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INTRA-OPERATIONAL AREA COORDINATION: THE ZONE EOC CONCEPT

by

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September 2015

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13. ABSTRACT (maximum 200 words)

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The thesis provides a detailed outline and analysis of the zone EOC concept and its various elements in the context of the San Mateo County OA and notes key aspects for successful adoption and implementation. The portability and applicability of the zone EOC concept in other OAs in the San Francisco Bay Area and beyond is also considered and further exploration is recommended.

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INTRA-OPERATIONAL AREA COORDINATION: THE ZONE EOC CONCEPT

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This thesis highlights the limitations of the existing one-to-one intra-operational area (OA) emergency operations center (EOC) coordination model during catastrophic disasters. In addition, it establishes a clear need for a more effective alternate model and offers an alternative, multilateral collaborative model solution—the zone EOC concept. Designed to enable manageable "span of control" and address shortages in available trained EOC personnel, the zone EOC concept involves establishing consolidated EOCs to represent geographic zones that encompass multiple cities, townships, and special districts within an OA. When activated, the zone EOCs would coordinate with an OA EOC on behalf of their constituent jurisdictions within each zone.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACS	Auxiliary Communications Service
CAL COP	California Common Operating Picture
CAL EOC	California (Web-based) Emergency Operations Center
CAL FIRE	California Department of Forestry and Fire Protection
CAL OES	State of California Office of Emergency Services
CAP	common alerting protocol
CERT	community emergency response team
CHP	California Highway Patrol
COP	common operating picture
DHS	Department of Homeland Security
DOC	Department Operations Center
DPW	Department of Public Works
EMA	Emergency Managers Association
EMAC	emergency management assistance compact
EMS	Emergency Medical Services
EOC	emergency operations center
EOD	explosive ordnance disposal
EOP	emergency operations plan
ESC	Emergency Services Council
ESRI	Environmental Systems Research Institute
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
FT	fulltime
FTE	fulltime employee
GIS	geographic information systems
HSD	Homeland Security Division
HSPD	Homeland Security Presidential Directive
IAEM	International Association of Emergency Managers

ICS	Incident Command System
IPAWS	Integrated Public Alert and Warning System
JIC	joint information center
JIS	joint information system
JPA	joint powers agreement
LAC	local assistance center
MAC	multiagency coordination
MACS	multiagency coordination system
MNS	mass notification system
MOU	memorandum of understanding
NCRIC	Northern California Regional Intelligence Center
NEMA	National Emergency Management Association
NGO	non-governmental organization
NIMS	National Incident Management System
NOAA	National Oceanic and Atmospheric Administration
NPG	National Preparedness Goal
NRF	National Response Framework
OA	operational area
OASIS	Organization for the Advancement of Structured Information Standards
OES	Office of Emergency Services
PG&E	Pacific Gas and Electric Utility Company
PIO	public information officer
PSC	public safety communications
RACES	Radio Amateur Civil Emergency Services
REOC	State of California Coastal Region Emergency Operations Center
SEMS	Standardized Emergency Management System
SF DEM	San Francisco Department of Emergency Management
SFIA	San Francisco International Airport
SOC	state operations center
SWAT	special weapons and tactics team
UASI	Urban Areas Security Initiative

WEA	wireless emergency alert
WebEOC	Web-based Emergency Operations Center

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EXECUTIVE SUMMARY

The San Francisco Bay Area lies in a highly active seismic zone, heightening the risks of catastrophic disasters from earthquakes in the region. The Hayward Fault and the San Andreas Fault are two of many faults that run through the San Francisco Bay Area with the highest probabilities of triggering earthquakes of significant magnitudes. Earthquakes of magnitude 7.0 and above on either fault would be expected to generate violent to extreme earthshaking in wide geographic areas of the San Francisco Bay Area region with dense populations and high concentrations of critical infrastructure. Devastating impacts are anticipated concerning loss of life, displacement of households, damage to infrastructure, disruption of essential services, and economic loss in the region.

The catastrophic scale of impacts will likely overwhelm the abilities of local governments to effectively provide emergency response services in the immediate aftermath. Initially, local governments, such as counties, cities, townships, and special districts within the operational areas (OA), will need to be self-reliant and also depend on each other until state and federal assistance are deployed and able to assist.

The likelihood of a geographically expansive scope of impact will require the simultaneous activation of all San Francisco Bay Area OA emergency operations centers (EOC) and a multitude of local government EOCs to support emergency response and coordination. Extensive and prolonged emergency response service and coordination needs will require affected local governments to have substantial resources of trained personnel to staff fully activated EOCs for extended periods.

The existing one-to-one intra-OA emergency response coordination model used for all events by the San Mateo County OA and other OAs in the San Francisco Bay Area and the state of California requires activated OA EOCs to coordinate simultaneously with all their activated local governments EOCs. During catastrophic disasters, this coordination model leads to unmanageable “span of control” challenges that overwhelm activated county-led OA EOCs’ abilities to effectively and simultaneously coordinate with the numerous, activated local government EOCs within their respective OAs.

Additionally, local governments typically do not have sufficient trained personnel resources to continually staff fully activated EOCs for extended periods. This is a challenge for the San Mateo County OA and likely for other OAs in the San Francisco Bay Area and beyond.

The goals of this research is: to highlight the limitations of the existing, one-to-one intra-OA emergency response coordination model during catastrophic disasters; establish a clear need for a more effective alternate model; determine what that alternate model could be, including its various elements; and also note key aspects for successful adoption and implementation in the San Mateo County OA. An additional objective of this research is to determine the portability and applicability of the alternate intra-OA emergency response coordination model to other OAs in the San Francisco Bay Area.

An alternate, intra-OA emergency response coordination model that would be more effective during catastrophic disasters would need to be multilateral and collaborative in design that enables manageable "span of control," and also addresses shortages in trained EOC personnel at local governments. One such model that meets the criteria is the zone EOC concept.

The zone EOC concept involves establishing consolidated EOCs to represent geographic zones that encompass multiple local governments within an OA. When activated, the zone EOCs would coordinate with an OA EOC on behalf of their constituent local governments within each geographic zone and not require separate and simultaneous EOC activations for each jurisdiction. The zone EOC concept works within the frameworks of the National Incident Management System (NIMS) and the State of California's Standardized Emergency Management System (SEMS), and is derived from the Incident Command System (ICS), and Multi Agency Coordination System (MACS) concepts.

During the past year, the San Mateo County OA considered and then tested via an exercise a preliminary idea of the zone EOC concept, aligning with the established zones in the OA used by the county Office of Emergency Services (OES) and the Law Enforcement Mutual Aid System. Lessons learned from the exercise highlighted the need

to determine and fully develop the working details of the zone EOC concept and other aspects necessary for successful adoption and implementation in the San Mateo County OA. This thesis aims to address this need.

The San Mateo County OA is part of the San Francisco Bay Area in California and encompasses the majority of the San Francisco Peninsula. The San Mateo County OA is comprised of 15 cities, five townships, and 31 special districts, and as of 2013, had an estimated total population of 739,311.[1] The San Mateo County OA serves as a major mass-transit corridor for the San Francisco Bay Area and hosts the second largest airport in California and a deep-water port.

Emergency management priorities and the needs in the San Mateo County OA are collectively addressed through intra-OA multilateral, collaborative frameworks and partnerships with all its local governments via a joint powers and exercise agreement (JPA) Emergency Service Council (ESC) and a separate Emergency Managers Association (EMA). Local governments within the San Mateo County OA have varying degrees of capabilities in emergency management functions. An assessment conducted by the author in collaboration with the San Mateo County EMA indicated that most local governments in the San Mateo County OA do not have sufficient trained personnel to sustain fully activated EOC operations for extended periods. Informal but informed estimations conducted as part of this research indicated that this capability gap also applies to most local governments in the San Francisco Bay Area.

The established intra-OA multilateral, collaborative frameworks and partnerships in the San Mateo County OA provide strong foundations to ease and support adoption and implementation of the zone EOC concept. Some of the key aspects for the zone EOC concept to be successfully implemented include: buy-in and support from senior leadership and stakeholders, addressing concerns for legal liabilities, potential loss of jurisdictional control and authority, cost-sharing and allocation of sustainable funding

[1] County of San Mateo, *County of San Mateo 2013–2015 Profile* (San Mateo, CA: County of San Mateo, 2015), accessed September 19, 2015, https://www.smcgov.org/sites/smcgov.org/files/documents/files/BudgetProfile_2013_v5_1.pdf, A-44.

support, long-term staffing and training-exercise plans, and provision of appropriate facilities for the zone EOCs.

The key elements of the concept of operations for the zone EOC concept include: activation and deactivation triggers and thresholds, geographic demarcations of zones within an OA, zone EOC facilities, organization and authorities, staffing, and operations. The activation and deactivation triggers and thresholds for zone EOCs will need to be determined and, preferably, standardized. The zone EOC concept would continue to use the north, central, south, and coastal zone demarcations used by the county OES and the Law Enforcement Mutual Aid System in the San Mateo County OA. Each zone in the OA would need to identify a suitable primary facility and an alternate facility to house the zone EOCs, preferably with geographic distancing. The zone EOC organizational structure, staffing, position authorities, operations, and functions would conform to applicable NIMS, ICS, and SEMS guidelines for EOCs. Staffing for the zone EOCs would be primarily sourced from the constituent local governments within each zone.

The zone EOC concept would enable OA EOCs to more effectively coordinate with and support their affected local governments. Their local governments would also be able to pool their resources to provide emergency response coordination and support services within their jurisdictions via consolidated zone EOCs. Additional benefits of the zone EOC concept include efficiency gains via sharing of limited resources among local governments, promotion and strengthening of collaborative working relationships across local governments, leveraging cost savings through cost sharing and decrease in duplicative services and personnel labor costs.

Based on the zone EOC concept's alignment with NIMS and SEMS frameworks, derivation from standard practices, such as ICS and MACS concepts, and the common SEMS based jurisdictional framework for local governments and OAs to coordinate emergency activities, the concept should be portable and applicable to other OAs in the San Francisco Bay Area and likely beyond

Accordingly, a recommendation borne out of this research and analysis is for the San Mateo County OA to proceed in further developing, and formally adopting,

implementing, and institutionalizing the zone EOC concept. A second recommendation is to socialize the zone EOC concept and promote portability in the San Francisco Bay Area, which would benefit the interests of all OAs in the region and the region as a whole.

Ultimately, the present thesis provides the San Mateo County OA and possibly other OAs in the San Francisco Bay Area and beyond a well-defined, more effective, alternate intra-OA emergency response coordination model as a viable solution to address a critical capability gap during catastrophic disasters.

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I have learned that there are several types of education: undergraduate, graduate, civilian, and military. Once again, I was reminded that there are no shortcuts in graduate education, especially in the field of the military academia. I am grateful for having the opportunity to meet many professionals in my cohort and humbled with having the experience of learning from some of the greatest patriots in today's world. Special thanks goes to Dr. Chris Bellavita for his uncanny and to-the-point, acute teaching ability, to Doctors Anders Strindberg and David Brannan to Mr. Nick Dew for showing me how real strategy is distilled and analyzed, and to Dr. Fahtali Moghaddam, whose life story, accomplishments, and philosophy continue to inspire all who meet him. They, along with the rest faculty of the Naval Postgraduate School, have made my time here especially rewarding, challenging, and productive.

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A new inspiration and purpose in my life arrived during this program, my beautiful and always smiling daughter, Madeline Rose, who inspires me to be better every day. I am honored and truly blessed to have you as my daughter and to be your father, and I look forward to more adventures together as a family.

I would be remiss not to mention my grandfathers, Mr. Lawrence J. Kearnan Sr. and Mr. Carl V. Martinangelo. Their lifelong emphasis on the importance of family and service has set the example for me that I continually strive to live up to. The impression you have made on me cannot be overstated.

This thesis is dedicated to my parents, Lawrence Jr. & Susan Kearnan and Robert & Carol Dailey—my first, best, and most influential teachers—and to my little brother Robert L. Kearnan, to whom I have always looked up. I will continue to look up to the heavens until that day comes when we will be together again.

I. INTRODUCTION

> Indeed one's faith in one's plans and methods is truly tested when the horizon before one is the blackest.
>
> *– Mahatma Gandhi*

The San Francisco Bay Area lies in a highly active seismic zone with numerous active and potentially active faults capable of causing earthquakes that would result in catastrophic disasters in the region.[1] The San Francisco Bay Area has experienced large-scale earthquakes in recent history, including the magnitude (M) 6.0 August 2014 south Napa earthquake and the M 6.9 October 1989 Loma Prieta earthquake. Previously recorded earthquakes that caused significant loss of life and structural damage were the M 7.8 1906 San Francisco earthquake and the M 6.8 1896 Hayward earthquake.[2]

The threat is real, and the consequences of an earthquake of significant magnitude could potentially be devastating for the San Francisco Bay Area. The catastrophic scale of impacts from earthquakes of any significant magnitude in the San Francisco Bay Area would likely overwhelm the abilities of local governments[3] to effectively provide emergency response services in the immediate aftermath and in subsequent days. Local governments (counties, cities, townships, and special districts) would require extensive state and federal emergency response assistance, which will take time to deploy and situate.

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[1] California Governor's Office of Emergency Services, U.S. Department of Homeland Security, and Federal Emergency Management Agency, Region IX, "Bay Area Earthquake Plan" (draft, California Governor's Office of Emergency Services, U.S. Department of Homeland Security, and Federal Emergency Management Agency, Region IX, 2015).

[2] Ibid., B-4, B-5.

[3] According to *SEMS Guidelines: Standardized Emergency Management System (SEMS)*, "Local governments include counties, cities, townships, and special districts. Local governments manage and coordinate the overall emergency response and recovery activities within their jurisdiction." State of California, Governor's Office of Emergency Services [Cal OES], *SEMS Guidelines: Standardized Emergency Management System)*, 2009, accessed September 4, 2015, http://www.caloes.ca.gov/PlanningPreparednessSite/Documents/12%20SEMS%20Guidelines%20Complete.pdf, 2.

At least initially, local governments would need to rely on their own resources and capabilities to provide emergency response services when the needs are greatest, immediately after such devastating earthquakes. Any assistance that might be available would come first from neighboring jurisdictions that would also be contending with the same disaster and emergency response needs but could be better placed to provide support more quickly given geographic proximity, and existing intra-operational area (OA) governance structures. Instead of post-event, ad-hoc, or snap decisions, pre-event formal frameworks and agreements for collaborative multilateral emergency response and coordination partnerships between local governments within OAs are needed for catastrophic disasters. However, to be effective, these partnerships must be formalized, adopted, practiced, and maintained before disasters strike.

Literature review indicated that a critical evaluation has not been conducted on the effectiveness of the existing intra-OA emergency response coordination model that will be utilized during catastrophic disasters in the San Mateo County OA and other OAs in the San Francisco Bay Area. This author's informed concerns as a practitioner in a senior leadership role overseeing coordination and support of emergency response in the San Mateo County OA has motivated this study of the challenges of the existing intra-OA emergency response coordination model. The goal of this research is to provide an effective, alternate solution (the zone EOC concept) that could be applied to the San Mateo County OA as well as other OAs in the San Francisco Bay Area and beyond.

A. RISK ASSESSMENT

The 2015 California Earthquake Authority and the Uniform California Earthquake Rupture Forecast (UCERF) 3 report, which provides authoritative details on earthquake fault ruptures throughout California, notes that the probabilities for an earthquake greater than M 6.7 in the San Francisco Bay Area is highest for the Hayward Fault at 14.3 percent, and next highest for the North San Andreas Fault at 6.43 percent.[4] The Hayward and San Andreas Faults, particularly the Hayward Fault, run through densely populated urban areas in the San Francisco Bay Area which has high

[4] Ibid., B-3.

concentrations of critical infrastructure, including regional mass transportation corridors, as well as gas, electric, fuel, and water utility lines.[5] Any earthquakes of significant magnitudes on the Hayward or San Andreas Fault are anticipated to have devastating effects in terms of loss of life, displacement of households, damage to infrastructure, disruption of essential services, and economic loss in the region.[6] A snapshot of the projected impacts based on Federal Emergency Management Agency (FEMA) Hazards United States (HAZUS) modeling runs for the M 7.0 Hayward Fault and the M 7.8 San Andreas Fault earthquake scenarios are presented in Table 1.

Table 1. FEMA HAZUS modeling projections for the Hayward and San Andreas Faults[7]

SCENARIO	BUILDINGS	Damage Complete	Damage Extensive	Damage Moderate	Debris	Economic Loss
Hayward	3,038,798	13,557	39,886	150,800	14.4M tons	$54 billion
San Andreas	3,085,867	13,357	59,005	112.363	10M tons	$60.5 billion
	Households	Day 1 w/o Power	Day 3 w/o Power	Day 7 w/o Power	Displaced Households	Short-term Shelter
Hayward	3,038,798	38%	17%	5.4%	76,501	55,295
San Andreas	3,679,700	56%	32%	14.5%	49,774	29,151
	Households	Day 1-3 w/o Water	Day 7 w/o Water	Day 30 w/o Water	Day 90 w/o Water	
Hayward	3,597,846	47%	43%	36%	25%	
San Andreas	3,679,700	60%	58%	48%	30.5%	

The San Mateo County OA is especially vulnerable as the San Andreas Fault runs north-south through the middle of the OA underlying most of the local governments within the OA. The San Mateo County OA is also vulnerable to the neighboring Hayward Fault, which runs parallel to the San Andreas Fault, east of the San Francisco Bay. Just during the writing of this thesis, the San Francisco Bay Area, including the San Mateo County OA experienced two earthquakes, an M 5.0 and an M 4.9 within six months of each other.

[5] Ibid., B-4.

[6] Ibid., B-1.

[7] Ibid., B-8.

B. PROBLEM SPACE

Catastrophic earthquakes in the San Francisco Bay Area will affect wide geographic areas and require the simultaneous activation of emergency operations centers (EOCs) of all affected local governments to support emergency response and coordination. At some level, intra-OA emergency response coordination is already well-planned. The State of California's Standardized Emergency Management System (SEMS) offers a framework and guidance for emergency management using the Incident Command System (ICS). SEMS is the adopted standard that is practiced throughout the State of California for field-level response, emergency operations management, and mutual aid coordination with OAs, regions, and the state. SEMS clearly defines emergency response coordination at the state and regional levels. In addition, it defines one-to-one, intra-OA coordination mechanisms between the lead agency for OAs and their local governments. County governments are typically the lead agencies for OAs and host OA EOCs.[8]

Similarly, the State of California's Governor's Office of Emergency Services (Cal OES) developed the *Regional Emergency Coordination Plan* (RECP) to assist OAs in the San Francisco Bay Area to coordinate with each other and the Cal OES Coastal Region EOC during catastrophic events affecting multiple jurisdictions. According to the *San Francisco Bay Area Regional Emergency Coordination Plan, Base Plan*:

> The Regional Emergency Coordination Plan builds on California's existing Standardized Emergency Management System, through better definition of regional components of that system, including coordination across disciplines and levels of government, resource sharing, and regional decision-making.[9]

Catastrophic earthquakes in the San Francisco Bay Area would meet the threshold to trigger implementation of the RECP. The RECP identifies a regional coordination group to represent the affected OAs for the coordination of emergency response activities in the San Francisco Bay Area. However, the RECP does not address intra-OA level

[8] Ibid., 7.

[9] Governor's Office of Emergency Services et al., *San Francisco Bay Area Regional Emergency Coordination Plan, Base Plan* (Governor's Office of Emergency Services et al.., 2008), Foreword.

multilateral, collaborative, emergency response coordination where there is an identified gap with a lack of formal plans or agreements between local governments within OAs. In the absence of intra-OA specific multilateral, collaborative, coordination plans, the San Mateo County OA, for example has adopted a Joint Powers and Exercise Authority agreement (JPA) for local governments within the OA to work together in their emergency response efforts.

At the intra-OA level, activated county-led OA EOCs must effectively coordinate simultaneously with all their activated local governments EOCs while operational. Affected local governments must sustain fully activated EOCs for extended periods. On behalf of OAs, counties must also supplement and assist severely affected local governments that are unable to provide emergency response services, including staff EOC operations.[10]

The need to sustain fully activated EOCs continually for extended periods requires local governments to have substantial numbers of trained personnel to staff EOCs. Counties also require deeper pools of trained personnel to support the severely affected local governments in providing emergency response services, as well as to also accommodate the county-led OA EOCs expanded coordination needs for extended periods.

Typically, local governments do not have sufficient trained personnel resources to continually staff fully activated EOCs for extended periods. Such is the case for the San Mateo County OA, its constituent local governments, and most, if not all, other local governments in the San Francisco Bay Area and likely beyond. Some of the smaller local governments in the San Mateo County OA do not have the capacities to activate and staff EOC operations at full levels for even one operational period and will defer to the county for assistance during catastrophic disasters. This is a common circumstance in other OAs in the San Francisco Bay Area and also beyond.

[10] Ibid., 30–31, §4.

The shortfall in trained EOC personnel resources will be further magnified during catastrophic disasters as personnel themselves may be affected and unable to staff EOC positions across the affected areas. The existing intra-OA emergency response coordination model that requires county-led OA EOCs to coordinate separately and simultaneously with the activated EOCs of their constituent local governments will likely be overwhelmed due to unmanageable "span of control" challenges.[11] Specifically, the shortages in trained EOC personnel impede the abilities of affected local governments to staff and operate fully activated EOCs for extended periods. Counties will also likely be overstretched in their abilities to provide, on behalf of the OA, the needed supplemental assistance and support to incapacitated local governments that are unable to fulfill their emergency response functions. Additionally, the lack of sufficient trained EOC personnel to assist with expanded coordination needs further diminishes the abilities of county-led OA EOCs to coordinate effectively with all their constituent local government's activated EOCs.

The need for trained personnel to staff EOCs at affected local governments is the greatest during the immediate aftermath of catastrophic disasters. As described in SEMS, affected local governments could be provided with additional trained personnel to staff their EOCs through the local, regional, and statewide mutual aid systems, particularly the Emergency Managers Mutual Aid (EMMA) System and additionally through the Inter-State Emergency Management Assistance Compact (EMAC).[12] However, it takes time to deploy and situate the personnel sourced from elsewhere, with additional delays due to the likelihood of widespread damage to the local and regional transportation infrastructure following catastrophic earthquake disasters. Also, personnel sourced from elsewhere would not be familiar with their assigned local governments and would not

[11] Span of control: The number of individuals a supervisor is responsible for, usually expressed as the ratio of supervisors to individuals. (Under the NIMS, an appropriate span of control is between 1:3 and 1:7.). This concept could be extrapolated and applied to jurisdictional entities, as is being done in this context. Federal Emergency Management Agency, *Incident Command System Training (ICS)* (Washington, DC: Federal Emergency Management Agency, 2008), accessed September 9, 2015, https://training.fema.gov/emiweb/is/icsresource/assets/icsglossary.pdf, 11 [glossary].

[12] State of California, *Emergency Management Mutual Aid Plan* (Sacramento, CA: State of California, 2012), Chapter 1, 3–7.

have pre-established working relationships with local government personnel, which may reduce efficiencies.

In the San Mateo County OA, smaller jurisdictions would not have the capacity to effectively respond to and manage any event of significant consequence, in particular catastrophic disasters. They rely heavily on the county for immediate and direct support. San Mateo County would be tasked with serving 15 cities, five townships, 31 special districts, and 20 unincorporated communities within the OA, as well as fielding mutual aid requests from other OAs in the San Francisco Bay Area. Figure 1 illustrates part of the dynamics of the existing one-to-one, intra-OA emergency response coordination model and its disproportionate span of control for the San Mateo County OA.

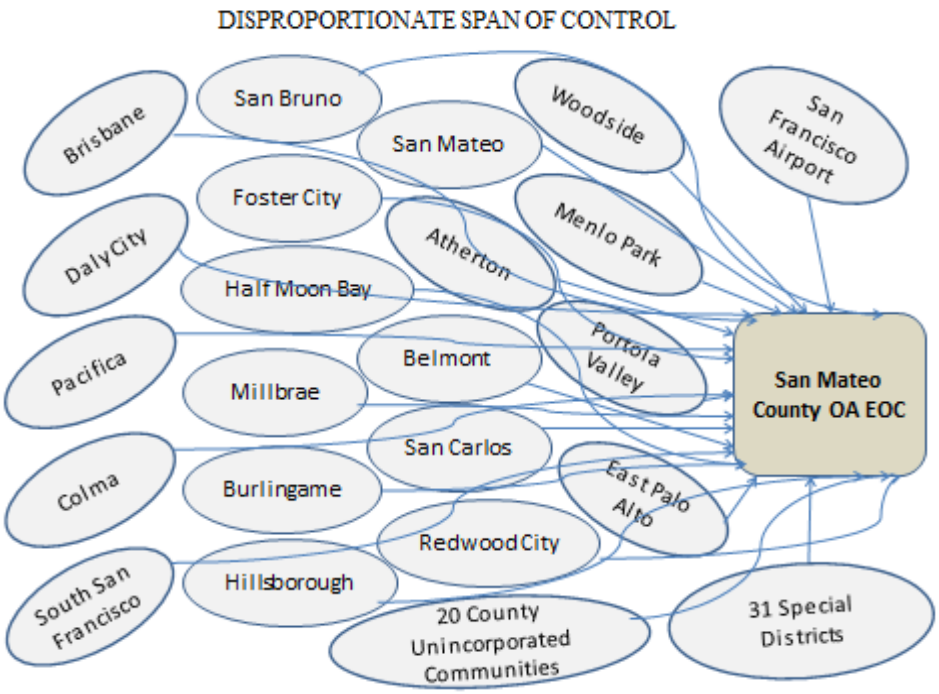

Figure 1. Existing intra-OA emergency response coordination model in the San Mateo County OA

The actual span of control challenge is greater than depicted in Figure 1 as the 31 special districts and 20 unincorporated communities within the San Mateo County OA have not been illustrated separately. San Mateo County will likely be overwhelmed in its

abilities to effectively coordinate and support all affected local governments within the OA immediately after a catastrophic disaster. Other OAs in the San Francisco Bay Area and beyond will likely face similar challenges as well.

C. RESEARCH QUESTION

This thesis posits an intra-OA emergency response coordination model that would work more effectively than the current model used in the San Mateo County OA during catastrophic disasters. The intra-OA emergency response coordination model currently used in the San Mateo County OA entails a one-to-one coordination relationship between the county-led OA EOC and each of the EOCs of the local governments within the OA. The one-to-one coordination model is applied for all emergency response events—regardless of scale of emergency response needed, the degree of disaster impact, and the duration of time EOCs need to remain activated. The application includes catastrophic disasters when the San Mateo County led OA EOC and most, if not, all the local governments in the OA are likely to simultaneously activate their respective EOCs at the highest activation levels that require fully staffed EOCs. The activated EOCs will additionally need to operate at fully staffed levels for extended periods.

This thesis asks: What would an alternate intra-OA emergency response coordination model look like and would it also have portability and applicability to other OAs in the San Francisco Bay Area and beyond?

D. PURPOSE OF STUDY AND SIGNIFICANCE OF RESEARCH

The objectives of the research is: to highlight the inadequacies of the existing one-to-one intra-OA emergency response coordination model during catastrophic disasters; establish a clear need for a more effective alternate model; determine what that alternate model could be, including its various elements; and also outline key aspects for successful adoption and implementation in the San Mateo County OA. Additionally, the research determines the portability and applicability of the alternate intra-OA emergency response coordination model to other OAs in the San Francisco Bay Area. The analysis examines existing local government emergency response coordination models to consider a new model using a multilateral philosophy of collaborative intra-OA coordination. The

outcome of this research aims to provide the San Mateo County OA a well-defined, more effective alternate intra-OA emergency response coordination model as a viable solution to address a critical capability gap during catastrophic disasters, a time of greatest need. The proposed solution also has portability and applicability to other OAs in the San Francisco Bay Area and beyond, significantly expanding the contributions of this research.

E. LITERATURE REVIEW

The research draws on primary sources such as after action reports, journals, books, manuals, Department of Homeland Security (DHS) and FEMA documents, State of California and San Mateo County Office of Emergency Services (OES) documents, annexes, and plans, as well as previously written theses, policy, and procedure manuals, and published local, state, and federal government articles.[13] The alternate, intra-OA emergency response coordination model this thesis advances, which would be more effective during catastrophic disasters, owes much to the author's formal training, experience, and practitioner knowledge in the fields of emergency management and law enforcement. The author has 29 years invested in the field of law enforcement, specifically in the U.S. military and as a special weapons and tactics team (SWAT) commander, incident commander, and director of emergency services for the San Mateo County OA.

Several scholarly theories also informed and influenced the author in considering an alternate intra-OA emergency response coordination model as a solution to the identified gap in effectiveness of the existing intra-OA coordination model during catastrophic disasters. Philosophical theories, such as complexity theory, holism, and predictable surprise, helped this author recognize the need for more effective intra-OA emergency response coordination during catastrophic disasters and inspired him to

[13] Literature pertaining to frameworks, policies, guidelines, and use of technology tools in emergency management is later presented in Appendix A. Appendix B examines the governance structure of local emergency management. General assumptions are examined for applicability toward emergency response, mitigation and recovery, the importance of cohesive efforts and unity of effort among stakeholders. The governance category concludes in Appendix C with an examination of the San Mateo County Operational Area as a model for intra-OA zone EOC consideration.

challenge the status quo of continuing to rely on the existing one-to-one intra-OA coordination model during catastrophic disasters. The theories provide insights that inform and support multilateral collaborative solutions for more effective intra-OA coordination.

1. Complexity Theory

Complexity theory is defined as "the study of complex and chaotic systems and how order, pattern, and structure can arise from them."[14] In Science Direct's 2001 *Leadership Quarterly* journal article, Russ Marion authored a study called "Leadership in Complex Organizations." The research argues:

> complexity theory focuses leadership efforts on behaviors that *enable* organizational effectiveness, as opposed to *determining* or guiding effectiveness. Complexity theory is the study of interacting systems; it explores the nature of interaction and adaptation in such systems and how they influence such things as emergence, innovation, and fitness.[15]

Complexity theory has direct correlation and application to the role of emergency management during EOC operations. According to Marion and Uhl-Bien, "Complexity theory focuses leadership efforts on behaviors that *enable* organizational effectiveness, as opposed to *determining or guiding* effectiveness."[16] Similar to the nature of emergency management, "complexity theorists see nature as too dynamic, unstable and unpredictable,"[17] as in surprise attacks, acts of nature or catastrophic events.

> Complexity science moves us away from reductionist perspectives that reduce holistic systems to isolated observations. Instead, complexity theory encourages us to see organizations as complex adaptive systems composed of a diversity of agents who interact with one another, mutually

[14] *Dictionary.com Unabridged*, s.v. "Complexity Theory," accessed: July 08, 2015, http://dictionary.reference.com/browse/complexity theory.

[15] Russ Marion, and Mary Uhl-Bien, "Leadership in Complex Organizations," *The Leadership Quarterly* 12, no. 4 (2001): 389–418 accessed July 8, 2015, http://www.sciencedirect.com/science/article/pii/S1048984301000923.

[16] Ibid.

[17] Ibid.

> affect one another, and in so doing generate novel behavior for the system as a whole[18]

This creates a healthy, collaborative work environment. The complexity theory supports the argument that a one-to-one intra-OA emergency response coordination model is a reductionist minded approach that soon loses efficiency during complex events such as catastrophic disasters.

2. Holism

The complimenting philosophical view to complexity theory is holism. Holism is best described in the context of the research as ideas that: "the whole is more than the sum of its constitutive parts, so reduction of the whole to its constitutive elements eliminates some factors which are present only when a being is seen as a whole."[19] For example, EOCs can interact with other EOCs for the benefit of multiagency cooperation; however, they lack the collective bandwidth of sustainability when acting alone in one-to-one coordination efforts.

In a similar analogy to the concept of holism, where the theory supports the "whole being greater than the sum of its parts,"[20] is the 2001 New England Patriots football team. The team, led by a rookie quarterback, a newly appointed head coach, and a mix of unknown players, won a wildcard playoff game. They followed this with a controversial playoff win against the Oakland Raiders (known as the infamous "snow bowl") and beat the reigning Superbowl champion, the St. Louis Rams, in the 2002 Superbowl.[21] The football example demonstrates the concept that the whole can be greater than the sum of its individual parts (players). The same concept can be applied in crisis response for smaller local governments where the employee pool is already taxed by combining with neighboring local governments to create a sum greater than its

[18] Ibid.

[19] *New World Encyclopedia*, s.v. "Holism," accessed July 8 2015, http://www.newworldencyclopedia.org/p/index.php?title=Holism&oldid=979137.

[20] Ibid.,

[21] Mike Gleason, "The Most Improbable Championship: The 2001 New England Patriots," *Bleacher Report*, January 8, 2010, accessed September 9, 2015, http://bleacherreport.com/articles/322646-the-most-improbable-championship-the-2001-new-england-patriots.

collective part(s). An alternate, multilateral, collaborative intra-OA coordination model would offer the sum of the pool of employees from contributing local governments, greatly expanding the collective capacity and capabilities.

In the book *Systems Thinking: Creative Holism for Management*, M. Jackson writes about holism as "systems to be more than the sum of their parts."[22] Jackson submits that holism offers benefits from "the failure of reductionism to cope with problems of complexity, diversity and change in complex systems."[23] Reductionism will not survive in a group setting where knowledge and experience is present and available to be shared.

3. Predictable Surprise

Max Bazerman and Michael Watkins, in their book, *Predictable Surprise: The Disasters You Should Have Seen Coming, and How to Prevent Them*, define predictable surprise as "an event or set of events that take an individual or group by surprise, despite prior awareness of all of the information necessary to anticipate the events and their consequences."[24] In a study conducted on U.S. pensions, the Oxford University Press defines predictable surprise as, "a predictable surprise describes a situation or circumstance in which avoidable crises are marginalized in order to satisfy economic and social policies."[25] In the aftermath of any significant crisis, the usual or inevitable second guessers will often imply that the people in leadership positions should have predicted the event.

A recent example of predictable surprise on the part of the Pacific Gas and Electric Company (PG&E) was its negligent pipeline maintenance practice and documentation. The result was the 2010 San Bruno, California (CA) pipeline explosion

[22] Michael Jackson, *Systems Thinking: Creative Holism for Management* (West Sussex, England: John Wiley & Sons, 2003), 4.

[23] Ibid.,

[24] Max Bazerman, and Michael Watkins, *Predictable Surprise: The Disasters You Should Have Seen Coming, and How to Prevent Them* (Boston, MA: Harvard School Publishing Corporation 2008), 1.

[25] Sylvester J. Schieber, *The Predictable Surprise: Unraveling the U.S. Retirement System* (New York: Oxford University Press, 2015).

where a "30 inch [in diameter] high pressure natural [gas] pipeline exploded, killing eight people"[26] and caused over $1 billion in damages to residents, the city, and its own assets. The city and news immediately accused PG&E of failing to prevent a predictable disaster. Ultimately, the residents and city of San Bruno were awarded millions of dollars from PG&E in damages. As if by premonition, professor Phil Tetlock of the University of California in Berkeley wisely noted, "events are not simply predictable or unpredictable, but rather they are a continuum of predictability,"[27] a wise and ominous foretelling for the PG&E legal team.

In most circumstances in life, there are a number of characteristics that can alert people to potential predictable surprises lying in wait. Some examples include:

1. Leaders knew of a problem but took no action to mitigate it.
2. "Fixing the problem would incur significant costs while benefits may be delayed; it is counterintuitive to spend scarce real resources now to prevent an ambiguous and merely potential harm from occurring in the future.
3. Measures aimed at avoiding predictable surprises require costs that constituencies will notice, yet politicians will not be recognized or awarded for the disasters they help to avert. For this reason, they have little motivation to work to prevent predictable surprises and may choose to cross their fingers and hope for the best."[28]
4. The fourth predictable surprise is "the natural human tendency to maintain the status quo: when a system still functions and there is no crisis to catalyze action, we will keep doing things the way we have always done them."[29]

Acting against the status quo bias goes against the natural flow of things and requires a decision that often is marginalized when compared with present day urgent matters.

Predictable surprise relates to the politics of crisis management and disaster planning, often manifesting in the lack of needed preparedness planning for known

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[26] San Mateo County Office of Emergency Services, *San Mateo County Office of Emergency Services: Post-San Bruno Fire Self-Evaluation*, accessed July 8, 2015, https://www.sanmateocourt.org/documents/grand_jury/2011/emergency_services.pdf, 6.

[27] Ibid., 4.

[28] Ibid., 6

[29] Ibid., 7

potential threats. For example, most local governments lack sufficient personnel with appropriate training and experience to staff fully activated EOCs for extended periods, and yet, measures to address the shortfall are not prioritized and addressed.

F. RESEARCH DESIGN

In mid-2014, the author, in collaboration with a colleague at the county OES, Donald Mattei (who is also a second reader for this thesis), considered the idea of establishing consolidated local government EOCs for the San Mateo County OA that would align with the established zones already used by the county OES and the Law Enforcement Mutual Aid System. The San Mateo County OA is currently demarcated into four zones for providing emergency service functions by the county OES: north, central, south, and coastal. Also, the Law Enforcement Mutual Aid System coordination in the San Mateo County OA utilizes the same corresponding zones, along with the OA public safety communications dispatch system when coordinating response units for calls in progress and for pre-planned events. The county OES has assigned district coordinators to each zone to coordinate and oversee emergency services functions, and the Law Enforcement Mutual Aid System has assigned a coordinator for each zone. Additionally, the Public Works Mutual Aid System established within the San Mateo County OA also envisions establishing a zone concept that mirrors existing geographic zones demarcated for the Law Enforcement Mutual Aid System.

In late 2014 and early 2015, the county OES conducted a zone-based, four-part exercise, with tabletop and functional elements, called Operation Cohesive Capability (OCC). One of the OCC exercise objectives was to test the preliminary concept of zone-based consolidated local government EOCs, focusing on EOC coordination, emergency communications, public-private partnership coordination, and use of mass notification systems. Although the concept at the time was still at a very high level and the working details and various conceptual elements had yet to be developed, the idea was to explore the feasibility and potential viability as well as to ascertain stakeholder interest in the concept.

Each of the OCC exercise series was designed to address an existing vulnerability in each pre-established county OES zone that also corresponded with the Law Enforcement Mutual Aid System coordination zone. Exercise scenarios were assigned as follows:

- North zone: mass transportation disruption with hazardous materials release; lead agencies were fire services, environmental health and public health;
- Central zone: utility disruption; lead agencies were Department of Public Works (DPW), law enforcement, and fire services;
- South zone: Active and mobile criminal threat; lead agencies were law enforcement, including explosive ordnance disposal (EOD) teams, and fire services;
- Coastal zone: Wild land fire; lead agencies were the California Department of Forestry and Fire Protection (CAL FIRE), DPW, and California Highway Patrol (CHP).

Each scenario was designed to overwhelm the capacity of a single jurisdiction's response requiring intra-OA mutual aid support.

As part of the OCC exercise, local governments within each county OES/Law Enforcement Mutual Aid System coordination zone in the San Mateo County OA agreed to combine resources and staffing into consolidated EOCs for their respective zones. Each OCC exercise series was conducted one month apart from each other, allowing time for planning, exercise play, and after action reporting before the next series. All jurisdictions were invited to participate, observe, evaluate, or assist in any exercise series with the agreement that the designated zone agencies would lead their respective exercises. The OCC exercise series target audiences were city managers, police and fire chiefs, department heads, law enforcement commanders, and emergency managers from all jurisdictions within the San Mateo County OA. Supporting branches and unit roles were also included from Human Services Agency, American Red Cross, County Parks, Animal Control, community emergency response teams (CERT), information technology services, finance, purchasing, private sector, non-governmental organizations, etc.

The OCC exercises were successful in that they confirmed feasibility and potential viability of the preliminary idea of zone-based consolidated local government

EOCs. Importantly, a majority of the local governments who participated in the OCC exercises were supportive of exploring the concept of consolidating local government EOCs by zones within the OA. Additional successes of the OCC exercises are that they provided opportunities for senior leadership and staff from various local governments in the OA to establish new working relationships, train together, and collaboratively problem solve the exercise scenario challenges. Also, the OCC exercises allowed local governments within the OA to learn that a significant majority of them were willing to work together and valued opportunities for partnerships.

The OCC exercises also revealed failures that informed lessons learned that in turn highlighted the need to determine and fully develop the specifics of the zone-based consolidated local government EOCs concept. The working details of the concept that need further development include legal and operational framework and design, concept of operations, associated legal agreements, policies, procedures, protocols, funding and staffing needs, and other aspects necessary for successful adoption and implementation in the San Mateo County OA. This thesis addresses the highlighted needs and provides a solid foundation to assist the San Mateo County OA in developing and implementing the zone-based consolidated local government EOCs concept.

G. THESIS STRUCTURE AND OVERVIEW

Chapter II provides foundational information on capacity and capability gaps of local, regional, state, and federal governments in the context of the San Francisco Bay Area sustaining EOC activations. The chapter also provides an overview of the San Mateo County OA and its constituent local governments in the context of emergency management functions, frameworks, agreements, partnerships, and capabilities.

Chapter III introduces an alternate, intra-OA emergency response coordination model, which would be more effective during catastrophic disasters in the context of the San Mateo County OA. The chapter details the various elements of the model providing an overview of what the model looks like and the working details to operationalize it.

Chapter IV discusses key aspects for successful adoption and implementation of an alternate, intra-OA emergency response coordination model in the San Mateo County

OA. The chapter also examines the portability and applicability of the alternate model in other OAs in the San Francisco Bay Area and possibly beyond.

Chapter V provides recommendations and conclusions that are informed by the thesis research and analysis on an alternate intra-OA emergency response coordination model that would be more effective during catastrophic disasters in the San Mateo County OA, in other OAs in the San Francisco Bay Area, and possibly beyond.

Appendix A discusses emergency management frameworks, policies, and guidelines for response to complex events, including catastrophic disasters. Technological tools that assist with situational awareness and promote a common operating picture are also discussed in the context of their usefulness for emergency response coordination.

Appendix B provides further insights to additional challenges in emergency management and capability gaps, highlighting the politics of crisis management that contribute to decision making, the importance in unity of effort between and among agencies and local governments, the overall role of emergency management, and the status of organization and structure of emergency management in counties.

Finally, Appendix C identifies coordination challenges in major events that occurred in the San Mateo County OA. Case studies are presented and discussed summarizing lessons learned and recommendations.

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II. LOCAL GOVERNMENT EOC STAFFING CAPABILITIES AND AN OVERVIEW OF THE SAN MATEO COUNTY OPERATIONAL AREA

> There is no greater necessity than to collaborate on a regional basis to leverage expertise, share specialized assets, enhance capacity, and interoperate cohesively and effectively.
>
> *– U.S. Department of Homeland Security, National Preparedness Guidance*

This chapter assesses the capacities of local governments in the San Francisco Bay Area to staff EOC operations and highlights gaps in their capabilities. Additionally, this chapter also provides an overview of the San Mateo County OA and its constituent local governments in the context of emergency management functions, frameworks, agreements, partnerships, and capabilities.

A. LOCAL GOVERNMENT EOC STAFFING CAPABILITIES

For this research, informal but informed estimations of the existing capabilities of local governments and OAs in the San Francisco Bay Area, and state and federal entities to sustain fully activated EOC operations for extended periods were developed and analyzed. The estimations are based on reviews of San Francisco Bay Area OA emergency managers' plans, local governments' contingency plans, and the author's years of relevant training, experience, and practitioner knowledge. The estimations highlight a critical capability gap at local government levels to sustain fully activated EOC operations for extended periods, as would be needed in catastrophic disasters. The capability gap significantly impedes the abilities of local governments to effectively support coordination of emergency response efforts during catastrophic disasters.

EOC activation levels and procedures can be scaled to correspond to the changing emergency response needs to events. The chief executive, usually a city or county manager or designee, decides the level of activation needed to support field operations or other activated department operations centers (DOC) or EOCs. For the purposes of the dataset presented in Table 2, an EOC activation level is defined in terms of an

organization's EOC activation sustainment capacity for multiple operational periods during an extended incident, emergency, or disaster. The county-led OA EOC, dependent on the need, may activate to Level 1 (duty officer status), Level 2 (duty officer in addition to affected department or agency representatives) or Level 3 (full activation of all EOC branches and required section chief positions) to support local governments within its OA boundaries. Table 2 depicts the EOC activation sustainment capacities of most San Francisco Bay Area local governments, categorized by jurisdiction type and population size, and the state OES entities.

Table 2. San Francisco Bay Area local governments and State OES entities and EOC activation sustainment capacities

Jurisdiction	Level 1	Level 2	Level 3	2+ Operational Periods
Township/City – Population ≤ 10,000	**Yes**	**Yes**	**No**	**No**
Township – Population ≤ 25,000	**Yes**	**Yes**	**No**	**No**
Small City – Population ≥ +25,000	**Yes**	**Yes**	**No**	**No**
Medium City – population ≥ 50,000	**Yes**	**Yes**	**Yes**	**No**
Large City – Population ≥ 100,000	**Yes**	**Yes**	**Yes**	**Yes**
Operational Areas	**Yes**	**Yes**	**Yes**	**Yes**
Cal OES Coastal Region EOC	**Yes**	**Yes***	**Yes***	**Yes***
State Operations Center	**Yes**	**Yes**	**Yes**	**Yes**

* The Cal OES Coastal Region EOC is currently not staffed by full time employees and would have to source personnel from other Cal OES regions or Cal OES headquarters if it needed to be fully activated.

Figure 2 illustrates the EOC activation sustainment capacities of the various levels of governments within the San Francisco Bay Area: local, OA, Cal OES Coastal Region Regional EOC (REOC), Cal OES Headquarters State Operations Center (SOC), and federal support. The y-axis in Figure 2 represents an EOC activation level while the x-axis represents the duration of event broken into 12-hour operational periods. The graph highlights the point that some jurisdictions have sufficient trained EOC staff to sustain a

fully activated EOC (level 3) for extended periods, while others do not have the bandwidth to staff or stay operational without additional trained EOC personnel support.

Typically, under the SEMS framework, the Cal OES Coastal Region REOC should be activated when a county-led OA EOC in the Cal OES Coastal Region is activated; the San Mateo County OA and the San Francisco Bay Area falls within Cal OES Coastal Region's jurisdiction. However, the Cal OES Coastal Region REOC does not activate when county-led OA EOCs are activated at any levels to support OAs in the Cal OES Coastal Region jurisdiction. The state presently relies on its SOC activation to accommodate the Cal OES Coastal Region REOC's absence. Federal resources are not applicable unless the SOC is fully activated and requests mutual aid assistance.

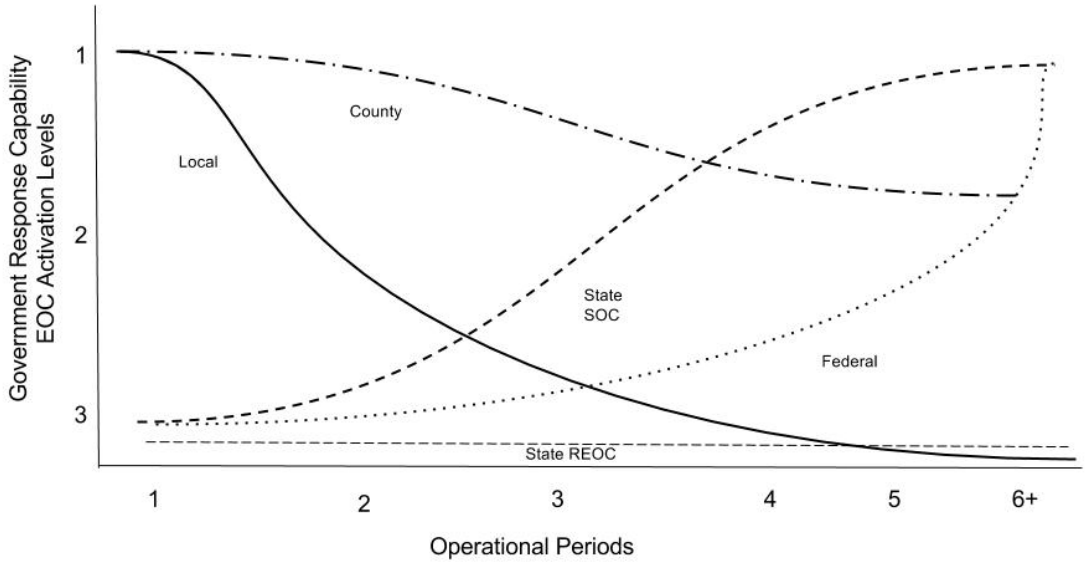

Figure 2. EOC activation levels and operational period sustainability

*The horizontal line at the bottom of the graph reflects the present operational capacity of the Cal OES Coastal Region REOC due to inadequate assigned personnel and lack of facilities and technology tools to support EOC activations.

Local governments in the San Francisco Bay Area can easily assess their own capabilities and align themselves on the Figure 2 graph to determine if they are creating or more likely perpetuating a predictable surprise for themselves in the event they are

required to fully activate and sustain their EOCs during a catastrophic disaster. Local jurisdictions, especially those with populations less than 50,000 or so, are likely to be quickly overwhelmed when responding to and managing complex incidents, emergencies, or disasters. As reflected by the informal but informed data in Table 2 and Figure 2, most local jurisdictions in the San Francisco Bay Area typically do not have sufficient trained EOC personnel to sustain fully activated EOC operations for extended periods.

The threat of a catastrophic earthquake is ever present in the San Francisco Bay Area. Appropriate preparedness measures in response to such risks and its challenges should be undertaken in an effort to better prepare for more effective and successful outcomes in the event of a catastrophe.

B. OVERVIEW: THE SAN MATEO COUNTY OPERATIONAL AREA

The San Mateo County OA consists of the political subdivisions that are within the geographic boundaries of the county of San Mateo. San Mateo County lies in the western coast of the state of California, encompassing the majority of the San Francisco Peninsula in the San Francisco Bay Area. As noted in the *San Mateo County Emergency Operations Plan (EOP)*:

> The county is bordered by the City and County of San Francisco on the north, the counties of Santa Clara and Santa Cruz on the south, the Pacific Ocean on the west, and the San Francisco Bay on the east.[30]

The Santa Cruz mountain range separates the coastside of the county from the bayside along the central axis of the county.

San Mateo County has a total area of 741 square miles, of which 449 square miles are land and 292 square miles are water.[31] As of 2013, the estimated total population in the county was approximately 747,373.[32] The majority of the population, approximately

[30] San Mateo County Sheriff's Office, *San Mateo County Hazard Vulnerability Assessment Annex to the Emergency Operations Plan* (San Mateo, CA: San Mateo County Sheriff's Office, 2015), 3.

[31] Ibid.

[32] Ibid.

91 percent reside in 20 incorporated cities, and the remaining residents live in unincorporated communities and areas.[33] The county hosts the second largest airport in California, the San Francisco International Airport, and is also home to the Port of Redwood City, which is the only deep-water port servicing the southern part of the San Francisco Bay.[34] The county also serves as a major mass transit corridor for the San Francisco Bay Area linking the city and county of San Francisco with Silicon Valley and the San Francisco Peninsula with the East Bay with a network of roads and railway lines.[35]

The county manager is the director of emergency services, as identified in the *San Mateo County EOP*; however, he/she assigns emergency management and oversight responsibilities to the elected sheriff as his/her designee.[36] In August 2012, a new Homeland Security Division and Area Office of Emergency Services (HSD/OES) was created within the San Mateo County Sheriff's Office. It is comprised of bureaus that focus all aspects of emergency management for all hazards. The county OES coordinates emergency management responsibilities through its four district coordinators, each assigned to pre-established geographic zones: north, central, south, and coastal.

The San Mateo County OA has established an Emergency Services Council (ESC) through a joint powers and exercise agreement/authority (JPA) with cities and townships within the OA. The JPA was formalized under the Joint Exercise of Powers Act, California Government Code, § 6500 *et seq*.[37] The JPA's core mission and purpose is "to operate pursuant to Presidential Directive 5, the National Response Framework, NIMS, Presidential Directive 8, the National Preparedness Goal,"[38] SEMS, and local

[33] Ibid.

[34] Ibid.

[35] Ibid.

[36] San Mateo Sheriff's Office Homeland Security Division, Office of Emergency Services, *Emergency Operations Plan* (San Mateo, CA: San Mateo Sheriff's Office Homeland Security Division, Office of Emergency Services, 2015).

[37] San Mateo Office of Emergency Services, and Emergency Managers Association, *San Mateo County Joint Powers Agreement*, October 2013, http://192.237.168.44/sites/default/files/downloadables/October%2017%2C%202014%20JPA.pdf.

[38] Ibid.

adopted Emergency Operations Plans and Annexes. Section 1.04 of the San Mateo County Emergency Services Council JPA, states:

> Participation in the Organization is intended to ensure cooperative emergency planning and response; all participating Member Agencies and partners are expected to attend all regular and special meetings of the Emergency Services Council, encouraged to active participation by their jurisdictions in the development of plans and training programs, drills, exercises and training opportunities, and otherwise assist in supporting the implementation of this agreement.[39]

The director of the HSD/OES reports to the ESC and manages the San Mateo County Emergency Services Council JPA comprised of elected representatives from each of the incorporated cities, the county, and townships, for the purpose of maintaining a unified emergency management organization.

The San Mateo County OA also has 31 special districts. Some special districts have active roles during emergencies, such as the fire protection districts, which often act as operations chiefs, planning chiefs, or incident commanders or make decisions on behalf of city and township managers. Other special districts, such as the school districts, mosquito and vector control district, harbor district, etc., have a lesser role during emergencies unless there is a specific nexus to their discipline. Some districts send representatives to an activated EOC while some do not, depending on the location and geographic area of impact of the incident, emergency, or disaster, and how it affects them as stakeholders in the OA. Special districts are not contributing member agencies in the San Mateo County Emergency Services Council JPA and have no voting rights.

The San Mateo County OA has also established a Public Works Mutual Aid System through a formal memorandum of understanding (MOU) between all cities and their departments of public works to share resources on a voluntary basis during disasters. The Public Works Mutual Aid System emulates the other existing discipline-specific mutual aid systems; however, it is a voluntary system and not automatic. Additionally, the language of the MOU and its accompanying procedures guide specifically envision

[39] Ibid., 12.

establishing a "zone" concept of aid that mirrors existing geographic zones demarcated for the Law Enforcement Mutual Aid System.[40]

The San Mateo County OA also has an Emergency Managers Association (EMA) for the purpose of supporting OA wide emergency management needs. The San Mateo County EMA comprises of emergency managers or representatives from cities, townships, county departments, special districts, and non-governmental organizations (NGOs) within the San Mateo County OA. The collaborative multiagency and multi-jurisdictional, OA-wide partnership through the San Mateo County EMA assists in collectively identifying emergency management capability gaps and needs and then developing strategies and implementation plans for programs and processes to address the identified gaps and needs in the San Mateo County OA. In addition, the San Mateo County EMA meets monthly to ensure that the county's provision of emergency management functions addresses the needs of local governments within the OA.

As part of this research, the author conducted an assessment in collaboration with members of the San Mateo County EMA to provide an overview of the cities and townships in the San Mateo County OA and their existing emergency management capabilities. The assessment data is presented in Tables 3 and 4. Table 3 presents an overview of the all the cities and townships in the San Mateo County OA and details their total populations, geographic areas, and service providers for key emergency management functions. Table 4 provides an overview of all the cities and townships in the San Mateo County OA and an estimation of their existing emergency management capabilities reflected through the number of trained personnel assigned for emergency management functions, and their capacities to sustain EOC activations at various levels and for extended periods.

[40] County of San Mateo Public Works, *County of San Mateo Public Works Mutual Aid Agreement*, accessed September 19, 2015, http://192.237.168.44/sites/default/files/downloadables/public%20works.pdf.

In essence, the Table 4 data provides an overview of the levels of commitment by cities and townships in San Mateo County OA to emergency management functions and highlights the potential capability gaps. The data in Table 4 shows that most cities and townships in the San Mateo County OA do not have a fulltime, dedicated emergency manager. In fact, most cities and townships in the San Mateo County OA share emergency managers between two or more jurisdictions, causing challenges for the emergency manager to focus on one city's needs over another.

Cities and townships in the San Mateo County OA also indicate disparities among assigned EOC personnel and trained employees in emergency management. The number of personnel recommended to staff an EOC should support the key ICS command staff and general positions of operations, planning, logistics, finance/administration and EOC director. Additionally, staffing for supporting positions would include, a policy group representative, unit leaders, web EOC support, logistics support, intelligence, legal counsel, liaison, etc., and would require additional staffing. However, the data indicates that most cities and townships do not have sufficient trained personnel to staff these respective positions in an EOC activated at Level 2 or higher. The data in Table 4 confirms that most cities and townships in the San Mateo County OA do not have the capacities to sustain fully activated EOCs for extended periods.

Table 3. San Mateo County OA jurisdictions details with emergency service providers

No.	City/Town	Population	Area: Square Miles	Fire Services	Law Enforcement
1	Town of Atherton	6,914	5.05	Menlo Park Fire District	Atherton Police Department
2	City of Brisbane	4,482	20.08	North County Fire Authority	Brisbane Police Department
3	City of Burlingame	29,892	6.09	Central County Fire Department	Burlingame Police Department
4	City of Belmont	26,731	4.63	Belmont Fire Department	Belmont Police Department
5	Town of Colma	1,492	1.90	Colma Fire Protection District	Colma Police Department
6	City of Daly City	104,739	7.66	North County Fire Authority	Daly City Police Department
7	City of East Palo Alto	29,143	2.61	Menlo Park Fire District	East Palo Alto Police Department
8	City of Foster City	32,377	19.90	Foster City Fire Department	Foster City Police Department
9	City of Half Moon Bay	11,324	6.45	Coastside Fire Protection District	San Mateo County Sheriff's Office
10	Town of Hillsborough	11,273	6.19	Central County Fire Department	Hillsborough Police Department
11	City of Menlo Park	33,071	17.42	Menlo Park Fire District	Menlo Park Police Department
12	City of Millbrae	21,532	3.26	Central County Fire Department	San Mateo County Sheriff's Office
13	City of Pacifica	38,606	12.66	North County Fire Authority	Pacfica Police Department
14	Town of Portola Valley	4,518	9.09	Woodside Fire Protection District	San Mateo County Sheriff's Office
15	City of Redwood City	76,815	34.62	Redwood City Fire Department	Redwood City Police Department
16	City of San Bruno	42,443	5.48	San Bruno Fire Department	San Bruno Police Department
17	City of San Carlos	29,387	5.54	Redwood City Fire Department	San Mateo County Sheriff's Office
18	City of San Mateo	97,207	15.88	San Mateo Fire Department	San Mateo Police Department
19	City of South San Francisco	63,632	30.16	South San Francisco Fire Department	S. San Francisco Police Department
20	Town of Woodside	5,481	11.73	Woodside Fire Protection District	San Mateo County Sheriff's Office

Table 4. San Mateo County OA jurisdictions details with emergency management capabilities

City/Town	Dedicated E/M	E/M Personnel	Trained EOC Personnel	EOC Activation Sustainment Capacity			
				Level 1	Level 2	Level 3	2+ Op Periods
Town of Atherton	0.30	3.00	6.00	Yes	Yes	No	No
City of Brisbane	0.33	Unk	Unk	Yes	Yes	No	No
City of Burlingame	0.33	6.00	Unk	Yes	Yes	Yes	Yes
City of Belmont	0.25	1.30	35.00	Yes	Yes	Yes	Yes
Town of Colma	0.00	Unk	Unk	Yes	Yes	No	No
City of Daly City	0.33	10.00	Most Employees	Yes	Yes	Yes	Yes
City of East Palo Alto	0.33	4.00	6.00	Yes	Yes	No	No
City of Foster City	0.66	10.00	Most Employees	Yes	Yes	Yes	Yes
City of Half Moon Bay	1.00	25.00	Most Employees	Yes	Yes	Yes	Yes
Town of Hillsborough	0.33	4.00	4.00	Yes	Yes	No	No
City of Menlo Park	0.33	8.00	Most Employees	Yes	Yes	No	Yes
City of Millbrae	0.33	4.00	4.00	Yes	Yes	No	No
City of Pacifica	0.00	1.00	8.00	Yes	Yes	Yes	Yes
Town of Portola Valley	0.00	2.00	2.00	Yes	Yes	No	No
City of Redwood City	1.00	10.00	Most Employees	Yes	Yes	Yes	Yes
City of San Bruno	0.00	6.00	6.00	Yes	Yes	No	No
City of San Carlos	0.00	2.00	2.00	Yes	Yes	No	No
City of San Mateo	0.33	10.00	Most Employees	Yes	Yes	Yes	Yes
City of South San Francisco	1.00	1.00	75.00	Yes	Yes	Yes	Yes
Town of Woodside	0.00	2.00	2.00	Yes	Yes	No	No

Legend:

Dedicated E/M: If the city/township has a dedicated Emergency Manager

E/M Personnel: Number of Emergency Management personnel

Trained EOC Personnel: Number of Personnel with required NIMS-SEMS training for EOC staffing assignments

EOC Activation Sustainment Capacity: Town/City's capacity to activate and sustain EOC activations at Levels 2 and 3, and ability to sustain EOC activations for more than 2 Operational Periods.

III. THE ZONE EOC CONCEPT

Let our advance worrying become advance thinking and planning.

– Winston Churchill

The intra-OA emergency response coordination model with a one-to-one coordination relationship between county-led OA EOCs and each of their local governments EOCs is typically the standard practice in the San Francisco Bay Area, the state of California, and beyond. There is a lack of alternate, intra-OA emergency response coordination model concepts that would be more effective during catastrophic disasters.

An alternate intra-OA emergency response coordination model would need to be multilateral and collaborative in design to be more effective during catastrophic disasters. A multilateral and collaborative design would be necessary to address the unmanageable "span of control" challenges faced by county-led OA EOCs and the shortage of sufficient trained EOC personnel to staff fully activated EOCs for extended periods at the local government level.

This chapter identifies an alternate multilateral collaborative intra-OA emergency response coordination model for the San Mateo County OA that would be more effective during catastrophic disasters and also outlines the key elements of that alternative model. A zone EOC concept can provide an alternate intra-OA emergency response coordination model that is multilateral, collaborative, and designed to enable manageable "span of control" with reduced overall trained EOC personnel staffing needs. A zone EOC concept involves establishing zone-based consolidated local government EOCs to represent geographic zones that encompass multiple local governments within an OA. When activated, the zone EOCs would coordinate with a county-led OA EOC on behalf of their constituent members within each zone, versus each city jurisdiction, township, and special district having its separate EOC.

A. LEGAL VALIDITY

The zone EOC concept should fall within the DHS FEMA National Incident Management System (NIMS) and SEMS frameworks as it is derived from the Incident Command System (ICS) and Multiagency Coordination System (MACS) concepts. The central feature of the zone EOC concept is that it calls for increased multilateralism and collaboration in coordination and sharing of resources between local governments within OAs. The zone EOC organizational structure, staffing, and position authorities and functions would also conform to applicable NIMS, ICS and SEMS guidelines for EOCs.

The SEMS framework has a total of five organization levels for coordinating emergency activities that progress from field response, local government, OA, region, and the state.[41] The local government level includes counties, cities, townships, and special districts. An OA is a SEMS organization level designation used for coordination of emergency activities within a county between all political subdivisions within the county geographic area.[42] The OA organization level also serves as a coordination link with the regional level, which represents the state.[43] The zone EOC concept facilitates a multilateral collaborative coordination mechanism for local government level entities to collectively coordinate emergency services within their jurisdictions, while maintaining the SEMS organizational level hierarchy of coordination between local governments and their respective OAs and the SEMS functions of local governments and OAs.

Additionally, the zone EOC concept aligns with the California Code of Regulations, § 2408, which states "local government shall use multiagency or inter-agency coordination to facilitate decisions for overall local government level emergency response."[44] Importantly, SEMS provides the framework for various agencies to work

[41] Cal OES, *SEMS Guidelines*, 8.

[42] Ibid., 7.

[43] Ibid.

[44] Ibid. See also James Asche, *Development of a Regional Emergency Operations Center for the San Mateo County Coast. May 2001* (Half Moon Bay, CA: Half Moon Bay Fire Protection District, 2001), 8.

together while continuing to retain their jurisdictional authority, responsibilities, and accountability.[45]

B. CONCEPT OF OPERATIONS

The concept of operations discusses the various elements involved in the implementation of the zone EOC concept within an OA in response to catastrophic disasters. The respective elements include activation, zone demarcations, zone EOC facilities, organization and authorities, staffing, operations, joint information centers (JICs)/joint information systems (JISs), situational awareness tools, and deactivation.

1. Activation

New policies can clarify when the zone EOCs would be activated and deactivated with clearly defined thresholds. The most appropriate scenario to activate the zone EOC concept would be following a catastrophic disaster, such as a catastrophic earthquake, that impacts the entire OA.

Additionally, emergencies or disasters that impact multiple local governments in more than one zone but not in all zones in an OA may also be appropriate thresholds to activate the zone EOCs. Activating zone EOCs in zones that have not been directly affected to support other zones that have been significantly affected would be helpful for streamlining management of mutual aid request and fulfillment that county-led OA EOCs are responsible for within an OA. In such instances, a county-led OA EOC can coordinate mutual aid resource request and fulfillment that a county-led OA EOC is responsible for at the zone levels via the zone EOCs versus separately with individual local governments.

A standardized policy for activation of the zone EOCs across the OA zones is preferable and should call for the activation of all zone EOCs following a catastrophic disaster impacting the entire OA. However, emergencies or disasters do not always impact the entire OA or do impact the entire OA but to varying degrees in the different zones. Accordingly, the zone EOC concept should be scalable by allowing flexibility for

[45] Cal OES, *SEMS Guidelines*, Chapter 1, 6.

the local governments within each zone to collectively decide and formally agree upon their respective zone EOC activation triggers and thresholds. Selective zone EOC activation options for flexible scalability will make the zone EOC concept more resilient in application. Policy decisions would determine the various activation levels and trigger criteria for degrees of zone EOC activations, preferably with common standards that apply to all zone EOCs within an OA.

2. Zone Demarcations

The zone EOC concept would continue to use the county OES and the Law Enforcement Mutual Aid System coordination zone demarcations of the San Mateo County OA into north, central, south and coastal zones for providing emergency service functions. The constituent cities, townships, special districts, and unincorporated area communities within each of the zones in the OA are as follows:

North zone: City of Daly City, City of Brisbane, Town of Colma, City of South San Francisco, City of San Bruno, City of Pacifica, Bayshore Sanitary District, Broadmoor Police Protection District, Colma Fire Protection District, North Coast County Water District, California Water Service - South San Francisco District, North San Mateo County Sanitation District, San Mateo County Harbor District, Westborough Water District, Guadalupe Valley Municipal Improvement District, Peninsula Health Care District, San Mateo County Mosquito and Vector Control District, and the unincorporated area communities of Broadmoor and Burlingame Hills.

Central zone: City of Millbrae, City of Burlingame, Town of Hillsborough, City of San Mateo, City of Foster City, the City of Belmont, California Water Service - Mid-Peninsula District, Mid-Peninsula Water District, Peninsula Health Care District, Sequoia Healthcare District, San Mateo County Mosquito and Vector Control District, and the San Francisco International Airport.

South zone: the City of San Carlos, City of Redwood City, City of Menlo Park, City of East Palo Alto, Town of Atherton, Town of Woodside, Town of Portola Valley, Menlo Park Fire Protection District, Ladera Recreation District, Mid-peninsula Regional Open Space District, California Water Service - Bear Gulch District, West Bay Sanitary District, Woodside Fire Protection District, Atherton Channel Drainage District, East

Palo Alto Sanitary District, Sequoia Healthcare District, San Mateo County Mosquito and Vector Control District, and the unincorporated area communities of Devonshire, Emerald Lake Hills, Ladera, Menlo Oaks, North Fair Oaks, Palomar Park, and West Menlo Park.

Coastal zone: the City of Half Moon Bay, Coastside Fire Protection District, Coastside County Water District, Granada Community Services District, Highlands Recreation District, Mid-peninsula Regional Open Space District, Montara Water and Sanitary District, San Mateo County Harbor District, Sewer Authority Mid-coastside, San Mateo County Mosquito and Vector Control District, San Mateo County Resource Conservation District, and the unincorporated area communities of El Granada, Highlands-Bay Wood Park, Kings Mountain, La Honda, Loma Mar, Montara, Moss Beach, Pescadero, Princeton-by-the-Sea, San Gregorio, and Sky Londa.

The San Mateo County Harbor District, the Mid-peninsula Regional Open Space District, San Mateo County Mosquito and Vector Control District, the Sequoia Healthcare District, and the Peninsula Health Care District, have jurisdictional boundaries and/or facilities in more than one zone and would be part of the zones they fall in. Policies and protocols will determine the respective districts to either participate in one or more zone EOCs, when multiple applicable zone EOCs are activated. Unincorporated areas that fall within each of the zones are under the county's jurisdiction and are represented by the county-led OA EOC.

Figure 3 presents the geographic boundaries of the four zones in the San Mateo County OA defined by the existing county OES and Law Enforcement Mutual Aid System coordination plans, which will also correspond to the zone EOC concept demarcations.

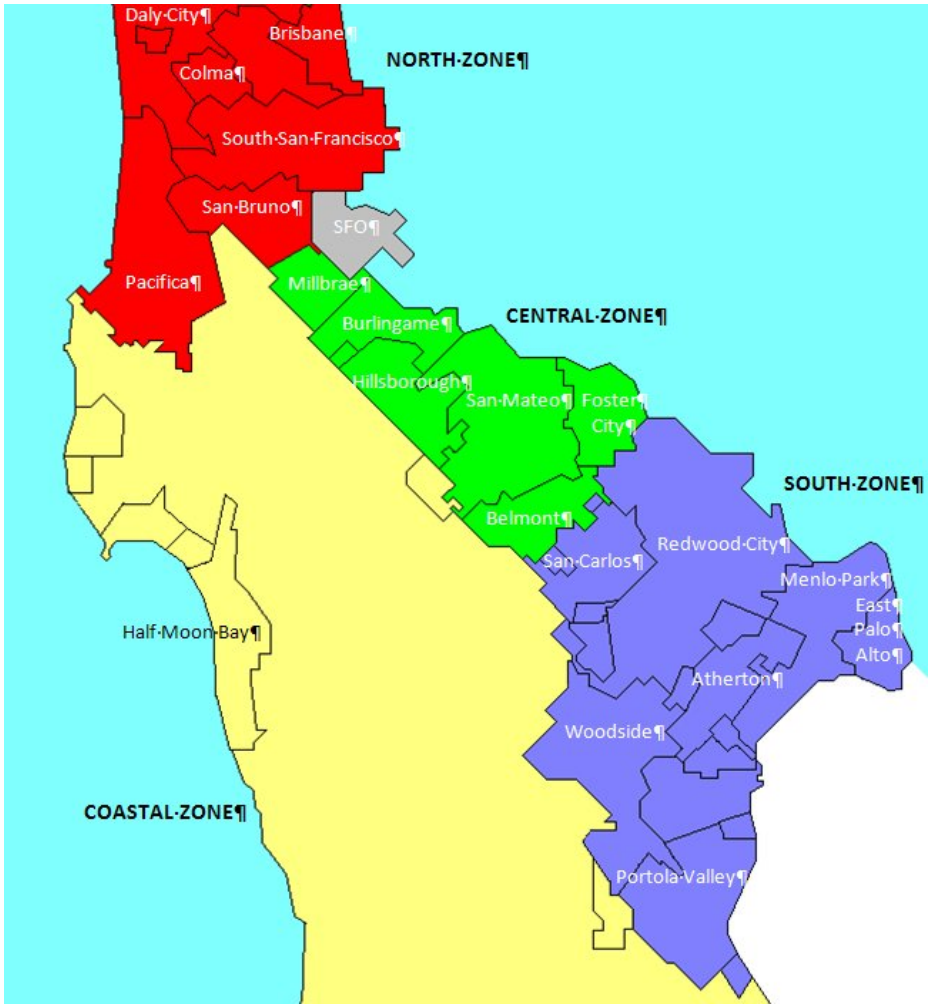

Figure 3. Color coded geographic map of San Mateo County OA depicting the four OES and Law Enforcement Mutual Aid System coordination zones taken from the Operation Cohesive Capability 2014–2015 exercise plan.[46]

3. Zone EOC Facilities

Each zone in the OA would need to identify a suitable primary facility and an alternate facility to house the zone EOCs, preferably with some distance to minimize the likelihood of both facilities being simultaneously compromised during an emergency or disaster. The proposed primary and alternate zone EOC facilities should meet and address the requirements of FEMA's EOC assessment checklist, which assists state and local

[46] Chris Floyd, "Operation Cohesive Capability" (presented at San Mateo County City Managers meeting, San Mateo, CA, September 2015), 7.

government in performing initial assessments of the hazards, vulnerabilities, and resultant risk to their EOCs.[47] Applicable guidelines, which primarily focus on flexibility, sustainability, security, survivability, and interoperability, for the design and criteria of EOCs should be considered when selecting the zone EOC facilities.[48]

4. Organization and Authorities

The zone EOC organizational structure, staffing, and position authorities and functions would conform to applicable NIMS, ICS and SEMS guidelines for EOCs. The policy groups in the zone EOCs would be represented by each of the local governments within each zone. The policy groups could additionally function as multiagency coordination (MAC) groups for their respective zones.

When the zone EOCs are activated, the county-led OA EOC Policy Group could expand and also incorporate the functions and operational guidelines of a MAC group. A policy decision will need to be made before a disaster as to whether the expanded county-led OA EOC Policy Group should include senior representatives from each of the local governments, or only designated representatives of each zone in the OA. The local governments in each zone will have to collectively make a policy decision beforehand to either opt to designate their respective zone representatives or to have their own city jurisdiction, township, or special district representatives for the expanded county-led OA EOC Policy Group. Given this may be a politically sensitive decision, it would be prudent to allow for either option.

However, if all the local governments in all zones were to opt for independent representations, the expanded county-led OA EOC Policy Group size may become unwieldy and not conducive for efficient decision making. While the expanded county-led OA EOC Policy Group should strive for consensus based decision making, it is

[47] Federal Emergency Management Agency, *Emergency Operations Center Assessment Checklist* (Washington, DC; Federal Emergency Management Agency, 2015), accessed August 31, 2015, http://www.fema.gov/emergency-operations-center-assessment-checklist.

[48] Ibid.

important to note that, in accordance with existing policies, the county representatives in the policy group would retain the authority to make final decisions on behalf of the OA.

To achieve effectiveness of the zone EOC concept, the local governments within a zone should establish collective zone-based Mutual Aid agreements. This will enable zone EOCs to source needed resources from local governments within their zones via the zone-based mutual aid agreements. The zone EOC concept would respect and work within the established frameworks for discipline-specific mutual aid systems, such as: fire and rescue, law enforcement and coroner /medical examiner, and medical and health disciplines. The zone EOCs would also work within the framework of the Public Works Mutual Aid System that is specific to the San Mateo County OA and voluntary based. If and when resources needed outside of the discipline-specific, mutual aid systems cannot be fulfilled from within local governments within a zone, zone EOCs would forward a resource request to the county-led OA EOC.

The zone EOCs would need to establish mechanisms to be aware and informed of discipline-specific mutual aid system requests and fulfillment status pertaining to local governments within their zones. The recommended mechanisms could be facilitated and assisted by representatives of fire and rescue, law enforcement and coroner/medical examiner, medical and health, and public works disciplines at the zone EOCs.

Prioritization decisions for resource deployment and other pertinent decisions within zones would be made by the zone EOCs and informed by their policy groups. It is recommended that criteria for prioritization be pre-determined and clearly defined as best as possible to avoid conflict during zone EOC activations. In the event any zone EOC policy groups are unable to reach consensus on resource deployment prioritization, a policy should be instituted in advance whereby the county-led OA EOC Policy Group would make decisions on their behalf.

Considerations should be made to assign legal counsel assistance at each activated zone EOC and the county-led OA EOC or alternatively provide reliable remote access to legal counsel. Assistance will be needed to facilitate decision making on matters with legal aspects. Time is of the essence during operational periods at activated EOCs; the

timely availability of legal counsel may be needed and would prove helpful. The need for legal counsel, particularly at the zone EOCs, will likely be higher during the early phases of implementing and institutionalizing the zone EOC concept.

5. Staffing

Staffing for the zone EOCs will be primarily sourced from the constituent local governments within each zone. Personnel from local governments who are otherwise assigned to their respective EOCs are ideal to staff their respective zone EOCs, when activated. Each local government should currently have sufficient trained personnel to staff at least one operational period of a fully activated EOC. This would provide a deeper collective pool of trained EOC personnel from jurisdictions within each zone to staff their respective zone EOCs.

Because the primary activation thresholds for zone EOCs are catastrophic disasters, which will require emergency response coordination support for an extended period, trained personnel will need to staff the zone EOCs for that prolonged time. However, some of the trained personnel may not be able to staff the zone EOCs due to impacts on themselves or their families during disasters. Ideally, staffing plans for each zone EOC position should consider having three designated trained EOC staff; two individuals as primary designees and one as an alternate. The alternate staff member would cover a shift in instances where either of the two primary designees are unable to do so,[49] which would enable a zone EOC to have alternates for each position to staff 24-hour operations.[50] Accordingly, it will be necessary to expand the pool of personnel to staff the zone EOCs by providing appropriate training and exercise. Also, if needed, the county-led OA EOC can assist in sourcing trained personnel via the state through the EMMA system to staff the zone EOCs. However, the period to deploy and situate the personnel sourced through EMMA should also be considered.

[49] Governor's Office of Emergency Services et al., *San Francisco Bay Area Regional*, 2, §5.

[50] Ibid., 2, §5.

Credentialing for zone EOC staffing will require prioritization as personnel will be sourced from an array of local governments and possibly from throughout the state via the EMMA system. Activated zone EOCs will also be operational for extended periods, increasing the need for effective verification of identity and training credentials.

6. Operations

The zone EOC operations and functions would conform to applicable NIMS, ICS, and SEMS guidelines for EOCs. Additionally, the zone EOC operations would function on behalf of all constituent local governments that opt to participate. Resource requests from the zone EOCs to the county-led OA EOC and fulfillment of resource request from the county-led OA EOC would also be on behalf of each zone representing its constituent jurisdictions.

As per SEMS, EOCs do not directly manage or command incidents but provide coordination and response support.[51] The field level has command and tactical control of response to incidents in the field; field level operations are usually conducted via incident command posts (ICPs).[52] Accordingly, successful implementation of zone EOCs will require local governments to activate their first responder agency DOCs, such as law enforcement, fire services, emergency medical services, and additionally public works DOCs. Zone EOCs will enable continued local government jurisdictional support and control of field-level response within their respective jurisdictions via direct coordination between their agency DOCs and established ICPs. The activated DOCs of local government agencies would then coordinate with the zone EOCs. If one or more area commands or unified area commands are established to coordinate with multiple ICPs, they would coordinate with the zone EOCs.

The zone EOCs will need to have the capability and capacity to manage and coordinate with the county-led OA EOC and activated DOCs of local government agencies. The county should provide liaisons for each activated zone EOC to assist

[51] Federal Emergency Management Agency, *Emergency Operations Center*, 3.

[52] Ibid.

coordination with the county-led OA EOC. The county liaisons at the zone EOCs could be either the designated county OES district coordinators, who are assigned to zones they oversee, or other county personnel knowledgeable about the zones they are assigned to. In addition to having a senior representative at the policy group at its respective zone EOC, each constituent local government should also consider having a field-operational level liaison at its respective zone EOC to assist with coordination with their activated DOCs and other local government entities.

Ensuring interoperable communications between the zone EOCs and their local government DOCs is important. The county's continued efforts to integrate the communications systems of all local governments with the county's newly deployed P25 radio system will prove valuable in enabling interoperable communications between the zone EOCs, DOCs, and the county-led OA EOC. Additionally, it will be necessary to establish clear communications protocols for zone EOCs to identify and track communications from the DOCs from various local governments within their respective zones.

A newly established communications unit will operate within the logistics sections of the zone EOCs to support communications needs between the numerous activated local government DOCs, the zone EOCs, and the county-led OA EOC. Additionally, the installation and use of dispatch consoles at the zone EOCs and the county-led OA EOC to monitor radio traffic and also communicate between the zone and with field units would enhance communications capabilities and situational awareness. Auxiliary Communications Service (ACS) or Radio Amateur Civil Emergency Services (RACES) would also be an important resource to cultivate and utilize at the zone EOCs and the county-led OA EOC for further enhancing situational awareness.

7. Joint Information Center/Joint Information System

Zone EOCs will require standing up of JICs and use of a JIS as public information will need to be disseminated across multiple local governments and unincorporated communities within each zone. The public information officers (PIO) or designated staff from each local government would staff their respective zone EOC JICs. The county-led

OA EOC has a JIS that the zone EOCs could adapt and implement, which will additionally provide standardization across the OA. A zone-based JIC/JIS, coordinated with the county JIC/JIS, will provide a unified and standardized means to manage and effectively disseminate public information across the OA on a zone-by-zone basis, versus the existing disparate local government based approach.

8. Situational Awareness Tools

The zone EOCs should utilize technological tools that enhance situational awareness such as WebEOC, California Common Operating Picture (Cal COP), Geographic Information System (GIS) mapping, social media, and mass notification systems. Background information on these situational awareness tools is presented in Appendix A. These tools are used by the county-led OA EOC and if integrated with the zone EOCs, they will assist the county-led OA EOC and the zone EOCs to have a better common operating picture.

WebEOC is currently used by the county-led OA EOC and the EOCs of the local governments primarily for resource requests, information sharing, and mission tasking. The WebEOC versions used in the zone EOCs can be configured to have boards that provide summary information for each zone, in addition to tracking data for individual local governments within each zone. Mission and resource requests from the zone EOCs to the county-led OA EOC will be zone based with the need to build in additional capability to track situation status details for each individual local government. The county-led OA EOC WebEOC version will require configuration to track and respond to zone based data, including mission and resource requests from zone EOCs and internal to zone EOCs. The zone based configurations of WebEOC will enable the zone EOCs and the county-led OA EOC to have situational awareness that promotes a common operating picture on a zone wide basis with the additional ability to track information by local governments.

Currently, only county level first responder agencies are either providing or considering providing data feeds into Cal COP for improving situational awareness. Encouraging local governments within the OA to also provide data feeds from their

appropriate agencies to Cal COP will further enhance overall situational awareness across the OA. Cal COP can also be configured to display data for the county-led OA EOC and zone EOCs on a zone by zone basis, which will prove useful for zone level situational awareness.

Local governments within the San Mateo County OA already use GIS-based mapping platforms for situational awareness. The creation and use of zone based map layers and features to overlay on existing mapping configurations will further enhance situational awareness for the zone EOCs and the county-led OA EOC at the zone levels across the OA. Social media sources can be tagged and profiled based on the local governments within each zone in the OA to provide a zone based social media profile, which will provide another source of situational awareness and valuable real-time information feeds at the zone based level.

A single platform, mass notification system is currently used across the San Mateo County OA, with the local governments having control over their respective jurisdictions in the system. In coordination with the local governments, the county could configure the mass notification system to broadcast alerts and warnings simultaneously to residents within local governments and unincorporated communities within a zone. This will allow for unified public alert and warning messaging across zones in the OA. The zone based alerting configuration could also alert and notify personnel designated to staff the zone EOCs when needed. An alerting entity should be pre-designated for each zone to broadcast zone based alerts and notifications to designated personnel assigned to staff the zone EOCs. A county-led OA EOC would be an ideal back-up alerting entity to broadcast such zone based alerts and notifications on behalf of zone EOCs, and it could also be designated as a primary alerting entity for zone EOCs. Currently, the mass notification system used in the San Mateo County OA has the capability to allow for this zone based notification configuration and can be implemented accordingly.

The technological tools that enhance situational awareness and promote a common operating picture further enable more effective and efficient multilateral coordination in the zone EOC concept. Common and interoperable technological tools implemented in a standardized way across jurisdictions can resolve duplicative efforts

and bring clarity to overall response management, promote quick and informed decision making, and improve effective and efficient coordinated response. Having common systems will enhance interagency communications, situational awareness, and common operating picture for all jurisdictions, not only within OAs but beyond.

9. Deactivation

While a standardized policy for deactivation of the zone EOCs across the OA zones is preferable, the zone EOC concept will be more resilient by allowing flexibility for local governments within each zone to collectively decide and formally agree upon their respective zone EOC deactivation triggers and thresholds. The deactivation triggers and thresholds that apply for independent jurisdictional EOCs would apply for the zone EOCs in the context of their respective zones and constituent local governments. The deactivation triggers and thresholds may also be dependent on the scale of the response needs.

C. CONCLUSION

The zone EOC concept will enable county-led OA EOCs to more effectively coordinate with and support their affected local governments, which will also have the ability to pool their resources to provide emergency response coordination and support services within their jurisdictions via consolidated zone EOCs. The zone EOC concept provides a solution that addresses the challenges of unmanageable span of control for intra-OA emergency response coordination during catastrophic disasters and the limited availability of trained personnel to staff fully activated EOCs for extended periods at local governments. Figure 4 provides an illustration of a more manageable span of control for the San Mateo County OA when supporting local governments within the OA.

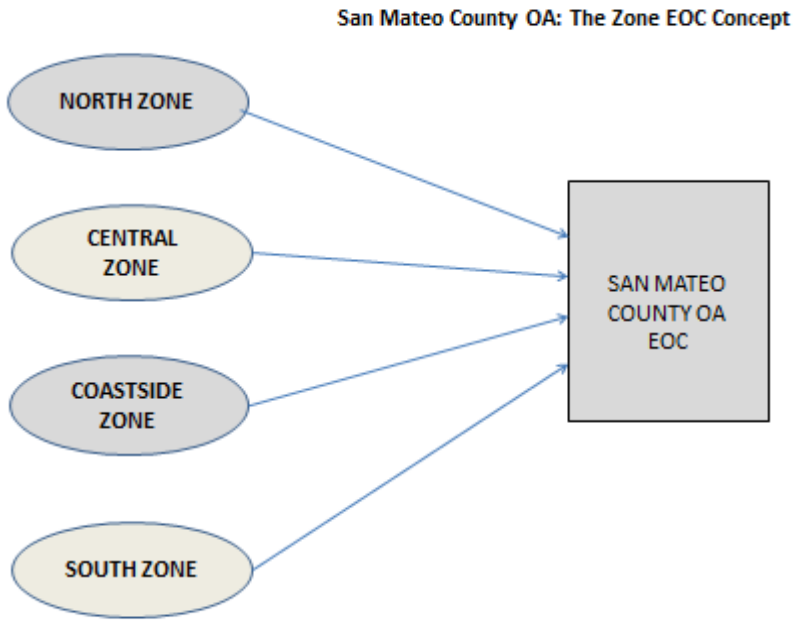

Figure 4. Suggested zone EOC model intended for better span of control designed for the San Mateo County OA

The zone EOC concept also moderates the burden on counties to directly supplement and support severely affected local governments unable to provide emergency response services as those service functions could be continued through their respective zone EOCs. Jurisdictions within a zone will also be better able to coordinate sharing of resources and collectively prioritize community needs through their zone EOCs and zone based mutual aid agreements. Increased zone based mutual aid coordination and sharing will also reduce the amount of resource requests to county-led OA EOCs, thereby, reducing the emergency response coordination burden on OA EOCs. The zone EOC concept will additionally assist in facilitating more effective and efficient response coordination between counties and their constituent local governments when responding to catastrophic disasters.

The zone EOC concept will provide other benefits, including efficiency gains via sharing of limited resources among local governments, in particular, sharing trained EOC personnel resources, who will assist in remediating existing personnel shortfalls to staff fully activated EOCs. Additional benefits include promotion and strengthening of

collaborative working relationships across local governments and leveraging cost savings via cost sharing and decrease in duplicative services and personnel labor costs.[53] Also, community partners, such as private sector and non-profit entities, would benefit from consolidation and centralization via zone EOCs, which streamlines coordination with local governments within an OA.[54]

The benefits of the zone EOC concept significantly outweigh known potential risks and disadvantages; however, they will still need to be fully determined and solutions effectively applied. One of the major risks of consolidating multiple local government EOC functions into zone EOCs is that it will magnify the consequences of failure to adequately perform, given that more entities will be reliant on services from the consolidated zone EOCs.[55] Robust staffing plans, appropriate facilities provisions, adequate and sustained training and exercise regimens, and allocation of necessary funding support will be critical to address potential risks and disadvantages.

[53] Steven J. Carman, *Unifying Emergency Operation Centers* (Richmond Heights, MO: Richmond Heights Fire Department, 2014), 29.

[54] Ibid., 30.

[55] Ibid., 29.

IV. THE ZONE EOC CONCEPT IMPLEMENTATION AND PORTABILITY

> You've got to think about big things while you're doing small things, so that all the small things go in the right direction.
>
> *– Alvin Toffler*

This chapter identifies critical considerations for successful adoption and implementation of the zone EOC concept in the San Mateo County OA, and it also determines portability and applicability of the concept to other OAs in the San Francisco Bay Area and beyond.

A. ADOPTION AND IMPLEMENTATION

Implementing the zone EOC concept within the San Mateo County OA will require obtaining the buy-in of senior leadership at all local governments in the OA, signing of formal agreements, and official adoption. Ensuring and assuring all participating jurisdictions that their jurisdictional authority will be retained and respected within the framework of the zone EOC concept is critical; without which, it will be highly unlikely to get majority buy-in and agreement. Seeking legal counsel advice from local governments within the OA early on is vital to ensure consideration and inclusion of legal provisions within the concept framework and formal agreements. Additionally, it will reduce political resistance and further the chances for successful adoption and implementation of the concept.

The development of a cost-sharing model to fund the zone EOCs will require formal agreements. The logical option would be to source equitably shared funding from each member local government for its respective zone EOC. The San Mateo County ESC JPA may provide an avenue through which consensus can be reached for equitable cost sharing. The county should consider proportionally contributing funding toward all zone EOCs in an equitable manner. Furthermore, it should consider funding the establishment

of the zone EOCs and providing personnel training and exercise through eligible grant funding sources.

A phased approach will ease implementing the zone EOC concept in the San Mateo County OA, as this endeavor will require considerable collaborative effort and it is a long-term project. While initial outreach should be conducted to all local governments in all zones, higher priority for implementation could be given to zones with a higher concentration of local governments. Zones with higher population densities, threats, vulnerabilities, and more at-risk assets could also be prioritized higher for implementation of the zone EOC concept. However, it may be more productive to prioritize zones with local governments that are more receptive and keen on implementing the zone EOC concept.

The ideal implementation of the zone EOC concept would include the agreement of all of the constituent local governments to participate as members within their respective existing zones. However, if some local governments do not initially agree to participate in the zone EOCs, they could opt-out and continue with the existing protocol to have their EOCs directly coordinate with the county-led OA EOC. With time and institutionalization of the zone EOC concept in the OA, continued engagement with the entities that initially opted out may lead them to reconsider and participate. The zone EOC concept has implementation flexibility and can still function in parallel with the county-led OA EOC directly coordinating with some local governments, regardless of their geographic locations in demarcated zones.

Established intra-OA multilateral collaborative frameworks, such as the San Mateo County ESC JPA for joint partnership in emergency management and the San Mateo County EMA, which assists in facilitating the implementation of the JPA, provide strong foundations that will ease and support the adoption and implementation of the zone EOC concept in the San Mateo County OA. Existing senior leadership preference and political will to further multilateral partnerships across the San Mateo County OA will also play a key role in the potential for successful outcomes.

The San Mateo County EMA and a majority of local governments that participated in the 2014–2015 OCC Exercise were open to agreeing to work together, and have voiced their support to explore implementing the zone EOC concept in the San Mateo County OA. As a follow up to the OCC exercise, as requested, the author will be presenting findings and recommendations to the San Mateo County City Managers Association with regards to the zone EOC concept. The author will also be drafting an MOU or multiagency coordination agreement for local governments to review in support of implementing the zone EOC concept in the San Mateo County OA. Lessons learned from the OCC Exercise highlight the need to determine and fully develop the details of the zone EOC concept and other aspects necessary for successful adoption and implementation. The detailed conceptualization of the zone EOC concept and its various elements in this thesis should provide a solid foundation and sufficient groundwork to support efforts to implement the concept. Follow-up exercises to the OCC Exercise are planned for 2016–2017, which will provide a valuable platform to further develop, test, and refine the zone EOC concept and assist in its successful implementation.

B. PORTABILITY AND APPLICABILITY

The San Mateo County OA and other OAs in the San Francisco Bay Area utilize the same one-to-one intra-OA emergency response coordination model that is consistently applied to all incidents, emergencies, and disasters, including catastrophic disasters. The limitations of the existing intra-OA emergency response coordination model during catastrophic disasters and shortages in trained EOC personnel to staff fully activated EOCs in local governments within OAs are common challenges faced by all OAs in the San Francisco Bay Area.

In addition, all OAs in the San Francisco Bay Area adhere to standardized NIMS and SEMS frameworks and requirements. As OAs is a SEMS organization level designation, the jurisdictional framework for all OAs and their constituent local governments for coordinating emergency activities in the San Francisco Bay Area and the state of California is the same. The San Francisco Bay Area OAs have developed closer standardization in emergency response coordination and planning over the past decade as

a result of collaboration as partners in a common region. Moreover, substantial federal grant funding over the last decade has played an important role in further aligning the OAs in the San Francisco Bay Area toward a common standard and culture that promote regionalized planning for preparedness, response, mitigation, and recovery.

The zone EOC concept works within the frameworks of NIMS and SEMS, and it also aligns with the SEMS organizational level hierarchy of coordination between local governments and their respective OAs, and the SEMS functions of local governments and OAs. The zone EOC concept is derived from the ICS and MACS concepts, which are already utilized by all OAs in the San Francisco Bay Area and beyond. The key aspect of the zone EOC concept is that it provides an effective multilateral collaborative coordination mechanism for local government level entities to coordinate emergency services within their jurisdictions.

Based on the zone EOC concept's alignment with NIMS and SEMS frameworks, derivation from standard practices, such as ICS and MACS concepts, and the common SEMS based jurisdictional framework for local governments and OAs to coordinate emergency activities, the concept should be portable and applicable to other OAs in the San Francisco Bay Area and likely beyond as well. The flexibility and scalability of the zone EOC concept should allow other OAs to adapt the concept as needed, which increases its portability factor.

V. RECOMMENDATIONS AND CONCLUSIONS

> Coming together is a beginning, staying together is progress, and working together is success.
>
> *– Henry Ford*

This chapter presents recommendations and conclusions that are informed by the thesis research and analysis on an alternate intra-OA emergency response coordination model featuring zone-based consolidated local government EOCs that would be more effective during catastrophic disasters in the San Mateo County OA, and in other OAs in the San Francisco Bay Area and possibly beyond.

A. RECOMMENDATIONS

The implementation of the recommendations developed based on insights gained from this thesis research will provide real-world benefits to address the need for an alternative, intra-OA emergency response coordination system that would be more effective during catastrophic disasters in the San Mateo County OA and other OAs in the San Francisco Bay Area.

1. Further Develop and Implement the Zone EOC Concept in the San Mateo County OA

The San Mateo County OA should proceed in further developing and formally adopting, implementing, and institutionalizing the zone EOC concept. While the key elements of the zone EOC concept have been presented and addressed in this thesis, there may be certain aspects that may have been overlooked or need closer scrutiny to better define applicable requirements and measures for successful implementation. This can be addressed by subsequent efforts to apply the zone EOC concept in the San Mateo County OA.

The San Mateo County EMA is an ideal starting point to further refine the concept, address any oversights and omissions, identify additional challenges, and propose solutions prior to outreaching other stakeholders in the OA. Engaging the San

Mateo County EMA will also help ensure countywide inclusiveness of a key decision-influencing constituency in the initial planning efforts, which in turn will promote buy-in and support across the OA. A cross-spectrum working group comprising of appropriate representatives from the county and other local governments within the OA may provide a good forum and approach at a later stage to further advance the zone EOC concept planning for the OA. Importantly, the San Mateo County EMA would need to closely coordinate with this working group and inform the planning process.

Senior leadership and key decision makers from local governments within the OA will need to be continually informed and engaged with the planning and decision making process. An outreach campaign to inform and solicit input from all relevant stakeholders in the OA should be a critical component of the planning and decision making process.

Key areas of focus and prioritization for furthering the zone EOC concept include the following:

- Legal framework
- Cost-sharing and funding support
- Staffing plans
- Primary and alternate facilities
- Concept implementation approach
- Activation and deactivation thresholds
- County-led OA EOC policy group expansion and representation composition
- Intra-zone mutual aid agreements between local governments
- Expanded zone EOC policy group decision making criteria and priorities
- OA wide adoption, implementation and institutionalization
- Training and exercise

2. Socialize the Zone EOC Concept and Promote Portability in the San Francisco Bay Area

The zone EOC concept aligns and works within the NIMS and SEMS frameworks, providing a multilateral collaborative intra-OA emergency response coordination model that could be ported and applied to other OAs in the San Francisco

Bay Area and beyond. Additionally, the flexibility and scalability of the zone EOC concept would allow other OAs to adapt the concept as needed.

Socialization of the zone EOC concept and promoting its portability and applicability to other OAs in the San Francisco Bay Area would benefit the interests of all OAs in the region and the region as a whole. All OAs in the San Francisco Bay Area have a common need for a more effective intra-OA emergency response coordination model that also addresses shortages of trained EOC personnel resources to staff fully activated EOCs in all local governments within OAs—a mutually shared challenge. OAs elsewhere likely have a similar need.

B. CONCLUSIONS

The risks of catastrophic disasters from earthquakes are extremely high for the San Mateo County OA and the San Francisco Bay Area. Effective intra-OA emergency response coordination between local governments will be critical during the aftermath of a catastrophic earthquake that impacts a wide geographic area.

This thesis defines the problem space and identifies the limitations of the existing intra-OA emergency response coordination model during catastrophic disasters. This thesis also recognizes the need for a more effective alternative model for the San Mateo County OA and other OAs in the Bay Area and beyond, and analyzes an alternative multilateral collaborative model solution, the zone EOC concept. The detailed outline and analysis of the zone EOC concept and its various elements in the context of the San Mateo County OA provide a clear understanding of what the concept entails and highlights key aspects required for successful adoption and implementation. In addition, it considers the potential for portability and applicability in other OAs in the San Francisco Bay Area and beyond.

The zone EOC concept provides an alternate multilateral collaborative intra-OA emergency response coordination model that would work more effectively in the San Mateo County OA and possibly other OAs in the San Francisco Bay Area and beyond, during catastrophic disasters. Some of the key aspects for successful adoption and implementation of the zone EOC concept include: senior leadership and stakeholder buy-

in and support; addressing concerns for legal liabilities and potential loss of jurisdictional control and authority; cost-sharing and allocation of sustainable funding support; long-term staffing and training and exercise plans; and provision of appropriate facilities for the zone EOCs. The significance of this research is that it provides the San Mateo County OA and possibly other OAs in the San Francisco Bay Area and beyond a well-defined, more effective alternate intra-OA emergency response coordination model as a viable solution to address a critical capability gap during catastrophic disasters.

APPENDIX A. EMERGENCY MANAGEMENT FRAMEWORKS, POLICIES, GUIDELINES, AND USE OF TECHNOLOGICAL TOOLS

A. INTRODUCTION

This appendix presents emergency management frameworks, policies, and guidelines for response to complex events, including catastrophic disasters. Technological tools that assist with situational awareness and promote a common operating picture are also discussed in the context of their usefulness for emergency response coordination.

B. THE STAFFORD ACT

As best described by the Federal Emergency Management Agency (FEMA):

> The Robert T. Stafford Disaster Relief and Emergency Assistance Act was signed into law on November 23, 1988; amended the Disaster Relief Act of 1974. The Stafford Act constitutes the statutory authority for most Federal disaster response activities especially as they pertain to the Federal Emergency Management Agency and FEMA programs.[56]

In other words, the Stafford Act is a federal law designed to "provide an orderly and continuing means of assistance by the federal government to state and local governments in carrying out their responsibilities."[57]

Title six of the Stafford Act explains the measures to organize agencies for expected threats to include assigning trained staff, preparing operational plans and creating appropriate early warning systems. According to the Stafford Act's Emergency Preparedness Doctrine,

> Title six also sets out the authority and responsibilities of the director of FEMA. The director may prepare and direct federal plans and programs

[56] Federal Emergency Management Agency, *The Robert T. Stafford Disaster Relief and Emergency Assistance Act as Amended* (Washington, DC: Federal Emergency Management Agency, 2013), accessed July 26, 2015 http://www.fema.gov/media-library-data/1383153669955-21f970b19e8eaa67087b7da9f4af706e/stafford_act_booklet_042213_508e.pdf, 1.

[57] Ibid.

> for U.S. emergency preparedness. The director should also delegate emergency responsibilities to federal agencies and state and local governments. [58] Additionally, executives and agencies that have emergency preparedness roles should be provided adequate training.[59]

Title six directs the FEMA director to oversee development of emergency preparedness compacts, known as emergency management assistance compacts (EMACs)[60] In addition, the Stafford Act states, "the Emergency Management Assistance Compact (EMAC) is an interstate mutual aid agreement that was developed out of the need to assist and coordinate resources across states in the event of a disaster situation."[61]

C. NATIONAL RESPONSE FRAMEWORK

The terror attacks on September 11, 2001 resulted in government reorganization and the creation of the Department of Homeland Security and the resulting homeland security enterprise, consisting of 22 consolidated agencies. According to the U.S. Department of Transportation, "The National Response Plan (NRP) was created to align federal resources into a unified, all-discipline, and all-hazards approach to domestic incident management."[62] In her thesis, Frazzano explains, "*National Response Plan* was developed from *Homeland Security Presidential Directive 5* (HSPD-5) and suggested the development of the National Incident Management System (NIMS)."[63] NIMS was a guide for response to "domestic" incidents regardless of complexity or size. In 2008, the NRP was replaced by the *National Response Framework* (NRF), which continues to use the concepts established in NIMS and the Incident Command System (ICS).

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[58] Ibid.

[59] Ibid., 62–65.

[60] Ibid., 1.

[61] Federal Emergency Management Agency, *Emergency Management Assistance Compact (EMAC) Overview for National Response Framework* (Washington, DC: Federal Emergency Management Agency, 2008), http://www.fema.gov/pdf/emergency/nrf/EMACoverviewForNRF.pdf.

[62] U.S. Department of Transportation, Federal Transit Authority. *An Introduction to All-Hazards Preparedness for Transit Agencies*, 2010, http://www.fta.dot.gov/documents/All_hazards.pdf, 2.

[63] Tracey L. Frazzano, "Local Jurisdictions and Active Shooters: Building Networks, Building Capacities" (master's thesis, Naval Postgraduate School., 2010), 10.

As a result of the creation of DHS, a large body of doctrine, policies, and grant guideline were established at the federal level as well as for state and local governments. The policies were designed around the cabinet level Homeland Security Department. There are no doctrines or policies that address multi-attack scenarios or multilateralism for local government jurisdictions. "The National Response Framework (NRF) focuses on several areas including terror attacks associated with weapons of mass destruction (WMD)." [64] However, the framework does not address incidents outside of WMD scenarios, leaving a gap for ongoing and continuous threats of conventional attacks in the United States by lone wolf violent extremists or radicalized groups.

D. NATIONAL INCIDENT MANAGEMENT SYSTEM

The *Homeland Security Presidential Directive 5* notes, "Homeland Security Presidential Directive 5 called for the creation of a National Response Plan (NRP)."[65] HSPD-5 later changed the NRP to the *National Response Framework* stating,

> National Response Framework (NRF) and a National Incident Management System (NIMS) was created. The system ensures a consistent nationwide framework for local, state, and federal agencies to work effectively; an integral part of the framework is the use of the Incident Command System (ICS).[66]

Faggiano, McNall, Gillespie note, "The National Incident Management System is a comprehensive, national approach to incident management that is applicable at all jurisdictional levels across functional disciplines." [67] NIMS requires "a common operating picture for information management and information sharing support at all levels."[68]

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[64] Ibid.

[65] U.S. Department of Homeland Security, *Homeland Security Presidential Directive 5* (Washington, DC: U.S. Department of Homeland Security, 2003), accessed July 10, 2015, http://www.dhs.gov/sites/default/files/publications/Homeland%20Security%20Presidential%20Directive%205.pdf, 1.

[66] U.S. Department of Homeland Security, *National Response Framework*, 2nd ed. (Washington, DC: U.S. Department of Homeland Security, 2013), http://www.fema.gov/media-library-data/20130726-1914-25045-1246/final_national_response_framework_20130501.pdf, 3.

[67] Vincent Faggiano, John McNall, Tom Gillespie, *Critical Incident Management*, 2nd ed. ((Boca Raton, FL: CRC Press, Taylor and Francis Group, LLC, 2012), 79.

[68] Frazzano, "Local Jurisdictions and Active Shooters," 12.

1. Incident Command System

A FEMA document explains, "The Incident Command System (ICS) defines operating characteristics, management components, and the structure of incident management organizations throughout the incident."[69] Erickson remarks, "The Incident Commander (IC) is located at the Incident Command Post (ICP) at the incident scene."[70] There is no legal mandate to use ICS; however, any agency that does not use the framework provided during an incident may not be eligible for federal reimbursement. A unified command (UC) is when two or more disciplines (e.g., fire, law, health, public works) come together under the Incident Command model and work together as one "unified" command.

The ICS relies heavily on the sharing of information from the field level command posts to emergency operations centers. Information is crucial for decision makers to best understand the situation and its level of complexity. When information is fragmented and personnel reach overload, decisions often become reactive, based on stimulus response. Practitioners have learned that too much information can also become a distraction to the overall decision-making process and can, at times, hinder quick decisions during a complex or chaotic event where timing is essential. Having a holism mindset can help policy makers see through the congestion of noise during an incident rather than fall victim to a reductionist's position of inability to act.

2. Area Commands

Area command is used for multi-scene incidents or emergencies. An area command is defined by Paul Erickson in his book *Emergency Response Planning for Corporate and Municipal Managers*:

> An Area Command is established as necessary to provide command authority and coordination for two or more incidents in close proximity.

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[69] Federal Emergency Management Agency, *National Incident Management System (NIMS): an Introduction, IS-700, Facilitator Guide*, 2004, http://training.fema.gov/emiweb/downloads/nims-facilitatorsguide.pdf?&session-id=2bfb5076d8728bf8925012353f68c6de, 7.

[70] Paul Erickson, *Emergency Response Planning for Corporate and Municipal Managers* (Oxford, UK: Elsevier Butterworth-Heinemann, 2006), 49.

> Area Command works directly with incident commanders. Area Command becomes Unified Area Command when incidents or emergencies are multi-jurisdictional. Area Command may be established as an EOC facility or at some location other than the Incident Command Post.[71]

The University of South Florida, Tampa, *Emergency Operations Plan* explains that an "Area Command is an expansion of the incident command function primarily designed to manage a very large incident or emergency that has multiple incident management teams or an event," [72] which can affect more than one jurisdiction. Additionally, under the ICS model area commands are flexible enough to integrate into a multi-discipline field command center. As noted in the Tampa *Emergency Operations Plan*, "Area Command may also be conducted as a Unified Area Command."[73]

3. Emergency Operations Center

According to FEMA, "An Emergency Operations Center (EOC) is a physical location where the coordination of information and resources to support response management takes place." [74] EOCs integrate information from multiple sources or incidents to establish a common operating picture (COP) and provide situational awareness for coordination efforts. When the scope of an event is beyond the capability to be resolved at the field command post level, an "Emergency Operations Center may be activated to support the Incident Commander"[75] and resource requests. The EOC is comprised of a separate group of higher level administrators, or a policy group, that will respond when called. The EOC has the important role of coordination and support during an event.

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[71] Ibid., 49.

[72] University of South Florida, Tampa, *Emergency Operations Plan* (Tampa, FL: University of South Florida, 2014), http://www.usf.edu/pdfs/USF-Emergency-Operations-Plan.pdf?&session-id=2bfb5076d8728bf8925012353f68c6de.pdf, 30.

[73] Cal OES, *SEMS Guidelines*, 21.

[74] Federal Emergency Management Agency, "Incident Command System (ICS) Resource Center," accessed July 10, 2015, https://training.fema.gov/emiweb/is/icsresource/glossary.htm, 4.

[75] Ibid.

4. Policy Group

The policy group is comprised of elected officials like the mayor or Board of Supervisors, the chief of police, fire chief, elected sheriff and city/county counsel; however, the policy group may also include the district attorney, public health director, coroner, public works director, etc., depending on the type and size of the event. The policy group has the responsibility to ensure appropriate direction and decisions are being conveyed throughout the response management period. A policy group's authority extends to other levels of the response organizational structure, from the EOC, MAC group to the incident commander. The policy group will manage continuity or implement the organizational continuity of operations plan (COOP) to keep operations running during the event.

5. Department Operations Center

A "Department Operations Center (DOC) is a location or facility"[76] used by an agency as a department level operations center. Examples include fire departments or special districts, police/sheriff, public works, public health or districts. With a multi-discipline team approach, "DOCs can be used at all SEMS levels above the field response level, depending on the impacts of the emergency, demographic nature of the agency or organization, local policy and procedures, and configuration of communications systems."[77] DOCs coordinate with field level command posts or EOCs, depending on the scale of the event.

6. Multiagency Coordination System

In the *Critical Incident Management*, the authors declare, "Multi-Agency Coordination System defines the operating characteristics, management components, and organizational structure of supporting entities."[78] Agencies may develop a multiagency

[76] Cupertino ARES/RACES, "Citizen Corps Department Operations Center (DOC)," September 6, 2012, accessed August 24, 2015, http://www.cupertinoares.org/arc/training/120906-DOC-Concept-Overview.pdf, 4.

[77] Ibid.

[78] Faggiano, McNall, and Gillespie, *Critical Incident Management*, 81.

coordination system (MACS) to develop formal partnerships and working relationships to support each other during prolonged or significant events. A MACS is generally used to "coordinate resources between participating agencies or jurisdictions."[79] In addition, a MACS "coordinates activities above the field level and prioritizes response needs for critical or competing resources." [80] Furthermore, a MACS assists in establishing personnel, procedures, protocols, business practices, and communications to support responses to event(s).

The use of the MACS is to increase the OA's ability to assist individual or multiple incidents, emergencies or disasters under the SEMS and OA concept. FEMA notes, "MACS do not eliminate command authority from a jurisdiction or an agency, but assists them through information management and logistical support."[81] Multiagency coordination in the form of MACS offers more effective ways for jurisdictions and agencies to collaborate. Like in a unified or area command, a MACS can also be applied across different disciplines. Additionally, a MACS can be established whenever personnel from different organizations interact. Unlike field command posts or EOCs, a MACS group will help establish "a common operating picture, set priorities among incidents and resolve critical resource issues by facilitating logistics support and resource tracking, and synchronizing messaging"[82] to ensure that agencies and jurisdictions are speaking with one voice. According to FEMA, "The success of the MAC Group depends on membership and should be staffed by personnel representing multiple jurisdictions and functional disciplines."[83] Another benefit of establishing a MAC group is that it promotes public confidence by showing that leaders are willing to come together and solve a problem in a "team of teams" concept. As the *Critical Incident Management* authors advocate, "Organizations that have not traditionally interacted well are now

[79] Ibid.

[80] Ibid.

[81] Federal Emergency Management Agency, "Incident Command System (ICS) Resource Center," 7.

[82] Federal Emergency Management Agency, "Understanding Multiagency Coordination, IS-701.A," February 2010, https://training.fema.gov/emiweb/is/is701a/visuals/02_is701a_macs_16feb2010.ppt+&cd=1&hl=en&ct=clnk&gl=us.

[83] Ibid., 11.

training together and will therefore be better prepared to respond together. We can no longer allow petty difference to compromise the protection of our communities."[84]

Figure 5 depicts examples of how a MACS can be formed or used to better support multiple incidents, multiple jurisdictions, or zone EOCs during an ongoing critical or complex situation. On the left of Figure 5 is an example of multiple small jurisdictions combining resources into geographic based regional zone EOC or MACS to better coordinate with an OA EOC.

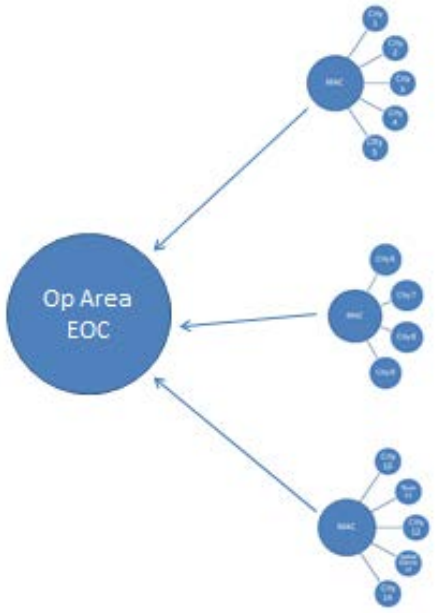

Figure 5. Illustration of zone EOC coordination within an operational area

7. Joint Information System and Joint Information Center

A joint information system (JIS) is commonly known as a group of public information officers (PIOs) working together as a team, having specific objectives of information gathering, sharing and dissemination, primarily to the public via several commonly used media platforms. A JIS "provides the mechanism to organize, integrate and coordinate information to ensure timely, accurate, accessible and consistent

[84] Faggiano, McNall, Gillespie, *Critical Incident Management*, 11.

messaging across multiple jurisdictions and/or disciplines."[85] The need for a functional, information sharing nucleus is ever-present, which is why a joint information center (JIC) is created. This is explained San Mateo County OES JIS plan draft:

> The Joint Information Center is the central location that facilitates the operation of the JIS. It is a physical or an Internet-based virtual location where personnel with public information responsibilities perform media and community relation duties during an incident, emergency or disaster. The JIC structure is designed to work equally well for incidents, emergencies, and disasters, and can expand or contract to meet response needs.[86]

The JIC creates information maneuverability, opening channels of communication when emergencies occur. The San Mateo County OES JIS plan draft states:

> Efficient information flow is critical to effectively meet public information needs and carry out PIO responsibilities when multiple organizations come together to respond to an emergency or manage an event. By maintaining a centralized communication facility, resources can be better managed and duplication of effort is minimized. The use of a JIC additionally allows for tracking and maintaining records and information.[87]

E. STANDARDIZED EMERGENCY MANAGEMENT SYSTEM

The following information was taken from the July 2008 Marin County Emergency Operations Plan (EOP), which was later adopted in 2015 by San Mateo County Office of Emergency Services for its EOP. The information below is paraphrased.

SEMS was introduced in 1994 to the state of California to help coordinate emergency response when there are multiple jurisdictions involved. Some jurisdictions may choose to contract fire and police services with other agency jurisdictions to handle emergency response responsibilities. The preceding Table 3 in Chapter II, for example,

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[85] B. Wayne Blanchard, *Guide to Emergency Management and Related Terms, Definitions, Concepts, Acronyms, Organizations, Programs, Guidance, Executive Orders and Legislation* (Washington, DC: Federal Emergency Management Agency, 2008), accessed July 10, 2015, http://training.fema.gov/hiedu/docs/terms%20and%20definitions/terms%20and%20definitions.pdf?&session-id=2bfb5076d8728bf8925012353f68c6de, 671.

[86] Information taken from page 3 the San Mateo County OES JIS plan draft, not yet adopted. July 25, 2015.

[87] Ibid.

illustrates the existing service contract status of jurisdictions within the San Mateo County OA.

Local governments within an OA are equally liable for emergency service coordination with other jurisdictions with the OA. As such, when requested for mutual aid support, in most cases for law, fire, EMS or public works, an agency or jurisdiction is expected to assist in fulfilling requests within their capacity. The SEMS framework provides a guideline for such circumstances:

> the Standardized Emergency Management System is the system required by Government Code Section 8607(a) for managing emergencies involving multiple jurisdictions and agencies. SEMS consists of five organizational levels, which are activated as necessary: Field response, Local Government, Operational Area, Regional and State.[88]

There are two basic requirements for SEMS and NIMS: "the Field Response and the Local Government levels. At the field response level, all agencies will use the Incident Command System (ICS) to standardize the emergency response."[89] At the San Mateo County OA level, the designated county-led OA EOC is used as "the central location for gathering and disseminating information, coordinating all jurisdictional emergency operations, and coordinating with the Cal OES Coastal Region and the Cal OES."[90]

F. MUTUAL AID

Two types of mutual aid are discussed in this chapter: interstate or mutual aid shared between states, more common with east coast states due to their size and close proximity to each other, and a review of the California mutual aid systems practiced today.

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[88] Cal OES, *SEMS Guidelines*, 21.

[89] Marin County Sheriff's Office of Emergency Services, *Marin Operational Area Emergency Operations Plan*. (Marin, CA: Marin County Sheriff's Office of Emergency Services, 2008), accessed July 10, 2015, http://marinsheriff.org/uploads/documents/Marin_EOP.pdf?&session-id=2bfb5076d8728bf8925012353f68c6de, 10–11.

[90] Ibid.

1. Interstate: Emergency Management Assistance Compact

Although common is most states, the notion of a national association specific to emergency management is just four decades old: "the National Emergency Management Association (NEMA) was established in 1974 when state directors of emergency management first united in order to exchange information on common emergency management issues that threatened their constituencies."[91] EMAC is a:

> national interstate mutual aid agreement that enables states to share resources during times of disaster. Since the 104th Congress ratified the compact, EMAC has grown to become the nation's system for providing Mutual Aid through operational procedures and protocols that have been validated through experience.[92]

Another platform for aid in resource management is the sharing and inventorying of resources with other member states.[93] According to the EMAC website, "EMAC offers assistance during governor-declared states of emergency through a responsive, straightforward system that allows states to send personnel, equipment and commodities to help disaster relief efforts in other states."[94] The national model may inform local governments on how to apply the same concept to their jurisdictions by partnering with neighboring jurisdictions for sharing resources and mutual aid.

2. California State Mutual Aid Systems

In 2012, the city of Palmdale, California adopted an emergency operations plan (EOP) that thoroughly described the state's Mutual Aid System. Because the history and definitions remains unchanged, San Mateo County later adopted the same language for its

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[91] Federal Emergency Management Agency, *Emergency Management Assistance Compact*.

[92] Federal Emergency Management Agency, Operational Templates and Guidance for EMS Mass Incident Deployment, (Washington, DC; Federal Emergency Management Agency, 2012), accessed July 13, 2015, http://www.usfa.fema.gov/downloads/pdf/publications/templates_guidance_ems_mass_incident_deployment.pdf?&session-id=2bfb5076d8728bf8925012353f68c6de, 135.

[93] Federal Emergency Management Agency, Emergency Management Assistance Compact (EMAC).

[94] Emergency Management Assistance Compact (EMAC), "What is EMAC?" accessed July 26, 2015, http://www.emacweb.org/index.php/learnaboutemac/what-is-emac.

OA EOP. The following information was taken from the originating city of Palmdale's EOP as it relates to the thesis topic:

> The foundation of California's emergency planning and response is a statewide Mutual Aid System that is designed to ensure adequate resources, facilities and other support is provided to jurisdictions whenever their own resources prove to be inadequate to cope with given situation(s). The basis for the system is the California Disaster and Civil Defense Master Mutual Aid Agreement, as provided in the *California Emergency Services Act*. This Agreement was developed in 1950 and has been adopted by the state, all 58 counties and most incorporated cities in the State of California. The Master Mutual Aid Agreement creates a formal structure wherein each jurisdiction retains control of its own facilities, personnel and resources, but may also receive or render assistance to other jurisdictions within the state. State government is obligated to provide available resources to assist local jurisdictions [governments] in emergencies. It is the responsibility of the local jurisdiction to negotiate, coordinate and prepare Mutual Aid agreements.[95]

3. Mutual Aid System

The Mutual Aid System, discussed as it applies to the state of California under the SEMS framework is "a statewide Mutual Aid System, operating within the framework of the Master Mutual Aid Agreement, allows for the progressive mobilization of resources to and from emergency response agencies, local governments, Operational Areas, regions and state with the intent to provide requesting agencies with adequate resources."[96] The state Mutual Aid System includes: fire and rescue, law enforcement, medical, coroner, building and safety, and public works. The described "systems work through local government, Operational Area, regional and state levels consistent with SEMS/NIMS. Mutual Aid may also be obtained from other states."[97]

> The San Mateo County OA:
>
> is part of the Mutual Aid Region II and the Coastal Administrative Region. The primary mission of Coastal Region's emergency management

[95] City of Palmdale, *City of Palmdale Emergency Operations Plan* (Palmdale, CA: City of Palmdale, 2012), accessed July 13, 2015, http://www.cityofpalmdale.org/Portals/0/Documents/Residents/COP%20EOP%20Executive%20Summary.pdf?&session-id=2bfb5076d8728bf8925012353f68c6de, 15.

[96] Ibid., 54.

[97] Ibid.

organization is to support Operational Area response and recovery operations and to coordinate non-law and non-fire and non-EMS Mutual Aid Regional response and recovery operations through the California State Regional EOC (REOC).[98]

4. Mutual Aid Regions

According to the Contra Costa County Office of Emergency Services:

> Mutual aid regions are established under the Emergency Services Act. Six Mutual Aid regions numbered I-VI have been established within California. The San Mateo OA is within Region II. Each Mutual Aid region consists of designated counties. Region II is in the Coastal Administrative Region.[99]

Figure 6 provides a color-coded illustration of mutual aid regions within the state of California.

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[98] Marin County Sheriff's Office of Emergency Services (OES), *Marin Operational Area Emergency Operations Plan* (Marin, CA: Marin County Sheriff's Office of Emergency Services, 2008), accessed July 10, 2015, http://marinsheriff.org/uploads/documents/Marin_EOP.pdf?&session-id=2bfb5076d8728bf8925012353f68c6de, 10–11.

[99] Contra Costa County Office of Emergency Services, *Contra Costa Operational Area Emergency Operations Plan* (Contra Costa, CA: Contra Costa County Office of Emergency Services, 2009), accessed July 14, 2015, http://www.contracosta.ca.gov/DocumentCenter/View/7352?&session-id=2bfb5076d8728bf8925012353f68c6de, 16.

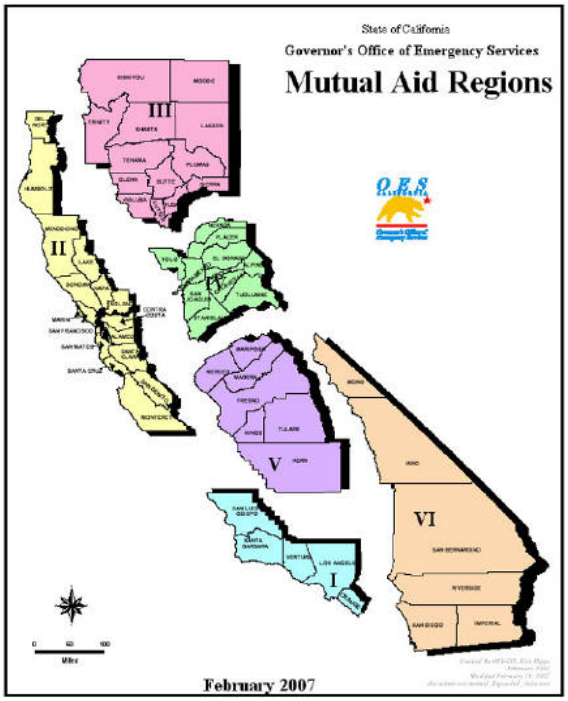

Figure 6. California state mutual aid regions[100]

5. Mutual Aid Coordinators

The Region II mutual aid coordinator for the San Mateo County OA is the Alameda County Sheriff's Office. The California Office of Emergency Services states:

> To facilitate Mutual Aid, discipline-specific Mutual Aid Systems work through designated Mutual Aid Coordinators at the Operational Area, regional and state levels. The basic role of a Mutual Aid Coordinator is to receive Mutual Aid requests, coordinate the provision of resources from within the coordinator's geographic area of responsibility and pass on unfilled requests to the next level.[101]

G. SITUATIONAL AWARENESS TECHNOLOGICAL TOOLS

Technology enables an improved ability to collect, analyze, communicate, and consume information. Technology offers a visual picture for public safety personnel to

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[100] California Office of Emergency Services (Cal OES), "Mutual Aid Regions Map," 2007, http://www.vfpd.net/operations/Expanded_Mut-Aid.jpg.

[101] Cal OES, *SEMS Guidelines*, 9.

better understand an event and can guide managers in response efforts by producing knowledge that can help develop a course of action.

> The National Response Framework (NRF) defines Situational Awareness as the ability to identify, process, and comprehend the critical information about an incident—knowing what is going on around you—which requires continuous monitoring of relevant sources of information regarding actual incident and developing hazards.[102]

The FEMA *National Incident Support Manual* defines situational awareness as a result of comprehensive information collection, analysis, and dissemination in a context relevant to the authorities and responsibilities of a particular organization level.[103] The FEMA *National Incident Support Manual* defines common operating picture (COP) as a shared situational awareness that:

> offers a standard overview of an incident and provides information in a manner that enables incident leadership and any supporting agencies to make effective, consistent, coordinated, and timely decisions. The NRF defines COP as a continuously updated overview of an incident compiled throughout an incident's life cycle from data shared between integrated systems for communication, information, management, intelligence and information sharing.[104]

Technology has provided EOC personnel a more cognizant level of situational awareness. An improved level of situational awareness will provide EOC personnel the information needed to better comprehend the breadth and depth of the response required. In contrast, a lack of collaboration can limit situational awareness and therefore, EOCs will not have information to share with each other or more importantly, with Incident Commanders in the field. "A collaborative environment requires the sharing of authority and a command

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[102] *Developing and Maintaining Effective Situational Awareness* (presented 28th Governor's Hurricane Conference, Orlando, FL, May 2013), http://flghc.org/ppt/2014/Training%20Sessions/TS37%20Developing%20&%20Maintaining/TS-37%20GHC2014%20-%20Developing%20and%20Maintaining%20Effective%20SA.pdf, 11.

[103] Ibid., 12.

[104] Ibid., 19.

and control structure that is more open and democratic."[105] Situational awareness technology fulfills the goal of collaboration amongst jurisdictions and other DOCs/EOCs.

1. Mass Notification Systems

Mass notification systems (MNS) capability can benefit a jurisdiction or multiple affected jurisdictions by notifying emergency responders in a designated geographic area. Emergency managers can quickly provide communities with life safety information and/ or warning of a pending danger. MNS outreach capabilities use multiple sources of communications, such as: sirens, landline telephones, wireless mobile devices, text messages, email, and social media. MNS can reach visitors and transient populations in an affected community or geographic area by designating areas of interest within the MNS program platforms.

The *National Preparedness Goal* identified "Operational Communications" as one of its 31 core capabilities. The mission statement for operational communications states: "ensure the capacity for timely communications in support of security, situational awareness, and operations by any and all means available, among and between affected communities in the impact area and all response forces;"[106] technology allows local governments to meet this goal.

Interoperable MNS software platforms are presently used in several jurisdictions in the San Francisco Bay Area; however, individual local governments continue to invest in independent systems and have yet to fully combine resources to invest in shared regional systems. Typically, MNS in use in the San Francisco Bay Area are not shared outside of existing local government jurisdictions or OAs. Although there is technology available to provide a robust Integrated Public Alert and Warning System (IPAWS) for both government and public notifications for events requiring maximum and indiscriminate outreach, most jurisdictions continue to lack the ability to selectively

[105] Duane Smith, *A Study of Command and Control of Multi-Agency Disaster Response Plans.* (Phoenix, AZ: University of Phoenix, 2010), 36.

[106] U.S. Department of Homeland Security, *National Preparedness Goal*, 1st ed. (Washington, DC: Department of Homeland Security, 2011), accessed July 9, 2015, http://www.fema.gov/pdf/prepared/ npg.pdf, 10.

communicate with each other or the public in selective geographic areas of interest through non-IPAWS means on standard MNS platforms. In a 2012 case study conducted by Filler and Associates for the 12 San Francisco Bay Area OAs that use MNS, the report concluded that there appears to be:

> …little formal or consistent regional coordination of alerting policy development and planning activities. The current patchwork of public warning systems among the OAs and other regional stakeholders causes great inconsistency in the type, content, and format of warnings received by the public. Almost all of the OAs' warning tools must be activated one-by-one and do not support simultaneous activation using the OASIS Common Alerting Protocol (CAP). This inhibits integration of OA technology systems and creates otherwise avoidable delay, additional workload, and opportunities for error for warning originators.[107]

Collaborative MNS that are standardized and interoperable across multiple jurisdictions would be helpful to promote situational awareness and COP across numerous jurisdictions and even a region. Existing technology would allow each jurisdiction to maintain control over its own MNS while integrating that system into a larger regional "system of systems" to better manage multi-jurisdictional threats and hazards.[108]

Federal efforts through IPAWS to modernize and integrate disparate MNS has also significantly enhanced capabilities for standardized and geographically wide-reaching mass notifications via input in one platform and broadcast through multiple platforms. Under IPAWS, Alerting authorities at the Federal, State, and Local level can use IPAWS and integrate local systems that use Common Alerting Protocol (CAP) standards with the IPAWS infrastructure. IPAWS provides public safety officials with an effective way to alert and warn the public about serious emergencies using the Emergency Alert System (EAS), Wireless Emergency Alerts (WEA), the National

[107] Bay Area Urban Areas Security Initiative, *Bay Area Emergency Public Information and Warning Strategic Plan, 2012–2017* (San Francisco, CA: Filler & Associates, 2012), http://www.bayareauasi.org/sites/default/files/resources/Bay%20Area%20UASI%20EPIW%20Strategic%20Plan_0.pdf, 44–46.

[108] Ibid.

Oceanic and Atmospheric Administration (NOAA) Weather Radio, and other public alerting systems from a single interface.[109]

2. Geographic Information Systems

Geographic Information Systems (GIS) "software is designed to capture, manage, analyze, and display all forms of geographically referenced information."[110] GIS will allow EOC personnel to visualize events and the surrounding geographical areas in "ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts."[111] The company and popular vendor Environmental Systems Research Institute (ESRI) is known for its GIS products that are used in both the public and private sectors. Its website states: "GIS software helps you answer questions and solve problems by examining data in a way that is quickly understood and easily shared on a map."[112] The State of California recently contracted with a vendor to integrate GIS into its California Common Operating Picture (CAL COP) project that will enhance EOC operations and improve situational awareness among the OAs in the state.

3. Web EOC / CAL EOC

WebEOC is a software program developed by Intermedix, Inc. that many county and city EOCs in California are now using to communicate within their OAs and to collaborate within their respective regions. WebEOC can be fused into the state-wide system, Cal EOC for communication and resource requests to the state. WebEOC "provides position-specific activity logging and significant events tracking for a real-time common operating picture"[113] of the life cycle of an event. Furthermore, WebEOC assists in providing situational awareness at the city and OA levels and Cal EOC assists

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[109] Federal Emergency Management Agency, "Integrated Public Alert and Warning System (IPAWS)," June 30, 2015, https://www.fema.gov/integrated-public-alert-warning-system.

[110] Environmental Systems Research Institute, "What is GIS? How GIS Works?" July 25, 2015, http://www.esri.com/what-is-gis/howgisworks.

[111] Ibid.

[112] Ibid.

[113] Intermedix Corporation, "WebEOC," accessed September 12, 2015, https://www.intermedix.com/product/product-webeoc/index.php.

in providing situational awareness at the regional and state levels. Additionally, ICS forms used as part of EOC operations can be uploaded into WebEOC for sharing, documentation, and tracking.

4. CAL COP

The California Coalition of Urban Area Security Initiatives (UASI), comprising of all UASIs in the state, recently funded a web-based situational awareness mapping software called the California Common Operating Picture (Cal COP). The CAL COP "is a cloud-based software that provides data to EOCs, dispatch centers and public safety agencies"[114] on threat awareness by sharing data on critical infrastructures, using lists, geographic map imagery, and data analysis.

> Cal COP leverages local and regional risk management and critical infrastructure assessments layered with real-time, man-made, technological, and natural hazard threat information—to create a statewide threat situational awareness picture to more effectively and efficiently understand California's threat landscape as it emerges across public safety disciplines, agencies, and jurisdictional boundaries. Access to information is managed securely through user-based privileges and data sharing agreements with participating agencies.[115]

H. SUMMARY

Technology as described above can assist in providing situational awareness and a common operating picture[116] to an EOC and to those who are in positions to make critical decisions. Technology, when understood how and when to properly use, will bridge the gap on layered communications, enhance knowledge management, and expedite response, mitigation, and recovery operations during EOC operations.

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[114] California Urban Areas Security Initiatives, "California Common Operating Picture (Cal COP)," January 5, 2015, accessed July 25, 2015, http://calcop.org/wp-content/uploads/2015/01/Cal-COP-Program-Overview_2015.pdf, 1.

[115] Ibid.

[116] Common terminology in law enforcement software based technologies used in the intelligence community and fusion centers.

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APPENDIX B. CHALLENGES IN THE EMERGENCY MANAGEMENT DISCIPLINE

A. INTRODUCTION

This appendix provides further insights to additional challenges in emergency management and capability gaps, highlighting the politics of crisis management that contribute to decision making, the importance in unity of effort between and among agencies and local governments, the overall role of emergency management, and the status of organization and structure of emergency management in counties.

B. THE POLITICS OF CRISIS MANAGEMENT

In the book, *The Politics of Crisis Management*, the authors discussed the subject of public leadership under pressure. Their initial message is that citizens who are affected by critical incidents "expect governments and public agencies to do their utmost to keep them out of harm's way."[117] In other words, the public expects people in charge (i.e., elected officials, city managers and directors of emergency management) to swiftly make difficult decisions and implement courses of action. Public policy makers in key organizational and government positions do not have the luxury of criticizing a crisis response after the fact, as news commentators and academics often do. Public officials live in an arena of uncertainty where at any time scenarios can materialize and have a lasting effect on their sphere of influence or area of responsibility.

Unlike days of past where most crisis were resolved by decisions made at the top levels of government, many crisis today are managed by an upward shift through reporting hierarchies in decision making. The measure of response is adjusted to the measure of the threat. When a crisis affects areas of other jurisdictions, responsibility for coordinating government responses will often shift to local or regional levels of authority. The authors of *The Politics of Crisis Management* remark, "The same goes for crises that are local in geographical terms but those whose depth and complexity exceed the coping

[117] Arjem Boin et al., *The Politics of Crisis Management* (Cambridge: Cambridge University Press, 2006), 9.

capacity of local authorities."[118] Crisis response is not only shaped by decision makers, but also from implementation of those decisions. In most cities, the key success to crisis response is shaped by well trained and assigned personnel within the organization, rather than just its top policy makers. In *The Politics of Crisis Management*, the authors state, "a successful crisis management depends not so much on who is making the decisions but on the facilitation of crisis response implementation and coordination throughout the response network."[119]

In government, personnel transfers, promotions, and turnover is constant, potentially causing vacancies in key strategic positions within a given organization or department. In many cases, top level executives, new city managers, recently elected city council or mayors, etc., are relatively unfamiliar with what is expected of them and any previously adopted protocols or policies that apply toward emergency management. In areas like San Mateo County, California, where serious crisis are rare occurrences but highly likely, chances are high that many top executives have little or no experience with disaster response. Moreover, as the authors of *The Politics of Crisis Management* explain:

> since a crisis never conforms fully to the ones foreseen in the manuals, there is a high likelihood that the people gathering around the table will not always be familiar with one another, let alone have experience in working together as a group.[120]

The need and abilities to coordinate and collaborate with partners from other jurisdictions and agencies creates its own challenges.

For politicians,

> being an effective crisis manager may seem like a priority when voters evaluate candidates for high office, though many political executives will learn during the course of their tenure that it is a crucial quality they should possess if they want to stay in office and remain effective.[121]

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[118] Ibid., 42.

[119] Ibid., 43.

[120] Ibid., 46.

[121] Ibid., 156.

Therefore, public officials rely on their police and fire chiefs to make the critical decisions and are often absent due to expectations of delegated duties. In a real world crisis, "the leadership potential that public office-holders claim to have is put to the test, and the testing is done in full public view thanks to the relentless media scrutiny that crisis generate."[122] Given all that is at stake, public expectations of local elected officials and government leaders is that they will be ready and prepared to answer the call when crisis arises.

C. UNITY OF EFFORT

In *The Politics of Crisis Management*, the authors' state:

> Achieving unity of effort is the central challenge to effective homeland security response. No single organization, function, or stakeholder has all the necessary tools to respond completely to the wide range of crisis that routinely occur, or could occur, in our homeland.[123]

Combining the capabilities, experience, and resources of multiple jurisdictions can be exceedingly complex and politically difficult. Local homeland security response capabilities are demanding, especially since there are so many potential variables like acts of nature or acts of violence that could affect a community. Blum and McIntyre posit, "The challenge in homeland response operations is neither inadequate resources nor lack of capabilities, but rather in being able to bring them to bear at the right time and place, and in the right combination."[124] Disasters in the United States can have enormous consequences, regardless of size and complexity; they always have the potential for loss of life, psychological impact, economic loss, and diminished public confidence in government. Enormous resources are devoted to public safety and for homeland security. American citizens have the right to expect that these resources will be used efficiently by their leaders, both elected and appointed. Finding better ways to work together is the responsibility of all public employees. Continuous efforts to identify areas where leaders

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[122] Ibid.

[123] Steven Blum, and Kerry McIntyre, *Enabling Unity of Effort in Homeland Response Operations* (Carlisle, PA: U.S. Army War College, 2012), ix.

[124] Ibid.

can combine efforts and resources can enhance response. As Blum and McIntyre note, "There cannot be any higher priority for government than ensuring the safety of its citizens."[125]

D. THE ROLE OF EMERGENCY MANAGEMENT

Emergency management is often a confused or assumed role by other disciplines in the first responder profession. Many in government believe that those assigned as emergency managers will assume all responsibilities and require little or no support from other partner agencies. The misconception is great among local governments were city and county departments often do not train their personnel for assignments in the local EOC, resulting in a disparate, disorganized team, which leaves the heavy lifting to the few emergency managers. Emergency management, for the purpose of this analysis, is one that outlines specific requirements, actions, or roles and responsibilities. There are many varied expectations placed on emergency management by local, state, and federal government. The following are some federal level documents that establish clear emergency management expectations: The *National Preparedness Goal* (NPG),[126] The *National Response Framework* (NRF), [127] *National Infrastructure Protection Plan* (NIPP), [128] The National Incident Management System (NIMS), [129] the Emergency Management Assistance Compact (EMAC), [130] and the Homeland Security Act of 2002.[131]

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[125] Ibid., 34.

[126] U.S. Department of Homeland Security, *National Preparedness Goal*.

[127] U.S. Department of Homeland Security, *National Response Framework*, 3.

[128] U.S. Department of Homeland Security, *National Infrastructure Protection Plan* (Washington, DC: Department of Homeland Security, 2009), http://emilms.fema.gov/IS821/assets/NIPP_Plan.pdf.

[129] U.S. Department of Homeland Security, *National Incident Management System* (Washington, DC: U.S. Department of Homeland Security, 2008), http://www.fema.gov/pdf/emergency/nims/NIMS_core.pdf.

[130] Emergency Management Assistance Compact, Public Law 104–321 (1996), http://www.emacweb.org/index.php/learnaboutemac/emac-legislation, Article II.

[131] Homeland Security Act of 2002, Public Law 107–296 (2002), http://www.dhs.gov/xlibrary/assets/hr_5005_enr.pdf.

The guiding federal documents for emergency management address emergency management as a capability, discipline, organizational structure, or activity, all of which apply to emergency response. The National Preparedness Goal establishes an expectation of participation of government organizations and disciplines to include emergency management by stating, "National preparedness is the shared responsibility of our whole community. Every member contributes, including individuals, communities, the private and nonprofit sectors, faith based organizations, and Federal, state, and local governments."[132] The metric of performance is measured through the spirit and language of the *National Preparedness Goal*: "A secure and resilient Nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk."[133]

Taking concepts and direction from these adopted government documents will help emergency managers and persons in government leadership positions better understand the role and responsibilities they inherit as directors of emergency services for their respective jurisdictions or area(s) of responsibility. The California Standardized Emergency Management System (SEMS) was adopted in 1993 and the federal National Incident Management System (NIMS) was adopted in 2005. These protocols for emergency response work well when implemented for the purposes they were designed to be used. The author agrees that there is not one universal approach to a complicated event (e.g., natural disaster, criminal activity or terrorist attacks). The recommendation is not to change existing policy, rather, to offer an opportunity for local governments to collaborate in a formal setting of multiagency cooperation within OAs.

The focus of discussion should be how emergency management together can better respond to any human or natural caused complex event. It is the emergency managers who are often left out of the spotlight and suffer lack of funding, support, training, and exercise opportunities and lack the political support to integrate with other agencies in a unity of effort response to mitigation and recovery. Recovery starts when

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[132] U.S. Department of Homeland Security, *National Preparedness Goal*, 1.

[133] Ibid.

events begin. Resiliency is often not on the list of "things to do" at the onset of a crisis, but it should be in the forefront in emergency planning and preparation stages for local governments.

This research focuses on a systems approach to solution-based problems. Complex events will continue to challenge emergency managers and task smaller jurisdictions like townships and cities with small populations and budgets. How government leaders approach chaos can determine the level of success and lives saved. It is difficult to rate how successful and well managed an event is because often times after action reports do not reflect embarrassing moments or lack of competence at the section chief or executive policy levels of an EOC operation. Therefore, decision-making failures at the time of crisis are sometimes not acknowledged unless there is injury or death as a result of negligence. However, not having all the information is exactly what first responders are faced with every day. It is the preparedness, planning training, and level of commitment that will contribute toward success and resiliency for a particular jurisdiction(s). Moreover, it is the relationships, knowledge, and collaborative efforts amongst jurisdictions within OAs and between OAs that are usually key to successful outcomes.

E. ORGANIZATION AND STRUCTURE OF EMERGENCY MANAGEMENT IN COUNTIES

In the *Emergency Management in County Government*, prepared by The National Association of Counties, the author presents data based on a national survey to county governments in which San Mateo County was a participant. The data and analysis in this section is taken from a national survey prepared for the National Center for the Study of Counties, authored by Wes Clarke in August 2006.[134] Although the report is now dated, the relevance remains unchanged. The survey identified common themes in emergency management at the county government level that cities should know for the purpose of knowing a particular county's strength and limitations within its own OAs.

[134] Wes Clark, *Emergency Management in County Government: A National Survey* (Athens, GA: Carl Vinson Institute of Government University of Georgia, 2006), http://www.naco.org/sites/default/files/documents/Emergency%20Management%20in%20County%20Government.pdf, 1.

The national survey found that in:

> many local governments, the emergency management function has traditionally been assigned to public safety units such as police/sheriff and fire departments. As shown in the table below, respondents to this survey suggest that emergency management is, for the most part, now a separate unit within a department of public safety (38 percent) or a stand-alone unit of the county government reporting directly to the chief executive or governing body (40 percent), meaning that 78 percent of counties nationally have established emergency management units separate from the police/sheriff and fire departments.[135]

The national survey also identified disciplines under which emergency management functions were assigned by geographic region as identified by percentages in Table 5.

Table 5. Structure of emergency management unit

	Total	Northeast	South	Midwest	West
Stand Alone Unit	40%	37%	45%	32%	51%
Unit within Public Safety	38%	56%	38%	40%	24%
Unit with Police/Sheriff	7%	---	10%	2%	13%
Unit with Fire Dept.	7%	---	1%	15%	3%
Unit with EMS	3%	5%	1%	5%	1%
Other	5%	2%	3%	6%	6%
Count	448	41	162	176	68

Clark also explains:

> Emergency management administrators have a variety of specialized training opportunities available to them, including state programs conducted by top state officials and, often, consultants or university faculty; a series of short courses in management development conducted through Federal Emergency Management Administration (FEMA) regional offices; and certification through the International Association of Emergency Managers (IAEM). The data presented in Table 6 below suggest that about 40 percent of top officials and 20 to 30 percent of second-in-command managers have completed some form of specialized training. Most top managers have duties beyond coordinating the county's emergency preparedness and response units.[136]

[135] Ibid., 8.

[136] Ibid., 9.

Table 6. Specialized emergency management training of top officials*

Top Administrator	Total	Northeast	South	Midwest	West
IAEM Certified Emergency Manager	19%	11%	22%	22%	11%
IAEM Associate Emergency Manager	3%	2%	4%	3%	3%
State Certification	44%	55%	50%	46%	20%
FEMA Professional Development Series	41%	43%	42%	39%	43%
Second in Command	Total	Northeast	South	Midwest	West
IAEM Certified Emergency Manager	7%	7%	5%	11%	4%
IAEM Associate Emergency Manager	2%	2%	1%	5%	0%
State Certification	22%	34%	17%	30%	8%
FEMA Professional Development Series	25%	30%	20%	31%	21%
Count	487	44	173	193	76

** Column totals do not sum to 100 percent since officials may hold more than one certification.*[137]

As shown in Table 7, more than three-quarters (77 percent) of top managers report responsibilities beyond emergency management; nearly 60 percent are engaged in at least one other major activity unrelated to emergency management, the most common of which is general oversight of additional county units beyond those normally associated with emergency services. This leaves only about one-quarter of top administrators who spend all of their time on emergency management and administration. However, 100 percent effort in emergency management was the modal response, with another large cluster (14 percent of managers) at 50 percent of their time. Top emergency management officials spend an average (mean) of 67 percent of their time on emergency management and administration activities. The number of employees actively engaged in emergency administration is remarkably low.[138]

[137] Ibid.

[138] Ibid., 10.

Table 7. Duties beyond emergency management[139]

		Total	Northeast	South	Midwest	West
Does the top EM administrator have duties beyond EM?	Yes	77%	65%	87%	69%	75%
	No	23%	35%	13%	31%	25%
Major duties related to EM?	Yes	59%	69%	60%	56%	54%
	No	41%	31%	40%	44%	46%
Count		467	41	167	186	72

As the data in Table 8 indicates, most counties operate with fewer than six fulltime equivalents (FTE) in the agency. The low mean and very high standard deviation in each category of the data indicate that there are a few large counties with significant numbers of staff in emergency management while the vast majority of counties have only a few (maybe one or two) employees assigned to this function. The mean number of employees per 100,000 populations is 10.27 with a standard deviation of 1.77. The data suggests that 95 percent of counties operate with between 6.7 and 13.7 persons engaged in emergency management.[140]

Table 8. Emergency management workforce[141]

	Number	Minimum	Maximum	Mean	Standard Deviation
How many FT persons does the EM office or department employ?	315	.50	186.00	5.8262	15.36038
How many PT persons does the EM office or department employ?	196	.30	400.00	6.7133	32.43091
How many FTEs does the EM office or department employ?	286	.15	240.00	6.2753	21.40733

The information collected from the national survey is helpful for city managers, police, and fire chiefs as well as county managers and elected sheriffs to know the balance of their particular workforce and level of expected (or perceived) expertise. Access to this information can help public leaders make informed decisions about

[139] Ibid.

[140] Ibid.

[141] Ibid.

whether they might explore zone EOCs or multilateral agreements with neighboring jurisdictions. Most local governments do not have the capacities to staff fully activated EOCs for events with extended response timelines. Multilateral, multi-jurisdictional collaborative agreements can help fill the gaps in the area of staffing and expertise, and they also provide relief on already limited budgets.

APPENDIX C. COORDINATION CHALLENGES FOR MAJOR EVENTS IN THE SAN MATEO COUNTY OPERATIONAL AREA

A. INTRODUCTION

This appendix highlights coordination challenges in major events that occurred in the San Mateo County OA. Case studies are presented and discussed summarizing lessons learned and recommendations.

B. ASIANA AIRPLANE CRASH

The July 6, 2013 Asiana Airplane accident at the San Francisco International Airport, Millbrae, CA offers an example of a predictable surprise. It was a situation in which pilots from a South Korean airline company received substandard training and lacked the necessary training and experience to land a jumbo jet onto an airstrip with a sea wall. The Asiana Airline incident also brought attention to the San Francisco International Airport, a San Mateo County special district, and how the politics of crisis management affected the airport director's decision to coordinate resource requests with the city and county of San Francisco instead of with its assigned operational area of San Mateo County.

1. Summary

According to the National Transportation Safety Board: "On July 6, 2013, at approximately 11:28 AM, a Boeing 777–200, operating as Asiana Airlines flight 214, was on approach to runway 28L when it struck a seawall at San Francisco International Airport (SFIA), San Francisco, California."[142] Three of the 291 passengers were fatally injured. One crewmember, eight flight attendants, and 40 passengers were seriously injured. Furthermore, 248 passengers, "four flight attendants and three flight crewmembers received minor injuries. The airplane was destroyed on impact forces and

[142] National Transportation Safety Board, *Board Meeting: Crash of Asiana Flight 214 Accident Report Summary*, 2014, accessed August 31, 2015, http://www.ntsb.gov/news/events/Pages/2014_Asiana_BMG-Abstract.aspx, 1.

the subsequent fire."[143] Upon notification that an airplane crashed, a Code 2000 (dispatch code for airplane crash) protocol was activated by San Mateo County Public Safety Communications (PSC). Law enforcement established posts along the U.S. 101 freeway off ramps to SFIA and enacted its closure plan. Fire units were dispatched for mutual aid. Hospitals were alerted to receive patients and EMS units dispatched ambulances to the scene. A subsequent law enforcement mobile field force was activated to search for evidence in the runway. The SFIA Department Operations Center was activated, as was the San Francisco Department of Emergency Management (SF DEM) EOC and the San Mateo County OA EOC to support airport resource requests.

2. Lessons Learned

During the event, responding units experienced lack of radio communications interoperability leading to challenges in integrating responding mutual aid resources. Reports of excess death counts were provided to local hospitals who were preparing for maximum surge capacity. EMS patient tracking via ambulance transports was inaccurate, which created confusion for receiving hospitals. As the responsible OA of jurisdiction, San Mateo County activated its OA EOC; however, the OA EOC did not have direct communications or receive resource requests from SFIA. Instead, SFIA communicated with the SF DEM. Web EOC was not utilized to document the incident and manage resource requests, creating unclear situational awareness. San Mateo County sent a county OES district coordinator to the SFIA DOC and relied on local television news reports for timely information.

The Asiana airplane crash provides an excellent case proving the need for multilateral agreements between OAs. The SFIA is considered a special district that has reporting responsibility to two OAs, San Mateo County, the geographic host to the airport, and SF DEM which is the political host to the airport. The lack of clarity and unity of effort caused valuable missed communication, confusion with resource requests, and multiple self-dispatched law and fire units from two counties, in violation of the framework established by SEMS. Better intra-OA coordination with the affected cities in

[143] Ibid.

the north zone of the San Mateo County OA would have helped effectively coordinate an airport closure or evacuation. Having no coordination in place, the cities would have to activate their own EOCs and coordinate independently with the San Mateo County OA EOC, which was already experiencing communication challenges with the SFIA DOC due to SF DEM's direct oversight of the incident.

C. SAN BRUNO PIPELINE EXPLOSION

The Glenview Fire incident in San Bruno, CA offers an example of a predictable surprise, a situation in which PG&E was identified as the entity at fault. The Glenview Fire incident also highlighted the capacity of a small city's ability to manage a complex, prolonged event.

1. Summary

In a report by San Mateo County Office of Emergency Services, it states, "On the evening of September 9, 2010, a massive explosion fueled by a ruptured high pressure natural gas pipeline tore through the Crestmoor residential neighborhood in San Bruno, CA,[144] (known as "the Glenview Fire"). The fire claimed the lives of six people and injured 60 six more. The six-alarm fire destroyed 38 homes, a city park, a public water, sewer and wastewater system, and storm drain services caused damages to 42 more homes. Property damage exceeded $55 million and subsequent lawsuits resulted in the Pacific Gas and Electric Company (PG&E) paying out over $1.6 billion dollars in fines and restitution.[145]

The city of San Bruno manager and the San Mateo County manager declared a local state of emergency to the governor's office. Over five hundred public safety personnel responded to the call for mutual aid. The city of San Bruno activated its EOC and was immediately overwhelmed, requiring staff and resource support from it fire protection district, neighboring cities, and San Mateo County. In the incident, 400 homes

[144] San Mateo County Office of Emergency Services, *Glenview Fire, September 9, 2010 After Action Report* (San Mateo, CA: San Mateo County Office of Emergency Services, 2011), 11.

[145] Ibid.

were evacuated and shelters were established. The incident lasted for 13 days until the county-led OA EOC demobilized and dispatchers were relieved of duty. However, a family assistance center and other resources were still open and operational to support residents who lost their homes.

2. Lessons Learned

For a city of only 42,000 in population and a small city employee staff to support its day-to-day tasks, the city of San Bruno was resilient based on a number of factors: existing working relationships among the responding agencies proved beneficial, emergency management staff at the city EOC and county-led OA EOC successfully demonstrated the ability to activate, mobilize, and operate the EOCs, and responding agencies were disciplined enough to identify a staging area and maintained a good perimeter. However, a lack of intra-OA multilateral agreements between jurisdictions caused a breakdown in communications and emergency response roles for the mutual aid responder, the SFIA DOC and the responding SFIA fire department.

According to the San Mateo County OES, some "areas of improvement were communications between the incident command post, city EOC and OA EOC."[146] The lack of a JIC for press releases and rumor control was not in place, neither was a formal multiagency coordination system where trained personnel could respond to help manage the effort and relieve the City of San Bruno staff of some responsibilities, including the city manager. Intra-OA multilateral collaborative agreements between the City of San Bruno and neighboring jurisdictions would have proven valuable and helpful in assisting to further enhance the effectiveness of the coordination and support of the response.

D. MULTI-JURISDICTIONAL FLOOD RESPONSE

Most creeks of San Mateo and Santa Clara Counties flow into the San Francisco Bay. During high tides, creeks cannot drain as conveniently, causing the push back of a significant amount of water back into the local communities. A significant rain storm would not create alarm in most communities, however, when a lengthy storm makes

[146] Ibid.

landfall, causing coastal creeks to overflow with no outlet to drain during the Pacific Ocean's high tide, cascading effects are likely to occur.

1. Summary

On December 11, 2014, a significant rainstorm fell on northern California, affectionately called "the Pineapple Express," summoned by its origin in the tropical northwest pacific region. The San Mateo County OA received up to nine inches of rain within a few hours. Areas within the OA most affected were the cities of San Bruno, Belmont, Redwood City, La Honda, and the SFIA. Due to the higher elevations of some of these jurisdictions, other low lying jurisdictions of South San Francisco, Belmont, Redwood City, and Pescadero suffered flooding from run off.

The county-led OA EOC was activated and City of South San Francisco also activated its EOC. Field command posts were established in the cities of Belmont and Redwood City. The flooding required evacuations of mobile home parks, residential neighborhoods, and businesses. Shelters were opened in the cities of South San Francisco and San Mateo to house over 100 evacuees for up to three days. The response effort was significant, primarily for: fire agencies, special districts, human services on-call personnel, the American Red Cross, private sector partners, community emergency response teams (CERT), and the San Mateo County OES. The director of emergency services for the San Mateo County OA later declared a disaster proclamation to the California governor's office for public damages of up to $3.8 million dollars. Private parties with losses were provided assistance from a local assistance center (LAC) established by the State of California Governor's OES (Cal OES).

2. Lessons Learned

San Mateo County OES was criticized for not establishing field command posts and not providing adequate resource support to local agencies via the county-led OA EOC and county OES district coordinator support. OES was further criticized by city jurisdictions in the affected areas for not staffing emergency shelters for multiple operational periods. However, the county OES did staff the shelters, did respond to all areas affected by flooding, and did activate its county-led OA EOC, as required by

SEMS. The experience taught the county OES that jurisdictions and county agencies were not prepared to effectively respond to the disaster, and there was a lack of a proper understanding of their roles and responsibilities per SEMS.

The absence of intra-OA multilateral collaborative agreements between jurisdictions caused a breakdown in communications and emergency response roles during response and recovery efforts. County response resources and capabilities were stretched as multiple cities were simultaneously flooded at the northern and southern zones of the San Mateo County OA—all of which also required evacuation and sheltering of displaced residents. Due to the complexity of having multiple incidents (at the same time calling for the same resources), better intra-OA coordination and pre-established, multilateral, collaborative agreements would have been helpful to organize a more efficient response. This would have also enabled local jurisdictions to better understand and assist with the overall response efforts.

E. KEY FINDINGS

In the case studies presented, each has a common theme: the challenges local governments' face with a no notice, large-scale, complex event that requires a multiagency, multi-government, coordinated response. Whether a terrorist attack or a natural disaster or a predictable surprise, like the Asiana airplane crash or the PG&E pipeline explosion, each event can expose gaps in the readiness of smaller jurisdictions and the need for multi-jurisdictional collaborative partnerships. Each case study, although differing in application and scope, required the same level of government response from the same public safety disciplines. Each incident required strategic coordination and support from EOCs and multi-jurisdictional unity of effort for response and recovery.

F. CONCLUSION

The events related to public safety response constructively evaluate and assess the operational and managerial challenges and identify the unique issues and challenges faced by local governments. The summaries offer a reminder for emergency managers and other stakeholders with practical recommendations to consider for future incidents. It is not the intent of this report to convey every detail or element related to each incident as

they are beyond the scope of the review. It is also not the author's intention to second-guess any of the actions or decisions of the officials or responders who were involved in the events. Often times, decisions are made quickly and without the luxury of discretionary time. First responders live in dynamic and extraordinary environments and respond to calls facing a variety of challenges without the benefit of hindsight. Ultimately, the responses were effective in mitigating the threats without the further loss of life.

Overall continuity of operations, although briefly interrupted, continued to sustain, which is a testament to the resiliency, professionalism, training, and bravery of the public safety personnel and civilians who responded to the scene(s). An analysis and a snapshot of lessons learned may provide other agencies and stakeholders with an understanding of the challenges and recommendations for possible improvements to mutual aid response to complex, on-going, critical situations, other emergencies or disasters that may require a large-scale, multiagency, coordinated intra-OA response. Having pre-established multilateral, multi-jurisdictional, collaborative agreements in place will be most helpful for local jurisdictions to rely on for established roles of delegated support and resource allocation in their hour of greatest need.

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