NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

FAST KNOWLEDGE: INNOVATING IN HOMELAND SECURITY BY LEARNING IN NEAR REAL-TIME FOR HIGH-THREAT EVENTS

by

Michael J. Marino

September 2020

Co-Advisors: Cristiana Matei
Lauren Wollman (contractor)

Approved for public release. Distribution is unlimited.

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE	Form Approved OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE September 2020	3. REPORT TYPE AND DATES COVERED Master's thesis

4. TITLE AND SUBTITLE FAST KNOWLEDGE: INNOVATING IN HOMELAND SECURITY BY LEARNING IN NEAR REAL-TIME FOR HIGH-THREAT EVENTS	5. FUNDING NUMBERS
6. AUTHOR(S) Michael J. Marino	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A	10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release. Distribution is unlimited.	12b. DISTRIBUTION CODE A

13. ABSTRACT (maximum 200 words)

Knowledge is critical to the advancement of any organization, yet lessons learned and after-action reports are insufficient to learn from high-threat events by the homeland security enterprise (HSE). What differentiates sub-optimal from meaningful learning is a systemic learning culture and emphasis on sensemaking and speed. This thesis examines effective organizational learning frameworks that can be applied to the HSE to accelerate knowledge acquisition from major events in near real-time. The results demonstrate that speed is not inhibitory to the learning process. Recommendations highlight the need for adaptive change in how the homeland security environment evolves through the creation of an entity responsible for organizational learning. Such an approach would also leverage local learning officers to achieve bi-directionality in a novel knowledge acquisition process. A new framework for learning must also include a process for near real-time data collection and sensemaking, which would require both public-sector incubators as well as advocacy networks within a new systematic learning process. This approach to organizational learning is required so as not to repeat failures and to enable “fast-learning” as threats and threat actors evolve.

14. SUBJECT TERMS organizational learning, knowledge management, innovation, after-action report, lessons learned, high-threat response, homeland security enterprise, HSE	15. NUMBER OF PAGES 147
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UU

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release. Distribution is unlimited.

FAST KNOWLEDGE: INNOVATING IN HOMELAND SECURITY BY LEARNING IN NEAR REAL-TIME FOR HIGH-THREAT EVENTS

Michael J. Marino
Assistant Fire Chief, Prince George's County Fire/EMS Department
BS, University of Maryland University College, 2005
MS, George Mason University, 2007

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF ARTS IN SECURITY STUDIES
(HOMELAND SECURITY AND DEFENSE)

from the

NAVAL POSTGRADUATE SCHOOL
September 2020

Approved by: Cristiana Matei
Co-Advisor

Lauren Wollman
Co-Advisor

Erik J. Dahl
Associate Professor, Department of National Security Affairs

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

Knowledge is critical to the advancement of any organization, yet lessons learned and after-action reports are insufficient to learn from high-threat events by the homeland security enterprise (HSE). What differentiates sub-optimal from meaningful learning is a systemic learning culture and emphasis on sensemaking and speed. This thesis examines effective organizational learning frameworks that can be applied to the HSE to accelerate knowledge acquisition from major events in near real-time. The results demonstrate that speed is not inhibitory to the learning process. Recommendations highlight the need for adaptive change in how the homeland security environment evolves through the creation of an entity responsible for organizational learning. Such an approach would also leverage local learning officers to achieve bi-directionality in a novel knowledge acquisition process. A new framework for learning must also include a process for near real-time data collection and sensemaking, which would require both public-sector incubators as well as advocacy networks within a new systematic learning process. This approach to organizational learning is required so as not to repeat failures and to enable "fast-learning" as threats and threat actors evolve.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

I. INTRODUCTION 1
- A. PROBLEM STATEMENT 1
- B. RESEARCH QUESTION 5
- C. METHODOLOGY 5
  - 1. Case Selection 6
  - 2. Data Collection 8
- D. LITERATURE REVIEW 8
  - 1. Organizational Learning 8
  - 2. Knowledge Management 15
  - 3. Operational Performance Research 21
- E. SIGNIFICANCE OF RESEARCH 24
- F. THESIS ROADMAP 25

II. 1 OCTOBER EXEMPLARS 27
- A. BACKGROUND: THE MOST LETHAL MASS SHOOTING IN THE UNITED STATES 27
- B. PROCESS: OFFICIAL AAR METHODOLOGY 29
  - 1. Las Vegas Metropolitan Police Department 29
  - 2. FEMA 32
- C. CASE STUDY: THE HIGH-THREAT INSTITUTE'S FLY TEAM 33
  - 1. AAR 33
  - 2. Analysis and Limitations 35
  - 3. Data 35
- D. DISCUSSION 45
  - 1. Timeliness 47
  - 2. Sensemaking 47
  - 3. Dissemination 49
- E. CONCLUSION 50

III. CENTER FOR ARMY LESSONS LEARNED 51
- A. BACKGROUND 51
- B. PROCESS 52
  - 1. AAR 54
  - 2. Richness of Data 55
  - 3. Dissemination 56
  - 4. Organization 57

C. CASE STUDY: HAITI 58
1. The Learning Effort 59
2. Real-Time Learning 60
D. DISCUSSION 62
1. Timeliness 62
2. Sensemaking 62
3. Dissemination 63
E. CONCLUSION 64

IV. NATIONAL TRANSPORTATION SAFETY BOARD 67
A. BACKGROUND 67
B. PROCESS 68
1. Data Collection 69
2. Organization 70
3. Preliminary Report 72
4. Investigative Hearing 73
5. Board Meeting 74
6. Final Report 74
C. CASE STUDY: MOTOR VESSEL CONCEPTION 75
D. DISCUSSION 77
1. Timeliness 77
2. Sensemaking 78
3. Dissemination 79
E. CONCLUSION 80
F. FINDINGS 80
1. Ritualization/Cognitive Activation 81
2. Absorptive Capacity 82

V. CONCLUSIONS AND RECOMMENDATIONS 85
A. RECOMMENDATION FOR A NEAR REAL-TIME LEARNING FRAMEWORK 85
1. National-Level Learning Teams 86
2. Near Real-Time Incident Access 87
3. Local-Level Learning Officers 88
4. Incubators and Advocacy Networks 90
B. SUMMARY 92

VI. IMPLEMENTATION CHALLENGES, LIMITATIONS, AND FUTURE RESEARCH 95
A. IMPLEMENTATION 95

1. Lack of Legislative Mandate 95
2. Indemnification 97
3. Collective Action 97
4. Contingency on Grant Funding 98
B. LIMITATIONS 99
C. FUTURE RESEARCH 100

APPENDIX. COMPARISON OF FINDINGS 103

LIST OF REFERENCES 113

INITIAL DISTRIBUTION LIST 123

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF FIGURES

Figure 1. Visualization of Tacit versus Explicit Knowledge 19

Figure 2. 32nd Floor Diagram of the MGM during the 1 October Incident 37

Figure 3. Call Process 53

Figure 4. The NTSB Process 73

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF TABLES

Table 1. Tacit versus Explicit Knowledge 18

Table 2. Learning Product Comparisons 29

Table 3. General Incident Response Findings 103

Table 4. Medical Findings 106

Table 5. Integration Findings 107

Table 6. Incident Command Findings 108

Table 7. Community Recovery Findings 109

Table 8. Specialized Response Findings 110

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF ACRONYMS AND ABBREVIATIONS

AAR	after-action report
CALL	Center for Army Lessons Learned
CCFD	Clark County Fire Department
EMS	emergency medical services
FAC	family assistance center
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
HVTE	high-velocity/turbulent environments
HSE	homeland security enterprise
HTI	High Threat Institute
IIC	inspector-in-charge
LO	learning officers
LVMPD	Las Vegas Metropolitan Police Department
MV	motor vessel
NSPD	National Security Presidential Directive
NTSB	National Transportation Safety Board
OAR	official after-action report
RTF	rescue task force
SME	subject-matter expert
SAFETY	Support Anti-Terrorism by Fostering Effective Technologies (Act)
SWAT	Special Weapons and Tactics
USAR	Urban Search and Rescue
USCG	United States Coast Guard

THIS PAGE INTENTIONALLY LEFT BLANK

EXECUTIVE SUMMARY

Knowledge is a limited currency that requires cultivation for the advancement of any organization.[1] However, homeland security as an enterprise is slow to learn, no matter the kind of learning: lessons-learned documents and after-action reports are inadequate for the homeland security enterprise to efficiently learn from high-threat events, especially in a timely manner.[2] The after-action process has been loosely adopted from the military experience, and increasing first-responder readiness for future events has been challenging, partly because no efficient or standardized way allows such responders to disseminate lessons learned from incidents of national significance.[3] Nor has any entity articulated a process by which either individual or organizational learning might occur in near real-time.[4] Thus, the homeland security enterprise is ill-equipped to learn from major events.

Violent, high-threat events, such as active-shooter/active-violence incidents, fire as a weapon, and responses to explosives, warrant immediate national-level learning for these complicated and complex threats given the multi-disciplinary coordination needed for mitigation. This is in part because threat actors iterate tactics and aggressors copycat incidents. Also, tens of thousands of departments and agencies across the United States need to learn simultaneously. The sheer size and diversity of the homeland security enterprise and the collective-action problem of who should champion knowledge capture

---

[1] Mark Easterby-Smith, *Handbook of Organizational Learning and Knowledge Management*, 2nd ed. (Chichester, UK: Wiley, 2011), 383; Antonio Ramírez and Rodrigo Rojas, "Knowledge Creation, Organizational Learning and Their Effects on Organizational Performance," *Inzineriné Ekonomika* 22, no. 3 (2011): 309.

[2] Amy Donahue and Robert Tuohy, "Lessons We Don't Learn: A Study of the Lessons of Disasters, Why We Repeat Them, and How We Can Learn Them," *Homeland Security Affairs* 2, no. 2 (July 2006): 1–28.

[3] Donahue and Tuohy.

[4] For the purposes of this research, "near real-time" is defined as one to seven days after initiation of the event. As the learning is to be assessed by an external team, 24 hours represents a lower estimate of placing a multi-disciplinary team on site. Given that collection, analysis, and dissemination of incident data would still have to occur once at the incident scene, seven days is offered as the upper limit to still be timely and meaningful. The author acknowledges that many factors, such as distance to the incident and method of travel, number of complexity factors (multiple threat vectors, new tactics, severe lethality), and number of incident evaluators performing research, can influence these estimates, which would change the timeframe of one to seven days.

all constitute barriers to learning quickly. The current after-action report process underappreciates the learning processes needed to get the right information to the end-user.

Fortunately, some learning organizations do exist and demonstrate recognizable characteristics that accelerate or contribute to enterprise-wide organizational learning.[5] First, such organizations embed a culture of learning into all processes, not just when an incident occurs or when something goes wrong.[6] Second, learning organizations embrace failure as critical to innovation and learning, rather than avoiding, fearing, or denying it.[7] Third, specific persons, entities, or teams own the learning process for the organization, which develops an organizational learning specialization, not an ancillary duty.[8] Homeland security possesses none of these features; therefore, a study of effective learning organizations may render a roadmap for efficient, timely, and more accurate learning for the homeland security enterprise (HSE).

This thesis investigated, through comparative case study analysis, two organizations purpose-built for organizational and enterprise-wide learning. Those two organizations, the Center of Army Lessons Learned (CALL) and the National Transportation Safety Board (NTSB), have demonstrated a repeatable learning process suitable for the HSE. A third analysis compared the learning efforts of official after-action reports with a novel learning team deployed by the High Threat Institute (HTI) following the 1 October massacre in Las Vegas. Each case study evaluated timeliness of reporting, sensemaking of facts, and dissemination to a broader community.

The United States Army formally created CALL in 1985 "as a unit for collecting new lessons as they emerged from army operations, either in a live situation . . . or during

---

[5] Peter Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization*, rev. ed. (New York: Doubleday/Currency, 2006).

[6] Steven Mains and Gil Ad Ariely, "Learning While Fighting," *Prism* 2, no. 3 (June 2011): 166.

[7] Bill Roberts, "Innovation Quotient," *Electronic Business* 26, no. 13 (December 2000): 98.

[8] Cynthia C. Lebow et al., *Safety in the Skies: Personnel and Parties in NTSB Aviation Accident Investigations* (Santa Monica, CA: RAND, 2000), https://www.rand.org/pubs/monograph_reports/MR1122.html.

simulations."[9] CALL's framework for learning translates multiple sources of data into timely, meaningful outputs for end-users and optimizes how practitioners receive those products. Notably, CALL also uses lessons learned to their fullest extent by then initiating doctrinal change with the new information. CALL's process embeds a learning culture into its parent organization and maintains a robust system to learn from action. In the case study of troops deployed to Haiti, real-time learning captured from an embedded learning team influenced how follow-on troops conducted operations. This ability to quickly transmit knowledge in the field shows promise for the HSE using the CALL framework.

The NTSB investigates significant accidents and incidents for the transportation community, employing a near real-time learning team to assess ground conditions and event information as soon as possible after an accident occurs. In 2019, the motor vessel *Conception* was involved in one of the deadliest maritime accidents in modern history.[10] This tragic incident served as an effective case study to demonstrate the attributes of a learning team: fast learning and knowledge transmission, both within and outside of the initial community of interest. Given the timeliness of the NTSB Go Team's response, swift data collection under chaotic event circumstances, the ability to quickly collect and make sense of data from multiple systems, and an established and effective route of dissemination, the NTSB model could be applied to other high-impact and complex incidents that require near real-time information and analysis to improve industry practices or processes.

The HTI is a non-profit grassroots effort founded in December 2016, "focused on developing an innovative framework for instituting a public safety–oriented platform of research, training, and education."[11] In 2017, the HTI assembled a team of researchers, including this author, to test a concept of operations for near real-time learning from a high-

---

[9] Alton Y. K. Chua and Wing Lam, "Center for Army Lessons Learned: Knowledge Application Process in the Military," *International Journal of Knowledge Management* 2, no. 2 (2006): 72, https://doi.org/10.4018/jkm.2006040105.

[10] National Transportation Safety Board, "Preliminary Report Marine DCA19MM047" (Washington, DC: National Transportation Safety Board, September 12, 2019), https://ntsb.gov/investigations/AccidentReports/Reports/DCA19MM047-preliminary-report.pdf.

[11] "Home Page," High Threat Institute, last updated February 4, 2020, http://highthreatinstitute.org/.

threat event, deploying October 2–5, 2017, to the 1 October incident in Las Vegas, Nevada, to collect interview accounts of responders. The data collected and the resulting findings demonstrate that the HTI information was equal or superior to official after-action reports, yet rendered in near real-time.

Each case study demonstrates that quick, effective learning is possible even within large and complex agencies. What differentiates sub-optimal from meaningful learning is a systemic learning culture, and an emphasis on sensemaking and speed. This thesis examined effective organizational learning frameworks that can be applied to the HSE to accelerate knowledge acquisition from major events in near real-time. The results demonstrate that speed is not inhibitory to the learning process. Recommendations highlight the need for adaptive change in how the homeland security environment evolves, through the creation of an entity responsible for organizational learning. Such an approach would also leverage local learning officers to achieve bi-directionality in a novel knowledge acquisition process. Homeland security must embrace new approaches to rapid learning that account for near real-time data collection and sensemaking. Sensemaking will require incubators to embrace failure as a learning tool and to test concepts and novel approaches. The testing and testers will inherently act as the advocacy networks required for a new HSE systemic learning process. This concept promotes HSE organizational learning momentum, thus avoiding recurrent failures and enabling fast learning for optimized performance.

ACKNOWLEDGMENTS

Throughout the last 18 months of this full-time endeavor crammed into part-time life, many contributed to my success. First to C., thank you for allowing me to be a life-long learner and to realize that I still do not know what I want to be when I grow up. I could not have done this without your support. To RAM, be better every day. Use your words, then work the problem. Nothing is too hard for you to overcome! Part of this was for you, too. Sulli, thank you for always believing that I have something unique to offer this profession and pontificating a roadmap for me over many nights on the porch, in the cool island air. To those that have retired to their eternal resting places, who sacrificed so much to allow me to be who and where I am today, I forever hold you close in my heart.

To the Center, thank you for this opportunity. Despite multiple and significant national challenges during this cohort, we did it. Homeland security is changing differently from how it did immediately after 9-11, when you were created. Please keep pace with that change. Our nation's homeland security leaders need you.

My many thanks to my committee of Lauren, Cris, and Marianne, who undoubtedly put up with way too many drafts and helped me both to clarify my grand ideas of improving the enterprise and to become a better writer. Discussing knowledge creation with veteran knowledge creators was memorable. To 1901/1902, it has been an incredible journey despite obstacles. It was an honor to embark on this endeavor with you. If you ever need to borrow a Swiss Army knife, please call.

To the men and women who understand high-threat like no others, most especially J.D., Reed, Geoff, Kate, Chief Jim, Graham, Peter, Tony, Daryll, Rich, Nate, Isaac, and all of the HTI. Thank you for your professionalism, friendship, counsel, provocation, and camaraderie. You continue to demonstrate thought leadership in homeland security and create systems that save lives and property. We need it, now more than ever before. I am better for knowing you all.

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION

For every complex problem there is a simple solution that is wrong.

—George Bernard Shaw

A. PROBLEM STATEMENT

Organizational learning is necessary for any discipline to advance both its practices and professionals to meet current and future challenges. Homeland security is a relatively nascent field; therefore, it has appropriated learning theory and principles from other disciplines with more institutional history in organizational learning. Police, fire, emergency medical services (EMS), and emergency management generally conduct after-action reports (AARs) following significant incidents to evaluate preparedness efforts, adequacies of response, and opportunities for improvement, yet lessons remain unlearned.[1] The after-action process has been loosely adopted from the military experience. Increasing first responder readiness for future events has been challenging, partly because no efficient or standardized way allows such responders to disseminate lessons learned from incidents of national significance.[2] Nor has any entity articulated a process by which either individual or organizational learning might occur in near real-time.[3] Thus, the homeland security enterprise is ill-equipped to learn from major events.

By the time of an AAR, under current homeland security practices, at least a year has usually passed since the incident under review. Institutional or national memory of the incident has been diminished or lost, and practitioners have moved on to concentrate their

---

[1] Amy Donahue and Robert Tuohy, "Lessons We Don't Learn: A Study of the Lessons of Disasters, Why We Repeat Them, and How We Can Learn Them," *Homeland Security Affairs* 2, no. 2 (July 2006).

[2] Donahue and Tuohy.

[3] For the purposes of this research, "near real-time" is defined as one to seven days after initiation of the event. As the learning is to be assessed by an external team, 24 hours represents a lower estimate of placing a multi-disciplinary team on site. Given that collection, analysis, and dissemination of incident data would still have to occur once at the incident scene, seven days is offered as the upper limit to still be timely and meaningful. The author acknowledges that many factors, such as distance to the incident and method of travel, number of complexity factors (multiple threat vectors, new tactics, severe lethality), and number of incident evaluators performing research, can influence these estimates, which would change the timeframe of one to seven days.

efforts on other agency priorities such as community policing efforts, risk reduction programs, or medical and fire responses.[4] In other words, the daily activities of homeland security practitioners and response agencies trump the opportunity cost for true learning.

Whether homeland security can learn from events evokes mixed responses. Homeland security has previously been assessed as stubborn about learning from past events.[5] However, whether this deficiency stems from not collecting lessons, analyzing them incorrectly, or disseminating them too narrowly—or some combination thereof—remains to be seen. Jeffrey Kaliner concurs: "The problem of how preparedness and response organizations effectively elicit, develop, capture, and disseminate organizational knowledge has been difficult to answer."[6] Given the current body of knowledge, the field can improve its learning process.

Unfortunately, the field learns at an excruciatingly slow pace and in a way that may not be optimal, especially during violent events. Confounding the problem, after-action reviews originated in the military, yet homeland security uses them extensively in a different fashion, and all the other tools supporting the AAR process, such as a learning culture, learning teams, or acceptance of failure, have not been inculcated into homeland security.[7] In one example, the Army has an entire entity dedicated to learning from events, a framework to process that information, and a learning culture to support the implementation of after-action reviews.[8] Yet no evidence suggests such support in

---

[4] Unpublished data by this researcher—analyzing the average time for 17 high-threat events over the past 21 years—demonstrated that the average time for an after-action review to be completed is 1.42 years with a minimum of 0.42 years (Aurora, Illinois, active shooter, 2019), and maximum of 2.55 years (Virginia Tech active shooter, 2007), with a median of 1.63 years respectively.

[5] Donahue and Tuohy, "Lessons We Don't Learn."

[6] Jeffrey Kaliner, "When Will We Ever Learn? The After Action Review, Lessons Learned and the Next Steps in Training and Educating the Homeland Security Enterprise for the 21st Century" (master's thesis, Naval Postgraduate School, 2013), v, http://hdl.handle.net/10945/34683.

[7] Marilyn J. Darling and Charles S. Parry, "After-Action Reviews: Linking Reflection and Planning in a Learning Practice," *Reflections* 3, no. 2 (Winter 2001): 64–72.

[8] David A. Garvin, "The U.S. Army's After Action Reviews: Seizing the Chance to Learn," in *Learning in Action, a Guide to Putting the Learning Organization to Work* (Boston: Harvard Business School Press, 2000), 9, https://www.nwcg.gov/sites/default/files/wfldp/docs/army-seizing-chance-to-learn.pdf.

homeland security, nor has enterprise-wide organizational learning occurred systemically.[9] This gap and lack of timeliness have stifled learning from major events, innovation, and advancement of the homeland security enterprise (HSE).

Violent, high-threat events, such as active-shooter/active-violence incidents, fire as a weapon, and responses to explosives, warrant immediate national-level learning for these complicated and complex threats given the multi-disciplinary coordination needed for mitigation. Threat actors iterate tactics and aggressors copycat incidents. Also, tens of thousands of departments and agencies possess the need to learn. The sheer size, diversity of the homeland security enterprise, and the collective action problem of who should champion knowledge capture all constitute barriers to learning quickly. The current AAR process underappreciates the learning processes needed to get the right information to the end-user.

However, learning organizations do exist and demonstrate recognizable characteristics that accelerate or contribute to enterprise-wide organizational learning.[10] First, such organizations embed a culture of learning into all processes, not just when an incident occurs or when something goes wrong.[11] Second, learning organizations embrace failure as critical to innovation and learning, rather than avoiding it.[12] Third, specific persons, entities, or teams own the learning process for the organization, which develops an organizational learning specialization, not an ancillary duty.[13] Homeland security displays none of these features; therefore, a study of effective learning organizations may render a roadmap for efficient, timely, and more accurate learning for the HSE.

While many commercial organizations, especially in technology, exhibit a learning culture, to draw conclusions about paramilitary agencies—such as police, fire, or EMS—

---

[9] Donahue and Tuohy, "Lessons We Don't Learn."

[10] Peter Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization*, rev. ed. (New York: Doubleday/Currency, 2006).

[11] Steven Mains and Gil Ad Ariely, "Learning While Fighting," *Prism* 2, no. 3 (June 2011): 166.

[12] Bill Roberts, "Innovation Quotient," *Electronic Business* 26, no. 13 (December 2000): 98.

[13] Cynthia C. Lebow et al., *Safety in the Skies: Personnel and Parties in NTSB Aviation Accident Investigations* (Santa Monica, CA: RAND, 2000), https://www.rand.org/pubs/monograph_reports/MR1122.html.

this thesis has employed two entities that exhibit a demonstrable learning culture, practice, and organization: the National Transportation Safety Board (NTSB) and the Center for Army Lessons Learned (CALL). Both the NTSB and CALL are widely recognized in the literature as entities that contribute significantly to the fields of knowledge management and organizational learning through their respective systems and methods.[14] The NTSB investigates significant transportation incidents by applying a fixed learning process after the accident. This process requires in-field inquiry, analysis, and dissemination of findings. Although the NTSB is legislatively mandated, it retains independence for accident investigation. This autonomy limits influence and bias in the learning process. Its findings, while critical to future safety efforts, are not mandatory but implemented at the discretion of the industry.

Operating as a tool of the Department of the Army, CALL has a long history of capturing on-the-ground learning, which has translated into doctrinal change in some instances and incremental innovation in others. CALL manages learning for the agency and has advanced the after-action review for both training and operations since its inception. With a clearly defined learning process that assigns roles and responsibilities for capturing learning, CALL has a specific mechanism for making sense of the information received and multiple systems to optimize dissemination of new knowledge. Importantly, the institution of the U.S. Army expects organizational learning, so the agency does not repeat mistakes or cost additional soldiers' lives because of ineffective tactics.

In a small-scale attempt to challenge the AAR timeline, process, and output, a small team from the High Threat Institute (HTI) deployed immediately after the 1 October massacre in Las Vegas, Nevada, in 2017.[15] Although not meant to replace the official AAR

---

[14] Mains and Ariely, "Learning While Fighting"; Alton Y. K. Chua and Wing Lam, "Center for Army Lessons Learned: Knowledge Application Process in the Military," *International Journal of Knowledge Management* 2, no. 2 (2006), https://doi.org/10.4018/jkm.2006040105.; Lebow et al., *Safety in the Skies.*

[15] See www.highthreatinsitute.org. The High Threat Institute (HTI) is an established 501(c)3 non-profit comprising subject-matter experts across multiple disciplines who analyze the high-threat space. In 2017, researchers, including this author, launched the HTI "Fly Team" and were on the ground within 23 hours after the start of the 1 October massacre to collect incident response data. Over the course of three days, the HTI interviewed key personnel and then disseminated the findings to the High Threat Institute for situational awareness and analysis to test the real-time learning concept.

process, situational awareness and some sensemaking of a very complex high-threat incident occurred in a compressed time frame, and participants transmitted specific response information to other offsite subject-matter experts (SMEs). A closer analysis of these two learning organizations, combined with a comparative analysis of the near real-time learning from 1 October vis-à-vis the official AAR, may produce a framework that optimizes learning from significant events for homeland security.[16]

In sum, no agency, locality, community, or jurisdiction should have to experience an incident directly to learn; the costs are too high. Alternatives to direct learning—conducting formal after-actions, listening to first-hand accounts, or forming a team to research the incident at some distant point in the future—are slow.[17] Organizational learning for emergency response entities and the connection to high-threat incidents are an underdeveloped research field. This thesis aspires to help fill this research gap. Specifically, it seeks to investigate how the HSE of police, fire, EMS, and emergency management can learn from these events in a quicker, more meaningful fashion than current practices allow.

B. RESEARCH QUESTION

How can the homeland security enterprise learn faster from high-threat events?

C. METHODOLOGY

This thesis sought to evaluate how the HSE could learn faster institutionally in the context of high-threat events. Toward that end, I employed a comparative analysis as the research method to evaluate the similarities and differences in organizational learning methods of two organizations—the NTSB and CALL—with significant responsibilities and institutional knowledge in organizational learning, and analyzed their processes

[16] Mains and Ariely, "Learning While Fighting," 166.

[17] For an example of a learning tool prepared by a deployed research team eight months after an incident, see QuinnWilliams, LLC, *The Attacks on Paris: Lessons Learned* (Los Angeles: Homeland Security Advisory Council, 2016), https://www.hsacouncil.org/s/HSAC-Paris_LessonsLearned_WhitePaper.pdf.

against those with which homeland security currently captures incident knowledge. Generally, these processes involve after-action reports.

Researching and publishing an official AAR inevitably involves delay.[18] Using the case studies, I identified and studied organizations that have excelled at learning quickly from significant events. Therefore, within the context of this research, comparing the analysis of an official AAR with what could be captured in near real-time seems fruitful. Given the results of a previous experiment of near real-time learning for the 1 October massacre, the information gleaned from that method of collection and analysis was compared to the official Las Vegas, Nevada, AAR. In doing so, this thesis could investigate this approach and draw generalizations about the feasibility of near real-time learning for future homeland security operations.

The thesis used the critical incident technique—an approach "to understand the key things people in a certain profession or activity should do or not do in order for them to have the best chance of achieving their goals."[19] This approach within the case studies allowed me to source critical factors related to successful organizational learning across the government and the military.[20] I selected the multiple case study method to evaluate differing organizational, political, and motivational structures to extrapolate to the multi-disciplinary homeland security high-threat environment in the future. In addition, I consulted secondary sources to evaluate the methods by which each organization learns.

1. Case Selection

Whether legislatively mandated (NTSB) or doctrinally instilled (CALL), these organizations embody a learning ethic. Furthermore, they learn from specified events and share that knowledge, both within their organizations and in some cases with external

[18] Unpublished data by this researcher—analyzing the average time for 17 high-threat events over the past 21 years—demonstrated that the average time for an after-action review to be completed is 1.42 years with a minimum of 0.42 years (Aurora, Illinois, active shooter, 2019), and maximum of 2.55 years (Virginia Tech active shooter, 2007), with a median of 1.63 years respectively.

[19] Roderik F. Viergever, "The Critical Incident Technique: Method or Methodology?," *Qualitative Health Research* 29, no. 7 (June 2019): 1066, https://doi.org/10.1177/1049732318813112.

[20] Viergever.

partners. No one has investigated these learning organizations to connect their learning principles specifically to the HSE.

The NTSB, a federal agency, investigates transportation accidents resulting in significant injury, loss of life, or systemic threats to the transportation system. The NTSB assesses the safety of the transportation system under the federal budget. Numerous recent examples—from the Boeing 737 Max 800 recall to the *Conception* boat fire, which resulted in 34 fatalities off the coast of Santa Barbara in September 2019—demonstrate the investigatory and learning capabilities of the NTSB and justify its inclusion in the dataset.[21] In each case, investigations occurred swiftly, and change was mandated because of institutional learning from key findings and timely recommendations.

CALL originated the modern-day lessons-learned process:

> [It] is the Army's daily focal point for adaptive learning based on lessons and best practices from the total force and provides timely and relevant knowledge to the warfighter and . . . unified action partners utilizing integrated systems and interactive technology in order to simplify winning in a complex world.[22]

CALL coordinates lessons learned for the entire Army and functions as a knowledge management hub. Not only does CALL structure organizational learning appropriately for the Army, but it also translates learning into practice by suggesting training or doctrinal revisions based on findings. CALL optimizes both learning and innovation by displaying unique organizational learning concepts, such as advocacy networks and incubators, where ideas can be cultivated in a safe atmosphere for trial-and-error learning.[23] CALL links innovation and learning in a manner that should be evaluated for applicability in homeland security.

---

[21] "NTSB Issues 7 Safety Recommendations to FAA Related to Ongoing Lion Air, Ethiopian Airlines Crash Investigations," National Transportation Safety Board, September 26, 2019, https://www.ntsb.gov/news/press-releases/Pages/NR20190926.aspx; National Transportation Safety Board, "Preliminary Report Marine DCA19MM047" (Washington, DC: National Transportation Safety Board, September 12, 2019), https://ntsb.gov/investigations/AccidentReports/Reports/DCA19MM047-preliminary-report.pdf.

[22] "Center for Army Lessons Learned," U.S. Army Combined Arms Center, October 2, 2018, https://usacac.army.mil/organizations/mccoe/call.

[23] Benjamin M. Jensen, *Forging the Sword: Doctrinal Change in the U.S. Army* (Stanford: Stanford University Press, 2016), 142–54.

In sum, these two cases provide significant insight into learning from crises, direct action, and emergencies that happen in the HSE. The extent to which new tools can be applied for better organizational learning is long past due.

2. Data Collection

The instrumentation for this study included academic research of open-source materials. Written sources from each organization were analyzed for organizational learning best practices. Each chapter and case study begins with an overview of the organization and its stated organizational learning objectives. It then covers the organizing principles that facilitate the collection of data in a timely fashion, analysis of data, and dissemination of data to the respective community of interest. The research design has adopted Kathleen Eisenhardt's case study methodology to most efficiently support policy development from the findings.[24]

D. LITERATURE REVIEW

This literature review investigates the various bodies of knowledge needed to successfully explore quicker learning for homeland security. This content, however, does not reside across any one domain of theory. Accordingly, this review encompasses multiple fields including traditional organizational learning, knowledge management, and operations research. An overarching theme of this exploration and a central tenet of this thesis are the comparisons between these domains at rest (non-emergent daily conditions) and—perhaps more importantly for homeland security—how the domains apply when crisis, emergency, or disasters occur.

1. Organizational Learning

Scholars argue that many disciplines within homeland security learn both inside and outside the classroom through traditional academic practices and on-the-job training or apprenticeship. Gary A. Klein, for example, notes that firefighters use past performance

[24] Kathleen M. Eisenhardt, "Building Theories from Case Study Research," *Academy of Management Review* 14, no. 4 (October 1989): 532–50, https://doi.org/10.2307/258557.

to make decisions rapidly in future situations.[25] Indeed, according to Getty and colleagues, police officers often start their careers in a probationary status in which they have to tangibly demonstrate concepts, skills, and practices learned before becoming full members of the organization.[26] Similarly, Alan Cox describes the significant cultural connection firefighters develop from probationary status onward throughout a career, which is a form of organizational learning.[27] Nevertheless, as Deverell argues, how an organization learns is still not well understood, and making matters worse for homeland security, learning from crisis is even murkier.[28] A critical gap noted and specific to the needs of this thesis is not only learning from crisis but potentially learning *during* crisis.

In this context, a corpus of literature discusses organizational learning, which is defined by Schwab as the process "when experience systematically alters behavior or knowledge."[29] This definition helps to frame the ideal end state for responders evolving from previous incidents. The homeland security community uses the term "lessons learned" to describe all things learning. Given the requirement of Schwab's definition to have a real organizational change in behavior for learning to occur, additional research on the number of "lessons" incorporated into practice may be needed.

Schwab's definition comports with Deverell's assertion of two types of learning processes: lessons distilled and lessons implemented. Lessons distilled are "lessons observed that do not change actual behaviour."[30] Lessons implemented are those put into

---

[25] Gary A Klein, *Sources of Power: How People Make Decisions* (Cambridge, MA: MIT Press, 1998), 17.

[26] Ryan M. Getty, John L. Worrall, and Robert G. Morris, "How Far from the Tree Does the Apple Fall? Field Training Officers, Their Trainees, and Allegations of Misconduct," *Crime & Delinquency* 62, no. 6 (June 2016): 822, https://doi.org/10.1177/0011128714545829.

[27] Alan Thomas Cox, "The Significance of Fire Service Culture as an Impediment to Effective Leadership in the Homeland Security Environment" (master's thesis, Naval Postgraduate School, 2012), 49, http://hdl.handle.net/10945/6781.

[28] Edward Deverell, "Crises as Learning Triggers: Exploring a Conceptual Framework of Crisis-Induced Learning," *Journal of Contingencies and Crisis Management* 17, no. 3 (September 2009): 179, https://doi.org/10.1111/j.1468-5973.2009.00578.x.

[29] Andreas Schwab, "Incremental Organizational Learning from Multilevel Information Sources: Evidence for Cross-Level Interactions," *Organization Science* 18, no. 2 (April 2007): 233, https://doi.org/10.1287/orsc.1060.0238.

[30] Deverell, "Crises as Learning Triggers," 180.

place "that change individual and organizational behaviour."[31] The imperative of actual organizational change aligns with the findings of Donahue and Tuohy—that many lessons articulated in after-action reports are just observed, not learned, thus contributing very little to organizational learning.[32] Most official learning after a significant event is not time sensitive.[33] But for this thesis, speed is important. Baird, Holland, and Deacon discuss the importance of "learning from action" and the close coupling of learning and performance.[34] As Baird and colleagues state, "If we shift our perspective from 'getting more performance into the learning process' to 'getting more learning into the performance process,' a whole new set of approaches can be added to our arsenal. We move from action learning to learning from action."[35] Critically, however, they also broach the requirement for speed: it "is often not fast enough or grounded enough in performance to keep up with the pace of change."[36] Although not evaluated by Baird, Holland, and Deacon, the change discussed could be envisioned as new threat actors or threat tactics confront the homeland security response community.

In contrast, the literature classifies learning organizations as those that learn at a quick pace or use a framework to learn consistently. This definition is distinct from organizational learning. Classical learning theory suggests two types of learning systems. Indeed, Argyris and Schön describe both single and double-loop learning systems as two

---

[31] Deverell, 180.

[32] Donahue and Tuohy, "Lessons We Don't Learn."

[33] Unpublished data by this researcher—analyzing the average time for 17 high-threat events over the past 21 years—demonstrated that the average time for an after-action review to be completed is 1.42 years with a minimum of 0.42 years (Aurora, Illinois, active shooter, 2019), and maximum of 2.55 years (Virginia Tech active shooter, 2007), with a median of 1.63 years respectively.

[34] Lloyd Baird, Phil Holland, and Sandra Deacon, "Learning from Action: Imbedding More Learning into the Performance Fast Enough to Make a Difference," *Organizational Dynamics* 27, no. 4 (1999): 19–32, https://doi.org/10.1016/S0090-2616(99)90027-X.

[35] Baird, Holland, and Deacon, 19. The authors specifically transpose word order here to mean two different concepts. *Action learning* is about driving more production into the learning process whereas *learning from action* is about learning while production or action is occurring. The authors contend that action learning as a process is not fast enough to keep pace with performance. Learning from action is almost simultaneous and iterative whereas, by performing the action, learning is captured and used to continuously improve.

[36] Baird, Holland, and Deacon, 19.

distinctive mechanisms of learning.[37] They define single-loop systems as those that recognize an error, such as in a procedure or task, and then work to fix the defect. Double-loop learning systems assess and correct the same parameters of single-loop learning but have the end-learner question or assess the underlying assumptions of the process to determine whether optimization or change needs to occur. [38] Deverell sees the utility of double-loop learning for crisis learning but argues that "single-loop learning processes are equally important teachers of how learning processes come about."[39] Although certainly true for traditional events, high-threat events need to be viewed from the lens of double-loop learning, both during and after a crisis, and prioritizing single-loop learning is a criticism of Deverell's argument.[40] Future research into reframing learning, especially through the after-action report, should be considered with double-loop learning outcomes in mind.

Questioning the underlying assumptions of the incident lies at the heart of double-loop learning. Finkel stresses that learning may need to be inculcated in a culture for meaningful knowledge capture to occur, which has implications for high-threat response and which has not generally been evaluated in the current literature.[41] Innovation in doctrine must assess the underlying assumptions about the response to the attacking force. Finkel points out that the Israelis used double-loop learning during the Yom Kippur War and demonstrates the lack of double-loop learning by British and American air forces before the attack on Pearl Harbor.[42] Since those fateful times, Finkel describes,

---

[37] Chris Argyris and Donald Schön, *Organizational Learning: A Theory of Action Perspective* (Boston: Addison-Wesley, 1978).

[38] Argyris and Schön.

[39] Deverell, "Crises as Learning Triggers," 184.

[40] The term "high threat" was first introduced by Marino et al. in 2015 and included both an active shooter and fire as a weapon. Broadly, through current capability development in the National Capital Region, high threat has expanded to include those initial response types as well as other atypical events involving complex coordinated attacks, civil disturbance, active violence (knife, vehicle ramming, or CRBN), explosive events, intelligence optimization, and technological threats such as unmanned aerial systems. Michael Marino et al., "To Save Lives and Property: High Threat Response," *Homeland Security Affairs* 11, no. 5 (January 2015): 1–18.

[41] Meir Finkel, *On Flexibility: Recovery from Technological and Doctrinal Surprise on the Battlefield* (Palo Alto: Stanford University Press, 2011), 112, ProQuest.

[42] Finkel, 115–16.

> American and Israeli armies have developed mechanisms of quickly disseminating information. . . . Learning officers and learning teams are dispatched to collect data, which is then analyzed to gain practical insights for changes in the Army. The lessons derived from the operations are either remitted directly to the forces or integrated into the training programs, doctrine, and weapons system development.[43]

Similarly, Naot, Lipshitz, and Popper investigated the richness of organizational learning and assessed double-loop learning as a critical factor in learning from past experience:

> The bottom-line criterion of successful assimilation was achieved through assimilation-enhancing activities, systematic dissemination, double-loop learning that enlisted both internal and external resources of knowledge available to the unit, and a policy of widespread participation and empowerment that won the hearts, as well as minds, of the unit's members.[44]

If double-loop learning is linked to learning richness, as connected above to learning, current learning practices of the homeland security community should also be evaluated for this concept.[45] Basten and Haamann do not take sides on the theoretical debate about single- versus double-loop learning utility but do show a gap such that, structurally, "an ideal learning organization has not been realized yet, which can be attributed to the lack of concrete prescriptions [of] how to implement the competencies suggested in the literature."[46] Importantly, the HSE literature has no comparable coverage.

However, the literature proposes an ideal of the "learning organization," which strives to obtain knowledge translation fully across the enterprise in a timely process. Senge relates organizational learning as a direct result of individual leaning and describes

---

[43] Finkel, 118.

[44] Yael Ben-Horin Naot, Raanan Lipshitz, and Micha Popper, "Discerning the Quality of Organizational Learning," *Management Learning* 35, no. 4 (December 2004): 468, https://doi.org/10.1177/1350507604048273.

[45] Information richness is defined as "the ability of an information exchange to change participant's understanding within a time interval." See Richard L. Daft, "Information Richness Theory," in *Encyclopedia of Management Theory*, vol. 1, ed. E. Kessler (Thousand Oaks, CA: SAGE Publications, 2020), 370-372, https://doi.org/10.4135/9781452276090.

[46] Dirk Basten and Thilo Haamann, "Approaches for Organizational Learning: A Literature Review," *SAGE Open* 8, no. 3 (April 2018): 1, https://doi.org/10.1177/2158244018794224.

individual competency, "mental models," collective knowledge, and goal attainment as critical to the realization of organizational learning.[47] Thus, Senge's entire "fifth discipline" relates to systems thinking, and fundamentally, this approach "makes understandable the subtlest aspect of the learning organization—the new way individuals perceive themselves and their world. At the heart of a learning organization is a shift of mind—from seeing ourselves as separate from the world to connected to the world."[48] For enterprise-wide organizational learning to occur, systems thinking is a logical framework to consider, especially for analyzing the effectiveness of responder performance at high-threat events.

Although not specifically articulated by Senge, this connection between knowledge and the individual is what Snowden and others have described as sensemaking.[49] The extent to which sensemaking applies to the crisis learning process needs to be evaluated. Generally, Senge represents the importance of a culture of learning within; however, a formal culture of learning is not evident for homeland security outside the ubiquitous AAR whereas the military culture of learning has been investigated extensively in the literature.[50] As such, scholars of the profession may continue to evaluate proven practices of learning and apply them to the high-threat environment.

Weick dominates the organizational learning literature, especially in high-performance organizational learning, such as the aircraft carrier community, which might be analogous to the HSE given time pressures, extremely stressful events over short periods, the chain-of-command structure, and zero tolerance for failure or loss of life. Along with Sutcliffe, Weick suggests five characteristics needed for organization performance under stressful circumstances: a flattened organizational structure not relying

---

[47] Senge, *The Fifth Discipline*, 129–252.

[48] Senge, 12.

[49] For additional source information, see David J. Snowden, "A Leader's Framework for Decision Making: Wise Executives Tailor Their Approach to Fit the Complexity of the Circumstances They Face," *Harvard Business Review* 85, no. 11 (November 2007): 68–76; Kaliner, "When Will We Ever Learn?"; Graham Dwyer and Cynthia Hardy, "Organizing to Save Lives: Post-Inquiry Sensemaking & Learning in Bushfire Emergency Organizations," *Academy of Management Proceedings* 2018, no. 1 (August 2018), https://doi.org/10.5465/AMBPP.2018.10085abstract.

[50] Senge, *The Fifth Discipline*.

on a chain of command for SMEs, embodying an ethos that supports flexibility, inculcating learning culture principles, embracing complexity, and showing a willingness to admit mistakes with subsequent support for learning from them across the organization.[51] Themes of decentralization of command also emerge.[52] Understanding how the HSE can effectively borrow established organizational learning principles is imperative.

To that end, Jensen relates the propriety of concepts originally articulated by Finkel on doctrinal innovation but goes a step further for the modern U.S. Army. In his book entitled *Forging the Sword*, he introduces the concepts of both incubators and advocacy networks that play critical roles in innovation of tactics and learning, which he ultimately ties to doctrinal changes. Moynihan and Landuyt suggest that "learning forums that establish collegiality and an equal footing for members are likely to overcome defensiveness and foster information sharing."[53] They also suggest that organizations allocate the bandwidth for learning or, as they deem it, the "organizational slack" to acculturate a learning process.[54] Given the spectrum of organizational learning, forums within an organization can be created to manage learning internally, but external forces may need to provide resources to enhance or support overall learning processes for enterprise innovation.

Along the same lines, as national security advisor H. R. McMaster stated, "The U.S. Army defines innovation as 'the result of critical and creative thinking and the conversion of new ideas into valued outcomes,'" which represent the measures by which learning is evaluated for homeland security in this thesis.[55] In relating the criticality of their role in

---

[51] Karl E. Weick, *Managing the Unexpected: Assuring High Performance in an Age of Complexity* (San Francisco: Jossey-Bass, 2001), 3–17.

[52] While the Center of Army Lessons Learned (CALL) is an established military learning organization with a hierarchical structure, it does not necessarily equate rank with experience required to capture learning. Outside of the established learning objectives, on-the-ground teams use this experience to explore topics that may be important for organizational learning.

[53] Donald P. Moynihan and Noel Landuyt, "How Do Public Organizations Learn? Bridging Cultural and Structural Perspectives," *Public Administration Review* 69, no. 6 (November 2009): 1100, https://doi.org/10.1111/j.1540-6210.2009.02067.x.

[54] Moynihan and Landuyt, 1099.

[55] Jensen, *Forging the Sword*, viii.

doctrinal change, Jensen defines incubators as "informal subunits established outside the hierarchy" and advocacy networks as those "championing new concepts that emerge from incubators."[56] Potentially, a new entity responsible for organizational learning may be needed for the HSE that can act more quickly than currently demonstrated.

Importantly, no data or literature ties these two concepts formally to homeland security. Incubators certainly provide "safe space" to think and test, which has been articulated as necessary for business.[57] Weick similarly uses the wildland firefighting analogy of "dropping tools" to describe the sensemaking and innovation needed to survive a complex event and extrapolate lessons to the larger study of organizational learning.[58] The dropping of tools refers to a wildfire event in which some firefighters innovate on the spot by creating new tactics while others do not and perish. Even if organizational learning occurs, potentially with innovation of tactics within an incident, the overall cultivation of that new knowledge in the community of interest must also occur.[59] This approach means that knowledge must be extrapolated and transmitted for holistic value to the community. Ideally, providing safe space, in similar contexts for multiple organizations, could be used as a template for learning across a diverse subset of emergency response organizations.

2. Knowledge Management

Even if sense can be made in a timely fashion from high-threat events, which has not been shown, knowledge would need to be effectively transmitted and stored for the HSE. High-threat events have different learning needs from those of traditional events: high-threat events are complex, multi-disciplinary, and man-made, necessitating

---

[56] Jensen, 142.

[57] See Richard Karlgaard, *The Soft Edge: Where Great Companies Find Lasting Success* (San Francisco: Jossey-Bass, 2014), 59; Peter Merrill, "Benchmarking Innovation," *Quality Progress* 49, no. 9 (September 2016): 43, 45; Rick Lash, "Best Practices for Leading via Innovation," *Harvard Business Review*, August 6, 2012, https://hbr.org/2012/08/best-practices-for-leading-via.

[58] Karl E. Weick, "Drop Your Tools: An Allegory for Organizational Studies," *Administrative Science Quarterly* 41, no. 2 (June 1996): 301–13.

[59] Mark Easterby-Smith, *Handbook of Organizational Learning and Knowledge Management*, 2nd ed. (Chichester, UK: Wiley, 2011), 404–26.

learning—and quickly evolving tactics—before the next incident occurs.[60] Also, high-threat events require the integration of multiple disciplines for incident resolution, which increases complexity and may decrease operational efficiency.[61] Hence, learning in this sense becomes more important because tactics must evolve and be shared. Richardson and Miller demonstrate that intelligence and information sharing in emergency services are suboptimal, which exposes another underlying problem: the information from learning in previous incidents, even if optimized, cannot be distributed quickly enough.[62] The need for timely sharing of intelligence logically applies to time-critical sharing of incident response information, which involves the knowledge management process.

Although knowledge management represents its own domain in the business literature, translating it for the HSE has not been fully explored. The flow and transmission of knowledge, otherwise referred to as "knowledge stock," has been reviewed in depth by Nissen.[63] His use case may be applied to the paramilitary HSE, as the original study reviewed knowledge management systems of a military joint task force. As Nissen postulates, designing systems to manage knowledge flows requires new thinking for optimal efforts—an idea that seems applicable to rapid learning among first responders.[64] Tzabbar et al. agree and identify three critical components of knowledge stocks: the intelligence possessed by the entity, the employees of the entity, and the interactions between the two that drive innovation or new knowledge creation.[65] Although knowledge

---

[60] One high-threat event type is the active shooter example. A simple evolution of tactics can be seen from Columbine, to Virginia Tech, to the Aurora, Colorado, movie theater: Columbine used incendiary and explosive devices in the attack; police entry at Virginia Tech was denied using chains and locks around door handles; and the Aurora murderer delayed the police response using CS gas.

[61] Marino et al., "To Save Lives and Property."

[62] Thomas J. Richardson, "Identifying Best Practices in the Dissemination of Intelligence to First Responders in the Fire and EMS Services" (master's thesis, Naval Postgraduate School, 2010), http://hdl.handle.net/10945/5137; Patrick E. Miller, "How Can We Improve Information Sharing among Local Law Enforcement Agencies?" (master's thesis, Naval Postgraduate School, 2005), 85.

[63] Mark E. Nissen, "Dynamic Knowledge Patterns to Inform Design: A Field Study of Knowledge Stocks and Flows in an Extreme Organization," *Journal of Management Information Systems* 22, no. 3 (December 2005): 225–63, https://doi.org/10.2753/MIS0742-1222220308.

[64] Nissen, 226.

[65] Daniel Tzabbar et al., "When Is the Whole Bigger Than the Sum of Its Parts? Bundling Knowledge Stocks for Innovative Success," *Strategic Organization* 6, no. 4 (2008): 381–82, https://doi.org/10.1177/1476127008096363.

stocks and flows have been established in the literature as imperative for organizational learning, the interaction and implementation of each have not been established for homeland security.[66] Several authors suggest a bottom-up approach to knowledge flow as optimal for military learning that may challenge current practices of high-threat learning. Furthermore, the after-action report is largely a top-down tool. Studies in knowledge management may represent an opportunity for additional bottom-up tools to be introduced to facilitate the learning process.

One of the most important themes in knowledge management—and critical to any debate involving quicker learning—is the differentiation of types of knowledge. Tacit knowledge, as explored in Polanyi, Nonaka, and Takeuchi's work, hypothesizes that the conversion of tacit knowledge to explicit knowledge may relate to the current AAR process as does the organization's need to convert information into action.[67] In Nonaka's view, experiences build tacit knowledge, and explicit knowledge, deemed the lesser of the two, is much simpler, easier to articulate, and easier to transmit.[68] Brown and Duguid, who agree with Nonaka, simplify this comparison to "know-what" (explicit) and "know-how" (tacit) knowledge.[69] A summary of tacit versus explicit knowledge is shown in Table 1.

---

[66] James G. March, "Exploration and Exploitation in Organizational Learning," *Organization Science* 2, no. 1 (February 1991): 71–87, https://doi.org/10.1287/orsc.2.1.71; W. H. Starbuck, "Learning by Knowledge-Intensive Firms," *Journal of Management Studies* 29, no. 7 (1992): 713–740.

[67] Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy* (Chicago: University of Chicago Press, 1962), https://books.google.com/books?id=qB7KuwAACAAJ; Ikujirō Nonaka, *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation* (New York: Oxford University Press, 1995).

[68] Nonaka, *The Knowledge-Creating Company*.

[69] John Seely Brown and Paul Duguid, "Organizing Knowledge," *California Management Review* 40, no. 3 (Spring 1998): 90–111, https://doi.org/10.2307/41165945.

Table 1. Tacit versus Explicit Knowledge[70]

Tacit knowledge	**Explicit knowledge**
Personal knowledge embedded in individual	Fact based, publicly available and beyond dispute.
Experience and involving such intangible factors as personal belief, perspective and values.	Possibly recorded in documents, also includes scientific and technical knowledge, common understandings, the 'right way of doing things' and socially accepted norms.
Informal, action and discourse orientated	Easily verbalised, and stated in the form of rules or notes. Includes knowledge of organizational structures, business rules, etc
Acting with rather than acting on.	Easier to deal with in ICT developments as it is easily articulated, communicated and represented in formal languages.
Real key to getting things done	Formalised

The references in this section, when lumped together, represent a target for future study in homeland security, whereby tacit and explicit knowledge both become optimized after a significant event to improve organizational learning. Figure 2 visualizes the amount of tacit knowledge to potentially unpack compared to the more overt knowledge generated in high-threat incidents.

[70] Source: Anthony Olomolaiye and Charles Egbu, "Tacit vs. Explicit Knowledge—The Current Approaches to Knowledge Management," in *Proceedings of the Second Scottish Conference for Postgraduate Researchers of the Built and Natural Environment* (Glasgow, Glasgow Caledonian University, 2005), 771. ICT refers to information and communication technology.

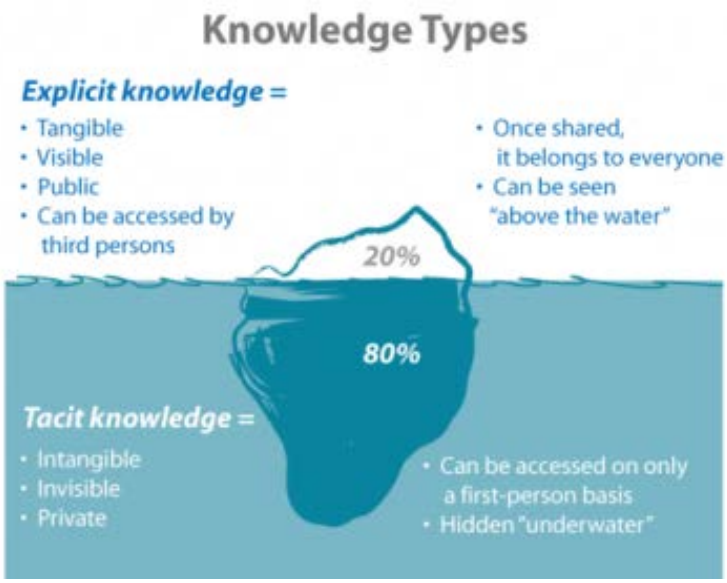

Figure 1. Visualization of Tacit versus Explicit Knowledge[71]

This knowledge conversation can potentially be problematic. In this connection, Pfeffer and Sutton show the problem of knowledge conversion of individuals and organizations in a knowing–doing gap, "which when combined with . . . flows and transmission work represent an opportunity for the homeland security enterprise to pinpoint exactly how optimal learning processes can close the gap that turns past performance or near real-time learning into future practice."[72] Importantly, however, Nissen teases out threads for the HSE, specifically in high-threat response:

> Knowledge needs to be applied—not just created or possessed—in order for a firm to extract value and to offset opportunity costs. . . . Communities of practice involve both stocks and flows of knowledge. Members of such communities are generally not part of a single organization yet they coordinate through common practices . . . to determine the knowledge stocks that are relevant to such practices.[73]

[71] Source: "About KM," United States Agency for International Development, accessed July 1, 2020, https://toolkits.knowledgesuccess.org/toolkits/km/about-km.

[72] Jeffrey Pfeffer and Robert I. Sutton, "Knowing," *California Management Review* 42, no. 1 (Fall 1999): 83–108.

[73] Nissen, "Dynamic Knowledge Patterns to Inform Design," 231.

Although the literature identifies no single entity to manage knowledge flows and stocks comprehensively for high-threat response, practitioners could benefit from this leadership toward better learning. Value to the firm, in the case of the HSE writ large, could mean better response practices, more efficient procedures, or better-suited equipment—all realized through quicker learning—while opportunity costs might be responder or civilian lives spared or time and money saved.

In an example of detrimental opportunity costs to the enterprise, Nissen et al. use a friendly fire example from the Gulf War to contextualize knowledge flow. As Nissen et al. relate, "Enterprises do not all operate in the same environment, and effective organization and process design must explicitly take into account the context of knowledge flows."[74] When framed within the context of multi-disciplinary homeland security response, the same pressures of different operating environments, rules of engagement, and response priorities remain. Furthermore, the model of knowledge flow applied could be extrapolated—as the flows for the incident "are embedded within a hazardous, time-critical context with mortal consequences"—even to homeland security.[75] Nissen et al. draw attention to two potential knowledge flow models—the life cycle model, or "capture, organize, formalize, distribute, apply"; and the spiral model, which depends on "socialization, externalization, combination and integration"—both of which could help optimize knowledge flows in nationally significant incidents for homeland security.[76] Ultimately, the works of Nissen, Pfeffer, Sutton, and Nonaka suggest theoretical models by which organizations can maximize knowledge management across their enterprises. How these models can be practically applied in homeland security to create more efficient, or at the least more effective, learning remains to be clarified.

---

[74] Mark E. Nissen et al., "Contextual Criticality of Knowledge-Flow Dynamics: Understanding a US Tragedy of Friendly Fire," *Defense & Security Analysis* 20, no. 3 (September 2004): 210, https://doi.org/10.1080/1475179042000260651.

[75] Nissen et al., 210.

[76] Nissen et al.

3. Operational Performance Research

Much of the learning literature reviews military performance and operational battlefield reports. End-users read these articles in the form of an after-action report, and such a report appears relatively quickly after the initiating event.[77] The literature parses military learning into two buckets: interwar and intrawar learning.[78] Moynihan adapts these concepts into intercrisis and intracrisis, which may have more applicability for the HSE.[79] He largely focuses on intracrisis learning, given the paucity of research in this area, but fails to envision a type of learning that blends the types to enhance learning significantly during an event. His analysis uses a case study of an outbreak that spanned a year, so the concepts might apply differently in a homeland security event with a shorter timeframe, such as a terrorist or active-shooter event. Notably, he highlights three barriers to intracrisis learning: "(a) a mismatch between information and task, (b) cognitive limitations, and (c) political barriers to learning."[80] The extent to which each of these barriers apply to near real-time learning is unclear.

No literature espouses a complete framework that a homeland security practitioner could apply across the enterprise in a standardized learning format, which represents a significant gap and opportunity for future research. Although Kaliner comes close by suggesting multiple "emergency learning frameworks" that deal with both exercise and incident learning, he fails to explain how any framework would be meaningfully operationalized.[81] He does broach the idea of real-time learning that has significance for high-threat response.[82] Many scholars have posited, however, the idea that no crisis should

---

[77] Baird, Holland, and Deacon, "Learning from Action."

[78] Lonnie B. Adams III, *The Interwar Period: Lessons from the Past* (Carlisle Barracks, PA: Army War College, 1992), http://www.dtic.mil/docs/citations/ADA251293; Dmitry Adamsky, "From Israel with Deterrence: Strategic Culture, Intra-War Coercion and Brute Force," *Security Studies* 26, no. 1 (2017): 157–84, https://doi.org/10.1080/09636412.2017.1243923.

[79] Donald P. Moynihan, "From Intercrisis to Intracrisis Learning," *Journal of Contingencies and Crisis Management* 17, no. 3 (September 2009): 189–98, https://doi.org/10.1111/j.1468-5973.2009.00579.x.

[80] Moynihan, 191.

[81] Kaliner, "When Will We Ever Learn?," 35–63.

[82] Kaliner, 66.

go to waste.[83] For example, Thomas Birkland has demonstrated this opportunity in both manmade phenomena, such as the September 11 terrorist events, and natural disasters, such as earthquakes and hurricanes.[84] Others, like Dominic Elliott, have deemed such opportunities "focusing event[s]."[85] Previously, an official source completed "lessons learned" as well as collated and housed them in a central repository. The Department of Homeland Security defunded the Lessons Learned Information Sharing database, maintained by the Federal Emergency Management Agency (FEMA), in 2015. The Center for Homeland Defense and Security in Monterey, California, currently houses these reports.[86] Given the diversity of the homeland security space and the number of actors within it, no one agency has the authority to govern learning for the nation's approximately 18,000 police agencies or 31,000 fire agencies, for example.

However, the literature does continually point to one institutional example—CALL—designed effectively to learn for the military.[87] This example suggests a tie between the effectiveness of organizational learning and the need to cultivate a culture of learning. Foley, Griffin, and McCartney show value in an organization's taking ownership of the learning process to enhance organizational learning objectives.[88] A collective-action problem could exist in homeland security—meaning the number of entities involved in a high-threat incident is so vast that no one actually takes ownership of the problem. Foley highlights a key analogous situation and explains the British army's learning process as follows:

---

[83] Michael G. Jacobides, "Don't Let This Crisis Go to Waste!," *Business Strategy Review* 20, no. 3 (Autumn 2009): 70–75, https://doi.org/10.1111/j.1467-8616.2009.00618.x.

[84] Thomas A. Birkland, *Lessons of Disaster Policy Change after Catastrophic Events*, American Governance and Public Policy Series (Washington, DC: Georgetown University Press, 2006).

[85] Dominic Elliott, "The Failure of Organizational Learning from Crisis—A Matter of Life and Death?," *Journal of Contingencies and Crisis Management* 17, no. 3 (September 2009): 157–68, https://doi.org/10.1111/j.1468-5973.2009.00576.x.

[86] "LLIS in the HSDL," Center for Homeland Defense and Security, accessed November 8, 2019, https://www.hsdl.org/c/llis-in-the-hsdl/.

[87] Baird, Holland, and Deacon, "Learning from Action."

[88] Robert T. Foley, Stuart Griffin, and Helen McCartney, "'Transformation in Contact': Learning the Lessons of Modern War," *International Affairs* 87, no. 2 (March 2011): 253–70, https://doi.org/10.1111/j.1468-2346.2011.00972.x.

> By recombining doctrine, development, and training, and placing responsibility for lessons firmly within this organization, the British army took a conscious decision to make the structural changes necessary to enable wider army transformation. In essence the ability to learn from front-line experience was elevated in status and given greater resources and its further development established as a key priority.[89]

These references suggest that operations research needs to be grounded in a "learning culture," which has to this point only been given sparse national resources.[90] This learning culture currently depends on the individual agency's taking ownership of the learning needed as no similar national-level agency exists for the homeland security community.

The ability to capture information quickly, or in near real-time has implications for operations research. In the military literature, Finkel pins learning to the need for speed, which ultimately is an output of established doctrine.[91] He slices doctrinal innovation into four "strata," the last of which—fast learning and quick transmittal of learned lessons throughout the organization—may have the greatest applicability to the homeland security enterprise but is scant in actual homeland security–related literature. Finkel surmises the following process:

> [The] fourth stratum deals with real-time learning, not with learning for lessons from past wars. . . . [A]n important factor in recoverability from technological and doctrinal surprise is the ability to derive lessons while the surprise is taking place, that is devising immediate solutions and circulating them throughout the army.[92]

Although Finkel does not use the term *innovation*, the description given suggests innovation of tactics, which would be a fitting classifier for his sentiment. Foley and colleagues support this claim in what they deem as the need for "transformation in contact."[93] Their criticism suggests that learning outside the near real-time of military events is less than useful, especially if doctrinal surprise occurs. In addition, no work has

---

[89] Foley, Griffin, and McCartney, 262.

[90] For an example of learning built into an organizational culture, see Baird, Holland, and Deacon, "Learning from Action"; U.S. Army Combined Arms Center, "Center for Army Lessons Learned."

[91] Finkel, *On Flexibility*, 111–20.

[92] Finkel, 111.

[93] Foley, Griffin, and McCartney, "Transformation in Contact," 253.

shown an optimal dissemination mechanism for an after-action report in homeland security.

In conclusion, the intersection of organizational learning, knowledge management, and operations research represents a body of knowledge that has not been fully explored as it relates to homeland security generally and high-threat response specifically. This trivariate abstraction represents elements of both innovation and sensemaking. To that end, the most appropriate definition for organizational learning relative to this thesis may be Hedberg's, which "includes both the processes whereby organizations adjust themselves defensively to reality, and the processes whereby knowledge is used offensively to improve the fit between organizations and their environments."[94] After-action reporting represents the dominant learning mechanism currently employed by homeland security but has been borrowed blindly from the military. Within several military organizations, lessons learned are a minor part of a larger organizational strategy of a culture of learning. Achieving a culture of learning and capturing data quickly with richer theoretical processes of learning, vis-à-vis double-loop learning mechanisms, have not been demonstrated as an attainable reality and represent an area for future research not sufficiently evaluated by the current literature.

E. SIGNIFICANCE OF RESEARCH

Organizations must learn to evolve. Emergency services, first responders, and counterterrorism units must not only evolve but do so in a rapid fashion when tactics and adversaries change. Organizational learning as an academic field is only about 50 years old.[95] Less is known about the extent to which police, fire, EMS, and emergency management learn and what best practices are most applicable for optimizing organizational learning. Mastliglio et al. argue that little is known about the AAR, the

---

[94] Bo Hedberg, "How Organizations Learn and Unlearn," in *Handbook of Organizational Design*, ed. Paul C. Nystrom and William H. Starbuck, vol. 1, Adapting Organizations to Their Environments (New York: Oxford University Press, 1981), 3–27.

[95] Roland K. Yeo, "Revisiting the Roots of Learning Organization: A Synthesis of the Learning Organization Literature," *Learning Organization* 12, no. 4 (2005): 368, https://doi.org/10.1108/09696470510599145.

primary tool for military organizations to learn, and the extent to which it enhances practice.[96] By extension, this idea applies to the paramilitary environment of homeland security, where even less is known.

Although after-action reports and lessons learned pervade the HSE after major incidents, they lag incidents. And the influence and effectiveness of these learning tools in nation-wide tactics have not been sufficiently evaluated. Given that high-threat incidents are increasing in number and mortality, the HSE must evaluate increasing timeliness and effectiveness of learning. This thesis seeks to add to the body of knowledge of organizational learning for the HSE to do just that. If not addressed, the gaps articulated for the HSE have high-impact consequences. Optimized organizational learning for homeland security ultimately equates to saving lives and property.

F. THESIS ROADMAP

For the chapters that follow, I researched how organizations succeeded in organizational learning and demonstrated that speed was not a limiting factor. Chapter II compares and contrasts two different learning methods from the same tragic incident: the 1 October massacre. It compares a traditional government AAR process with a novel near real-time deployment and interview model. Likewise, Chapter III investigates the success of CALL while Chapter IV evaluates quick learning by the National Transportation Safety Board. Chapter V summarizes the conclusions and recommendations, including a framework for real-time learning, and Chapter VI concludes with issues surrounding implementation, limitations of the research, and future areas to explore in the homeland security enterprise.

[96] Thomas Mastiglio et al., *Current Practice and Theoretical Foundations of the After Action Review* (Arlington, VA: Army Research Institute for the Behavioral and Social Sciences, 2011), v, http://www.dtic.mil/docs/citations/ADA544543.

THIS PAGE INTENTIONALLY LEFT BLANK

II. 1 OCTOBER EXEMPLARS

> There's only one thing more painful than learning from experience, and that is not learning from experience.
>
> —Archibald MacLeish

> In our chosen profession of policing, we often cannot control what takes place on the ground that we have been commissioned to protect and serve. . . . Taking a critical look at LVMPD's performance—so the Agency and others in the profession can learn from how we responded—is a valuable exercise. A comprehensive review of our work can save lives, which is the ultimate goal of first responders.
>
> —Las Vegas Metropolitan Police Department[97]

A. BACKGROUND: THE MOST LETHAL MASS SHOOTING IN THE UNITED STATES

On October 1, 2017, the community of Las Vegas, Nevada, and the entire nation experienced the worst shooting massacre in U.S. history. Fifty-nine souls were heinously murdered and 850 injured due to the still-unknown motivations of one deranged individual displaying advanced tactics.[98] Several agencies, including the Las Vegas Metropolitan Police Department (LVMPD) and FEMA, were called to respond to the incident and produced written reports outlining the response to that event.[99] The investigative report was published on January 18, 2018—99 days after the event. The Federal Emergency Management Agency's AAR was published on August 24, 2018—327 days after the event. And the official Las Vegas after-action report was published on June 6, 2019—613 days

---

[97] Las Vegas Metropolitan Police Department, *1 October After-Action Report* (Las Vegas: Las Vegas Metropolitan Police Department, 2019), 1, https://www.lvmpd.com/en-us/Documents/1_October_AAR_Final_06062019.pdf.

[98] Las Vegas Metropolitan Police Department, *1 October After-Action Report*, 1. The death toll was raised to 59 after a victim died on November 15, 2019, months after the publication of the official AAR. This number does not include the perpetrator. See Danielle Wallace, "Las Vegas Massacre Death Toll Rises after Southern California Woman's Death," Fox News, November 19, 2019, https://www.foxnews.com/us/las-vegas-massacre-death-toll-rises-after-southern-california-womans-death.

[99] The Las Vegas Metropolitan Police Department (LVMPD) had law enforcement jurisdiction for the incident, and the City of Las Vegas asked the Federal Emergency Management Agency (FEMA) to execute an all-hazards review.

after the event. The LVMPD's report focuses primarily on law enforcement operations whereas FEMA's report summarizes pre-incident capability of both police and fire as well as other resource management and community recovery concerns. In both AARs, methodology, confidentiality, distribution, and analysis resemble one another, comparable to other government-authored AARs. In sum, these after-action reports encompass many facets of the response across multiple disciplines and share consistent formats with numerous after-action reports from high-threat events in recent years in terms of scope, collection methods, timeframes, and distribution.

This chapter compares three official after-action reports: the one produced by FEMA, the one produced by the LVMPD for investigative purposes (LVMPDa), and the one produced by the LVMPD for response purposes (LVMPDb). These three were compared with incident information collected by a non-profit research team, the HTI, including this author, which used an alternative format to the standard AAR to collect data in near real-time.[100] Table 2 compares the aforementioned learning tools.

[100] The official after-action reports of FEMA and the LVMPD are combined for discussion here because of their similar methods and official government authorship.

Table 2. Learning Product Comparisons

	LVMPD(a)	LVMPD(b)	FEMA	HTI
Days to produce	99	613	327	5
Page count	81	158	61	8
Purpose	Accountability of investigation	Response performance/internal review of procedures	Response performance for other communities to learn	Response performance for other communities to learn
Intended consumer of product	Nation	Las Vegas response community	Whole of community	Whole of community
Research team composition	Forensic Investigation Team; Homicide Division	LVMPD	FEMA's Office of Counterterrorism and Security Preparedness; National Exercise Division	Two deployed researchers;10–20 SMEs available for reachback and immediate sensemaking
Inputs	Witness interviews, physical and digital evidence, autopsy results	Surveys; interviews, reports, radio communications, digital media; open sources; LVMPD(a)	LVMPD(b) data; internal training records; internal SOPs; open sources; 9-1-1 calls; radio reports	Interviews
Output	Written report	Written report	Written report	Field notes; interview statements
Dissemination method	Open sources, public	Open sources; public	Official distribution via HSDL	Learning matrix distributed to SME group only via email

B. PROCESS: OFFICIAL AAR METHODOLOGY

Las Vegas and FEMA had similar learning methodologies. A comparison of the two is instructive when taken as an aggregate against an alternative methodology. Given that there were subtle differences in data collection and timeliness, each is separated for specificity.

1. Las Vegas Metropolitan Police Department

The LVMPD(b) began official collection activities in October 2017. Although the final after-action report concentrated on the efforts, tactics, and efforts of the LVMPD, the

team collected data from a wide variety of multiagency and multidisciplinary partners. These partners included Clark County Fire Department (CCFD), the Henderson Police Department, the North Las Vegas Police Department, FEMA, the Las Vegas Fire and Rescue Department, the Federal Bureau of Investigation (FBI), and the Bureau of Alcohol, Tobacco, Firearms and Explosives.[101] All of these response entities, except for FEMA, had significant responsibilities during the first operational period of the incident.[102]

The Las Vegas Metropolitan Police Department used multiple sources to collect data for the after-action report. First, it surveyed all department personnel to ascertain any duties performed on the night of the active-shooter incident. The LVMPD used Survey Monkey to ask 22 questions, which generated 672 responses.[103] According to the LVMPD, all respondents answered

> a general set of questions . . . focusing on the interviewees' first notification of the incident, initial response, actions taken, defined roles, and post-incident and after-action reflections. Interview questions focused on the specific roles of the interviewees, but participants received a standardized set of instructions."[104]

According to the LVMPD, it interviewed an additional 650 personnel, "ensuring internal consistency and allowing themes and trends to be identified more readily."[105] However, the interview format was not standardized, and interviews took place both in individual and multiple responder settings.

After the survey, personnel were then directed by LVMPD Administrative Notice AN-017-17 to complete a follow-up narrative. According to the LVMPD, "Approximately 500 reports were submitted and thoroughly reviewed. . . . On February 20, 2018, a similar request was distributed to civilian employees, including dispatch and crime scene

---

[101] Las Vegas Metropolitan Police Department, *1 October After-Action Report*, 6.

[102] The timeline stipulated in FEMA's AAR coincides with the period between the start of the event at 10:05 p.m. on October 1 and Clark County Fire Department's termination of command at 7:32 a.m. on October 2. Federal Emergency Management Agency, *1 October After-Action Report* (Washington, DC: Federal Emergency Management Agency, 2018), 2, https://www.hsdl.org/?view&did=814668.

[103] Las Vegas Metropolitan Police Department, *1 October After-Action Report*, 8.

[104] Las Vegas Metropolitan Police Department, 8.

[105] Las Vegas Metropolitan Police Department, 7.

investigators," soliciting information and generating nearly 100 responses.[106] Other mixed methods of instrumentation included radio traffic, calls to the 9-1-1 center, and officer-worn body camera footage. Over 3,000 officer-worn cameras were active on the night of 1 October, and 47 personnel accountability reports were included in the AAR's documentation.[107]

a. Confidentiality

Since the LVMPD requested that employees respond to both surveys and written requests for follow-up documentation, as required by Administrative Notice AN-017-17, the AAR team knew the respondents' identities. Confidentiality for the data collection was not an issue as no LVMPD employee declined a follow-up interview. Nevertheless, interviews were not recorded. The LVMPD did not include personally identifiable information in the official after-action outside the names of several AAR team members; individual responses were not published.

b. AAR Distribution

The official *1 October After-Action Report* produced by the LVMPD was completed on June 6, 2019, and officially released to the public on July 10, 2019. A press conference by the LVMPD outlined the key details of the report for the media and community prior to its distribution. Given the incident's gravity, the AAR was immediately distributed electronically to multiple agencies and disciplines via electronic mail. The distribution for the FEMA-authored AAR resembled that of the Las Vegas products. FEMA released the AAR to the public via the Homeland Security Digital Library, maintained by the Center for Homeland Defense and Security at the Naval Postgraduate School.[108] Numerous government entities, including the Clark County Fire Department,

---

[106] Las Vegas Metropolitan Police Department, 8.

[107] Wallace, "Las Vegas Massacre Death Toll Rises."

[108] Federal Emergency Management Agency, *1 October After-Action Report*.

announced the release, which furthered distribution efforts as both media and related communities of interest took note.[109]

2. FEMA

The CCFD and the LVMPD also asked FEMA to write a report. According to the separate LVMPD(b) AAR, its purpose "was to review the integrated response to 1 October between the fire department and law enforcement."[110] The report, while issued under FEMA's authority, relied heavily on data collected from each agency and principal members of FEMA's team from Las Vegas, including the CCFD, Emergency Management, and Multi-Assault Counter-Terrorism Action Capabilities personnel. Prior to the demobilization of the event, Las Vegas leadership decided to start the learning process by establishing the Route 91 Task Force on October 2.[111] The task force consisted of four employees of the CCFD and three police officers from the LVMPD, who in total surveyed 24 "departments and/or offices" in the course of the AAR. For FEMA's report, the LVMPD also used a written survey distributed to the entire department to solicit a response from any member who participated in the incident. The police department received 672 responses. FEMA's task force used mixed methods for collecting response data, including a review of the radio and dispatch recordings, written surveys, and debriefs.[112]

---

[109] Erik Pappa, "FEMA Releases 1 October After-Action Report," Clark County, Nevada, August 27, 2018, https://www.clarkcountynv.gov/public-communications/news/Pages/FEMA-Releases-1-October-After-action-Report.aspx; "FEMA Releases Report on Vegas Shooting," Firehouse, September 5, 2018, https://www.firehouse.com/operations-training/ems/news/21020859/fema-report-las-vegas-shooting-conclusions-recommendations-firefighters.

[110] Las Vegas Metropolitan Police Department, *1 October After-Action Report*, 10.

[111] Federal Emergency Management Agency, *1 October After-Action Report*, 2. The HTI research team also confirmed this detail via in-person interviews in Las Vegas on October 4, 2017.

[112] Federal Emergency Management Agency, 2.

C. CASE STUDY: THE HIGH-THREAT INSTITUTE'S FLY TEAM

Founded in December 2016, the HTI is a non-profit grassroots effort

> focused on developing an innovative framework for instituting a public safety-oriented platform of research, training, and education. This innovative framework integrates law enforcement, fire services, and emergency medical personnel to more efficiently and effectively respond to and prevent evolving scenarios of atypical emergencies and complex attacks.[113]

Imitating the successful grassroots model of the Committee for Tactical Emergency Casualty Care, whereby a multi-disciplinary group of experienced professionals elevates operational gaps in civilian high-threat response, the group's initial scope centered on active violent events; chemical, biological, radiological, nuclear, and explosives response; intelligence sharing and optimization, fire as a weapon, civil disturbances, and future threats.[114] Because these homeland security areas—often inadequately addressed or funded—have highly consequential impacts, the group felt it could offer guidance to the broader response community.

1. AAR

In 2017, the HTI assembled a team of researchers, including this author, to test a concept of operations for near real-time learning from a high-threat event. The team, designated as the "Fly Team," resembled other no-notice deployment teams.[115] The HTI activated the research team on the morning of October 2, 2017, and assembled in Las Vegas, Nevada, within 23 hours of the incident's initiation. At 6:00 a.m. on Wednesday, October 4, 2017, the HTI team awoke to begin its day of data collection. This date was the beginning of the third operational period of the incident for emergency services, and data collection was well underway before the last notification to next of kin was made to a

---

[113] "Home Page," High Threat Institute, last updated February 4, 2020, http://highthreatinstitute.org/.

[114] In the case of the Committee for Tactical Emergency Casualty Care, the issue was confined to the medical response to high-threat events and the appropriate civilian translation of medical lessons learned from the military experience rather than blind adoption of principles that may or may not apply.

[115] Other examples include the National Transportation Safety Board, the Federal Bureau of Investigation, and Urban Search and Rescue teams maintained by FEMA.

victim's family at 9:34 a.m.[116] As the team prepared to travel, data collection began in earnest with a review of open-source incident data that became available to the deploying team to plan its approach to structured interviews.

a. Methodology

On the morning of October 3, the research team began to meet with persons directly involved with the incident. It held informal interviews that varied in length, from approximately 45 minutes to two and a half hours, depending on the amount of relatable information the interviewee had to share. All participants were informed before the start of the interview that the researchers would not record the interview except for handwritten notes in response to direct and open-ended questions regarding preparation and response. The researchers explained the purpose of the research to interviewees, which was to compile a snapshot of the incident response within a compressed timeframe.

The interview team conducted a total of eight interviews, with one interview as a follow-up; however, the latter interview was adjusted for a different purpose and scope with different questions. Interviewees were not compensated for their time. The researchers returned home after two days of extensive interviews. The HTI shared the raw data and interview notes internally for analysis, discussion, and quick sensemaking of the incident among a group uninvolved yet still knowledgeable in interagency and atypical threat procedures.

b. Confidentiality

The information was shared with other SMEs from the HTI to deconstruct the incident and apply high-level analysis. All participants were informed that the data captured would be anonymized if distributed outside the HTI. Only the researchers conducting the interviews and the limited HTI SME group knew the identity of the respondents. Instructions were clear that responses would be nonattributable if extrapolated so that participants would feel comfortable freely discussing the incident.

---

[116] Las Vegas Metropolitan Police Department, *1 October After-Action Report*, 22.

2. Analysis and Limitations

The HTI's grassroots effort limited the number of assets researchers could deploy. Although initially planning two days of interviews, the amount of time needed to conduct interviews, travel to interviews, collate the data, and set up new interviews far exceeded this timeframe. Furthermore, although only one team of two researchers worked the incident, multiple teams of researchers could have worked in parallel to capture more data.

Backend support to assist the forward-deployed team was limited. The deployed team handled everything from travel logistics to monitoring open-source information as the incident unfolded. The relative newness of the concept also proved to be an impediment. For example, researchers leveraged personal and professional contacts to secure interviewees. At the start of the interviews, depending on the degree of the interviewee's familiarity with the researcher, explaining why the HTI team was there cost valuable time. The deployment, while attempting to provide a proof of concept, relied on the expertise of the HTI to generate questions based on the respondents' role and responsibilities. No templated or standardized question sets existed.

3. Data

The official *1 October After-Action Report* took 613 days to distribute whereas the HTI's data-gathering effort took only five. Although the scope, intent, and breadth of the government-authored reports are not comparable to the HTI's report, the latter contained many facts of the incident that were published in the final report. A coded matrix separating the data into themes was completed nine days after the incident. The official data were collated from one of three official after-action reports (OARs): the LVMPD's criminal report, the LVMPD's AAR, and FEMA's AAR.[117] The AAR reference and HTI statement correlated the data with contextual relevance provided. Data were broken down into significant themes for clerical ease and included the following for review: general incident response, medical, integration, incident command, community recovery, and specialized

[117] Las Vegas Metropolitan Police Department, *LVMPD Preliminary Investigative Report: 1 October/ Mass Casualty Shooting* (Las Vegas: Las Vegas Metropolitan Police Department, 2018), Homeland Security Digital Library; Las Vegas Metropolitan Police Department, *1 October After-Action Report*; Federal Emergency Management Agency, *1 October After-Action Report*.

response. All of the comparative findings between the HTI process and the OARs are listed in the Appendix. The following sub-sections outline the 26 findings across six sub-themes of high-threat response. Sensemaking for each finding is provided, not to critique the 1 October response specifically but to show that quick learning was possible for the event itself and, in some cases, had external validity to others outside the immediate response.

a. General Incident Response

(1) After the original shooting, police received multiple calls of additional shooters.

For planning purposes, this was a key finding for several reasons. First, the number of responders involved and the geography needing coverage make situational awareness difficult. Likewise, staffing the event appropriately is challenging, especially in the beginning stages of the incident. Distractor calls should be expected and planned for, meaning additional resources may need to be ordered early in the incident to address this need. Second, mechanisms should be employed to rapidly deconflict actual versus perceived incidents. This deconfliction requires rapid deployment, strong relationships with commercial partners, optimized information-sharing pathways between response agencies, and updated contact lists.

(2) The assailant actively surveilled police response and anticipated tactics.

This finding shows that the assailant actively planned for the law enforcement response. This conclusion means the first responder community should expect this behavior from assailants as copy cats are always likely, especially when attacks are successful.[118] Capturing such a granular yet important detail, in near real-time, validates the approach and provides value for future efforts. Ultimately, this finding, if transmitted early, helps to prepare against complacency but can ultimately save responder lives if multiple similar incidents take place. An example would be a complex coordinated attack scenario.

[118] Sherry Towers et al., "Contagion in Mass Killings and School Shootings," *PLOS One* 10, no. 7 (2015).

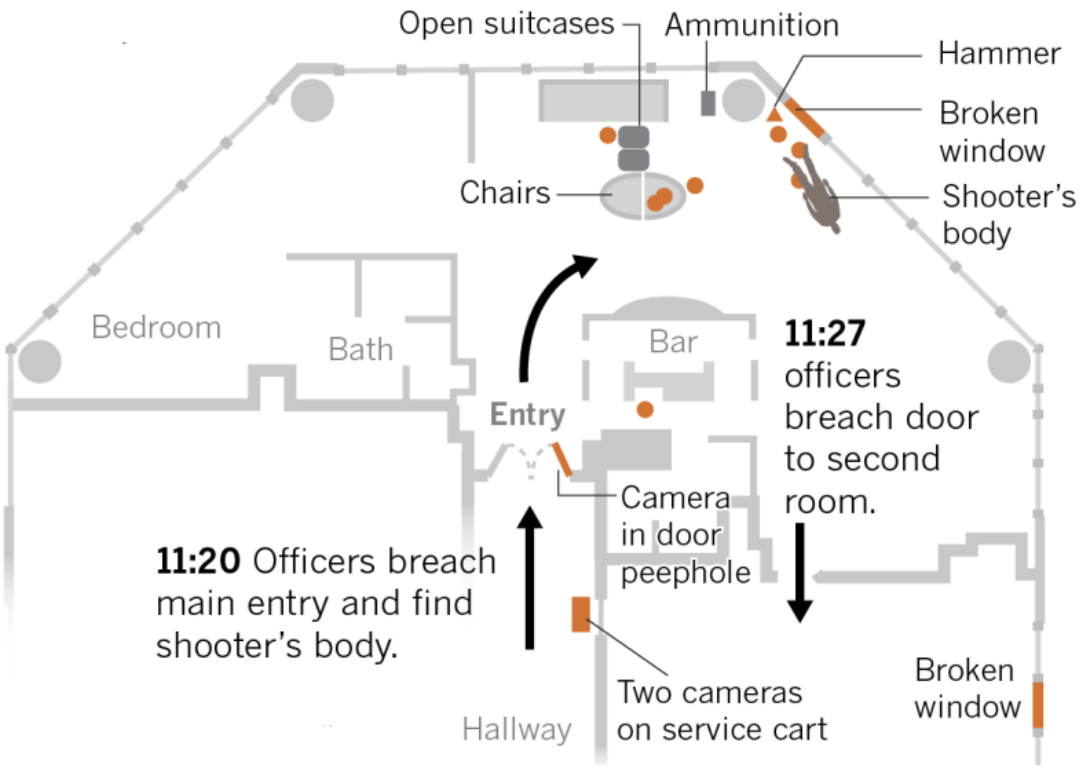

Figure 2. 32nd Floor Diagram of the MGM during the 1 October Incident[119]

(3) Accurate victim counts and patterns of injury were captured.

Understanding the magnitude of the event early is critical for planning purposes. Further, understanding not only how many are injured but also how they are injured is important for high-threat events. Injury patterns in civilian wounding are unequivocally different from combat wounds and must be planned for in terms of equipment, training, and types of responders needed.[120] Notably, the HTI effort collected similar data, as well

[119] Source: "Here's a Timeline of the Las Vegas Shooting—with the Crucial Detail Police Left Out Last Time," *Los Angeles Times*, October 9, 2017, https://www.latimes.com/nation/la-na-vegas-shooting-timeline-revised-20171009-story.html. The floor schematic shows multiple surveillance devices placed by the assailant.

[120] Babak Sarani et al., "Wounding Patterns Based on Firearm Type in Civilian Public Mass Shootings in the United States," *Journal of the American College of Surgeons* 228, no. 3 (March 2019): 228–34, https://doi.org/10.1016/j.jamcollsurg.2018.11.014; E. Reed Smith, Geoff Shapiro, and Babak Sarani, "Fatal Wounding Pattern and Causes of Potentially Preventable Death following the Pulse Night Club Shooting Event," *Prehospital Emergency Care* 22, no. 6 (2018): 662–68, https://doi.org/10.1080/10903127.2018.1459980.

as processed and disseminated the information in far less time. The information created knowledge and relevance for the community, exhibiting formal knowledge transmission.

(4) Planning efforts for the music festival were dictated by the number of personnel assigned to special events planning.

Special events planning is a sub-specialty of police and fire/EMS response planning. Balancing the potential needs of an incident with complete accuracy poses great difficulty. The fire department's lack of full-time representatives in the special events planning process could be indicative of other failures of the incident response.

(5) An insider presence helped to narrow the location of the shooter for the authorities.

Although the exact details of the initial reports to the HTI differ slightly from the actual details, the finding is clear. An employee of the hotel helped narrow down the location of the shooter. This finding is significant—despite the size of the venue, law enforcement's having near real-time and accurate information of the location of the shooter can significantly accelerate threat mitigation.

(6) Recognizing the initial response dynamics of responding officers pursuing the immediate threat afforded general situational awareness.

Understanding the tactics of initial officers and their response is paramount to understanding the incident. Questions emerge as to what equipment was available, what officers knew, and when they knew it. Furthermore, the shooting took place for approximately 10–11 minutes, but responders did not enter until 65 minutes later.[121] This detail is important for planning future responses to high-threat events.

For the high-threat community, this finding suggests a change in response posture. An active shooter, even with no active shooting, is still a direct and immediate threat. The collapse of the hot zone, which can aid in victim access, treatment, and transport, cannot occur as effectively as in a warm zone.

[121] The LVMPD's investigative report timeline shows that the shooting began at 10:05 p.m., and no shots were reported after 10:15 p.m. Explosive entry to the hotel room occurred at 11:20 p.m.

(7) Incursion onto the active runway at McCarran International Airport had significant response implications.

Airport involvement helped to underpin the severity and magnitude of the event. It also underscores how response dynamics might be extrapolated to other special events in and around critical infrastructure and how "spillover" occurs. It also helps to quantify the number of resources needed to mitigate such an event and the magnitude of response issues for the incident commander.

(8) The planning for the after-action review began immediately.

This quick response is key for any department that experiences a high-threat event like 1 October. The planning began immediately for lessons learned, and the highest levels of the organization supported it.

(9) The hotel prompted a response to the assailant's room. This information was conveyed via building intelligence from inside the room, which was monitored at a central control panel.

Understanding the response posture of the private entity before the arrival of professional (sworn) responders is important. Specific to this incident, the HTI understood that an MGM employee had encountered the situation first and witnessed both the actions of the individual and the security posture of the corporation. Further, building information is not appropriately harnessed in many aspects of emergency response because the information is not transferred to responders. In this case, room alarms that prompted staff to investigate provided new information to many response professionals. Generally, camera systems are sometimes exploited during active-shooter incidents by responding officers not on the initial contact team.[122]

Leveraging this information in a timely fashion is critical for emergency responders. Entry to the room was delayed even though sensors in the room detected no

[122] In the active-shooter incident at Marjory Stoneman Douglas High School, responding officers attempted to use CCTV. Their efforts were unsuccessful when they learned the video they were viewing was not in real time. See Marjory Stoneman Douglas Public Safety Commission, *Initial Report* (Tallahassee: Florida Department of Law Enforcement, January 2, 2019), 26–27, http://www.fdle.state.fl.us/MSDHS/CommissionReport.pdf.

movement. Leveraging in-room data, such as motion sensors or heat detectors, in real time for incident response is unexplored in the literature. This specific finding suggests emergency responders should study how to leverage such information. According to the official timeline, the assailant "fired two separate volleys of an unknown number of rounds into the Las Vegas Village area" at 10:15 p.m.[123] According to the LVMPD's report, at 10:18 p.m., "the heat detection indicator from inside Room 32-135 detected no further readings."[124] The execution of the explosive breach of the hotel room was performed at 11:20 p.m.[125]

(10) Establishing facts of how the incident unfolded and what unit actions occurred gives preliminary data to assess response effectiveness.

The way departments deploy is a function of their available equipment and staffing. Understanding the deployment model helps to ascertain the optimal response mechanism for an integrated response.

b. Medical

(1) Bleeding control equipment, specifically tourniquets, were not personally carried by the police.

Major hemorrhage control is a key skill to prevent death in hemorrhagic shock. The fact that tourniquets were kept in vehicles and not mandated to be carried could have affected morbidity and mortality.

(2) Law enforcement provided immediate support to area hospitals to assist with scene stabilization and hospital security.

The unbelievable number of injured patients necessitated local assistance from area hospitals. This fact is critical in establishing reasonable expectations to assist medical facilities in dealing with the huge influx of injured, family members, walking wounded, and potentially nefarious actors. Supporting local hospital operations in the middle of a

---

[123] Las Vegas Metropolitan Police Department, *LVMPD Preliminary Investigative Report*, 36.

[124] Las Vegas Metropolitan Police Department, 37.

[125] Las Vegas Metropolitan Police Department, 37.

complex incident should now be considered a standard of operations, given the success of the 1 October incident in assisting local facilities.

(3) Despite limited time, information, and access, authorities conducted a fairly accurate patient count.

As incident complexity increases and patient counts rise, resource and logistical requirements become overwhelming. Receiving accurate patient count information as wells as patterns of injury allows non-affected entities to overlay their capabilities on a similar simulated event type in their jurisdiction for planning purposes.

c. Integration

(1) Deployed rescue task forces had limited utility in this particular incident, identifying accountability and discipline of response as concerns.

The rescue task force is a warm zone model that mitigates the risk for Fire/EMS personnel by assigning law enforcement as close force protection and providing enhanced personal protective equipment. The goal is to access the active violent incident scene quicker to prevent deaths and provide rapid life-saving measures. The data show the need for a flexible rescue task force system as an optimal deployment model. A specific example, such as four officers with two or three firefighter/EMTs, may not be possible given resource constraints of a large geographic footprint. The conclusion from the data also shows the need to train to avoid freelancing and self-deployment, which are a major concern for law enforcement and fire/EMS.

(2) All warm zones are not created alike, and specific tactics must be adjusted based on incident dynamics.

This data point shows that a warm zone differs depending on incident dynamics. A large open-air venue must be treated differently from the interior of a school. Because warm zones can vastly differ, this finding demonstrates the need for law enforcement to train and collapse the hot zone as quickly as possible. For this incident, the primary area of concern remained “hot” for over an hour, even though the assailant had self-terminated after shooting for only 10 minutes. The fact that the actual highest-threat window was only ten minutes long highlights the need for very specific and tight multiagency coordination.

This finding further emphasizes how the dynamics of initial efficient law enforcement response can affect other responding agencies with different response objectives.

(3) Rescue task forces operated in multiple zones of threat.

The rescue task force is one of four appropriate warm zone models, according to the national standard.[126] The composition of a rescue task force is appropriately left up to the jurisdiction to manage based on training, available resources, and the deployment model. Warm zone operations must be broad to allow for multiple configurations of responders based on the constraints of the incident. This finding also shows that when confronted with the injured, providers may choose to assume more a personal threat than policy substantiates. Having informed procedures for how and when to deploy and a reasonable expectation of success will aid other departments when faced with similar circumstances.

d. Incident Command

(1) The unified command suffered specific challenges related to this complex incident but ones not easily anticipated.

In large incidents, especially in the beginning, the incident command can be overloaded with information. Applying a system and structure to manage the chaos is critical for incident stabilization. Especially in active-violence incidents, the unified command often proves a point of failure when multiple agencies with competing priorities respond. Here, complexities within the incident may have impeded an optimal transition to a unified command, which was eventually established. Also, having command aides or assigning command officers to monitor various aspects of the radio can prevent information overload for large-scale incidents.

[126] National Fire Protection Agency, *Standard for Active Shooter and Hostile Event Response*, NFPA 3000 (Quincy, MA: National Fire Protection Agency, 2018), 16.

(2) Prior to the shooting, the fire department was not represented in the command post.

The relevance of this finding indicates that a unified command was not pre-established between agencies. Such an agreement might have allowed for greater situational awareness of the incident and a smoother transition to rescue operations. Special events planning must not occur in a vacuum, and even during steady-state operations, a unified command should be pre-established at all major events.

(3) The initial command post for both police and fire became the hot zone.

Obtaining an overall understanding of incident command dynamics so quickly with the HTI method suggests that other first responders can preplan for this or a similar incident in their communities. This finding shows that in a short period, some of those complexities could be determined and shared with the first-responder community.

e. Community Recovery

(1) The city quickly stood up a family assistance center.

Support services, such as a family assistance center (FAC), increase the resiliency of a community in recovering from such a tragic event as the 1 October incident. Yet many jurisdictions have no formal policy, procedure, plan, or template to accomplish this important task. The importance of the center's work, as it was flooded with visitors almost immediately, was incredible. The need to prioritize this action cannot be underestimated and should be shared.

(2) Donations at the FAC require management.

The research team visited the FAC as soon as the interviews started and had unfettered access to the site. This type of near real-time knowledge sharing provides a baseline for discussing a model FAM and its importance to the community in contributing to resiliency. Donation management is just one example that the team witnessed of a service provided and coordinated at the FAC.

(3) The FAC is a complicated resource working to help mitigate the event. Las Vegas requested SMEs early to assist with setting up and optimizing the work of the FAC for this mass-casualty event.

Because the City of Orlando had experienced a mass-fatality event before the 1 October incident, its emergency management officials rendered assistance organizing the FAC. While the AARs highlight that the FBI was called in to assist in this process, which may certainly have been the case, the research team also personally met City of Orlando emergency management officials—not the FBI—who helped establish and optimize the FAC. This near real-time assistance helped Vegas immensely in organizing its FAC and should be considered a best practice for those that may be unfamiliar in the operations and needs of such a center. Understanding this critical factor so shortly after the incident was critical in comprehending the smooth operation witnessed at the Vegas FAC. *This point in the HTI process—in five days versus 613—realized a fact that has been misinterpreted in the lengthier AAR.*

f. Specialized Response Activities

(1) Distractor events called out the bomb squad to investigate.

During active-violence incidents, especially active-shooter events, specialty teams such as bomb squads are critically important. Suspicious vehicles, bags, and persons become a resource drain, and well-intended calls pour in as the public increases awareness of the incident. Understanding the initial and subsequent actions of this team is important for general incident response dynamics, especially as the use, or threat of use, of explosives by threat actors becomes commonplace.

(2) The assailant had explosives in his vehicle.

Confirming that the assailant used explosives in his vehicle should heighten the response of first responders and increase the planning efforts of those not directly involved in this incident. Tannerite is a continued threat for emergency personnel as it is easily obtainable and can cause great damage. The issues associated with accessing the assailant's vehicle should be used as a training scenario for others.

(3) Law enforcement found the shooter dead after a prolonged period of being barricaded and quiet. The bomb squad was not used in the shooter's room.

This is an interesting point because the Special Weapons and Tactics (SWAT) team used explosives to gain entry into the assailant's room. Theoretically, that could alter the results of a K-9 sweep of the area and suggests a certified bomb technician might be interested in surveying the rest of the room for explosive threats. Responders should expect multiple threats including explosives in an active assailant scenario and be cognizant of secondary devices designed to injure response personnel.

(4) The assailant fashioned a makeshift device to protect his air supply from either propellant being fired or gas potential deployed by police personnel. The assailant was also prepared to extinguish a fire if needed, using equipment not commonly found in a hotel room, suggesting he also brought the extinguisher with him.

A scuba mask with makeshift hose and tubing was also recovered in the evidence list.[127] This fact demonstrates the assailant's premediated preparedness of the police response and his understanding of advanced tactics. He had also searched SWAT tactics online.[128] Understanding how assailants optimize against emergency responders is crucial in the preparation and advancement of responder tactics.

D. DISCUSSION

The aforementioned data indicate the ability to collect near real-time information from a high-threat incident, which may be valuable for the first-responder community. Yet capturing key incident details shortly after incidents and transmitting them to other experts for sensemaking do not currently occur. Instead, producing an official AAR requires a significant amount of time. If an adversary uses novel tactics, responders need to make sense of that information quickly and build capacity to defeat the attacker. For example, a quick shift in active-shooter tactics after Columbine could have made threat mitigation a patrol function or made fire and EMS perform warm zone operations.

---

[127] Las Vegas Metropolitan Police Department, *LVMPD Preliminary Investigative Report*, 42.

[128] Las Vegas Metropolitan Police Department, 46.

Certainly, the author concedes multiple limitations with the first iteration of this fly team concept. Its data collection effort focused quite narrowly, and time, funding, and the number of personnel limited the efforts. However, even the small number of comparisons in the previous section indicate the potential for quicker learning for the homeland security enterprise. The lack of a core set of questions represents both a limitation and a benefit. While this deficit might limit repeatability, the researchers could still concentrate on specific areas of their expertise that may have not have been uncovered with key points nor pinpointed in a standardized question set.

Although FEMA provides support to state and local governments after catastrophic incidents, it lacks the mandate to conduct after-action reviews. FEMA's after-action review of the event, despite being outside its purpose or mission, benefited the city. FEMA and Las Vegas worked closely on many of these issues in a simulated fashion while hosting a Joint Counterterrorism Assessment Workshop Series in 2012.[129] The workshops assessed local capabilities in response to a complex terrorism event and the effectiveness of emergency services in areas applicable to the 1 October incident, such as information sharing, integration efforts, tactical operations, and command competency. The series was demonstrated to increase jurisdictional capacity to mitigate a complex coordinated attack.[130] However, the relationship between FEMA and Las Vegas may be too collegial for a truly dispassionate and impartial assessment as other major events have contracted with objective third parties to perform the AAR.[131] In the LVMPD's case, because it assessed itself in the after-action report, the potential for bias and blind spots exists. Regarding FEMA's AAR, the agency compiled the report "with the intent of distributing best practices and lessons learned for other communities around the country to better prepare for a mass casualty incident should one occur. . . . It was the intent of the agencies involved

[129] Federal Emergency Management Agency, *1 October After-Action Report*, 5.

[130] Jared Goff, "Prospective Vigilance: Assessing Complex Coordinated Attack Preparedness Programs" (master's thesis, Naval Postgraduate School, 2017), 56, https://apps.dtic.mil/dtic/tr/fulltext/u2/1053254.pdf.

[131] Independent examples include industry advocacy groups such as the Police Foundation in the case of the Pulse nightclub shooting or private contractors such as TriData in the case of the Aurora, Colorado, movie theater shooting.

to provide this information as timely as possible.[132] Whether 327 days is considered timely, or actionable for new learning, is debatable.

1. Timeliness

In only 23 hours, the team moved to collect near real-time data. Although the LVMPD and CCFD had begun planning to conduct an AAR, they were still within the operational periods of the incident, and recovery efforts were ongoing. The results indicate that the quick HTI data collection process positively correlates with the official after-action reports of the government, supporting it as a viable adjunct to the AAR process. Although it is not a replacement for any official learning process, the HTI fly team method has demonstrated value in collecting rapid knowledge within a highly complex incident. Notably, the team had to perform data collection while simultaneously accessing responders for interviews.

Finally, just-in-time research may have additional benefits if civilians have been involved in a high-threat event. Professional responders, especially in emergency services, recognize that large incidents generally have an AAR or official learning process associated with the event. Therefore, they may more readily recall their actions or be able to describe them at points more distant in the future. Civilians, on the other hand, who generally have no stress inoculation and are not routinely exposed to high-threat events, may not retain thoughts, feelings, and emotions with specificity or accuracy for as long. Understanding the immediate response, actions, and sensemaking of civilians quickly is also an area to be explored for future research.

2. Sensemaking

Quick data collection is one important piece of the learning process. Likewise, reporting facts of the incident aligns more closely with single-loop learning than the double-loop variety, which may have more impact as tactics, technology, or responder assumptions shift. Sensemaking of the incident must occur in a timely way to analyze the facts for new insights and meaning. Doing so presents a two-fold problem: accurately

[132] Federal Emergency Management Agency, *1 October After-Action Report*, i.

gaining the information quickly, and then processing acquired knowledge for meaning and relevance to share it appropriately.

Perspectives of an event change over time as both chemical and physical processes affect the brain. During high-stress events, the body releases neurotransmitters and catecholamines as a coping mechanism to deal with the event. The degree to which one remembers the facts, or reactions or actions within the event, may differ based on normal stress reactions. A complete AAR analysis would capture both short, medium, and long-term memory to ensure data have not been missed. Medium and long-term memory are currently captured during the current AAR process; however, no process exists to immediately capture incident response data in real time or near real-time.

Within the results of the experiment, some conclusions emerge in comparing the HTI approach to the traditional AAR approach. First, the data captured within five days are close enough to the data distributed after 99, 327, and 613 days, respectively. Assailant attack methods, response procedures, challenges encountered, injury type, casualty counts, and special circumstances generally correlate in both methods. Information that had external validity for the HSE—such as procedures for handling a warm zone with an elevated shooter, the need to collapse a hot zone and make entry quicker to confirm the assailant's status, the use of pre-planning and active surveillance against police tactics, distractor calls that potentially change the incident from an isolated active shooter to a complex coordinated attack, and the missed opportunity to leverage building system intelligence—were all demonstrated in near real-time. This begs the question that if such meaningful data can be captured and shared so quickly, why would the HSE not capitalize on this approach if only for situational awareness? This effort could pay significant dividends as unaffected jurisdictions consume this information and assess their own capabilities as a planning tool.

The official reports obtained the same information, potentially with finer granularity, but were they worth the wait? And the HTI demonstrated that even at time intervals, the official information could also be incorrect. The LVMPD(b) attributed the family assistance center assistance only to the FBI, when in fact the HTI research team met the non–law enforcement personnel sent from Orlando emergency management. This

conflicting information suggests that official reports can still get it wrong, as to who did what, even with so much time to produce the final product. Therefore, the output of an official report does not suggest sacrificing speed. And room for both methods exists to provide different value to the enterprise.

The understated value to be found in the HTI approach is when an actor applies novel tactics that the HSE enterprise has not yet encountered. An example in this context was an active shooter from an elevated platform, which had not been seriously evaluated since 1966.[133] The HTI quickly and appropriately captured specific difficulties in the response effort to this novel event and, through sensemaking, provided context generally for its community. Very granular pieces of novel data, such as the SCUBA mask and tubing staged at the scene by the assailant, were captured at both five days and 99 days, indicating the near real-time ability to be specific. Providing context around this data point for the entire HSE, such as implications for fire as a weapon within active-shooter response, gives the HTI approach additional validity and value not necessarily produced from an individual jurisdictional AAR.

3. Dissemination

HTI initially distributed notes to the group via email on October 6, 2017. As the notes provided a valuable snapshot of a high-threat multi-disciplinary effort, the anonymized results were coded into a matrix and separated into major themes: incident command, multidiscipline integration, community response, medical, and general. The codes applied to each theme consisted of the originating discipline of the respondent and a second code representing a subtheme. These subthemes included response mechanisms, information sharing, rescue task forces, staging, accountability, training, security/ screening, recommendations, equipment, communications, family assistance center, bystanders, patient transport, patient distribution, treatment, recovery, and atmospheric threat monitoring. The coded matrix was distributed on October 10, 2017.

[133] The incident occurred on August 1, 1966, when the assailant killed 17 and injured 31 in an active-shooter event. Most of the killing occurred from a firing position on the tower observation deck at the University of Texas, above the 27th floor.

E. CONCLUSION

The data presented demonstrate that the HTI information, when compared to official after-action reports, proved salient enough to disseminate lessons to emergency responders across the country in near real-time. This process solves a major problem in the HSE by making post-major-incident learning accurate and timely, which is not currently the case. However, observations that become lessons learned must find the end-user quickly. No central authority presides over high-threat incident learning, nor does any entity actively curate such material. The fly team, while innovative, proved the concept of rapid data acquisition and analysis but did not address the ideal dissemination of the information.

Channel concerns remain outside the scope of the experiment because the original intent concerned sharing the data internally. The government after-action reports were distributed via the media and various websites. This channel represents a "push" rather than a "pull" mentality for the dissemination of the incident review. For instances in which agencies encounter an unsolved problem or intractable issue, a mechanism to pull learning from another agency or initiate a learning process would be helpful. This approach would be analogous to pulling information and complementary to the push of an AAR, for example. Likewise, agencies cannot measure the degree to which an AAR has reached stakeholders. Optimizing organizational learning data is discussed in Chapter V but is a rich area for future research.

As demonstrated in the next chapter, a U.S. Army organization named the Center for Army Lessons Learned captures real-time data. Unless a research team like the HTI becomes embedded with an emergency services organization for a previously scheduled event, such as an exercise or training, real-time data capture is highly unlikely for the HSE. However, examples provided in Chapter II make the argument that near real-time data capture, from one to five days following a significant event, is good enough and can supplement more formal learning processes.

III. CENTER FOR ARMY LESSONS LEARNED

> Discovery is seeing what everybody else has seen and thinking what nobody else has thought.
>
> —Albert Szent-Györgyi

Organizations need to curate lessons learned and organizational successes, and the U.S. Army has invested in a structure to do so. In this vein, the Center for Army Lessons Learned (CALL)—which has operated since 1985 in the Department of the Army's Training and Doctrine Command—focuses on organizational learning.[134] Indeed, having experience in both creating lessons learned from training scenarios and observing troops in deployment—"learning in action"—CALL maintains organizational learning processes in multiple methods for the Army.

Accordingly, successful knowledge management results in "improved decision-making, increased productivity, sharing best practices, less need to reinvent, and improved staff development," all of which are important to a military or an organization.[135] As with many facets of organizational growth, continuous improvement has occurred over many decades, with catalysts along the way. CALL has become an award-winning government institution responsible for learning among the broader community it serves.[136] More importantly, learning is an active, well-structured process that ultimately translates into doctrinal evolution for the Army. CALL can shed much-needed light on the organizational learning process to guide civilian efforts in this arena.

A. BACKGROUND

The U.S. Army formally created CALL in 1985 "as a unit for collecting new lessons as they emerged from army operations, either in a live situation . . . or during

---

[134] The U.S. Army's Training and Doctrine Command was established in 1973 and incorporated four combat training centers to prepare troops for war and develop operational leaders.

[135] Chua and Wing, "Center for Army Lessons Learned," 69.

[136] In 1996, CALL's database won the Hammer Award and received accolades toward the Computer World Smithsonian Award. The Hammer Award recognized innovative technological infrastructure that supported President Clinton's National Performance Review, specifically for a more efficient government.

simulations."[137] However, its roots precede 1985. The Army began the tradition of rapidly disseminating battlefield lessons learned during World War II by printing a newsletter for field personnel discussing pertinent current issues. These daily accounts served the purpose of "enabl[ing] units . . . to profit from the latest combat experiences of our troops . . . fighting the Germans."[138] Given the harsh realities of war, and the cost of lessons learned in physical injury and death, the military needs to retain and distribute those lessons across the organization, both at the time learned and in similar future situations. Mains and Ariely argue that formal lessons-learned pathways were less successful during Vietnam; however, errors during Operation Urgent Fury in Grenada in 1983 led to the formal establishment of CALL to address these concerns.[139] Initial efforts lacked real-time data collection and dissemination and focused on lessons from units training at the National Training Center. The high-tempo period of the first Gulf War motivated a transition to collect lessons learned actively from deployed field units.

The scope of CALL's activities increased after the Gulf War as the Army began to leverage technology in additional capacities to augment training. These additional technologies included "virtual reality, digitization, and sophisticated simulation."[140] CALL's involvement has supplemented the Army's intent to link performance in training with future capability and officer development but also drive decision making for current operations based on the outcome of simulation-based training.

B. PROCESS

CALL inculcates a multistep learning process with four overarching objectives. First, it locates gaps in knowledge or areas that need to be explored further to meet the Army's needs. Second, it follows a rigorously prescribed method of data collection; it then

---

[137] Chua and Wing, "Center for Army Lessons Learned," 72.

[138] Mains and Ariely, "Learning While Fighting," 166.

[139] Mains and Ariely, 168.

[140] Lloyd Baird, John C. Henderson, and Stephanie Watts, "Learning from Action: An Analysis of the Center for Army Lessons Learned (CALL)," *Human Resource Management* 36, no. 4 (1997): 386.

transforms that information into intelligence: a finished product that can be used to change an action or behavior or optimize a current process (see Figure 3).

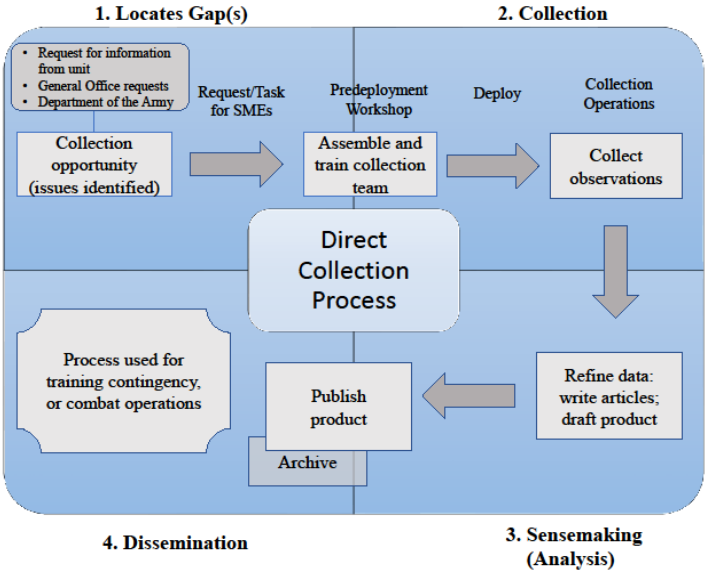

Figure 3. Call Process[141]

The final step of the process involves the transmission of new knowledge into the field. As stated above, CALL deploys direct observation teams to accomplish its mission in real time and "insights obtained from the field are interpreted from multiple sources and disseminated as lessons learned in various forms such as written reports, videos, or training simulations."[142] This process generates new tacit knowledge for the community, which is the most difficult knowledge to describe as it involves interpretation and sensemaking to draw conclusions and inference.[143] The CALL approach undoubtedly represents an optimized method for continuous organizational learning.

---

[141] Adapted from Center for Army Lessons Learned, *Establishing a Lessons Learned Program: Observations, Insights, and Lessons*, Handbook 11–33 (Ft. Leavenworth, KS: Center for Army Lessons Learned, 2011), 75, https://apps.dtic.mil/dtic/tr/fulltext/u2/a550674.pdf.

[142] Chua and Wing, "Center for Army Lessons Learned," 72.

[143] Tacit knowledge is that which cannot be easily seen or described. Thus, someone must process data and transform disparate points of information into something actionable for the user.

With CALL's vast institutional memory, knowledge creation comes in many forms and depends only on the needs of the organization. Local customs, cultural indoctrination, or deployment health concerns represent the more explicit type of needed knowledge disseminated throughout the organization for mission success. On the other end of the spectrum, tacit knowledge, such as adjustment to tactics or core doctrine, can occur with its knowledge management process. Importantly, however, CALL now ties "specific learning objectives" to data collection because, by not focusing on this previously,

> [the] approach resulted in an avalanche of raw data that overloaded the army's capacity to turn it into useful lessons for future engagements. CALL recognized this pitfall and has since developed a framework to select an event for observation that has high potential for generating knowledge with future strategic value.[144]

Notably, CALL's process discriminates what to study *and* how to study it.

1. AAR

CALL has optimized the AAR as a major tool for the Army over many years. Although an intricate process, as described by Morrison, it uses four principal questions: What was expected to happen during the engagement? What transpired? Considering both of the aforementioned, what new concepts emerged? And how do these concepts relate to ongoing and future engagements for the army?[145]

CALL indoctrinates personnel before they deploy as the learning team. The center brings the team to headquarters, located at Fort Leavenworth, Kansas, to learn how to collect field data related to the problem sets being studied. This process can take up to two months to learn but "helps to keep each collector focused on critical information requirements and provides a structure to organize the myriad of details collected."[146] This structure facilitates a repeatable process.

---

[144] Chua and Wing, "Center for Army Lessons Learned," 74.

[145] John E. Morrison and Larry L. Meliza, *Foundations of the After Action Review Process*, Special Report No. 42 (Alexandria, VA: Army Research Institute for the Behavioral and Social Sciences, 1999), https://apps.dtic.mil/dtic/tr/fulltext/u2/a368651.pdf.

[146] Chua and Wing, "Center for Army Lessons Learned," 75.

Collectors are not failure-seekers, looking for divergence from established policy or doctrine, and they "are not sent with ground troops in the field to deliberately look for failures and mistakes. Rather, they are there to understand current events and enable the Army to be better prepared for the future."[147] As everyone feels an aversion toward failure, establishing the purpose is important. Making the system better—the explicit goal of the research process—differs from seeking information for disciplinary purposes for rule-breaking. When framed this way, people more willingly provide information that optimizes future operations. Ultimately in the military setting, perfecting a tactic could mean the difference between life and death, so this makes sense as a motivation.

2. Richness of Data

CALL seeks to provide a vivid account of the ground conditions in conflict. Alton refers to the "richness" of the data multiple times in reference to "belligerent crowds, barking dogs, and rotting garbage."[148] Why? Because by providing this level of accuracy, those interpreting the tacit knowledge can hypothesize and be in the moment. This richness could lead to a level of abstraction that creates new meaning or tacit knowledge. Contextual details are important and, as such, relate directly to knowledge creation and transfer. However, the shiny object dilemma accompanies richness. If not prevented by training, the collector might focus on outliers. If, for example, a radio fails to work, it would be an ordinary event. CALL could, however, generalize the radio failure as a deficiency outside the immediate area of operation. CALL has a remedy for this challenge, as "collectors try to focus on identifying systemic problems rather than those due to temporary anomalies. . . . They seek to trace the path of the problem back to its source to gain a rich understanding of what happened and why, collecting evidence along the way."[149] Early examples of this in CALL's history came from the Bosnia experience. For instance, troops received warnings about roads covered with snow and bearing no visible track marks, which suggested the presence of minefields buried by the adversary, and a procedure required

[147] Chua and Wing, 76.

[148] Chua and Wing, 76.

[149] Chua and Wing, 76.

trucks caught in minefields to back out rather than execute turns to escape.[150] This foreknowledge saved lives.

3. Dissemination

Even in an optimized learning process, if the new knowledge does not reach the end-user, its creation is pointless. As Mark Nissen has written regarding stocks and flows of knowledge, knowledge "needs to be applied—not just created or possessed—in order for a firm to extract value and to offset opportunity costs."[151] CALL transmits knowledge via multiple dissemination pathways. Media can range from written materials that emphasize a specific purpose, such as leadership under emergent circumstances, maneuver warfare adjustments, or visual aids such as training videos. In one case, CALL developed multiple training video modules to pass on knowledge from one deployed force to the next.

CALL uses both an open and secure database depending on the lesson and the intended audience. For example, with a civilian or academic audience, CALL uses the open database approved for unlimited distribution; likewise, with an audience internal to the Army or with appropriate clearance, CALL uses the restricted site. CALL has created a number of indexing and searching tools that optimize the search process for the end-user, which contributes to knowledge conversion and decreases organizational friction for both knowledge stocks and flows.[152] And just like the multi-disciplinary effort of the collection team, a multi-disciplinary set of curators and technologists supports the process by storing materials in a database. Specifically,

> CALL has invested in RetrievalWare, an enterprise search ad categorization solution that allows users to sort . . . [t]o ease searching the CALL database uses two indexing schemes. The first is a structural indexing based on keywords, attributes of the learning events such as time, place, and date, as well as an army-wide coding scheme of conditions, tasks, and standards. The second is a process-based index scheme based on the organizational

[150] Chua and Wing, 79.

[151] Nissen, "Dynamic Knowledge Patterns to Inform Design," 231.

[152] Nissen.

> processes and functions mapped in the "Blueprint of the Battlefield used in the army."[153]

End products are released in multiple formats including guides, newsletters, training documents, and doctrinal adjustments.

4. Organization

CALL organizes data collection into teams for in-field learning. The team collects observations and sends them back daily for analysis by a nondeployed group called analysts. The data sent back could be from multiple teams and multiple locations, representing information collected in real time and freshly transmitted via electronic means. Physical media that support the observations made are transmitted via mail. To reduce the risk of entering bias into the process, the observation and analyst teams do not collaborate; however, the collection team collaborates "online on a daily basis to discuss emerging insights into the war to share feedback."[154] The analysts then leverage the Army's network of SMEs, who may or may not be associated with CALL, to create tacit knowledge from the raw data. Gaining situational awareness, the operation—as it is applied against the standing conditions on the ground and the data interpreted for new discovery—becomes a sensemaking process.

Specifically, CALL provides sensemaking in a group process close to the event that contributes to another learning attribute of shared meaning. As Weick explains, "If people want to share meaning, then they need to talk about their shared experience in close proximity to its occurrence and hammer out a common way to encode it and talk about it."[155] Analysts prepare the observations in a standardized format before sending them out for review. A regimented format not only ensures consistency but allows for tracking of all observations. CALL leverages the world wide web, distribution lists, and electronic communities of interest to share the material and solicit feedback to cast a wide net for

---

[153] Chua and Wing, "Center for Army Lessons Learned," 79.

[154] Chua and Wing, 77.

[155] Karl E. Weick, *Sensemaking in Organizations* (Thousand Oaks, CA: SAGE Publications, 1995), 188.

general issues and a targeted channel for specific circumstances that require a focused viewpoint. The analyst must keep the sensemaking iterative and "open and redirect issues to other participants."[156] The analyst referees and moderates as knowledge is being explored or created.

Tacit knowledge creation, or the knowledge that cannot be easily seen or described, according to Nonaka, plays a critical role in CALL's success.[157] Analysts use conversations with SMEs to draw new inferences between the data and operational context to derive lessons for future operations. As the data prompts new questions from the analysts, requests for additional information reroute to the collection team. This push–pull relationship effectively creates a two-way roadmap for knowledge conversion. Once enough knowledge has resulted in multiple lessons, collectors are removed from the field to finally meet and pair with the analysts assigned to review and rank the data. Releasing too many lessons at one time could create information overload, so CALL analysts deliberate about which lessons are most likely to yield the greatest operational impact.

C. CASE STUDY: HAITI

During the period of 1991–1994, Haiti saw severe unrest, catalyzed by a military coup that overthrew elected leadership. President Jean-Bertrand Aristide narrowly avoided death, and the military exiled him to France while presiding over the county. Years of oppression and human rights abuses ensued. The broader international community applied pressure and economic sanctions to force behavioral change in the regime, yet these efforts ultimately failed to achieve the desired goals. In July 1994, the United Nations authorized Security Resolution 940, which approved the use of a U.S.-led military force to restore President Aristide and democracy writ large. This operation was called Operation Uphold Democracy.

Faced with the threat of overwhelming military force, a peaceful transition of power took place in 1994–1995 without significant military operations. However, Operation

---

[156] Chua and Wing, "Center for Army Lessons Learned," 284.

[157] Nonaka, *The Knowledge-Creating Company*.

Uphold Democracy still required a large U.S. Army presence for peacekeeping and nation-rebuilding efforts. U.S.-led efforts ended on March 31,1995, at which time the operation transitioned to a United Nations peacekeeping force. While the entire operation was still ongoing, CALL embedded learning teams. Ultimately, the Army attributed the seamless transition of forces to the real-time knowledge transferred.

1. The Learning Effort

A significant learning opportunity presented itself in the Haiti conflict. CALL had previously generated real-time learning efforts in both Somalia and Rwanda and understood the opportunity when it became clear that troops would be deployed to Haiti.[158] For instance, true lessons learned from these past experiences included the "importance of and procedures for water purification, deployment procedures for peacekeeping operations, improvements in the coordination of logistics, and the integration across armed services."[159] All these lessons were "consolidated and introduced into training prior to deployment and to the documentation soldiers took into Haiti."[160] This example illustrates previous on-the-ground learning that influenced and helped optimize ongoing operations. It also demonstrates successful knowledge transfer of past practices. Thus, CALL quite literally identified "ground truths" in Haiti that became embedded in the training and doctrine cycle for the next wave of troops deploying.

The first major changeover of units featured the best example of knowledge transfer into operations. As the first force to deploy, the 10th Mountain Division had already embedded with CALL. Soldiers from the 25th Infantry Division (Schofield Barracks, Hawaii) had been set to replace the 10th Mountain; accordingly, CALL created 26

---

[158] In 1992, the United States assisted the United Nations in a peacekeeping mission in Somalia called Operation Restore Hope. From August to October the next year, the United States conducted military operations there, code-named Gothic Serpent. By 1995, the United States and United Nations had withdrawn but not before fierce fighting killed several U.S. soldiers. See Mark Bowden, *Black Hawk Down: A Story of Modern War* (New York: Atlantic Monthly Press, 1999). Operations in Rwanda were in direct response to the genocide, and Operation Support Hope began in July 1994. Estimates of the murders range from 500,000 to over one million. For additional material, see Alison Des Forges, *Leave None to Tell the Story: Genocide in Rwanda* (New York: Human Rights Watch, 1999).

[159] Baird, Henderson, and Watts, "Learning from Action," 387.

[160] Baird, Henderson, and Watts, 387.

scenarios from its lessons learned to train the 25th soldiers prior to deployment. This incredible learning opportunity represents one of the major successes of the entire operation. Baird, Henderson, and Watts confirm CALL's success:

> The 26 scenarios included situations faced by the first troops in and suggested best solutions, complete with video footage of the actual events, virtual simulations, and scripted responses. . . . [L]anding in Haiti by troops from Schofield was like landing on familiar ground. . . . During six months in Haiti they actually faced 23 of the 26 scenarios on which they trained. Commanders gave credit to CALL and their "just-in-time" learning capability for the smoothness of the operation. The troops knew what they would likely face and how to react.[161]

The approach demonstrated phenomenal success in both learning and the distillation of knowledge to the solider.

2. Real-Time Learning

In Haiti, CALL wrote over 100 scenarios and smaller instructive teachings, prepared remote learning for deployed troops to train with, and developed simulations for the incoming replacement personnel. It also produced documents that "helped clarify how the army should work with non-army organizations such as the local government, Haitian police, and multinational forces."[162] Deployed forces attribute success to the targeted learning prior to deployment. When a journalist asked for a candid assessment of why the deployment was successful, one soldier said, "Because I have already walked down this street 20 times before."[163] This quote testifies to the value of real-time learning for doctrinal shifts of large organizations, and the role new knowledge plays in the evolution of tactics in time-sensitive settings.

These examples show the need and benefit of continuous strategic learning. More specifically, learning became a priority within the deployed units and was adopted

---

[161] Baird, Henderson, and Watts, 387.

[162] James B. Thomas, Stephanie Watts Sussman, and John C. Henderson, "Understanding 'Strategic Learning': Linking Organizational Learning, Knowledge Management, and Sensemaking," *Organization Science* 12, no. 3 (June 2001): 339, https://doi.org/10.1287/orsc.12.3.331.10105.

[163] Chua and Wing, "Center for Army Lessons Learned," 73.

throughout all levels of the organization. Benefits also became readily apparent on the ground, as the situation evolved, and so did the tactics employed. After the transition from dictatorial rule, peacekeeping operations regularly searched for stored weapons caches from sympathizers and interviewed the population to gain intelligence on rebel locations. The U.S. Army frequently used the AAR process to assess activities and make operational adjustments. During the first period of operations, an AAR suggested that large-breed dogs, such as German shepherds, commonly used by military police, intimidated the Haitians. Up to that point, Haitians had been extremely uncooperative with peacekeeping forces.[164] The AAR process captured three data points. The first was the reaction to the dogs; second, native dogs did not exist in theater, which could complicate the operation involving military dogs; and third, dogs should be placed at the front of the patrol, increasing their presence and projecting early power. The troops patrolling changed their use of dogs in the next outing, which yielded greater success.

A second AAR observation in real time helped troops become even more successful. During initial efforts, villages had few Haitian women, and the men of the towns often became agitated and difficult. Some suggested a female commander take command of the unit and interact with the townspeople. The largely male unit purposely and visibly deferred to the new female commander, and each member saluted her as the unit strode into the next village, which differed from the cultural norm in-situ and further decreased aggressive encounters. Modifying tactics lowered hostilities and relieved tension in occupying villages.

Finally, an AAR noted that villagers became extremely hostile when encountered on the street but much calmer when greeted in their homes. The commander moved conversations over local issues into people's homes. The addition of large-breed dogs, a female commander, and a tactics adjustment in real time "worked superbly; guns and ammunition were found and quickly removed."[165] These outcomes suggest that the investment in real or near real-time data collection pays handsome rewards.

---

[164] Baird, Henderson, and Watts, "Learning from Action," 387.

[165] Baird, Henderson, and Watts, 387.

D. DISCUSSION

CALL demonstrably succeeds as a strategic learning organization that produces "knowledge asymmetries that can lead to differences in organizational performance."[166] CALL's framework for learning translates multiple sources of data into timely, meaningful outputs for end-users, and optimizes how practitioners receive those products. Notably, CALL also uses lessons learned to their fullest extent by then initiating doctrinal change with the new information. Distilling knowledge permeates all aspects of the organization once doctrinal change occurs, including future training, officer development, and operations of currently deployed forces.

1. Timeliness

In these case studies, CALL accomplished regular lessons observed, as well as those learned in an extremely short period. A situation identified as a learning opportunity before deployment may take only two to eight weeks. Once CALL is embedded, collecting begins immediately for consumption by the analysis crew. In contrast, civilian emergency services take a protracted time to gather and publish lessons learned or an after-action review document. CALL's strength lies in its repeatable framework for deployment in a compressed timeframe. If innovation in doctrine or tactics occurs with this established process in the military, external validity exists for police, fire, EMS, and emergency management.

2. Sensemaking

The CALL process makes sense for deployed units in both combat and training. Sensemaking uses many factors and has been shown, specifically for CALL, to include an informed collection team very close to the incident, deployment, or training, and a coterie of SMEs who dissect observations. The team analyzes these observations for relevance, cross-references them against other SMEs who are not in the CALL network, and prioritizes them for the most significant organizational learning opportunities. CALL then efficiently disseminates these lessons learned.

---

[166] Thomas, Sussman, and Henderson, "Understanding 'Strategic Learning,'" 331.

Sensemaking in CALL's case extends far beyond just reporting relevant facts. Since the analysts not only assess performance against a baseline but also question underlying assumptions, this scope suggests both single- and double-loop learning. As Weick describes, "Sensemaking is about such things as placement of items into frameworks, comprehending, redressing surprise, constructing meaning, interacting in pursuit of mutual understanding, and patterning."[167] Sensemaking is especially useful when comparing CALL's process to current emergency services' AARs. Not only do they lack timeliness, but they often rely on SMEs internal to the organization and lack the objectivity of analysts unaffiliated with the organization. Also, the current AAR process lacks sufficient evidence of challenging underlying assumptions that would transform it into double-loop learning.

CALL also exhibits quick sensemaking because it is already embedded with units experiencing problems, and as Weick articulates, "in real-world practice, problems do not present themselves to the practitioners as givens. They [problems] must be constructed from the materials of . . . situations that are puzzling, troubling, and uncertain."[168] Having a pre-established framework to present the problem set and the means by which to evaluate it presents an advantage not currently possessed by the HSE.

3. Dissemination

After sensemaking, lessons learned must be transmitted. Individual or organizational learning cannot be generalized without a doctrine and structure to disseminate lessons learned. CALL uses multiple channels for distributing information. Individual users search both the open-source and restricted site for information. Individuals initiate this learning and research, and the learning depends on individual motivation. CALL's responses to custom questions from the field regarding ongoing operations represent another channel. CALL personnel email the field user in as little as a few hours or at most a few days. The third pathway distributes "mass-market" materials "intended for a wide audience and are published in the form of handbooks, newsletters and training

[167] Weick, *Sensemaking in Organizations*, 6.

[168] Weick, 9.

materials or incorporated into army doctrine."[169] Its first and most prominent channel broadcasts the official after-action reports. The CALL website posts these reports with restricted access for authorized users. This website serves as a single point of reference, doctrinally approved, to look for lessons learned.

Interestingly, CALL uses a "push and pull" approach in the dissemination of knowledge.[170] Given the disjointed nature of the federal emergency response system in the United States, many entities have knowledge repositories of after-action reviews from various incidents. No one established entity can easily manage a repository of lessons learned. Previous efforts, such as the Lesson Learned Information System, archived documents with lessons learned in one location, but the Department of Homeland Security defunded it.

E. CONCLUSION

The sensemaking organization, CALL, demonstrates that rapid learning is possible in highly complex and violent environments. Decades of real-time deployment embedded in combat operations have polished its processes and framework, which can be used as a model. Its data collection often produces "rich accounts" from the field but separates the analysis from such data collection to limit bias. Although not designed to be a reactive learning team because of its embedded nature, CALL still suggests a framework for effective organizational learning that could provide a better method for paramilitary organizational learning.

The CALL process does, however, suggest the HSE has a long way to go—specifically in gathering, assessing, and disseminating pertinent information from high-threat events in real time to optimize learning. It also suggests the significant opportunity costs incurred when agencies that face high-threat problems lack a structured, systemic organizational learning mechanism to answer unresolved response questions. If the HSE is slow to learn and ineffective in its knowledge transfer processes, thinking adversaries could

[169] Chua and Wing, "Center for Army Lessons Learned," 79.

[170] Chua and Wing, 78.

benefit from these identified shortcomings. The following chapter evaluates a near real-time learning team that responds only after a tragic event has occurred to investigate its applicability for better learning in the HSE.

THIS PAGE INTENTIONALLY LEFT BLANK

IV. NATIONAL TRANSPORTATION SAFETY BOARD

Ever tried. Ever failed. No matter. Try again. Fail again. Fail better.

—Samuel Beckett

The National Transportation Safety Board (NTSB) is a legislatively mandated governmental agency with absolute independence but no regulatory authority. It investigates significant accidents and incidents for the transportation community, employing a near real-time learning team to assess ground conditions and event information as soon as possible after an accident. The NTSB has established a strict process for this learning team that may apply to other incidents requiring fast knowledge or quick learning for a broader community.

A. BACKGROUND

The National Transportation Safety Board's genesis lies in the Air Commerce Act of 1926, whose purpose was "to encourage and regulate the use of aircraft for commerce, and other purposes."[171] The word "safety" appears only four times in the original document and relates to the need to provide weather and other meteorological reports for flight operations and to inspect aircraft. In 1938, the Civil Aeronautics Act created a Civil Aeronautics Authority to focus on "air traffic control, safety programs, and airway development."[172] Congress created the Department of Transportation in 1967, which housed an independent organization focused on safety, and in 1974 moved the NTSB out from under the Department of Transportation as a stand-alone agency with full autonomy. Such independence allowed for full investigative authority, free from any perceived or real political influence. As an independent investigatory agency, a presidentially appointed, Senate-confirmed five-person board that serves a five-year term leads the NTSB and issues investigative reports. The legislative mandate extends not only to the investigation of every

[171] Air Commerce Act of 1926, Pub. L. No. 69–24 § 1, 44 Stat. 568 (1926), https://ia800700.us.archive.org/9/items/UnitedStatesAirCommerceAct1926/United%20States%20Air%20Commerce%20Act%20-%201926.pdf.

[172] "Civil Aeronautics Act," Department of Transportation, accessed July 14, 2020, https://www.transportation.gov/content/civil-aeronautics-act.

aircraft accident but also to "significant" accidents related to road, pipeline, rail, or water incidents.

Accordingly, it has investigated over 149,000 air events and thousands of road and waterway accidents, resulting in over 15,000 recommendations since its inception.[173] These recommendations are voluntary as the NTSB carries no regulatory authority; however, industry compliance with NTSB recommendations is estimated to be approximately 82 percent and, therefore, should be heralded as a successful motivator to change industry practice or behavior after an event.[174] The NTSB also plays a significant role in the initial coordination of federal family assistance resources for persons involved in significant transportation accidents.

B. PROCESS

The NTSB has two defined roles: investigating transportation accidents and incidents. In the case of an incident, the event itself may or may not result in property damage, injury, or death.[175] The Federal Aviation Administration defines an accident as "an occurrence associated with the operation of an aircraft . . . and [an occurrence] in which any person suffers death or serious injury, or in which the aircraft receives substantial damage."[176] This definition implies the opportunity for many hundreds of investigations in any given year.[177]

Investigations have five distinct categories: major investigation (full team), major investigation (regional office), field investigation, limited investigation, and delegated investigation. This research explores only the major full-team investigatory processes to analyze and interpret the organizational learning process and knowledge transfer.

---

[173] "History of the National Transportation Safety Board," National Transportation Safety Board, accessed March 7, 2020, https://www.ntsb.gov/about/history/Pages/default.aspx.

[174] Sharon Bryson, "How the NTSB Handles a Major Accident Investigation" (webinar, Daytona Beach, Florida, May 9, 2019), 35, https://worldwide.erau.edu/webinars/how-the-ntsb-handles-a-major-accident-investigation.

[175] Lebow et al., *Safety in the Skies*, 14.

[176] "NTSB System Level Business Rules," Federal Aviation Administration, accessed March 8, 2020, https://www.asias.faa.gov/apex/f?p=100:9:::NO::P9_REGION_VAR:2.

[177] Lebow et al., *Safety in the Skies*, xxxii.

Likewise, the desire to focus on the NTSB's Go Team, the entity responsible for initial data collection, further supports this limited scope.

The NTSB implements a five-step process for investigating transportation-related accidents. First, it deploys a data collection team to the incident site, releases a timely initial preliminary report, conducts an investigative hearing if needed, holds an NTSB meeting, and then issues a final report. The process begins as soon as possible after an event and can take two to three years for a final report.[178] The NTSB produces a preliminary report regarding the incident within several weeks, making it public for general situational awareness. A recent example included a helicopter crash in Calabasas, California, in January 2020, when a Hall of Fame basketball player and eight other souls tragically perished. The crash occurred on January 26, 2020, and the NTSB released the preliminary report on February 7, 2020—demonstrating the speed with which preliminary reports can be published.

1. Data Collection

The NTSB Go Team is a multi-disciplinary group of SMEs on call for deployment within a few hours of notification. It organizes initial data collection efforts for major investigations. The groups within the Go Team specialize in particular areas depending on the accident but could include operations, human factors, air traffic control, powerplants, maintenance, survival factors, flight recorders, weather, structure systems, airports, aircraft performance, and materials laboratories.[179] The team maintains a roster and communicates with NTSB headquarters in Washington, DC, for rapid deployment to the accident site. The team members often maintain readiness with luggage prepared with personal items, clothes, and other effects needed for an extended deployment. The NTSB office also ships pre-packed office materials, otherwise known as the "fly-away suitcases" to the team assembly area upon notification of a deployment.[180] Throughout all of its initial

---

[178] Federal Aviation Administration, "NTSB System Level Business Rules."

[179] Bryson, "How the NTSB Handles a Major Accident Investigation," 20.

[180] National Transportation Safety Board, *Aviation Investigation Manual: Major Team Investigations* (Washington, DC: National Transportation Safety Board, 2002), 12, https://ntsb.gov/investigations/process/Documents/MajorInvestigationsManual.pdf.

deployment organizational processes, speed is considered a critical component to capturing data that eventually lead to organizational learning.

Notification of the event can come several ways, from media monitoring by the NTSB operations center or via foreign partners, air traffic control, the Federal Aviation Administration, or the aircraft operator. The inspector-in-charge (IIC)—who is federally designated but not often the first to arrive at the incident site—leads the NTSB Go Team. The NTSB representative who arrives first, perhaps from a regional office closer to the crash site, conducts a "stake-down" of the incident site.[181] To the NTSB, a stake-down connotes a brief physical review of the incident site and the initial effort to preserve the scene. This process also establishes the NTSB's jurisdiction at the crash site. A final component to this initial process is assessing safety conditions for the team before starting the investigation. The perishability of evidence for the NTSB is often a concern. With non–aircraft related accidents, such as rail or roadway, the public often exerts pressure to reopen the transportation pathway once the clean-up is complete. Generally, aircraft-related accidents do not suffer from this issue, given the magnitude and severity of the event.

2. Organization

The Response Operations Center at the NTSB handles the deployment of the Go Team to the incident site. The operations center arranges logistics to get the team in place including flights, hotel bookings, meeting space, and other travel details. Having someone outside the investigations team handle logistical details allows the team to prepare for the review of the scene without distraction. Once on scene, the team is divided into small groups, referred to as the "party process," within the overall organizational structure. Each party to the investigation has a specific area of responsibility and abides by the disclosure rules. Parties swear themselves in and sign the party agreement at the initial meeting that governs information disclosure exclusively through official NTSB mechanisms. No party

[181] National Transportation Safety Board, 4.

individual may communicate, as this is a stipulation of the agreement. Any violation of the party agreement can result in the Go Team being dismissed.

At an initial meeting on scene, the Go Team organizes itself at a distance from the family assistance location and the incident site. This setup delineates each function and prevents spillover of information. During the investigation, daily meetings to share information and discuss progress happen. Each group presents the information collected from the preceding day, and teams discuss what work still needs to be accomplished. Multiple briefings happen each day including separate ones for families and the media. Another multi-disciplinary team that operates within the Go Team structure is the transportation disaster assistance group, which was established in the Aviation Disaster Assistance Act. This group may comprise response personnel, social workers, forensic anthropologists, mental health professionals, and aviation representatives, all of whom help coordinate the recovery of deceased passengers for family members. The involved carrier and the group work collaboratively to establish the family assistance center, which is located separately from the Go Team's base of operations.

The first few hours of a Go Team deployment involve traveling to the incident location and the initial stake-down. The working group chairs usually attempt a site walk-through if safe to do so as well as coordinate with first responders. If applicable, toxicology tests will be requested and drawn, and the Go Team will have a full organizational meeting to discuss all pertinent preliminary information, obtain an official briefing by first responders, discuss fatalities and injuries, review ground rules, sign the party declaration, and ensure all applicable groups and personnel have been assigned.[182] The Go Team also consists of other support functions to support the data collection effort. These groups routinely encompass a liaison with first responders, governmental affairs to interact with local and state officials, public relations to handle all media concerns, logistics, information technology support, and general counsel, if legal guidance is needed to support efforts in obtaining subpoenas.

[182] Bryson, "How the NTSB Handles a Major Accident Investigation," 18–19.

Go Team deployments do not have strict deadlines for data collection, but efforts generally take between one and three weeks.[183] The amount of time required to collect all information needed on the ground is not pre-determined and remains at the discretion of the IIC. The IIC guides the process because "data" in a transportation-related accident or investigation is perishable. All team members take notes throughout the collection process and sign their field notes at the end of the effort. But the IIC is the only person who authorizes a team member to clear the investigation site upon completion of the data collection. Potentially, a few actions happen after the Go Team has left the site that cannot feasibly be performed with team members there. Full site exploitation requires close coordination and good initial evidence preservation during the stake-down process. Engine or component disassembly, follow-up interviews, simulator and materials analysis, or a review of maintenance records may occur after the initial deployment. After a Go Team deployment, the NTSB transitions into its second phase, which consists of drafting the preliminary report.

3. Preliminary Report

With all the data assembled after the deployment of the Go Team, the preliminary report becomes part of the official record. Within several weeks of the event, the draft report is released. Broadly, this step summarizes the field notes from the Go Team. Information such as which investigation groups deployed to the scene, weather information at the time of the incident, airframe ownership, an exemplar of an undamaged similar airframe, injury or fatality information, air traffic control, and physical location of wreckage are all reported. This initial report states facts regarding objective indicators and does not attribute fault, thus reserving incident-specific information for dissemination to the broader community until after verification by SMEs.

[183] Lebow et al., *Safety in the Skies*, 18.

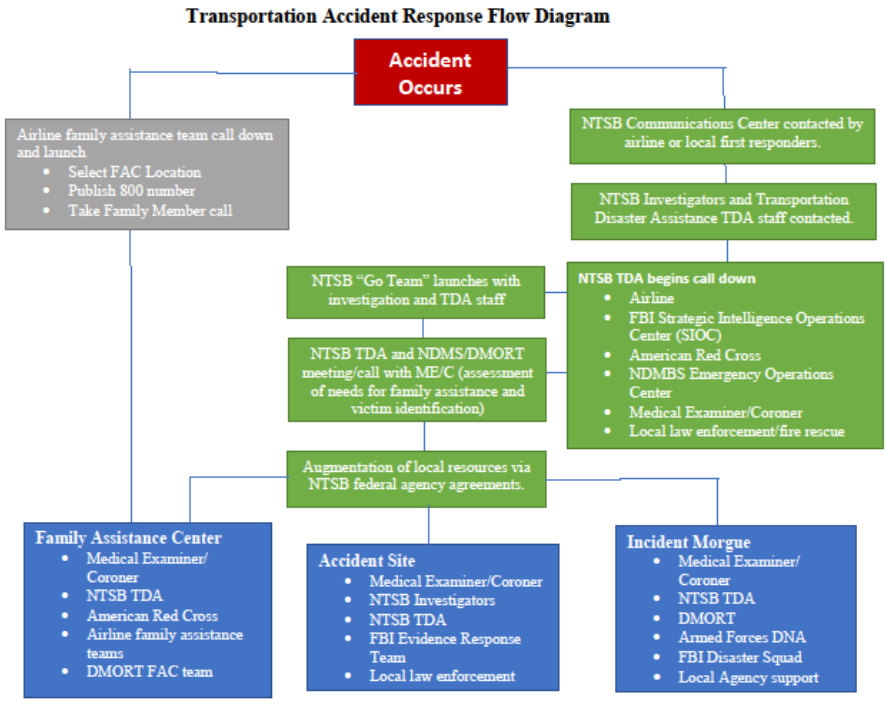

Figure 4. The NTSB Process[184]

4. Investigative Hearing

Next in the process is the investigative hearing. The Sunshine in the Government Act dictates that the hearing be open to the public. According to Berg, the Act "is based on the policy that 'the public is entitled to the fullest practicable information regarding the decision-making processes of the Federal government.'"[185] The public hearing serves to gain additional information needed to support the investigation or to make recommendations regarding safety concerns. It can include testimony by witnesses either

[184] Source: National Disaster Medical System, *DMORT Standard Operating Procedures for National Transportation Safety Board Activities* (Washington, DC: National Transportation Safety Board, 2006), 9, https://nsri.nebraska.edu/-/media/nsri/documents/ndms2020/dmort-ntsb-sop-nov-2006.pdf.

[185] Richard K. Berg and Stephen H. Klitzman, *An Interpretive Guide to the Government in the Sunshine Act* (Washington, DC: Government Printing Office, 1978), xiii, http://hdl.handle.net/2027/mdp.39015013513950.

by consent or under deposition. The five-member NTSB board chairs the investigative hearing held at NTSB headquarters in Washington, DC. Depending on the nature of the accident or investigation and the politicization of the event, these hearings can be highly publicized in the media.

5. Board Meeting

The penultimate step in the process is the NTSB board meeting, which determines probable cause and at which the board votes on recommendations based on the totality of the data. For accountability, this hearing takes place in a public forum. Ultimately, the findings and conclusions appear before the board for adjudication. Adjudication may involve adopting the entire draft report, instituting revisions to the report, requesting further investigation, or finalizing the report with updates considered during the open board meeting.[186] All of the previous data collection, deliberation, and sensemaking are now prepared as a product intended for learning and industry change.

6. Final Report

The NTSB then issues a final report and disseminates it via its website. The report generally contains four sections that cover the factual events of the incident, the analysis of the data collected, the conclusion of the NTSB board, and subsequent safety recommendations to be employed. While the NTSB has no regulatory power over compliance, the data suggest that compliance is generally adopted by industry.[187] When the NTSB makes a recommendation, it identifies the party responsible for the recommendation, clearly describes the rectifying measures, and identifies the overall safety measure that the action will meet.

---

[186] Lebow et al., *Safety in the Skies*, 22–23.

[187] Bryson, "How the NTSB Handles a Major Accident Investigation," 35.

C. CASE STUDY: MOTOR VESSEL CONCEPTION

The *Motor Vessel* (*MV*) *Conception* was involved in one of the deadliest maritime accidents in modern history.[188] Thirty-three passengers and one crew member perished in a large shipboard fire. This tragic incident serves as a case study to demonstrate the attributes of the Go Team: fast learning and knowledge transmission, both within and outside the initial community of interest.

In the early morning hours of September 2, 2019, the *MV Conception* was beginning its third and final day of a charter scuba diving trip off the coast of Santa Cruz, California. The boat had a crew of six on board with 33 divers. At 3:14 a.m., the United States Coast Guard (USCG) received a distress call indicating a fire on the 75-foot vessel. The fire quickly engulfed the boat and spread to the cabin area where the stairs to the lower deck housing the berths were located. The crew, according to the NTSB, "attempted to access the salon and passengers below. Unable to use the aft ladder, which was on fire, the crewmembers jumped down to the main deck (one crewmember broke his leg in the process) and tried to access the salon and galley compartment, which was fully engulfed by fire."[189]

All the passengers and one crew member, who were sleeping below, perished. The above-deck crew jumped to safety to the water after radioing the emergency and continued to attempt rescue efforts, which were futile. The USCG then named the incident a major accident, which designated the NTSB the lead agency. Parties for this incident included the NTSB Go Team, Santa Barbara Sherriff's Office, Santa Barbara Fire Department, USCG, and Truth Aquatics, Inc., the vessel's owner.

Between September 3 and September 11, the NTSB Go Team conducted its field investigation of the incident. On September 12, 2019, the NTSB published the preliminary accident report outlining the key facts of the case but reserved probable cause. On September 10, 2019, two days before the release of the preliminary NTSB report, the USCG published the Marine Safety Information Bulletin No. 008-19, entitled "Passenger

---

[188] National Transportation Safety Board, "Preliminary Report Marine DCA19MM047."

[189] National Transportation Safety Board, 2.

Vessel Compliance and Operational Readiness." This bulletin "identifies regulations related to firefighting, lifesaving, preparations for emergencies, and means of escape that serve as a reminder for owners and operators to ensure the safety of the passengers and crew while onboard."[190] Among other requirements, the bulletin reminds operators to check emergency equipment and procedures, review the sleeping areas for passenger guests in relation to hazards present, and most importantly, "reduce potential fire hazards and consider limiting the unsupervised charging of lithium-ion batteries and extensive use of power strips and extension cords."[191] This first mention of the potential cause of the deadly fire was absent in the NTSB release two days later. Saving the cause determination until the final report is consistent with the NTSB's procedure.

The arrangement between the USCG and the NTSB is established in 49 C.F.R. § 831.55. It stipulates, "The NTSB conducts marine casualty and major marine casualty investigations. . . . [T]he NTSB and USCG work together to collect evidence related to marine casualties and major marine causalities," and furthermore, the NTSB "independently analyzes the evidence and determines the probable cause of marine casualties and major marine causalities."[192] Under this mandate, the USCG leverages the investigatory power of the Go Team when maritime accidents occur. To that end, the maritime industry had an initial safety bulletin, factually based, issued by the USCG eight days after the occurrence of the fire and an NTSB account two days after that. Although both the bulletin and the report were preliminary, they provided a common situational assessment for all entities across the United States. Although the NTSB report provided an accurate account of the events and avoided determining a cause until the final report was released, the USCG report provided some initial sensemaking by offering specific safety steps to review, such as the warning against charging batteries.

---

[190] U.S. Coast Guard, "Passenger Vessel Compliance and Operational Readiness," MSIB No. 008-19 (Washington, DC: U.S. Coast Guard, September 10, 2019), 1, https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5p/MSIB/2019/MSIB_008_19.pdf?ver=2019-09-10-115632-287.

[191] U.S. Coast Guard, 1.

[192] Relationships with Other Agencies, 49 C.F.R. § 831.55 (2019), https://www.govinfo.gov/content/pkg/CFR-2019-title49-vol7/pdf/CFR-2019-title49-vol7-sec831-55.pdf.

D. DISCUSSION

The discussion of the NTSB case focuses on three similar factors evaluated for both the 1 October exemplars and CALL. Timeliness, sensemaking, and the efficient dissemination of knowledge are all critical factors that contribute to organizational learning.

1. Timeliness

The speed of a deployment for a significant accident or investigation is crucial. The NTSB Go Team process institutionalizes the ability to muster a technically qualified team to contribute to organizational learning from a tragic incident. In this instance, capturing information as quickly as possible is vital, given the perishable nature of evidence and the fleeting nature of memory. As Lebow et al. state, "The field notes are the only official representation of conditions immediately following an accident. They are very important because a witness's memory of events can change with time and the wreckage itself can be altered shortly after the on-scene phase of the investigation is completed."[193] As is described in the NTSB's Go Team description, the logistics of putting an entire team on the ground with no notice requires significant planning and operational effort.

The Go Team being deployed has the responsibility of collecting data. This process is established in the major team's *Investigation Manual* of the NTSB.[194] The Operations Center handles common issues such as the identification of a base of operations for the team, lodging and flights if needed, and transportation. Having a non-deployed employee handle team needs frees the team, especially the IIC, to concentrate on assembling the appropriate team for the incident and focusing on the best plan for the exploitation of the site. It also allows for a full-time operations assistant who is remote from the site for near real-time incident support. Having a pre-established policy regarding the party process, delineation of duties, and the authority of the IIC allows the team to hit the ground and be efficient in executing its investigatory responsibilities.

---

[193] Lebow et al., *Safety in the Skies*, 18–19.

[194] National Transportation Safety Board, *Aviation Investigation Manual*.

Comparatively, not many no-notice teams exist in the homeland security environment. FEMA's Urban Search and Rescue (USAR) teams, the FBI's Fly Team, and the NTSB are three examples among tens of thousands of operational response units responsible for near real-time organizational learning and knowledge management. In the case of USAR teams, learning is only a by-product of operational response, as the primary function of these teams is to provide rescue and medical services to areas hard hit by natural or manmade disasters. The FBI's teams perform mandated investigations rather than optimize emergency response.[195] No real-time learning team exists to optimize the response of first responders.

2. Sensemaking

Sensemaking implies making order from the unknown. The NTSB Go Team process aims to combat disorder quickly. In the example given, experts across the United States collaborate with multiple agencies and disciplines to produce a factual report in nine days. Specific to the *MV Conception* case, Go Team members had to access a geographically difficult area, analyze evidence that was mostly submerged underwater, and produce a meaningful report in accordance with their agency's charter.[196] This sensemaking becomes less difficult when all parties expect the investigation. The Go Team, armed with legislation, does not have competing priorities of gaining access to those with the information and simultaneously conducting the investigation. Because all involved understand the need and role of the NTSB, the Go Team can deploy and go to work.

External validity is important to the discussion of near real-time learning because, according to Leighton,

> external validity can be generalized to a broader group of individuals than those originally included in the study. External validity is relevant to the topic of research methods because scientific and scholarly investigations are

[195] For more information about the FBI's Countering Terrorism Fly Team, see Robert Mueller, *The FBI's Counterterrorism Program since September 2001: Report to the National Commission on Terrorist Attacks upon the United States* (Washington, DC: Department of Justice, 2004).

[196] Patrick Kelley, "MV Conception Salvage Barge Arrives," Department of Defense, accessed July 14, 2020, video, 1:58, https://dod.defense.gov/News/Special-Reports/Videos/?videoid=707250.

> normally conducted with interest in generalizing findings to a larger population of individuals so that the findings can be of benefit to many and not just a few.[197]

Sensemaking infuses the NTSB Go Team's process since SMEs within each subgroup (e.g., human performance, weather, and materials) interpret the data presented. When applicable, the team translates the data for the NTSB board and makes recommendations for the transportation community. Sensemaking plays a valuable role because the NTSB board adjudicates. The process prohibits self-assessment and encourages debate and dissent in underlying causes.[198] This process parallels peer review in academic journals and adds a high level of scrutiny and trust in the process.

3. Dissemination

The NTSB aims to produce a preliminary report within one to three weeks of an event. Dealing with issues related to safety makes fast learning essential since sifting through the time-sensitive facts takes time. Even with fully developed information, transmitting knowledge stocks to end-users is not immediate. Even though the NTSB compiles field notes into a preliminary report from the accident site, disseminating such notes to agency personnel not present on scene takes time. These preliminary reports also represent a low hurdle to obtain detailed and incident-specific information with a few clicks of a mouse or keyboard. The speed of dissemination is important. However, housing the information in one specific and expected location is equally important. That way, all involved understand where to look for it.

The preliminary report, along with the future final report released in one to three years, also represents an official record of the investigation and a documented paper trail of the recommendations, whether implemented or not. This knowledge repository allows for a wide body of data available to future investigators to apply to current practice. These

---

[197] Jacqueline P. Leighton, "External Validity," in *Encyclopedia of Research Design*, ed. Neil J. Salkind (Thousand Oaks: SAGE Publications, 2020), 468, https://doi.org/10.4135/9781412961288.

[198] Christopher Baber and Richard McMaster, "Individual Sensemaking," in *Grasping the Moment: Sensemaking in Response to Routine Incidents and Major Emergencies* (London: CRC Press, 2016), 61–69, 72, https://doi.org/10.1201/9781315585796.

dissemination pathways also stipulate who is responsible for maintaining the learning data and allows for funding of such efforts. Ultimately, no matter how vast or detailed the archive is, a distribution and storage pathway must also be optimized to enhance both knowledge management and information transmission.

E. CONCLUSION

The NTSB has a significant institutional history of deploying to accident sites, completing technical investigations, and reporting key findings that often spur change in the transportation industry that can be modeled by the HSE. Given the timeliness of the Go Team response, swift data collection under chaotic event circumstances, the ability to quickly collect and make sense of data from multiple systems, and an established and effective route of dissemination, the NTSB model could be applied to other high-impact and complex incidents that require near real-time information and analysis to improve industry practices or processes.

Such application warrants further study in how to adapt a transportation-based research model to other event types since modifications may be required. The board follows a coordinated and standardized process that is both repeatable for future incidents yet adaptable for each event according to differences in modes of transportation, the magnitude of the event or investigation, or the technical areas of inquiry to be examined. This standardization also allows for consistency when presenting data to all stakeholders, whether industry partners, media, family, or other government agencies. The case study does illustrate that it is indeed possible, with the proper resources, to perform near real-time data collection and sensemaking in a meaningful fashion in a quasi-emergent environment.

F. FINDINGS

This thesis has demonstrated that strategic organizational learning principles do not exist in the HSE. Strategic learning "aims to generate learning in support of future strategic initiatives that will, in turn, foster knowledge asymmetries that can lead to differences in

organizational performance."[199] Given the stakes of the HSE, mainly lives and property, realizing optimized organizational learning requires greater systematic effort, including a more rapid tempo. Fast learning can be accomplished with multidisciplinary Go Teams using "a telescope, not a vacuum cleaner" approach, as in Haiti by CALL.[200] A real-time learning approach should intersperse traditional learning tools, such as AARs, rather than replacing them. As Birkland summarizes, "The challenge for democracies is to create the sort of public pressure necessary to make learning processes more realistic and responsive to the problems and to the needs of the organizations, communities, regions, and nations in which these events occur."[201] Focusing on critical response areas (telescope), rather than sucking up any and all information (vacuum), is critical. The HSE Go Team concept models how to optimize organizational learning after an event.

Organizations need to spearhead continuous learning from new threats before high-threat events occur. Ultimately, the results show that homeland security learning lacks timeliness, a small, well-qualified group needs to exploit new knowledge and apply it within the context of the HSE, and effective dissemination must be measured.[202]

1. Ritualization/Cognitive Activation

CALL, NTSB, and the HTI approach demonstrate stable, repeatable approaches to learning. Within the HSE environment, complex emergency services operations have a battle rhythm. Police, fire, and EMS break down critical job performance tasks into multiple steps, often using checklists for operations, training, and evaluation. The HSE learning environment lacks such standardization in what is to be learned from a high-threat event. Thus, lessons learned from one event cannot be generalized to the next.

---

[199] Thomas, Sussman, and Henderson, "Understanding 'Strategic Learning,'" 331.

[200] Thomas, Sussman, and Henderson, 336.

[201] Thomas A. Birkland, "Disasters, Lessons Learned, and Fantasy Documents," *Journal of Contingencies and Crisis Management* 17, no. 3 (September 2009): 155, https://doi.org/10.1111/j.1468-5973.2009.00575.x.

[202] The argument here is that just because a report is placed on a website does not necessarily translate into learning or even effective transmission of information. Quantifying how the information is received and then acted upon by the user to create additional operational capacity or change would be valuable for organizational learning.

As Snowden, creator of the Cynefin framework states, "Ritual is one of the most effective methods of changing cognitive activation."[203] Cognitive activation—the process by which the brain prepares itself to do a specific task, almost automatically—uses pattern matching and best-fit analysis to compete against differing decision pathways. Having pre-established teams for organizational learning, such as CALL, the NTSB, and HTI, establishes cognitive activation. No equivalent entities drive cognitive activation for organizational learning in the HSE.

2. Absorptive Capacity

Cohen and Levinthal describe absorptive capacity as "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends," which also facilitates innovation.[204] Total absorptive capacity represents prior knowledge known to the firm, research and development, and experience of the processes that support the product, such as manufacturing. Though the HSE does not encompass manufacturing, its learning and innovating require increasing absorptive capacity. If new domains require "diversity of knowledge," such as the high-threat space, a "diverse background provides a more robust basis for learning because it increases the prospect that incoming information will relate to what is already known."[205]

The jurisdiction experiencing the event sometimes issues after-action reports. This self-assessment may involve not only conflicts of interest but also an absorptive capacity gap. The jurisdiction cannot know what it does not know. This organizational Johari window exacerbates an integrated multi-disciplinary response.[206] Zahra and George's expanded work may be most applicable for HSE organizational learning as they describe

---

[203] AcademiWales, "Dave Snowden - How Leaders Change Culture through Small Actions," YouTube, July 26, 2016, video, 1:11:06, https://www.youtube.com/watch?v=MsLmjoAp_Dg. The sensemaking Cynefin framework has applicability for the HSE, especially in novel events.

[204] Wesley M. Cohen and Daniel A. Levinthal, "Absorptive Capacity: A New Perspective on Learning and Innovation," *Administrative Science Quarterly* 53, no. 1 (1990): 128, https://doi.org/10.2307/2393553.

[205] Cohen and Levinthal, 131.

[206] The Johari window, created by Joseph Luft and Harrington Ingham (Jo/Hari) in 1955 and generally represented as a four-quadrant 2x2 model, explains the relationship between one's self and others. The model compares what is known and unknown against the four quadrants of open, blind, hidden, and unknown.

absorptive capacity as "a set of organizational routines and processes by which firms acquire, assimilate, transform and exploit knowledge to produce a dynamic organizational capability."[207] Establishing a multi-disciplinary team with a standardized and structured approach to learning from high-threat events would naturally increase HSE absorptive capacity.

[207] Shaker A. Zahra and Gerard George, "Absorptive Capacity: A Review, Reconceptualization, and Extension," *Academy of Management Review* 27, no. 2 (2002): 186, https://doi.org/10.5465/amr.2002.6587995.

THIS PAGE INTENTIONALLY LEFT BLANK

V. CONCLUSIONS AND RECOMMENDATIONS

Facts do not cease to exist because they are ignored.

—Aldous Huxley

The data presented in the previous chapters demonstrate that near real-time data collection following a high-threat event is possible and that such data can be meaningful and accurate. The two case studies of CALL and the NTSB illustrate that systemic organizational learning practices contribute to both knowledge management and knowledge transfer. Therefore, the homeland security enterprise should evaluate ways in which to institutionalize organizational learning in a more meaningful fashion. This chapter summarizes best practices from the case studies, provides conclusions and recommendations on moving forward with quicker learning processes, and suggests further research for optimizing the HSE learning environment.

A. RECOMMENDATION FOR A NEAR REAL-TIME LEARNING FRAMEWORK

The near real-time HTI data collected immediately after the 1 October event suggest the HSE should establish an entity dedicated to optimizing data collection and analysis for national-level organizational learning. Two related federal precedents relate to this effort. First, National Security Presidential Directive (NSPD) 44 seeks "to promote the security of the United States through improved coordination, planning, and implementation for reconstruction and stabilization assistance for foreign states and regions at risk of, in, or in transition from conflict or civil strife."[208] NSPD 44 directs the secretary of state to ensure this occurs in conjunction with an appointed coordinator for reconstruction and stabilization.

Importantly, one of the mandates of this directive is to "identify lessons learned and integrate them into operations."[209] NSPD 44 suggests the criticality of a systems approach

[208] George W. Bush, *Management of Interagency Efforts Concerning Reconstruction and Stabilization*, National Security Presidential Directive 44, (Washington, DC: White House, 2005), 1.

[209] Bush, 4.

to institutionalizing organizational learning for complex operations or, in the case of the HSE, complex incidents. The intent is also to capture verified procedures and incorporate responses into future deployments, suggesting organizational learning. Finally, the NSPD suggests the need for speed in the learning process as well as the implementation of other learning tools such as "gaming exercises, training, and after-action reviews," which could be applicable in the HSE if there were a national coordinating authority.[210]

Another precedent lies in Presidential Decision Directive 56. While not regulatory in nature, it is intended to represent best practices for managing complex military peace operations. Organizational learning is cited as a relevant task—especially learning from "crisis management procedures to ensure that we, as a government, are learning from our experiences with complex contingency operations and institutionalizing the lessons learned."[211] Both of these presidential documents set the stage for a structural mechanism for nationwide organization learning; however, more will be needed.

A mandate to implement organizational learning from significant high-threat events must also be accompanied by a mandate for individual agencies involved to share data from the event. While some data would be publicly available to a research team, near real-time data would need to be in the form of interviews and accounts of responders.

1. National-Level Learning Teams

This thesis provides an analytical framework for future HSE organizational learning based on successful models. Although individual agencies may still produce official (and often self-assessed) after-action reports, near real-time learning from external SMEs must still optimize learning for the entire HSE within weeks, not years.

By design, learning teams should be sufficiently broad and scalable for each event. Professional organizations for each discipline type (fire, EMS, law enforcement, and emergency management) could be combined to streamline the learning process. Functional

---

[210] Bush, 5.

[211] William J. Clinton, *Managing Complex Contingency Operations*, Presidential Decision Directive 56 (Washington, DC: White House, 1997).

learning teams could also provide a structure for a deep pool of SMEs, grounded in the established learning methodology, for deployment. Although not comprehensive, the following discussion illustrates many best practices from the case studies and the scholarship and provides the foundation for a framework for quick learning from high-threat events.

2. Near Real-Time Incident Access

CALL and the NTSB enculturate the near real-time learning process. CALL represents learning that is doctrinally approved, and the NTSB comes from a legislative mandate. Their official approval gives weight to the learning teams and their deployment. Having pre-established learning team roles, responsibilities, and structure eases this burden. Also, having personnel on the ground who expect to be contacted about a debriefing directly after an incident occurs ensures information can be captured quickly. Pre-event expectation setting potentially translates into rapid sensemaking and dissemination. If organizational learning is to be held in a higher regard for the HSE, the expectation for learning teams to be deployed after every significant high-threat incident should be institutionalized.

As discussed in Chapter I, the traditional measure of organizational learning, the after-action report, takes a great deal of time to produce. Compressing this timeframe stands to benefit the community even if no overhauls to the organizational learning process are made. As Evans summarizes, "Organizations need to consider the dimensions of space and time when choosing appropriate learning approaches to maximize opportunities for knowledge transfer."[212] The value of being on the ground directly after a high-threat event cannot be overstated, as the causal relationships between networks (the interagency response) must be quickly explored.

Near real-time data collection (proximity) also insulates sensemaking from political intrusion based on sensitivities stimulated by any jurisdiction. It also, much like the NTSB methods, reinforces the need for rapid sensemaking by experts and transmission of data

[212] Christina Evans, *Managing for Knowledge: HR's Strategic Role* (Boston: Butterworth-Heinemann, 2003), 117.

back to a centralized authority. This sensemaking is also articulated in the CALL process with rapid transmission back to headquarters and dissection by the learning team and analysts. As the HSE lacks this capability, getting near real-time data, processed through a sensemaking organization, would unequivocally add value to homeland security. If physical proximity is important to the organizational learning process, as suggested by Lee, temporal proximity must also be analyzed for accretive value.[213]

3. Local-Level Learning Officers

Successfully implementing organizational learning requires a bottom-up as well as a top-down approach. Much like other integrated efforts, it must represent the whole of community. This approach ensures both top-level structural support and boots on the ground buy-in. To that end, every professional law enforcement, fire, EMS, emergency management, and federal response agency must identify local learning officers to champion organizational learning. The HSE must replicate the learning officers (LOs) of both CALL and the NTSB to champion learning for the broader community.[214]

These LOs would have several roles. First, they would be responsible for engaging national-level learning go-teams when deployed. Since local LOs would understand the local dynamics of who responded, what was or was not accomplished, and successes or failures, they could ready the scene for the learning team. Initial LO deployment to a high-threat event would also parallel the NTSB's initial stake-down process.[215] Early LO deployment would relieve the go-team of the dual responsibilities of logistical concerns of getting to the site and arranging access to responders.

Besides coordinating the responding post-event learning team and local assets, a local LO would also champion organizational learning with an agency. Obviously, given

---

[213] Sunkee Lee, "Learning by Moving: Can Reconfiguring Spatial Proximity between Organizational Members Promote Individual-Level Exploration?," *Organization Science* 30, no. 3 (2019): 467–88, https://doi.org/10.1287/orsc.2019.1291.

[214] While it was outside the scope of this thesis, learning officers also facilitate learning in foreign military organizations. See Tom Dyson, *Organizational Learning and the Modern Army: A New Model for Lessons-Learned Processes* (Abingdon, UK: Routledge, 2020), 11.

[215] Bryson, "How the NTSB Handles a Major Accident Investigation."

the size of some of the larger organizations, multiple learning organizations may need to be appointed. As high-threat incidents occur nationally, LOs would be local points of contact, responsible for disseminating lessons observed or near real-time information for the agency. Having an engaged local LO would relieve a central organization from optimizing the learning process and disseminating first-responder intelligence. The LO would receive information from major incidents as well as timely research into novel tactical advances as they occur. Given the success of CALL's push and pull methodology, discussed in Chapter III, learning officers would also be points of contact for the plethora of departments nationwide to submit questions. A fully structured national-level learning organization could then prioritize those requests for the HSE and conduct research or additional real-time learning to answer the question appropriately.

Although all three case studies demonstrate organizational learning in a military or paramilitary environment, the CALL case study unequivocally shows the need for a specialized and formal organizational learning process. This is due to the speed with which learning needs to occur and the specialization needed to be effective. Moreover, it specifically highlights the need for both learning officers and specialized learning teams because organizational learning must be championed and integrated fully into the organizational ethos. Organizational learning for the HSE must itself become specialized, given the evolving and technical nature of the work requires such specialization.

CALL shows that dedicated institutional learning officers who both manage and lead the learning process are a critical node for organizational learning. Learning officers help craft learning objectives to specify what needs capturing, coalesce a team to accomplish the objectives, and are responsible for making sense of data—ultimately converting the data into knowledge for dissemination. CALL, as an organization, uses specialized learning teams to deploy to active military engagements as well as training sites to collect data. At the end of the team-led process, information not only gets disseminated but often changes doctrinal processes. The instances in the Balkans and Somalia allowed the organization to pivot quickly in contrast to after-action reviews. Thus, HSE processes do not allow such nimbleness, nor do doctrinal changes frequently occur. Lessons learned from the high-threat Columbine massacre, for example, did not prompt changes to fire

service integration tactics until 15 years later.[216] Thus, lessons not learned must end by applying new organizational learning tactics guided by an agency solely dedicated to this cause.

4. Incubators and Advocacy Networks

Incubators and advocacy networks contribute to doctrinal change because they allow for experimentation in a safe space and provide critical representation of new ideas within an organization. Jensen articulates these two concepts as they apply to the military environment.[217] To use a Silicon Valley analogy, incubators are small, fast, and light entities that rapidly develop prototypes. In the military or HSE context, incubators are much the same, but they reside outside the big bureaucracy. Incubators set preconditions that allow for the acceptance of failure, iteration, and adaptation. Contextually, incubators could develop new tactics or confirm the effectiveness of current ones. Advocacy networks apply the experimentation of an incubator horizontally across an organization. Advocacy networks can also help to overcome cultural resistance to change. If "professional soldiers require these safe spaces to visualize new forms of warfare," the HSE likewise requires space and time (incubators) along with a dedicated pipeline of professionals to advance issues in a scientifically rigorous manner.[218]

Exploring new issues means more than just the deployment of a specialized team to a high-threat event and should include novel thinking during normal operations if the HSE is to learn both faster and better. The concept of incubation and advocacy networks is the applied learning required once knowledge is generated. For example, if a deployed go-team captured information about specific first-responder tactics that were used, those tactics should be tested against other available tactics to confirm efficiency or effectiveness through analysis and not anecdote. Understanding the limitations of current tactics or the

---

[216] William H. Erickson, *The Report of Governor Bill Owens' Columbine Review Commission* (Denver: Columbine Review Commission, 2001). Note: Law enforcement tactics evolved quickly after this event, transitioning to immediate contact teams to address active threats; however, the first warm zone integration teams with fire and EMS providers did not evolve until 2011.

[217] Jensen, *Forging the Sword*, 1–2.

[218] Jensen, 2.

creation of new ones would be under the direct purview of incubators. Innovation in the HSE becomes especially important when dealing with interagency response as one response agency depends on another to complete mutual incident objectives. Warm zone integration is a prime example of interdependencies among multi-disciplinary agencies. The fire/EMS mission must be in close and constant coordination with police resources.

Themes of both incubators and advocacy networks can be found in all of the examples provided. CALL, the NTSB, and the HTI each possess core elements. At CALL, in-field data collection leads to learning. That learning is a direct result of trying new tactics and procedures as well as using simulation and training to confirm or deny results.[219] CALL also acts as an advocacy network as the organizational structure points to CALL when there is a deficit in knowledge. CALL maintains a repository of information, so it continually acts as an advocate.

The NTSB is undoubtedly an advocate for safety and assimilates learning from the quick collection of crash or accident evidence. The NTSB becomes the advocacy network for the improved safety process based on the learning process. It has simulation at its disposal when new procedures or processes need to be tested and is a small unit separate from heavily regulated and burdened big government.

The HTI acts as an incubator focusing on new and novel threat types and proposing additional tactics and procedures to meet them. As a newly formed organization, it has established advocacy networks from the professional organizations of its members. It has also acted as an incubator proposing and executing on near real-time data collection from the 1 October incident. Regarding doctrinal change performed by the initial work of incubators, Jensen writes, "Size matters. Small proved beautiful. Some of the most innovative work and imaginative thinking was done by small cohorts."[220] The potential for incubators and advocacy networks, even small ones in the HSE, should not be underestimated. The HTI model also exhibits signs of "infection pathways" within the

---

[219] Darling and Parry, "After-Action Reviews," 65–67.

[220] Murray E. Jensen, *Current Issues in Knowledge Management* (Hershey, PA: Information Science Reference, 2008), 144.

advocacy network by connecting distant points of information with communities of interest.[221] "As military professionals develop new theories of victory they need to reach beyond their immediate peers to infect the larger institution," says Jensen; the HSE, too, needs to broadly influence communities of interest that are not directly related to the learning opportunity.[222] Specific to high-threat learning, the HTI acted as a "connecting agent," creating a pathway for near real-time learning to reach the broader HSE.[223]

Whether one considers the properties of incubators, advocacy networks, or connecting agents, the cases demonstrate pieces of all three in the context of organizational learning. To advance the HSE in knowledge capture, information distillation, and dissemination of lessons from major events, elements of all three should be imitated.

B. SUMMARY

Given the rate and magnitude of change, organizational learning systems should be implemented to address what Jones and Mahon term high-velocity/turbulent environments (HVTEs) for the HSE. High-threat events align with HVTEs because "change is rapid, large and discontinuous."[224] Learning during these types of events can be plotted as a continuum ranging from adaptation to innovation.[225] However, for organizational learning from an HVTE, "the time between when something is learned and applied must be greatly compressed"—if the HSE wants to address novel threats and tactics.[226] Thus, achieving organizational learning in the homeland security enterprise must address both individual and organizational learning. Both must be responsible for knowledge transference such that organizations "will be asked to deliver just-in-time learning, devise mechanisms for helping people learn at the point of action from their own experiences and create

---

[221] Jensen, *Forging the Sword*, 145.

[222] Jensen, 145.

[223] Matthew Syed, *Black Box Thinking: Why Most People Never Learn from Their Mistakes—but Some Do* (Reno, NV: Penguin, 2015), 199.

[224] Nory B. Jones and John F. Mahon, "Nimble Knowledge Transfer in High Velocity/Turbulent Environments," *Journal of Knowledge Management* 16, no. 5 (2012): 776, https://doi.org/10.1108/13673271211262808.

[225] Jensen, *Forging the Sword*, 8–9.

[226] Baird, Henderson, and Watts, "Learning from Action," 386.

mechanisms for transferring experience and knowledge from one part of the organization to another."[227]

Multiple organizations with different responsibilities and scopes make it necessary for each one (EMS, fire, and police) to learn for itself. Likewise, the coordination of those agencies demands that the Department of Homeland Security, FEMA, a nonprofit, or scholars need to manage a knowledge transmission process. Jones and Mahon observe that "one of the challenges of management is to recognize that decisions in high velocity/turbulent environments cannot wait for complete information and knowledge—it is the ability to combine explicit knowledge and limited information with tacit knowledge that yields unique breakthrough solutions."[228] Given the inherent incompleteness of information during HVTEs, traditional government organizations will be reluctant to release incomplete response data even though this type of information may contain the most useful incident intelligence. In the HSE's case, this knowledge chasm, between what is known immediately and what is known in the long term, shows little difference on either side.[229] The key element needed to connect the two is speed, structured within a systemic process built specifically for HSE organizational learning.

---

[227] Baird, Henderson, and Watts, 386.

[228] Jones and Mahon, "Nimble Knowledge Transfer in High Velocity/Turbulent Environments," 780.

[229] The use of Geoffrey Moore's crossing-the-chasm analogy evokes the divide between what can be learned quickly and what is learned through slower traditional mechanisms such as AARs. Moore uses it in the context of marketing to convert market shares from the early adopters to the early majority, thus increasing total sales of a product. This transition represents a significant hurdle, according to Moore. Arguably, the "knowledge chasm" is not as large in homeland security, so quick learning should be embraced in the HSE as an organizational tool. Geoffrey A. Moore, *Crossing the Chasm,* 3rd ed. (New York: HarperCollins, 2014).

THIS PAGE INTENTIONALLY LEFT BLANK

VI. IMPLEMENTATION CHALLENGES, LIMITATIONS, AND FUTURE RESEARCH

> True ignorance is not the absence of knowledge, but the refusal to acquire it.
>
> —Karl Popper

A. IMPLEMENTATION

Several barriers inhibit national-level organizational learning in the HSE. They include a legitimate mandate to include learning as a competency for response agencies; indemnification, so professional responders feel free to discuss issues openly without fear of retribution; and the significant problem of collective action.[230] Identifying these barriers and working to minimize them will enhance efforts to optimize organizational learning for the HSE.

1. Lack of Legislative Mandate

Information sharing has long been cited as an impediment to organizational learning in the homeland security environment.[231] In this context, *The 9-11 Commission Report* assessed that the nation needed to pivot from a culture of "need to know" to "need to share" after the intelligence and information sharing failures leading up to the attack.[232] Although this requirement to share applies to prevention efforts for the HSE, lessons not learned pervade major homeland security events. Most certainly, learning efforts could be

---

[230] Chatham House rules, which originated in 1927 at the United Kingdom's Royal Institute of International Affairs, supply a method to discuss emotionally charged, sensitive, or controversial issues in an informed manner without fear of retribution or future attribution. An analogous term, Monterey rules, is used at the Center for Homeland Defense and Security among students to discuss critical and controversial issues in homeland security under the same auspices.

[231] National Commission on Terrorist Attacks upon the United States, *The 9/11 Commission Report* (Washington DC: National Commission on Terrorist Attacks upon the United States, 2004), 79, https://govinfo.library.unt.edu/911/report/911Report.pdf; Donahue and Tuohy, "Lessons We Don't Learn"; Mark E. Nissen and Tara A. Leweling, "Knowledge Sharing as a Contingency in the Design of Counterterrorism Organizations," *International C2 Journal* 4, no. 2 (2010): 3; Christopher Bellavita, "Changing Homeland Security: A Strategic Logic of Special Event Security," *Homeland Security Affairs* 3, no. 3 (2007): 4.

[232] National Commission on Terrorist Attacks upon the United States, *The 9/11 Commission Report*, 417.

increased if some level of mandate existed. The problem of lessons not learned is so pervasive among the HSE that the contents of the next after-action report are jokingly said to exist before the next event occurs if incident command and communication are included as topic areas. Standing or recurring topic areas for the next after-action report suggest a broken organizational learning environment for the current HSE.

In our federal system with 50,000 police, fire, EMS, and emergency management agencies in the United States, conducting an after-action review lies with local agencies. National disasters or those with national security implications such as 9-11 have risen to the level of a federal mandate. However, significant incidents with homeland security implications run the gamut. Some incidents receive extensive scrutiny while others receive less or none at all.[233] Some are self-assessed, and some are independently assessed.[234] Standardizing what incidents are scrutinized and how they are studied, especially focusing on a mechanism that discourages self-rating by the involved jurisdictions, is paramount.

Agencies might be reluctant to share for several reasons, including liability concerns and privacy issues. Both would need to be mitigated with a sharing mandate. The mandate to share ultimately drives the organizational learning process, which transcends any one agency, locality, or department. Raising the competency level of the entire HSE, could potentially pay significant dividends toward future lifesaving efforts as threat actors and their tactics evolve. A mandate for post-event sharing of information could be tied to the acceptance of grant funds currently administered by the government. Similar mechanisms have already been placed by the Department of Homeland Security mandating the use of the incident command system.[235]

---

[233] Major incidents, such as the Pulse nightclub and Marjory Stoneman Douglass attacks, have received extensive reviews while the Pittsburgh synagogue received no official after-action review.

[234] Aurora, Colorado, published a self-assessed review prior to commissioning an independent third party for the movie theater massacre in 2012. The Broward County Aviation Department also self-assessed the Fort Lauderdale Airport active-shooter incident as did the Metropolitan Police Department for the Washington, DC, Navy Yard shooting. Incidents such as 1 October received both independently assessed and self-assessed reviews.

[235] Homeland Security Presidential Directive-5 mandates the use of the National Incident Management System, which is synonymous with the Incident Command System.

2. Indemnification

Indemnification of public agencies from tort or liability claims may become a barrier to organizational learning if not addressed. An agency chief or municipal head might not make personnel available if he thinks that the data collected could result in litigation. Yet without internal pressure, responders are willing, even eager, to discuss their response when framed as an organizational and national learning opportunity.

The 2001 anthrax attacks brought indemnification into focus as a part of the larger national conversation around bio-preparedness and readiness for terrorism. The *Code of Federal Regulations* allows the president to amend contractual language, even if it contradicts other law when needed in the name of national defense practices, in relation to medicines and vaccines needed for recovery from a biological weapons attack.[236] This preparedness would include the indemnification of liability from adverse effects.

The Support Anti-Terrorism by Fostering Effective Technologies (SAFETY) Act of 2002 assuages liability concerns for first-responder emerging technologies. The SAFETY Act "provides important legal liability protections for providers of Qualified Anti-Terrorism Technologies—whether they are products or services. The goal of the SAFETY Act is to encourage the development and deployment of new and innovative anti-terrorism products and services by providing liability protections."[237] Although these current laws address therapeutics and equipment, if knowledge of significant events could be protected for near real-time organizational learning, one might see the application. Exemptions could be carved out for standard issues such as neglect, malice, or gross incompetence.

3. Collective Action

Organizational learning from large-scale, high-threat events suffers from a collective-action problem. In it, an academic institution, government agency, or a

---

[236] Indemnification under Public Law 85-804, 48 C.F.R. § 52.250-1 (1984), https://www.law.cornell.edu/cfr/text/48/52.250-1.

[237] "Safety Act," Department of Homeland Security, accessed July 17, 2020, https://www.safetyact.gov/.

structured collection of informed responders must champion the process for the HSE, which requires an investment of time and resources. Even if an organization performs its own assessment of an event, ensuring the learning process works for the rest of the HSE community exceeds its reach. Further, such an agency has no incentive to fully disseminate information to the broader community outside the agencies that experienced the event.

This lack of information distillation suggests that an ordered approach must be created for HSE organizational learning. This ordered approach must be actively managed by a new entity dedicated solely to its cause. Like CALL or the NTSB, the HSE enterprise must view knowledge and information as "communal property rather than a source of individual power."[238] An independent agency responsible for learning relieves the burden of information collection, sensemaking, and dissemination to the departments involved and initially onto the learning team. Any agency involved could conduct AARs later, if warranted. A designated learning team would prevent self-scoring of the event, providing greater external validity for the entire HSE.

4. Contingency on Grant Funding

The collective-action problem of organizational learning entails delineating responsibility for coordinating and budgeting this effort. This research indicates that organizational learning can be accomplished in a more effective and structured manner and yield positive results for the HSE. The question is, who funds the effort?

Although this thesis provides a framework to facilitate organizational learning, funding the effort falls outside its scope. But mechanisms exist to compel effort. By establishing an individual agency, learning officers could be contingent on the massive amount of grant funding in the HSE. Through the Department of Justice grants, Urban Area Security Initiative funds, State Homeland Security Grant Program, Staffing for Adequate Fire and Emergency Response, and Assistance to Firefighter Grants, the federal government supplies funding to police, fire, EMS, and emergency management agencies. Much like continued grant funding is contingent on the adoption of the Incident Command

[238] Chua and Wing, "Center for Army Lessons Learned," 73.

System by all agencies, organizational learning could become the federal government's unfunded mandate. Practically, this means that agencies establish a point of contact for organizational learning, which most likely means another "other duty as assigned" for most smaller agencies. However, this assignment represents an opportunity to contribute to the goal of optimizing HSE practice, which also benefits the locality. Organizational learning structured in this way also aligns with a give-to-get approach. Agencies willing to share information also receive information and can optimize based on sensemaking they might otherwise not receive.

All in all, as Dyson has previously espoused in relation to the military, "without the correct organizational processes and activities, military adaptation can be blocked, or the wider lessons from adaptation can easily be lost, leading to the need to relearn lessons in the field, often at great human and financial cost."[239] This thesis argues that paramilitary organizations such as police, fire, EMS, and emergency management are no different. The lack of any institutional or formal learning management processes suggests a gap that must be immediately addressed to continue the missions of saving lives and property. In the absence of a quick formalized method to rapidly learn, the HSE will repeat past shortcomings, lack innovation, and be unable to adapt tactics rapidly. The ability of the HSE to establish lessons learned, rather than just lessons observed, has not been given sufficient coverage in the literature. This thesis contends that templates such as CALL or the NTSB, from which the HTI processes came, should be tested to increase national-level organizational learning from high-threat events.

B. LIMITATIONS

The most serious limitation to organizational learning relates to leadership. Although a true discussion of the leadership needed lies beyond the scope of this thesis, leadership must be exerted across stratified levels of government to realize organizational learning. In one of the most famous, and deadly, wildland fires in recent history, the iconography of "dropping tools" was used to demonstrate the actions needed for

[239] Dyson, *Organizational Learning and the Modern Army*, 1.

firefighters to save themselves from an on-coming flame front.[240] The firefighters who followed the tacit knowledge of their senior crew boss and dropped their tools quickly outran the fire and saved themselves. Those who did not ditch their gear perished.

Although the need to improve organizational learning extends beyond the fire service, the HSE needs to drop current tools and implement new methods to learn from high-threat events, at all costs. This process will require "meta-leadership" on a scale not previously realized.[241] Articulated differently,

> in the development of any effective knowledge management capability, leadership is important. . . . It is the leadership team that needs to keep the flexibility and relevance of tacit knowledge processes alive in the organization and to demonstrate by their own actions that tacit knowledge and its transfer is important.[242]

The adaptive leadership must enculturate organizational learning for the enterprise, not just a specific silo or discipline; high-threat response is multi-disciplinary in nature and organizational learning for the HSE must be, too.

C. FUTURE RESEARCH

This research proposes a novel approach to organizational learning *after* a significant high-threat event has occurred. However, how best to optimize the dissemination of knowledge or any lessons learned still needs to be assessed. Also, the degree to which the HSE can increase organizational learning in day-to-day circumstances is not well understood in the literature. The work above describes inter-disaster learning whereas long-duration events might also require intra-disaster learning, which is also unexplored here.

Implementing a national framework for learning will require future research, too. This framework might include an analysis of the effectiveness of a deployed learning team.

---

[240] For an account of the deadly Mann Gulch fire, see Norman Maclean, *Young Men & Fire* (Chicago: University of Chicago Press, 1992). For an organizational learning context, see Weick, "Drop Your Tools."

[241] Leonard J. Marcus, Barry C. Dorn, and Joseph M. Henderson, "Meta-Leadership and National Emergency Preparedness: A Model to Build Government Connectivity," *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 4, no. 2 (2006): 128–34.

[242] Jones and Mahon, "Nimble Knowledge Transfer in High Velocity/Turbulent Environments," 779.

Potentially, an effort could be made to standardize a base set of questions for each discipline at a high-threat event. Standard questions would prove useful for a comparative analysis of multiple events and individual discipline response mechanics. Some effort is underway nationally for standardized after-action review questions for hostile events; however, no enforcement mechanism is in place.[243] This effort to standardize questions could streamline the process for multiple teams to be activated for specific disciplines and warrants future research.

Finally, the stories of survivors sometimes capture the success and failure of emergency response systems. Notionally, these stories include important data points to consider in streamlining response practices, such as motivating factors of survival versus non-survival, self-provided medical care, civilian-provided medical care to others injured before professional help arrives, and concurrence or rejection of common public policy protection strategies such as Run, Hide, Fight. While this research concentrates on high-threat events, learning across many different areas within the HSE could be enhanced. Practitioners and scholars would also have the opportunity to compare and contrast incidents in a standardized fashion if a common framework for learning were employed.

[243] See National Fire Protection Agency, *Standard for Active Shooter and Hostile Event Response*.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX. COMPARISON OF FINDINGS

Table 3. General Incident Response Findings

Finding #	Finding	OAR	HTI
1	After the original shooting, police received multiple calls of additional shooters.	"Many responding officers reported that multiple distraction calls were heard over the radio, and they felt as if Las Vegas was experiencing a Mumbai-type of incident.34 Reports of active shooters as well as suspicious people, backpacks, and vehicles were coming in from all over the Las Vegas Strip."[1]	Interviewee stated many wounded went back to various hotels with GSWs and called 9-1-1. Police and fire initially believed it was a complex coordinated attack due to the number of reports across multiple venues.
2	The assailant actively surveilled police response and anticipated tactics.	"Officers attempted to enter the hallway to the 100 wing from the 32nd floor stairwell but were delayed entry due to the door being secured with a silver metal 'L' bracket. . . . Upon opening this door, they discovered a metal food cart, five to seven feet away, draped with a white tablecloth, dishes, and what appeared to be an improvised explosive device (IED) and a black recording device. Several wires were observed on the cart leading back into Room 32-134. Concerned there was an IED on the food cart, the officers developed a tactical plan."[2]	Interviewee reported a video feed from the hallway into the assailant's room.
3	Accurate victim counts and patterns of injury were captured.	"The gunfire began at approximately 10:05 p.m. and continued for over 10 minutes, with an excess of 1,000 rounds fired from various rifles from the 32nd floor of the Mandalay Bay Resort and Casino. The tragic result was the loss of 58 innocent lives and over 850 injured attendees."[3]	Approx. 1200 rounds of .223 and .308 caliber rounds. Possibly .273 caliber as well. They think approximately 700 pounds of ammunition in total. About 11 minutes of shooting.

[1] Las Vegas Metropolitan Police Department, *1 October After-Action Report*, 31.

[2] Las Vegas Metropolitan Police Department, 29.

[3] Las Vegas Metropolitan Police Department, 4.

Finding #	Finding	OAR	HTI
4	Planning efforts for the music festival were dictated by the number of personnel assigned to special events planning.	"On October 1, 2017, LVMPD's Events Planning Section was composed of one lieutenant, one sergeant, eight police officers, and three civilian support staff members."[4]	The police department has nine full-time special events officers, and the fire department has zero full-time personnel dedicated for special events.
5	An insider presence helped to narrow the location of the shooter for the authorities.	"While walking toward Center Core, Security Officer Campos heard gunfire coming from Room 32-135 and ran down the hallway. Security Officer Campos realized he was shot in his left calf as he took cover in the alcove of rooms 32-122 and 32-124. Using both his radio and cell phone, Security Officer Campos advised the security dispatcher he had been shot in the leg."[5]	A security guard for Mandalay Bay apparently rattled the door knob of the shooter's room, and the gunman shot through the door and the security guard was hit in the shoulder. We believe the security guard radioed this in and gave an accurate location of the shooter to the police.
6	Recognizing the initial response dynamics of responding officers pursuing the immediate threat afforded general situational awareness.	"The collection of officers who arrived at the 32nd floor stairwell consisted of several different units, uniformed patrol officers, plainclothes investigators, a K-9 supervisor, and a specialty trained SWAT breacher."[6]	The SWAT team reported to be on Floor 32 was just two SWAT operators, a patrol officer, and one canine officer.
7	Incursion onto the active runway at McCarran International Airport had significant response implications.	"At approximately 10:30 p.m., attendees fled the festival toward McCarran International Airport. LVMPD Air Support was advised of this development and broadcasted over the CCAC radio channel that multiple people were running across the runways."[7]	Two patients were driven to the firehouse at the airport. The vehicle broke through security and drove across two active airstrips to get to the firehouse. Subsequently, we find out through open-source, the shooter shot the fuel tanks with two rounds at the airport.

[4] Las Vegas Metropolitan Police Department, 15.

[5] Las Vegas Metropolitan Police Department, 40.

[6] Las Vegas Metropolitan Police Department, 29.

[7] Las Vegas Metropolitan Police Department, 41.

Finding #	Finding	OAR	HTI
8	The planning for the after-action review began immediately.	"The Fire Chief assigns four CCFD members to an AAR team. Several days later, LVMPD adds three members to this team and the Route 91 Task Force is created."[8]	The Fire Department assembled and detailed an AAR team two days after the incident.
9	The hotel prompted a response to the assailant's room. This information was conveyed via building intelligence from inside the room, which was monitored at a central control panel.	"On October 1, 2017, at approximately 2118 hours, Mandalay Bay Security Officer Jesus Campos was assigned to check several Hotel Service Optimization System (HotSOS) alarms from various rooms inside the hotel. Room 32-129 was the last of the rooms Security Officer Campos was assigned to check."[9]	It is the hotel policy to send one security officer to check smoke alarms or other problems prior to calling 9-1-1.
10	Establishing facts of how the incident unfolded and what unit actions occurred gives preliminary data to assess response effectiveness.	"In addition to taking fire and rendering medical aid, many officers who worked the festival formed strike teams to clear the venue for additional threats and search the venue for survivors."[10]	Metro uses X [number redacted to maintain operational security] strike teams of officers. The perpetrator did not exchange rounds with SWAT.

[8] Federal Emergency Management Agency, *1 October After-Action Report*, B-5.

[9] Las Vegas Metropolitan Police Department, *LVMPD Preliminary Investigative Report*, 5. A HotSOS is an alarm that is activated in a central monitoring station when the occupant leaves the hotel door open for a specified timeframe.

[10] Las Vegas Metropolitan Police Department, *1 October After-Action Report*, 26.

Table 4. Medical Findings

Finding #	Finding	OAR	HTI
1	Bleeding control equipment, specifically tourniquets, were not personally carried by the police.	"Operational readiness was hindered for the overtime officers assigned to the interior of the event, as their equipment was in vehicles parked at a church approximately 250-350 yards away."[11] "Working officers had access to at least one tourniquet in each patrol or unmarked police vehicle."[12]	Metro (Police Department) is provided tourniquets, but they're not required to wear it on their body.
2	Law enforcement provided immediate support to area hospitals to assist with scene stabilization and hospital security.	"Assigning LVMPD captains to local area hospitals was beneficial in establishing command at and around hospital locations to maintain site security and communicate with hospital administrators. These assignments also facilitated quick access for doctors and nurses, with credentials, into hospitals under tightened security following the mass shooting."[13]	Law enforcement set up a one-block perimeter around the hospital, and the interviewee was checked three times upon arrival. He said the hospital was back to normal operations by about 4:30 a.m.
3	Despite limited time, information, and access, authorities conducted a fairly accurate patient count.	"Of the over 870 documented survivors who suffered injuries, 400 suffered injuries as a result of gunshot wounds and/or shrapnel, and 360 of those documented survivors were injured in ways other than by gunshot wounds and/or shrapnel, and 95 survivors suffered documented injuries categorized as unknown."[14]	147 patients were transported by EMS, the rest by a privately owned vehicle. 527 injured, 59 dead. Most of the injuries were shrapnel injuries.

[11] Federal Emergency Management Agency, *1 October After-Action Report*, 23.

[12] Las Vegas Metropolitan Police Department, *1 October After-Action Report*, 98.

[13] Las Vegas Metropolitan Police Department, 54.

[14] Las Vegas Metropolitan Police Department, 109.

Table 5. Integration Findings

Finding #	Finding	OAR	HTI
1	Deployed rescue task forces had limited utility in this particular incident, identifying accountability and discipline of response as concerns.	"Two hours after the shots were fired, just after midnight, Unified Command broadcast 'no more hot zones,' so RTFs were officially able to enter the festival lot. An RTF is a combination of fire department and law enforcement personnel with the tactical objective of rescuing victims. This team consists of three or more fire personnel (one paramedic and one company officer) and two or more armed law enforcement officers. However, unbeknownst to Unified Command, the RTFs had already formed and entered the festival lot (a hot zone) to search for survivors before permission was given. This response into a hot zone did not follow standard protocol as listed in the Fire Department's Hostile MCI Policy."[15]	RTFs self-deployed from the staging area once operations got heated. Four RTFs were set up and ready to go very quickly into the incident.
2	All warm zones are not created alike, and specific tactics must be adjusted based on incident dynamics.	"Route 91's approximately 17.5- acre venue plot is assembled directly across from the Mandalay Bay and the Luxor Hotel & Casino and is one of two open-air venues on the Las Vegas Strip. . . . The venue was accommodating over 22,000 attendees."[16]	Interviewee asked back to the research team, "Where is the warm zone for an open-air venue?"
3	Rescue task forces operated in multiple zones of threat.	"Fire department Rescue Task Force team members operated outside of the Southern Nevada Fire Operations Hostile MCI policy to address supervisor shortages."[17]	Four RTFs were set up and ready to go very quickly into the incident. Fire department personnel were pushing to be deployed.

[15] Las Vegas Metropolitan Police Department, *1 October After-Action Report*, 27.

[16] Federal Emergency Management Agency, *1 October After-Action Report*, 7.

[17] Federal Emergency Management Agency, 27.

Table 6. Incident Command Findings

Finding #	Finding	OAR	HTI
1	The unified command established suffered specific challenges related to this complex incident but ones not easily anticipated.	"The CCFD Incident Commander was unable to leave his command vehicle because he needed to monitor radio traffic on multiple channels simultaneously. This confinement to his vehicle created initial challenges in establishing Unified Command with LVMPD."[18]	It took about 10–15 minutes to set up a unified command. PD had set up an incident command for the special event at the police substation. A Battalion Chief [name redacted] was the fire department incident command but was required to listen to four radios channels simultaneously. As such, he was unable to move to the unified command. Chief [name redacted] ended up going to unified command inside the substation and he assigned [name redacted] as the operations chief.
2	Prior to the shooting, the fire department was not represented in the command post.	"Prior to the incident, command was not unified at the Route 91 Harvest Festival. LVMPD and Community Ambulance were both operating in the venue as planned; however, CCFD was not integrated into the special event plans or operations. The Route 91 Harvest Festival did not integrate CCFD into the on-scene festival command post for the special event, as there is no ordinance or requirement that mandates a venue to include fire personnel in event plans or operations."[19]	Metro police are mandated by law to have a command component at the special event. There is no requirement to have fire involved. EMS is usually contracted for special events, but it doesn't sound like they are well integrated into the command structure for special events.
3	Initial command post for both police and fire became the hot zone.	"The LVMPD CCAC Captain notified officers over the radio that he was en route to South Central Area Command, which was the location he chose for the formal Incident Command Post (ICP). He also communicated initial information to Las Vegas Strip properties. Upon arrival at South Central Area Command, he assumed the role of Unified Incident Commander with CCFD personnel."[20]	Outside the venue, there was a series of trailers, and that is where the police incident command for the concert was set up (prior to the shooting).

[18] Federal Emergency Management Agency, *1 October After-Action Report*, 30.

[19] Federal Emergency Management Agency, 11.

[20] Federal Emergency Management Agency, 30.

Table 7. Community Recovery Findings

Finding #	Finding	OAR	HTI
1	The city quickly stood up a family assistance center (FAC).	"In the days following, LVFR staff assisted in establishing the Family Assistance Center and the Vegas Strong Resiliency Center and provided staffing resources."[21]	They said it will take 48 hours or so to really ramp up the FAC, and as of now, which is two days into it, very few people have used the services. They anticipate that will increase.
2	Donations at the FAC require management.	"The community response to assist after 1 October was impressive. Citizens, local businesses, and corporations donated essentials such as food, water, and hydrating beverages to first responders. LVMPD's coordination and communication during this time was extremely important in receiving these kinds of donations."[22]	The FAC has a lot of various services and responsibilities related to the incident, one of which is donation management. The public is sending anything and everything. Much of the stuff that is being donated is random and perishable.
3	The FAC is a complicated resource working to help mitigate the event. Las Vegas requested SMEs early to assist with setting up and optimizing the work of the FAC for this mass-casualty event.	"FBI agents from the Orlando, Florida Field Office, who were involved in the response to the Pulse Nightclub shooting, flew to Las Vegas to provide support and assistance. The FBI's expertise in setting up and maintaining an FAC became a model for Las Vegas and was instrumental to its success. In order to facilitate support and connections, exchange critically important information, answer questions, and make referrals, it was essential to create the FAC quickly in the aftermath of the mass-casualty incident."[23]	They immediately called for assistance from Orlando, and two people immediately flew out to Vegas to assist.[24]

[21] Las Vegas Metropolitan Police Department, *1 October After-Action Report*, 90.

[22] Las Vegas Metropolitan Police Department, 95.

[23] Las Vegas Metropolitan Police Department, 112.

[24] This detail is incorrect in the LVMPD's OAR.

Table 8. Specialized Response Findings

Finding #	Finding	OAR	HTI
1	Distractor events called out the bomb squad to investigate.	"LVMPD Communications received a call of a suspicious vehicle (a black Audi bearing Nevada plates) at the Luxor Hotel and Casino valet, possibly with an explosive device. An LVMPD strike team composed of a SWAT sergeant, SWAT officer, and a few patrol officers were deployed to assess the suspicious vehicle before additional resources were summoned. As a result, All Hazard Regional Multi-Agency Operations and Response (ARMOR) was contacted. The LVFR Bomb Squad and the FBI deployed resources to the suspicious vehicle as well. It was later discovered that the vehicle was an autonomous (self-driving/driverless) vehicle."[25]	The bomb squad went to the Luxor casino for a suspicious vehicle with wires sticking out of it. The device was described as a can of some sort in the car about the size of a tuna can. It was possibly a VBIED, so people started running away from the vehicle. Subsequently, the responders found out that people were running because of hearing the gunshots. Initial investigation revealed a possible autonomous vehicle for the specific type of vehicle described, which ended up being a good intent call with no hazards found.
2	The assailant had explosives in his vehicle.	"A search warrant was obtained and at 0325 hours, detectives with the LVMPD All-Hazard Regional Multi-agency Operations and Response Section (ARMOR) broke a window to the vehicle, to allow an explosive detection dog access to the scent from inside the vehicle. A U.S. Marshall explosive detection K9 moved around the vehicle and gave an alert to the presence of explosive precursors."[26]	Law enforcement located the suspect's vehicle and an agent breaks the back window of the vehicle to insert [name redacted] bomb dog. The dog hits on the vehicle. Three duffel bags of various equipment and supplies are present. There are over 100 pounds of Tannerite in the vehicle, and the vehicle is two floors below grade in the parking garage. The vehicle was valeted by the assailant and was reversed into the parking spot. This made access challenging. Also, the distance to the vehicle and being surrounded by concrete prevented remote control of a robot via radio signal, which required or necessitated a hands-on approach. It was too long of a distance to use wired controls. The vehicle was not backed up all the way, so there was room to access the interior by opening the back hatch. The bomb technician manually pulled the duffel bags out of the back and x-rayed the contents.

[25] Las Vegas Metropolitan Police Department, *1 October After-Action Report*, 31.

[26] Las Vegas Metropolitan Police Department, *LVMPD Preliminary Investigative Report*, 50.

Finding #	Finding	OAR	HTI
3	Law enforcement found the shooter dead after a prolonged period of being barricaded and quiet. The bomb squad was not used in the shooter's room.	"11:20 p.m. An explosive breach was conducted on the door to Room 32-135. The shooter was found with a self-inflicted gunshot wound to the head."[27]	The interviewee stated that they ran a bomb dog in the shooter's room and that law enforcement did not contact the bomb squad for assistance in the shooter's room.
4	The assailant fashioned a makeshift device to protect his air supply from either propellant being fired or gas potential deployed by police personnel. The assailant was also prepared to extinguish a fire if needed, using equipment not commonly found in a hotel room, suggesting he also brought the extinguisher with him.	"A blue plastic tube, was fashioned with a fan on one end and a snorkel mouthpiece on the other end."[28] "At the southwest corner of the bar was a sink. There were two loaded rifle magazines and a 'Tundra' fire extinguisher on the sink counter."[29] "On 09-15-17, searches were performed for 'swat weapons,' 'ballistics chart 308,' 'SWAT Las Vegas,' 'ballistic,' and 'do police use explosives.'[30]	Assailant had a device to pressurize or scrub the air for gunpowder so as not to set off smoke or fire alarms or provide air in the case gas was used.

[27] Las Vegas Metropolitan Police Department, *1 October After-Action Report*, 21.

[28] Las Vegas Metropolitan Police Department, *LVMPD Preliminary Investigative Report*, 50.

[29] Las Vegas Metropolitan Police Department, 40.

[30] Las Vegas Metropolitan Police Department, 46.

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF REFERENCES

AcademiWales. “Dave Snowden - How Leaders Change Culture through Small Actions.” YouTube, July 26, 2016. Video, 1:11:06. https://www.youtube.com/watch?v=MsLmjoAp_Dg.

Adams, Lonnie B, III. *The Interwar Period: Lessons from the Past*. Carlisle Barracks, PA: Army War College, 1992. http://www.dtic.mil/docs/citations/ADA251293.

Adamsky, Dmitry. “From Israel with Deterrence: Strategic Culture, Intra-War Coercion and Brute Force.” *Security Studies* 26, no. 1 (2017): 157–84. https://doi.org/10.1080/09636412.2017.1243923.

Argyris, Chris, and Donald Schön. *Organizational Learning: A Theory of Action Perspective*. Boston: Addison-Wesley, 1978.

Baber, Christopher, and Richard McMaster. “Individual Sensemaking.” In *Grasping the Moment: Sensemaking in Response to Routine Incidents and Major Emergencies*, 21–37. London: CRC Press, 2016. https://doi.org/10.1201/9781315585796.

Baird, Lloyd, John C. Henderson, and Stephanie Watts. “Learning from Action: An Analysis of the Center for Army Lessons Learned (CALL).” *Human Resource Management* 36, no. 4 (1997): 385–95.

Baird, Lloyd, Phil Holland, and Sandra Deacon. “Learning from Action: Imbedding More Learning into the Performance Fast Enough to Make a Difference.” *Organizational Dynamics* 27, no. 4 (1999): 19–32. https://doi.org/10.1016/S0090-2616(99)90027-X.

Basten, Dirk, and Thilo Haamann. “Approaches for Organizational Learning: A Literature Review.” *SAGE Open* 8, no. 3 (April 2018): 1–20. https://doi.org/10.1177/2158244018794224.

Bellavita, Christopher. “Changing Homeland Security: A Strategic Logic of Special Event Security.” *Homeland Security Affairs* 3, no. 3 (2007): 1–23.

Berg, Richard K., and Stephen H. Klitzman. *An Interpretive Guide to the Government in the Sunshine Act*. Washington, DC: Government Printing Office, 1978. http://hdl.handle.net/2027/mdp.39015013513950.

Birkland, Thomas A. “Disasters, Lessons Learned, and Fantasy Documents.” *Journal of Contingencies and Crisis Management* 17, no. 3 (September 2009): 146–56. https://doi.org/10.1111/j.1468-5973.2009.00575.x.

———. *Lessons of Disaster Policy Change after Catastrophic Events*. American Governance and Public Policy Series. Washington, DC: Georgetown University Press, 2006.

Bowden, Mark. *Black Hawk Down: A Story of Modern War*. New York: Atlantic Monthly Press, 1999.

Brown, John Seely, and Paul Duguid. "Organizing Knowledge." *California Management Review* 40, no. 3 (Spring 1998): 90–111. https://doi.org/10.2307/41165945.

Bryson, Sharon. "How the NTSB Handles a Major Accident Investigation." Webinar, Daytona Beach, Florida, May 9, 2019. https://worldwide.erau.edu/webinars/how-the-ntsb-handles-a-major-accident-investigation.

Bush, George W. *Management of Interagency Efforts Concerning Reconstruction and Stabilization*. National Security Presidential Directive 44. Washington, DC: White House, 2005.

Center for Army Lessons Learned. *Establishing a Lessons Learned Program: Observations, Insights, and Lessons*. Handbook 11–33. Ft. Leavenworth, KS: Center for Army Lessons Learned, 2011. https://apps.dtic.mil/dtic/tr/fulltext/u2/a550674.pdf.

Center for Homeland Defense and Security. "LLIS in the HSDL." Accessed November 8, 2019. https://www.hsdl.org/c/llis-in-the-hsdl/.

Chua, Alton Y. K., and Wing Lam. "Center for Army Lessons Learned: Knowledge Application Process in the Military." *International Journal of Knowledge Management* 2, no. 2 (2006): 69–82. https://doi.org/10.4018/jkm.2006040105.

Clinton, William J. *Managing Complex Contingency Operations*. Presidential Decision Directive 56. Washington, DC: White House, 1997.

Cohen, Wesley M., and Daniel A. Levinthal. "Absorptive Capacity: A New Perspective on Learning and Innovation." *Administrative Science Quarterly* 53, no. 1 (1990): 128–52. https://doi.org/10.2307/2393553.

Cox, Alan Thomas. "The Significance of Fire Service Culture as an Impediment to Effective Leadership in the Homeland Security Environment." Master's thesis, Naval Postgraduate School, 2012. http://hdl.handle.net/10945/6781.

Daft, Richard L. "Information Richness Theory." In *Encyclopedia of Management Theory*. Vol. 1. Edited by E. Kessler, 370–372. Thousand Oaks, CA: SAGE Publications, 2020. https://doi.org/10.4135/9781452276090.

Darling, Marilyn J., and Charles S. Parry. "After-Action Reviews: Linking Reflection and Planning in a Learning Practice." *Reflections* 3, no. 2 (Winter 2001): 64–72.

Department of Homeland Security. “Safety Act.” July 17, 2020. https://www.safetyact.gov/.

Department of Transportation. “Civil Aeronautics Act.” Accessed July 14, 2020. https://www.transportation.gov/content/civil-aeronautics-act.

Des Forges, Alison. *Leave None to Tell the Story: Genocide in Rwanda*. New York: Human Rights Watch, 1999.

Deverell, Edward. “Crises as Learning Triggers: Exploring a Conceptual Framework of Crisis-Induced Learning.” *Journal of Contingencies and Crisis Management* 17, no. 3 (September 2009): 179–88. https://doi.org/10.1111/j.1468-5973.2009.00578.x.

Donahue, Amy, and Robert Tuohy. “Lessons We Don’t Learn: A Study of the Lessons of Disasters, Why We Repeat Them, and How We Can Learn Them.” *Homeland Security Affairs* 2, no. 2 (July 2006): 1–28.

Dwyer, Graham, and Cynthia Hardy. “Organizing to Save Lives: Post-Inquiry Sensemaking & Learning in Bushfire Emergency Organizations.” *Academy of Management Proceedings* 2018, no. 1 (August 2018). https://doi.org/10.5465/AMBPP.2018.10085abstract.

Dyson, Tom. *Organizational Learning and the Modern Army: A New Model for Lessons-Learned Processes*. Abingdon, UK: Routledge, 2020.

Easterby-Smith, Mark. *Handbook of Organizational Learning and Knowledge Management*. 2nd ed. Chichester, UK: Wiley, 2011.

Eisenhardt, Kathleen M. “Building Theories from Case Study Research.” *Academy of Management Review* 14, no. 4 (October 1989): 532–50. https://doi.org/10.2307/258557.

Elliott, Dominic. “The Failure of Organizational Learning from Crisis—A Matter of Life and Death?” *Journal of Contingencies and Crisis Management* 17, no. 3 (September 2009): 157–68. https://doi.org/10.1111/j.1468-5973.2009.00576.x.

Erickson, William H. *The Report of Governor Bill Owens’ Columbine Review Commission*. Denver: Columbine Review Commission, 2001.

Evans, Christina. *Managing for Knowledge: HR’s Strategic Role*. Boston: Butterworth-Heinemann, 2003.

Federal Aviation Administration. “NTSB System Level Business Rules.” Accessed March 8, 2020. https://www.asias.faa.gov/apex/f?p=100:9:::NO::P9_REGION_VAR:2.

Federal Emergency Management Agency. *1 October After-Action Report*. Washington, DC: Federal Emergency Management Agency, 2018. https://www.hsdl.org/?view&did=814668.

Finkel, Meir. *On Flexibility: Recovery from Technological and Doctrinal Surprise on the Battlefield*. Palo Alto: Stanford University Press, 2011. ProQuest.

Firehouse. "FEMA Releases Report on Vegas Shooting." September 5, 2018. https://www.firehouse.com/operations-training/ems/news/21020859/fema-report-las-vegas-shooting-conclusions-recommendations-firefighters.

Foley, Robert T., Stuart Griffin, and Helen McCartney. "'Transformation in Contact': Learning the Lessons of Modern War." *International Affairs* 87, no. 2 (March 2011): 253–70. https://doi.org/10.1111/j.1468-2346.2011.00972.x.

Garvin, David A. "The U.S. Army's After Action Reviews: Seizing the Chance to Learn." In *Learning in Action, a Guide to Putting the Learning Organization to Work*. Boston: Harvard Business School Press, 2000. https://www.nwcg.gov/sites/default/files/wfldp/docs/army-seizing-chance-to-learn.pdf.

Getty, Ryan M., John L. Worrall, and Robert G. Morris. "How Far from the Tree Does the Apple Fall? Field Training Officers, Their Trainees, and Allegations of Misconduct." *Crime & Delinquency* 62, no. 6 (June 2016): 821–39. https://doi.org/10.1177/0011128714545829.

Goff, Jared. "Prospective Vigilance: Assessing Complex Coordinated Attack Preparedness Programs." Master's thesis, Naval Postgraduate School, 2017. https://apps.dtic.mil/dtic/tr/fulltext/u2/1053254.pdf.

Hedberg, Bo. "How Organizations Learn and Unlearn." In *Handbook of Organizational Design*, edited by Paul C. Nystrom and William H. Starbuck. Vol. 1. Adapting Organizations to Their Environments, 3–27. New York: Oxford University Press, 1981.

High Threat Institute. "Home Page." Last modified February 4, 2020. http://highthreatinstitute.org/.

Jacobides, Michael G. "Don't Let This Crisis Go to Waste!" *Business Strategy Review* 20, no. 3 (Autumn 2009): 70–75. https://doi.org/10.1111/j.1467-8616.2009.00618.x.

Jensen, Benjamin M. *Forging the Sword: Doctrinal Change in the U.S. Army*. Stanford: Stanford University Press, 2016.

Jensen, Murray E. *Current Issues in Knowledge Management*. Hershey, PA: Information Science Reference, 2008.

Jones, Nory B., and John F. Mahon. “Nimble Knowledge Transfer in High Velocity/Turbulent Environments.” *Journal of Knowledge Management* 16, no. 5 (2012): 774–88. https://doi.org/10.1108/13673271211262808.

Kaliner, Jeffrey. “When Will We Ever Learn? The After Action Review, Lessons Learned and the Next Steps in Training and Educating the Homeland Security Enterprise for the 21st Century.” Master’s thesis, Naval Postgraduate School, 2013. http://hdl.handle.net/10945/34683.

Karlgaard, Richard. *The Soft Edge: Where Great Companies Find Lasting Success*. San Francisco: Jossey-Bass, 2014.

Kelley, Patrick. “MV Conception Salvage Barge Arrives.” Department of Defense. Accessed July 14, 2020. Video, 1:58. https://dod.defense.gov/News/Special-Reports/Videos/?videoid=707250.

Klein, Gary A. *Sources of Power: How People Make Decisions*. Cambridge, MA: MIT Press, 1998.

Las Vegas Metropolitan Police Department. *1 October After-Action Report*. Las Vegas: Las Vegas Metropolitan Police Department, 2019. https://www.lvmpd.com/en-us/Documents/1_October_AAR_Final_06062019.pdf.

———. *LVMPD Preliminary Investigative Report: 1 October/Mass Casualty Shooting*. Las Vegas: Las Vegas Metropolitan Police Department, 2018. Homeland Security Digital Library.

Lash, Rick. “Best Practices for Leading via Innovation.” *Harvard Business Review*, August 6, 2012. https://hbr.org/2012/08/best-practices-for-leading-via.

Lebow, Cynthia C., Liam P. Sarsfield, William Stanley, Emile Ettedgui, and Garth Henning. *Safety in the Skies: Personnel and Parties in NTSB Aviation Accident Investigations*. Santa Monica, CA: RAND, 2000. https://www.rand.org/pubs/monograph_reports/MR1122.html.

Lee, Sunkee. “Learning by Moving: Can Reconfiguring Spatial Proximity between Organizational Members Promote Individual-Level Exploration?” *Organization Science* 30, no. 3 (2019): 467–88. https://doi.org/10.1287/orsc.2019.1291.

Leighton, Jacqueline P. “External Validity.” In *Encyclopedia of Research Design*, edited by Neil J. Salkind, 467–70. Thousand Oaks: SAGE Publications, 2020. https://doi.org/10.4135/9781412961288.

Los Angeles Times. “Here’s a Timeline of the Las Vegas Shooting—with the Crucial Detail Police Left Out Last Time.” October 9, 2017. https://www.latimes.com/nation/la-na-vegas-shooting-timeline-revised-20171009-story.html.

Maclean, Norman. *Young Men & Fire*. Chicago: University of Chicago Press, 1992.

Mains, Steven, and Gil Ad Ariely. "Learning While Fighting." *Prism* 2, no. 3 (June 2011): 165–76.

March, James G. "Exploration and Exploitation in Organizational Learning." *Organization Science* 2, no. 1 (February 1991): 71–87. https://doi.org/10.1287/orsc.2.1.71.

Marcus, Leonard J., Barry C. Dorn, and Joseph M. Henderson. "Meta-Leadership and National Emergency Preparedness: A Model to Build Government Connectivity." *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 4, no. 2 (2006): 128–34.

Marino, Michael, John Delaney, Paul Atwater, and Reed Smith. "To Save Lives and Property: High Threat Response." *Homeland Security Affairs* 11, no. 5 (January 2015): 1–18.

Marjory Stoneman Douglas Public Safety Commission. *Initial Report*. Tallahassee: Florida Department of Law Enforcement, January 2, 2019. http://www.fdle.state.fl.us/MSDHS/CommissionReport.pdf.

Mastiglio, Thomas, Jeffrey Wilkinson, Phillip N. Jones, James P. Bliss, and John S. Barnett. *Current Practice and Theoretical Foundations of the After Action Review*. Arlington, VA: Army Research Institute for the Behavioral and Social Sciences, 2011. http://www.dtic.mil/docs/citations/ADA544543.

Merrill, Peter. "Benchmarking Innovation." *Quality Progress* 49, no. 9 (September 2016): 43–45.

Miller, Patrick E. "How Can We Improve Information Sharing among Local Law Enforcement Agencies?" Master's thesis, Naval Postgraduate School, 2005. http://hdl.handle.net/10945/1961.

Moore, Geoffrey A. *Crossing the Chasm*. 3rd ed. New York: HarperCollins, 2014.

Morrison, John E., and Larry L. Meliza. *Foundations of the After Action Review Process*. Special Report No. 42. Alexandria, VA: Army Research Institute for the Behavioral and Social Sciences, 1999. https://apps.dtic.mil/dtic/tr/fulltext/u2/a368651.pdf.

Moynihan, Donald P. "From Intercrisis to Intracrisis Learning." *Journal of Contingencies and Crisis Management* 17, no. 3 (September 2009): 189–98. https://doi.org/10.1111/j.1468-5973.2009.00579.x.

Moynihan, Donald P., and Noel Landuyt. "How Do Public Organizations Learn? Bridging Cultural and Structural Perspectives." *Public Administration Review* 69, no. 6 (November 2009): 1097–1105. https://doi.org/10.1111/j.1540-6210.2009.02067.x.

Mueller, Robert. *The FBI's Counterterrorism Program since September 2001: Report to the National Commission on Terrorist Attacks upon the United States.* Washington, DC: Department of Justice, 2004.

Naot, Yael Ben-Horin, Raanan Lipshitz, and Micha Popper. "Discerning the Quality of Organizational Learning." *Management Learning* 35, no. 4 (December 2004): 451–72. https://doi.org/10.1177/1350507604048273.

National Commission on Terrorist Attacks upon the United States. *The 9/11 Commission Report*. Washington DC: National Commission on Terrorist Attacks upon the United States, 2004. https://govinfo.library.unt.edu/911/report/911Report.pdf.

National Disaster Medical System. *DMORT Standard Operating Procedures for National Transportation Safety Board Activities*. Washington, DC: National Transportation Safety Board, 2006. https://nsri.nebraska.edu/-/media/nsri/documents/ndms2020/dmort-ntsb-sop-nov-2006.pdf.

National Fire Protection Agency. *Standard for Active Shooter and Hostile Event Response*. NFPA 3000. Quincy, MA: National Fire Protection Agency, 2018.

National Transportation Safety Board. *Aviation Investigation Manual: Major Team Investigations*. Washington, DC: National Transportation Safety Board, 2002. https://ntsb.gov/investigations/process/Documents/MajorInvestigationsManual.pdf.

———. "History of the National Transportation Safety Board." Accessed March 7, 2020. https://www.ntsb.gov/about/history/Pages/default.aspx.

———. "NTSB Issues 7 Safety Recommendations to FAA Related to Ongoing Lion Air, Ethiopian Airlines Crash Investigations." September 26, 2019. https://www.ntsb.gov/news/press-releases/Pages/NR20190926.aspx.

———. "Preliminary Report Marine DCA19MM047." Washington, DC: National Transportation Safety Board, September 12, 2019. https://ntsb.gov/investigations/AccidentReports/Reports/DCA19MM047-preliminary-report.pdf.

Nissen, Mark E. "Dynamic Knowledge Patterns to Inform Design: A Field Study of Knowledge Stocks and Flows in an Extreme Organization." *Journal of Management Information Systems* 22, no. 3 (December 2005): 225–63. https://doi.org/10.2753/MIS0742-1222220308.

Nissen, Mark E., Erik Jansen, Carl Jones, and Gail Thomas. "Contextual Criticality of Knowledge-Flow Dynamics: Understanding a US Tragedy of Friendly Fire." *Defense & Security Analysis* 20, no. 3 (September 2004): 209–28. https://doi.org/10.1080/1475179042000260651.

Nissen, Mark E., and Tara A. Leweling. "Knowledge Sharing as a Contingency in the Design of Counterterrorism Organizations." *International C2 Journal* 4, no. 2 (2010): 1–30.

Nonaka, Ikujirō. *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*. New York: Oxford University Press, 1995.

Olomolaiye, Anthony, and Charles Egbu. "Tacit vs. Explicit Knowledge—The Current Approaches to Knowledge Management." In *Proceedings of the Second Scottish Conference for Postgraduate Researchers of the Built and Natural Environment*, 769–78. Glasgow, Glasgow Caledonian University, 2005.

Pappa, Erik. "FEMA Releases 1 October After-Action Report." Clark County, Nevada, August 27, 2018. https://www.clarkcountynv.gov/public-communications/news/Pages/FEMA-Releases-1-October-After-action-Report.aspx.

Pfeffer, Jeffrey, and Robert I. Sutton. "Knowing." *California Management Review* 42, no. 1 (Fall 1999): 83–108.

Polanyi, Michael. *Personal Knowledge: Towards a Post-Critical Philosophy*. Chicago: University of Chicago Press, 1962. https://books.google.com/books?id=qB7KuwAACAAJ.

QuinnWilliams, LLC. *The Attacks on Paris: Lessons Learned*. Los Angeles: Homeland Security Advisory Council, 2016. https://www.hsacouncil.org/s/HSAC-Paris_LessonsLearned_WhitePaper.pdf.

Ramírez, Antonio, and Rodrigo Rojas. "Knowledge Creation, Organizational Learning and Their Effects on Organizational Performance." *Inzineriné Ekonomika* 22, no. 3 (2011): 309–18.

Richardson, Thomas J. "Identifying Best Practices in the Dissemination of Intelligence to First Responders in the Fire and EMS Services." Master's thesis, Naval Postgraduate School, 2010. http://hdl.handle.net/10945/5137.

Roberts, Bill. "Innovation Quotient." *Electronic Business* 26, no. 13 (December 2000).

Sarani, Babak, Cheralyn Hendrix, Mary Matecki, Jordan Estroff, Richard L. Amdur, Bryce R. H. Robinson, Geoff Shapiro, Stephen Gondek, Roger Mitchell, and E. Reed Smith. "Wounding Patterns Based on Firearm Type in Civilian Public Mass Shootings in the United States." *Journal of the American College of Surgeons* 228, no. 3 (March 2019): 228–34. https://doi.org/10.1016/j.jamcollsurg.2018.11.014.

Schwab, Andreas. "Incremental Organizational Learning from Multilevel Information Sources: Evidence for Cross-Level Interactions." *Organization Science* 18, no. 2 (April 2007): 233–51. https://doi.org/10.1287/orsc.1060.0238.

Senge, Peter. *The Fifth Discipline: The Art and Practice of the Learning Organization*. Rev. ed. New York: Doubleday/Currency, 2006.

Smith, E. Reed, Geoff Shapiro, and Babak Sarani. "Fatal Wounding Pattern and Causes of Potentially Preventable Death following the Pulse Night Club Shooting Event." *Prehospital Emergency Care* 22, no. 6 (2018): 662–68. https://doi.org/10.1080/10903127.2018.1459980.

Snowden, David J. "A Leader's Framework for Decision Making: Wise Executives Tailor Their Approach to Fit the Complexity of the Circumstances They Face." *Harvard Business Review* 85, no. 11 (November 2007): 68–76.

Starbuck, W. H. "Learning by Knowledge-Intensive Firms." *Journal of Management Studies* 29, no. 7 (1992): 713–740.

Syed, Matthew. *Black Box Thinking: Why Most People Never Learn from Their Mistakes—but Some Do*. Reno, NV: Penguin, 2015.

Thomas, James B., Stephanie Watts Sussman, and John C. Henderson. "Understanding 'Strategic Learning': Linking Organizational Learning, Knowledge Management, and Sensemaking." *Organization Science* 12, no. 3 (June 2001): 331–45. https://doi.org/10.1287/orsc.12.3.331.10105.

Towers, Sherry, Andres Gomez-Lievano, Maryam Khan, Anuj Mubayi, and Carlos Castillo-Chavez. "Contagion in Mass Killings and School Shootings." *PLOS One* 10, no. 7 (2015).

Tzabbar, Daniel, Barak S. Aharonson, Terry L. Amburgey, and Andreas Al-Laham. "When Is the Whole Bigger Than the Sum of Its Parts? Bundling Knowledge Stocks for Innovative Success." *Strategic Organization* 6, no. 4 (2008): 375–406. https://doi.org/10.1177/1476127008096363.

United States Agency for International Development. "About KM." Accessed July 1, 2020. https://toolkits.knowledgesuccess.org/toolkits/km/about-km.

U.S. Army Combined Arms Center. “Center for Army Lessons Learned.” October 2, 2018. https://usacac.army.mil/organizations/mccoe/call.

U.S. Coast Guard. “Passenger Vessel Compliance and Operational Readiness.” MSIB No. 008-19. Washington, DC: U.S. Coast Guard, September 10, 2019. https://www.dco.uscg.mil/Portals/9/DCO%20Documents/5p/MSIB/2019/MSIB_008_19.pdf?ver=2019-09-10-115632-287.

Viergever, Roderik F. “The Critical Incident Technique: Method or Methodology?” *Qualitative Health Research* 29, no. 7 (June 2019): 1065–79. https://doi.org/10.1177/1049732318813112.

Wallace, Danielle. “Las Vegas Massacre Death Toll Rises after Southern California Woman’s Death.” Fox News, November 19, 2019. https://www.foxnews.com/us/las-vegas-massacre-death-toll-rises-after-southern-california-womans-death.

Weick, Karl E. “Drop Your Tools: An Allegory for Organizational Studies.” *Administrative Science Quarterly* 41, no. 2 (June 1996): 301–13.

———. *Managing the Unexpected: Assuring High Performance in an Age of Complexity*. San Francisco: Jossey-Bass, 2001.

———. *Sensemaking in Organizations*. Thousand Oaks, CA: SAGE Publications, 1995.

Yeo, Roland K. “Revisiting the Roots of Learning Organization: A Synthesis of the Learning Organization Literature.” *Learning Organization* 12, no. 4 (2005): 368–82. https://doi.org/10.1108/09696470510599145.

Zahra, Shaker A., and Gerard George. “Absorptive Capacity: A Review, Reconceptualization, and Extension.” *Academy of Management Review* 27, no. 2 (2002): 185–203. https://doi.org/10.5465/amr.2002.6587995.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
   Ft. Belvoir, Virginia

2. Dudley Knox Library
   Naval Postgraduate School
   Monterey, California