the tasks required for a safe “ascent to periscope depth”(COI 2001: 38); And third, Captain Waddle’s sixty-six second periscope sweep was not in accordance with navy regulations which specifically direct proper periscope employment requires “more than three minutes” (COI 2001: 49) to accomplish.

As a result, Waddle and Coen’s abbreviated visual searches and Seacrest’s assumption that there were no close contacts combined with the high sea state, white hazy conditions and Ehime Maru’s white color and off bow angle combine to prevent its *visual detection*. In addition, the captain’s rushing the crew, the weak contact picture

maintenance throughout the day, the spaghetti created by the high-speed turns, the broken ASDVU and the lack of CEP combined to prevent its *acoustical detection*.

Teamwork & Sense-Making

One of the murkiest aspects of this case study is the apparent inconsistencies between the outstanding reputation the Greeneville captain and crew enjoyed prior to the collision and their teamwork and sense-making that fateful day in February. Senior personnel who visited the Greeneville noted the “‘superficial’ indicators of readiness all looked good. The boat was clean, the crewmembers were ‘positive’...happy with their leadership...and proud of their organization” (NTSB 2001: 40). And retention of Greeneville sailors was exemplary. All signs of a satisfied and productive navy crew.

Yet many people such as the Admiral Griffith, Captain Waddle and Lieutenant Commander Pfeiffer noted “something was different” that day. Commander Waddle reflected “the crew was complacent, including me to some degree, because” our mission that day was to “take these VIPs out on a lazy Friday and it was just another VP cruise”, and that lackadaisical attitude “was wrong” (NTSB Waddle interview: 34). What caused this crew to become so complacent? The captain testified “one of the root causes” of the accident is “how even a submarine crew when they're great or a ship or aircraft crew, whatever, becomes so confident in their abilities that they sometimes take for granted their expertise and they become complacent. And that's what happened on that day” (NTSB transcripts 2001, Waddle interview: 34).

Yet the NTSB found the situation more complicated than the crew simply “taking their expertise for granted”, concluding “the teamwork problems demonstrated on the day of the collision were due in part” to Captain Waddle’s “overly directive style”,

particularly with Coen (NTSB 2001: 42). What was Captain Waddle’s ‘overly directive’ leadership style like and why was it apparently so difficult for his crew to speak up—Did he berate people in public or embarrass them when they made mistakes? Was he disrespectful or demeaning?

By all accounts no. His latest evaluation called Captain Waddle “an outstanding mentor” and “inspirational leader” who is “performing flawlessly as commanding officer” and recommended his “immediate promotion” (Sciolino 2001). Admiral Knetzi had an opportunity to ride the *Greeneville* in November 1999 and reported Captain Waddle and his crew “did an unbelievably professional job” and the “the ship was operated beautifully” with “a lot of camaraderie” (COI 2001: 735). In fact when Waddle took command of the *Greeneville* in March 1999, he stated his goal was to remove the crews’ “fear factor” in order to create a “more relaxed atmosphere” of “mutual respect and trust” where crew members would feel free “to challenge me about something” when warranted. “It was part of the backup” (NTSB Waddle interview: 37).

How can we reconcile these competing images of the Captain and his crew? On one hand we have a ‘work-hard, play-hard’ career Naval Officer, a charismatic leader with a selfless dedication to his job and a real knack for mentoring young sailors and marketing for the navy. On the other hand we have an impatient, intimidating perfectionist who wants things done his way, at his pace and does not mind violating regulations when he sees fit. I suspect it was precisely the former characteristics—Captain Waddle’s competence and charisma—that actually put him at risk for this team performance breakdown in a “window of accident opportunity” (Reason 1990: 202)

created by the latter. In other words, it is precisely his charisma and competent directive leadership style that broke down his crew's intra-team alliances.

Recent research (Bayers 2003; Boukreev and De Walt 1997; Elmes and Barry 1999; Kayes 2002, 2004, 2006) studying the 1996 Mount Everest climbing expedition disaster found that leaders can inhibit rather than enhance team performance by tempting teams into overly risky actions especially when there is an over reliance on directive leadership and an ill-defined problem. Kayes' (2004) analysis of glory seeking Mount Everest mountain climbers concluded that, in some cases, "the temptation of goal achievement overtakes the leader's ability to consider alternative courses of action" (1281).

As found in the Greenville's case, Kayes (2004) observed "when a team with a narrowly defined purpose and little discretion over learning fails to sense an ill-defined problem, the formula for disaster is in place" (1279). The irrationality of the leaders' single minded pursuit of unachievable goals in the face of emerging facts—such as Captain Waddle's fixation on completing all training evolutions before returning to port on time –fragmented the team creating an internal chaos that was never reconciled. Graen (2010) provided further guidance, observing that in order for intra-team alliances to be successful three critical areas must be resolved. Teammates must respect each other's competence and contributions; trust each other's motives; and accept each other's level of commitment. Yet, we find that this trifecta of respect, trust and acceptance within the Greenville crew was not in balance. As the situation became increasingly ill-defined, team learning stopped and the crew defaulted to dependency.

My hypothesis is that in high-risk fields the repercussions of human error can be so devastating that when leaders are extremely competent and team members trust and respect them—like Captain Waddle and his crew aboard the USS Greeneville—team leaders must be mindful that a dependent group dynamic can emerge in which individuals develop an almost irrational respect for them as all knowing as a means to defend against the anxieties provoked by the work environment. In a sense, the leader becomes omnipotent in the minds of their team. As in the Greeneville accident, team members can withhold important information, not from incompetence or fear of the leader's reprisal, but because the individuals actually think these impressive leaders already know the information, because they 'know everything'.

As a result of the complex intra-team alliances that emerged, the crew trusted and respected Captain Waddle so completely, they believed he was infallible, accepting his behavior without question while doubting their own competence. Captain Waddle's leadership failure was to not guard against the potential that his charisma might create this dependency dynamic in which he became almost clairvoyant with supernatural powers while his crew seemed to happily defer to him. Until high-risk organizations and leaders and teams within them, understand the need to balance these parameters, charismatic commanders will continue to fall prey to the power of their own authority to breakdown intra-team alliances.

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