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POSTGRADUATE  
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**MONTEREY, CALIFORNIA**

**THESIS**

**POLICY OPTIONS ANALYSIS AND THE NATIONAL  
FIRE OPERATIONS REPORTING SYSTEM**

by

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June 2015

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**POLICY OPTIONS ANALYSIS AND THE NATIONAL FIRE OPERATIONS  
REPORTING SYSTEM**

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## **ABSTRACT**

Effectively managing a fire department requires leaders to understand that allocation adjustment to resources will impact the outcome of structure fire incidents. It is important that fire service leaders and politicians understand how resources deployed impact firefighter and civilian injuries, death, and property loss. Additionally, fire service leaders must have reliable data to understand the complexities and apply the correct resources. The National Fire Incident Reporting System (NFIRS) is a voluntary system and only describes the cause of a fire, its origin, and how a fire spreads within a structure. Information submitted into the NFIRS database does not provide real-time information. Despite recent advances in technology, fire departments do not have a method to determine the availability of resources able and ready to respond or the capability of those resources to manage the event. This thesis will identify those specific definitions and describe the operational effectiveness of fire department resources deployed to a structure fire incident. Operational effectiveness states the match between the resources deployed to the incident type and management of the events. Explaining these terms empowers the leader to allocate the correct resources—reducing firefighter and civilian injury, death, and property loss.

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## **LIST OF ACRONYMS AND ABBREVIATIONS**

CHDS	Center for Homeland Defense and Security
DHS	Department of Homeland Security
FEMA	Federal Emergency Management Agency
FFPCA	Federal Fire Prevention and Control Act
FFSDS	Firefighter Safety and Deployment Study
EFOP	Executive Fire Officer Program
IFSTA	International Fire Service Training Association
PL	public law
NFIRS	National Fire Incident Reporting System
N-FORS	National Fire Operations Reporting System
NASFM	National Association of State Fire Marshals
NFPA	National Fire Protection Association
NIST	National Institute of Standard and Technology
NPS	Naval Postgraduate School
SAFER	Staffer Adequate for Emergency Response

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# EXECUTIVE SUMMARY

## Results

This thesis reviews the national fire service regulation, standards, and practices that define the fire data incident collection processes. Reviewing the documents grounds the criteria that define the availability of fire department resources that are ready and able to respond to a structure fire incident and the capability of those deployed resources to manage the incident. Operational effectiveness is a measure combining availability and capability to state that the deployed resources matched the incident risk type and managed the event.

A comprehensive assessment of the current fire service federal regulation, national standards, and recommended practices identified a data set that limited the fire problem for origin of ignition, cause of a fire, and flame spread inside the structure. Further examination revealed gaps in the terms, processes, and national data analysis used to describe the operational information available in calculating the assignment of resources to structure fire incidents.

The National Fire Data Summit findings identified the elements, terms, and definitions to describe structure fire operations that include the availability of resources that are ready and able to respond to a structure fire incident, the capability of the deployed resources to manage the event, and operational effectiveness.

## Conclusions

These data elements describe the availability of local fire department resources that are able to respond to a structure fire incident and capability of those resources to manage the incident upon arrival. The operational effectiveness qualifies the complexities of the process required to calculate the assignment of resources to structure fire incidents. Defining these terms with the National Fire Operations Reporting System (N-FORS) software empowers fire service and political leaders with data to assign the correct resources to the fire problem. This process creates policy that will reduce firefighter and civilian injury, death, and property loss for the local community.

## **Recommendations**

This thesis provides a policy options analysis with recommendations to fire service and political leaders for assignment of resources for the structure fire incident. The recommended action is structured language assignment of the terms availability of resources that are ready and able to respond to structure fire incidents, the capability of deployed resources to manage the scene, and the operational effectiveness to state the deployed resources match the risk for the incident type and management of the events, into the Federal Fire Prevention and Control Act of 1974 (FPCA) in §9, Paragraph C. In addition, the recommended actions include structured language assigning the National Fire Operations Reporting System as the performance improvement process into the Federal Fire Prevention and Control Act of 1974 (FPCA) in §9, Paragraph C.

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## I. INTRODUCTION

Fire service leaders and politicians across the United States face a set of complex issues on as to how to best to allocate fire department resources to structure fire incidents in a timely, safe, efficient, and effective manner. Factors that drive these decisions to assign resources` include: budget shortfalls, personnel shortages, increasing call volume, homeland security issues, department training, and overall expectation to accomplish more with less.

### A. THE PROBLEM STATEMENT

Effective analysis of local fire service resource deployment historically has been limited by the United States Fire Administration's (USFA) National Fire Incident Reporting System (NFIRS).<sup>1</sup> NFIRS data collection and analysis is focused on the cause of a fire, origin of where the fire started, and features that allowed fire to spread.<sup>2</sup> The NFIRS data structure was designed in the 1970s to characterize the profile of the fire incident incidents in the United States.<sup>3</sup> NFIRS does not collect the data elements required to explain the complexity of the fire problem and resource requirements for communities. The United States fire service requires an examination of the current data process regulation, standards, and practices. This review includes the process for the identification of the elements that build terms, methods that establish meaning for those terms, and sequence that defines the value of those terms.

There is no federal standard or regulation requiring fire departments' to report information on structure fire incidents to a national database. NFIRS is a voluntary data submission process with fire departments opting to enter into or out of the system at any time. Currently, fire departments' that receive Fire Act Grant funds are required to

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<sup>1</sup> United States Fire Administration, National Fire Data Center, *National Fire Incident Reporting System 5.0 (NFIRS): Complete Reference Guide* (Emmitsburg, MD: United States Fire Administration, 2013).

<sup>2</sup> *Ibid.*, 3.

<sup>3</sup> *Ibid.*

participate in NFIRS data submission.<sup>4</sup> However, no formal data set is established for compliance. Without regulation for the structure fire incident terms, definitions, and process, local fire departments cannot state resource allocation needs.

Complicating the issue is the fact that fire departments can specify individual data elements in different sequence and formats specific to local preference or vendor requirements. The NFIRS approved list of vendors is more than 100 members, and there is no standard data template is common among vendors.<sup>5</sup> Without standard fire department data terms, common definitions, and collection process fire departments are cannot request the allocation of the correct resource to manage the structure fire incident.

Additionally, there is a lack of adequate attention to the data quality. Fire service data entry systems have multiple data entry points that are not consistent in the quality of reporting. There is no formal oversight stated at the national, regional, or state level levels to assure that the personnel are trained in data entry. Observations from the National Fire Data Summit identify missing data in more than 60 percent of the reviewed reports.<sup>6</sup>

Research completed by the National Association of State Fire Marshals Research and Education Foundation revealed that information about the investigation process is often not included in the NFIRS process. This gap makes determining the cause of the fire impossible.<sup>7</sup>

NFIRS is a voluntary method. Fire departments can enter into and out of the system to submit data without notice.<sup>8</sup> This is a problem because the analyses of fire

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<sup>4</sup> Assistance to Firefighters Grant Program, "Frequently Asked Questions," 2014, accessed August 8, 2014, <https://www.fema.gov/assistance-firefighters-grant/assistance-firefighters-grant-2014-frequently-asked-questions>

<sup>5</sup> United States Fire Administration, "National Fire Incident Reporting System," last modified December 4, 2014, <http://www.usfa.fema.gov/data/nfirs/vendors/>

<sup>6</sup> Jason D. Averill et al., *National Fire Service Data Summit Firefighter Safety and Deployment Study, National Fire Service Data Summit Proceedings* (NIST Technical Note 1968) (Washington, DC: Department of Commerce, 2011).

<sup>7</sup> Association of State Fire Marshals, *Conquering the Unknowns*, 2011, <http://www.nfic.org/docs/NASFMFoundationFinalReportConqueringtheUnknowns.pdf>

<sup>8</sup> United States Fire Administration *National Fire Incident Reporting System 5.0*.

department data results are incomplete for fire department incidents, the accounting for resources deployed to a structure fire scene, and ability to compare similar departments. NFIRS does not provide real real-time reporting for structure fire incidents or regular reporting increments for fire department information. These gaps create areas for problems to remain undetected problems in the process to collect information.

That ambiguity in fire data process, collection of timely records, and accuracy of data analysis confines leaders to make decisions based on limited knowledge of the issue. The result is that the fire department allocated resources assigned are inadequate to resolve the fire problem. In addition, incomplete fire department data complicate the construction and application of measures designed to determine a best practice or effective assignment of resources for structure fire incidents.

It is imperative that fire service and political leaders understand how resources are allocated at the local level and how they impact firefighter and civilian injuries, death, and property loss.<sup>9</sup> Without accurate information, leaders cannot assemble the data to accurately define the problem, and leaders must have accurate, reliable, and timely data to effectively manage a fire department. This includes the number of resources available, capability to manage a structure fire, and operational effectiveness measures.<sup>10</sup> Failures to collect, develop, and disseminate meaningful and current fire service data obstructs the development of the national fire service and local government policy.

The United States fire service demands a change in the current data terms that describe the structure fire incident. Outcome is a solid concept to develop a set of elements and terms that describe and define the required allocation of resources to match the risk of the incident and management of the event. Finally, understanding the risk provides fire service and political leaders the information to craft policy assigning the correct resources to reduce firefighter and civilian injury, death and property loss.

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<sup>9</sup> Averill et al., *National Fire Service Data Summit*.

<sup>10</sup> *Ibid.*, 3.

## **B. RESEARCH QUESTION**

Which policy options or combination thereof optimize the fire service incident policy data elements, availability, capability, and outcome while maintaining cost neutral implementation, political acceptance, organizational function, and legal compliance?

## **C. PURPOSE OF THIS THESIS**

This thesis identifies new elements and terms to describe the required resources for assignment to structure fire incidents. Availability describes the fire department resources ready and able to respond to structure fire incident, and capability describes the abilities of the deployed fire department resources to manage the event. Operational effectiveness states the degree to which the deployed resources match the incident risk type and managed the event. Outcome is the combination of the availability, capability, and operational effectiveness. These terms will function as the basis to assess the national fire regulation on data process. Define the standards that contribute to the documentation of structure fire incidents, and initiate policy option analysis recommendations. Those policies will reduce firefighter and civilian injuries, death, and property loss is principal to the assessment.

## **D. METHODOLOGY**

The policy options analysis method selected is from Eugene Bardach's *A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving*.<sup>11</sup> This method was part of the Naval Postgraduate School master's degree curricula for homeland defense and security. Bardach was selected to demonstrate how a structured process is applied to examine a fire service issue in a sequence of steps to deliver a policy options analysis.

This action provides value for the reader to build the process in chronological steps. These steps allow the reader to assess the information referring back to the steps for quick linkage with previous information. Finally, the process empowers the reader

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<sup>11</sup> Eugene Bardach, *A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving*, 3<sup>rd</sup> ed. (Washington, DC: CQ Press, 2009).

with the tools to replicate this thesis or apply the policy option analysis method to another problem.<sup>12</sup>

The simplicity of the weight scale to measure the policy applications is embedded into the research. Finally, the sophistication of the model allows the introduction of critical news terms to succinctly state the value of the data points in the research and introduce a new tool to measure the performance improvement of fire ground operations the National Fire Operations Reporting System (N-FORS).<sup>13</sup>

The product of this method is to deliver a set of policy option analysis to the fire service that state new terms that describe the allocation criteria for resources assigned for a structure fire incident. This new criteria and the definitions include the terms of the availability of resources that are ready and able to respond to a building fire, the capability of those resources to manage the event, and the operational effectiveness of the deployed resources. That outcome is a combination the availability and capability compared to the incident type. This measure provides fire service and political leaders with the information to assess risk. This thesis also includes a set of discussion points to open the dialog with focus on the criteria of the terms that compose the availability of the resources that are ready and able to respond to a structure fire incident, the capability of those resources to manage the structure fire incident, and operational effectiveness.

The National Fire Operations Reporting System Software (N-FORS) measures the outcome. This is performance improvement software that allows fire departments to enter data into a configuration application to build a community risk statement. Linked with a series of event modules, the software builds a performance package that combines elements of the cause, origin, and spread of the fire with availability, capability, and operational effectiveness to deliver to leaders a statement of outcome.

The outcome is then mapped to a fire incident type and then a risk statement is created. This statement includes a number for the fire department's resources that holds

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<sup>12</sup> U.S. Health and Human Services, Center for Disease Control and Prevention, *Analytical Policy Framework*, 2013, <http://www.cdc.gov/policy/process/docs/CDCPolicyAnalyticalFramework.pdf>

<sup>13</sup> N-FORS, "National Fire Operations Reporting System," June 2014, <http://911perform.org/n-fors/>

value in the discussion with political and fire service leaders who determine the assignment of resources to meet the fire problem demands of a community.

(1) Define the Problem

The problem is that the fire service national policy on fire service data processes, standards, and guidelines do not state the outcome terms required to describe the allocation of resources necessary for deployment to a structure fire incident. The lack of elements to describe these terms and measures inhibits fire service and political leaders from crafting policy to allocate the correct resources to a structure fire incident.

(2) Evidence

A literature review from the current documentation that drives the regulation, standards, research, and guidelines of the fire service records management process identified and compared a select group of policy options analysis. These documents were placed into a four-step process to evaluate the budgetary, organizational, legal, and political feasibility to select an alternative for implementation. A scale to demonstrate the elements within each category is explained with a weight chart to demonstrate the value of the recommendations.

(3) Constructing the Alternatives

Following the Bardach method, a definition is given for each of the four-evaluation areas. These included effect of the budgetary, organizational, legal, and political feasibility.

(4) Select the Criteria

Each of the alternatives is subdivided into a four categories to measure against the qualitative value of the definition. These categories were assigned number ratings from 0 to 4—the higher number is equal to greater value.

(5) The Outcome of the Policy Options Analysis

The straight addition methods were the used to calculate the policy analysis options. Each definition is weighed based on the literature impact and the corresponding definition parts that match the outcome. Each option has been closely reviewed to

identify any partial value options that could be linked or grouped into relationship to leverage that position to optimize the value.

(6) Decision

The process to select an option for policy implementation was based on the assessment scale used from the Bardach and NPS methods. The final recommendation was determined on the ability of policy option analysis to function in a low cost, organizational, legal, and politically feasible environment. The possibility of combining policy components is also considered.

(7) Next Steps

The introduction provides the background for the problem, defining the narrow space and consequence of the issue. A concise problem statement provides the reader the focus of the specific terms, definitions, and assessment this policy option analysis delivers about fire service data process. Additionally, the methodology section provides a step-by-step process to apply and analyze the policy options for this specific problem. The document assessment provides a comprehensive of current policies, regulations, standards, guidelines, and research about fire service data policy.

**E. LIMITATIONS AND SCOPE OF THIS THESIS**

This thesis focuses on a review of the regulations, standards, and guidelines that describe the current fire service data process. The scope of the review is limited to avoid mission creep into other technology platforms that are flourishing in the fire service operational environment. By applying the principals from the Naval Postgraduate School (NPS) Center for Homeland Security and Defense master's program, a structured methodology was selected to describe the policy options analysis process. The establishment of the framework for the assessment based on materials used in the NPS program provides the reader with exact reference to apply the process to another problem state and provide the results. The research into the fire service data process is unlimited. The scant amount of regulation and vast amount of data vendors provides a robust environment to select a small problem and apply a variety of research process.

## **F. OUTLINE OF NEXT CHAPTERS**

This thesis provides a review of the current regulations, standards, and guideline practiced in the fire service. Chapter II provides a literature review of the current regulations, standards, firefighter safety, and deployment research and guiding documents on data process. Chapter III provides a background for the fire service data history and identifies gaps in the system specifically in identification of gaps in terms in the availability of resources and the capability of resources to manage a fire and operational effectiveness. Chapter IV explains the application methods in policy option analysis framing the criteria for selection weighting process and decision measurement.

## II. LITERATURE REVIEW

### A. INTRODUCTION

This thesis includes a comprehensive literature review from open source materials to provide the reader with a foundation of the fire service data process. This review guides the reader along the path of federal reports, national regulations, and industry standards to describe the United States fire service. The reader gains insight into the sources that contribute to the formulation of fire service data process. With additional information provided in the chapter, the reader is better equipped to ask questions for insight into the fire service data gaps.

*America Burning* is a sentinel report in the fire service community that prompted political leaders to create regulation (such as Fire Prevention and Control Act of 1974) to address the fire issues.<sup>14</sup> Furthermore, the United States Fire Administration was created in direct response to this report and tasked with the activities required to address the fire problem in local communities.<sup>15</sup>

The Fire Prevention and Control Act of 1974 outlined a network of divisions at the USFA to assist in the mission.<sup>16</sup> By reviewing a detail description of that regulation, the reader gains additional insight into the process of fire data at the national level. With added information, the reader is building a base to assemble the complex issues that require resources allocated for structure fire incidents.

Linking the fire service through data, the National Fire Information Reporting System (NFIRS) was developed to characterize the fire problem in the United States.<sup>17</sup> The NFIRS data elements have a history connected with the National Fire Protection Association (NFPA). The NFPA provides a rich collection of standards, guidelines, and

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<sup>14</sup> Federal Emergency Management Agency, *United States Fire Administration America Burning Revisited* (Washington, DC: Federal Emergency Management Agency, 1987), <https://www.usfa.fema.gov/downloads/pdf/publications/fa-264.pdf>

<sup>15</sup> Federal Fire Prevention and Control Act.

<sup>16</sup> *Ibid.*

<sup>17</sup> Federal Emergency Management Agency, “National Fire Incident Reporting System,” <https://www.nfirs.fema.gov>

recommended practices in the fire service. The NFPA in conjunction with the National Institutes of Standards and Technology (NIST) provide research on a variety of fire service problems that result in the direct need for more robust fire service data.<sup>18</sup>

Many fire service organizations conduct research with the goal of reducing firefighter and civilian injuries, death, and property loss. With the development of the Assistance to Firefighter Grant program, many opportunities emerged for funding of research that connects organizations inside and outside of the fire community. One of these opportunities was the Firefighter Safety and Deployment Studies.

These scientifically based efforts studied the activities of firefighters required to contain a fire to room of origin.<sup>19</sup> Based on the results from those efforts, a significant gap in descriptive fire operations data emerged. This information was presented at the National Fire Data Summit. The result of that effort was the establishment of a grant to develop a comprehensive set of points to describe fire ground operations.<sup>20</sup> In turn, this produced the National Fire Operations Reporting System program to develop the terms and measures of availability, capability, and operational effectiveness that describe the management of fire operations.<sup>21</sup>

The literature review builds the foundation to explain the history of fire data process in the United States. The assembly of the documents starts with federal documents moving to state and local applications, which provides the reader a solid perspective on the complexity of the fire department data process. Building from the document review, the reader can trace the problem state into Chapter III. With information on the specific reason for expanding the fire data terms to include availability, capability, and operational effectiveness, the reader can assemble a rational model for the conclusion section.

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<sup>18</sup> National Institute of Standards and Technology, *Report on Residential Fireground Field* (NIST Technical Note 1661), 2010, NIST Firefighter Safety and Deployment Studies, [http://www.nist.gov/el/fire\\_research/upload/Report-on-Residential-Fireground-Field-Experiments.pdf](http://www.nist.gov/el/fire_research/upload/Report-on-Residential-Fireground-Field-Experiments.pdf)

<sup>19</sup> Ibid.

<sup>20</sup> National Institute of Standards and Technology, *NIST Fire Data Summit*, May 2011, [http://www.nist.gov/customcf/get\\_pdf.cfm?pub\\_id=908244](http://www.nist.gov/customcf/get_pdf.cfm?pub_id=908244)

<sup>21</sup> N-FORS, "National Fire Operations Reporting System."

## **B. DOCUMENT REVIEW**

The following is a summary of the documents pertinent to this thesis research.

### **1. America Burning**

The *America Burning* report presented by the National Commission on Fire Prevention and Control positioned the problem of fire in society as a public health crisis.<sup>22</sup> A sentinel document in the fire service, this report cited the toll that fire causes in the community from injuries to death, property damage, and cost associated with the incident. In addition, this report cites the need for the federal government to assist the local communities with technical and educational resources.<sup>23</sup> These technical resources include assets to collect and analyze fire data.

National Commission on Fire Prevention and Control made recommendations in this report to a number of bodies. These included the American public, the president, Congress, state and local governments, industries, professional organizations, and agencies of the federal government. It also outlined important tasks for the proposed United States Fire Administration. These tasks included developing a comprehensive national fire data system that will help establish priorities for research and action. In addition, it was to monitor fire research in both the government and private sectors to assist the exchange of information and to encourage research and areas that have been neglected.

The *America Burning* report makes specific emphasis to the need for fire data. The authoring commission noted one other function of the proposed USFA, which deserves special emphasis; it was to help place solutions to the fire problem on a firm foundation of scientific data. Moreover, the commission recommended that the national fire data system be established to provide a continuing review and analysis of the entire fire problem. In addition to filling in current gaps and understanding of the fire problem,

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<sup>22</sup> Ibid.

<sup>23</sup> National Commission on Fire Prevention and Control, *America Burning Report* (Washington, DC: National Commission on Fire Prevention and Control, 1972), x.

this system could insure against duplication of efforts by data gatherers in both the public and private sectors.

Since the proposed USFA could not perform functions effectively without adequate data, it is logical to house the responsibility for administering the national fire data system within the fire administration.<sup>24</sup> The commission with this designation provides a foundation for the national fire service data resources.

With the fire data structure in place, the commission report continues to describe in detail the various components of fire operations citing the requirements for each to seek improvement. In Chapter 5, Fire Service Personnel, the report states, “common sense tells us that once a destructive fire is begun the effectiveness of the fire department reducing life and property losses depends on how soon fire fighters arrived at the scene and what they and their equipment do after they arrive.”<sup>25</sup> This observation is a true statement and guides the efforts of research conducted in the fire service today.

A final recommendation for the report states, “Federal assistance and support of state and local fire service programs should be limited to those jurisdictions complying with the national fire data system reporting requirements.”<sup>26</sup> The link between data and funding is important for the reader to digest as part of the thesis process in the policy options analysis presented in Chapter V.

*America Burning* was sentinel report for the United States Fire Service. The observation and recommendations made by the commission set the regulation in place that determine the allocation of resource for the fire service data process. As the reader builds the information in the fire data process, the identification of the policy areas to initiate change is essential to explain the complexity of the problem and create effective, efficient solutions.

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<sup>24</sup> Ibid., x.

<sup>25</sup> Ibid., 33.

<sup>26</sup> Ibid., 141.

## **2. Public Law 93-498 the Fire Prevention and Control Act of 1974**

Public Law (P.L.) 93-498 is a result of the National Commission on Fire Prevention and Control, established pursuant to Public Law 90-259 to undertake an exhaustive and comprehensive examination of nation's fire problem. P.L. 93-498 §2, Paragraph 7, addresses the scarcity of data and information. In addition, this regulation provides the reader with a structured view of how the federal government created policy to assign the correct resources to address the fire problem. P.L. 93-498 empowers the political leaders to establish a framework to address the fire problem and create policy with strategy and distribution of funds to take steps to improve the problem on a federal, state, and local levels.

The regulation established of the United States Fire Administration (USAF) as a first step in a series of high-level actions designated to understand the fire problem.<sup>27</sup> Subsequent actions created a substantial assembly of departments within the USFA to support this mission. As part of the USFA, the National Fire Data Center was created under §9 and assigned a set of objectives to support the fire service.

In specific, the FPCA, §9 A addresses the National Fire Data Center (NFDC) and cites the general provisions of the center moving systematically in four sections to describe the need for data, methods to complete that need, and responsibilities to report that data. This provides the reader with a logic method to track the current data process at the national level. The regulation stated in terms of goals and objectives provides the reader with the insight to gain additional understating of connection required to collect fire data, analyze the information, and compile a report.

## **3. National Fire Incident Reporting System**

The USFA received authority in P.L. 93-498, §9 to create the National Fire Data Center (NFDC), which is tasked with goals and objectives responsible for collecting, analyzing, and reporting the cause of fire, origin within a structure, and spread of the fire from materials within a structure. To address the tasks assigned to the NFDC for the

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<sup>27</sup> National Commission on Fire Prevention and Control, *America Burning Report*, x.

selection, analysis, publication, and dissemination of information related to the prevention, occurrence, control, and results of the fires of all types. These responsibilities required the construction of a data system to document these actions.

The National Fire Incident Reporting System is the authorized fire service product to complete these functions. In the scheme of information collection, a corresponding set of documents were developed in conjunction with terms and definitions in place from the previous work of Nation Fire Protection Association Standard 901, Standard Classification for Incident Reporting and Fire Protection Data. These documents constitute the package of instructions for the United States Fire Service for all structure fire incidents. Each of the 11 modules provides the student additional information on the data components required to document specific incident types. It is important for the reader to recognize the comprehensiveness of the process and the burden placed on firefighter personnel to shift large amounts of text to define and categorize the subtle elements of a fire.

This thesis reviews the National Fire Incident Reporting Tools.<sup>28</sup> This documentation system is the national model for collecting the fire elements that directly state the origin of the fire, cause of ignition and flame spread. NFIRS data system updates were completed in 1980 and 1990 with the addition of several modules to build the understanding of the fire problem in the United States. Early in 2000, NFIRS funding was significantly reduced for software update that caused the process of system updates to retreat to only a select group of elements.<sup>29</sup>

The NFIRS program continued as the primary source of fire service organizations that voluntarily selected to submit data to the state fire marshal office for batching and submission into a separate national database. The NFIRS database is the largest collection of fire service data, retaining more than 22 million records. Buried in those records are millions of threads of information about the structure fire incidents that are

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<sup>28</sup> United States Fire Administration, *National Fire Incident Reporting System, Common Reference Guide* (Washington, DC: Federal Emergency Management Agency, 2013), [http://www.dps.state.ia.us/fm/main/pdf/NFIRS/2013/US%20Fire%20Admin%20Trng%20Resources/NFIRS\\_Complete\\_Reference\\_Guide\\_2013.pdf](http://www.dps.state.ia.us/fm/main/pdf/NFIRS/2013/US%20Fire%20Admin%20Trng%20Resources/NFIRS_Complete_Reference_Guide_2013.pdf), i.

<sup>29</sup> United States Fire Administration, *Common Reference Guide*, 16.

sitting idle with few links to connect the elements into a comprehensive statement of fire service value. The transition between lots of data and data that assists in solving local issues to reduce firefighter and civilian injuries, death, and property loss is the focus. Section of the correct sequence of questions and searching the data is a step in the right direction. This thesis builds those questions in Chapter III.

The strengths of the NFIRS process come from the historical basis of the creation of the process. Based on other fire descriptive terms, the process to identify the cause of fire, origin of fire, and spread of fire provides a solid history to address the fire problem. The NFIRS tool is a simple process knit together to capture the most critical pieces of the fire incident, and it delivers information on a national basis. Today, the tool is viewed as a national model, not from the methods process, but from the comprehensive application of the tool across the nation.

The NFIRS data set is a counting system that provides common terms in the fire service. Those data points contribute to a report to show the number of incident responds or number of fires in a jurisdiction. It is important for the data process and demand require expansion of the data set to meet the needs of real-time analysis to allocate the correct resources for communities. The current methods used in the NFIRS system do not allow the expansion of the current data methods to include outcome terms.

#### **4. National Fire Protection Association**

The National Fire Protection Association (NFPA) develops codes, standards, recommended practices, and guides are through a consensus standards development process approved by the American National Standards Institute. This process brings together members representing varied viewpoints and interests to achieve consensus on fire and other safety issues. While the NFPA administers the process and establishes rules to promote fairness in the development of consensus, it does not independently test, evaluate, or verify the accuracy of any information or the soundness of any judgments contained in NFPA documents.<sup>30</sup>

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<sup>30</sup> National Fire Protection Association, *NFPA 901, Standard Classification for Incident Reporting and Fire Protection Data* (Quincy, MA: National Fire Protection Association, 2011), 901–1.

The NFPA effectiveness for the fire service data definition process has a long history. The common problem, which created the National Fire Protection Association, reflects the data problem of today. Boston pipe fitters had many different types of threads that were used to connected fire suppression pipes. Members recognized that this construction method caused problems from community to community, and they subscribed to develop a common pipe thread standard.

In the fire service today, the data definition base is spread among more than 10 different sources with no single source as the dominant force within the industry. No national data base regulation guides a national fire service framework for a single source for industry definitions. This open gap is problematic as the fire service matures in sophistication of tactics, techniques, and procedures.

NFPA does provide the framework in each of the documents for the fire service to expand the foundation of scope into a robust and comprehensive set of regulations. In the fire data process, NFPA 901 describes the fire incident elements, terms, and definitions. It is important to note that this as a solid source in that many other information terms and definitions are built form this platform. The NFPA 901 standard provides the basis for some of the data elements contained in NFIRS but does not describe the current terms examined in this policy analysis focused on availability, capability, and operational effectiveness.

The author reviewed all of the additional NFPA documents that focus on fire incident documentation for the key terms (NFPA 901, 902, 903, or 906).<sup>31</sup> No terms or elements were identified that describe the availability of resources ready and able to respond, capability of resources to manage the incident, or operational effectiveness of the units deployed. It is important to note the absence of terms to describe the current needs of the fire service in the set of National Fire Protection Association documents. This

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<sup>31</sup> National Fire Protection Association, *NFPA 902, Fire Reporting Filed Incident Guide* (Quincy, MA: National Fire Protection Association, 1997); National Fire Protection Association, *NFPA 903, Fire Reporting Property Survey Guide* (Quincy, MA: National Fire Protection Association, 1996); National Fire Protection Association, *NFPA 904, Fire Incident Follow-up Reporting Guide* (Emmitsburg, MD: National Fire Protection Association, 1996); National Fire Protection Association, *NFPA 906, Guide for Fire Incident Field Notes* (Emmitsburg, MD: National Fire Protection Association, 1998).

provides the basis for development in the background section of the thesis, which expands on the required insight necessary to select the correct terms.

In reviewing the data, elements for the policy question on availability, capability, and outcome NFPA 901, 902, 903, 904, 906, 951, and 1401<sup>32</sup> were examined to locate any terms or like terms that connect with those terms. This is an important step in the policy analysis to search for the element components that may explain the links and relationships of words in other documents that contribute to their value, in terms of the problem.

No other links were observed or patterns detected that link terms of availability, capability, or outcome in the search of the NFPA documents. Searching the documents for the policy terms required a review of the standard officer knowledge, skills, and performance section of multiple documents. The search criteria were used to identify any elements that may connect the supervision assembly of knowledge into a document that provides insight into collecting information on the problem space. After an extensive, line-by-line search of *NFPA 1001 Standard Firefighter Professional Qualifications and NFPA Standard Fire Officer Qualifications* no links, patterns, or relationships exist to demonstrate any reference to the key words or relational pattern to the combination of terms to identify these terms into analysis<sup>33</sup>.

Similar analysis of the key terms was completed from the community lens focused on what services are provide to the community by fire service standard. NFPA 1561,<sup>34</sup> 1670,<sup>35</sup> 1201,<sup>36</sup> 450,<sup>37</sup> and 1901<sup>38</sup> assemble the foundation for fire services and

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<sup>32</sup> National Fire Protection Association, *NFPA 1021, Standard for Fire Officer Professional Qualifications* (Emmitsburg, MD: National Fire Protection Association, 2014).

<sup>33</sup> National Fire Protection Association, *NFPA 1001 Standard for Firefighter Professional Qualifications* (Quincy, MA: National Fire Protection Association, 2013).

<sup>34</sup> National Fire Protection Association, *NFPA 1561, Standard on Emergency Services Incident Management System Command Safety* (Emmitsburg, MD: National Fire Protection Association, 2014).

<sup>35</sup> National Fire Protection Association, *NFPA 1670, Standard on Operations and Training for Technical Search and Rescue Incidents* (Emmitsburg, MD: National Fire Protection Association, 2009).

<sup>36</sup> National Fire Protection Association, *NFPA 1201, Standard for Providing Fire and Emergency Medical Services to the Public* (Emmitsburg, MD: National Fire Protection Association, 2010).

<sup>37</sup> National Fire Protection Association, *NFPA 450, Guide for Emergency Medical Services Systems* (Emmitsburg, MD: National Fire Protection Association, 2013).

vehicular resources required to respond to a structure fire incident. These NFPA document convey the framework for fire rescue services to a community in a linear method from dispatch to recovery efforts of fire departments but lack any reference or clarity to the terms described in the policy analysis focus.

With research from the National Institutes of Standards and Technology conducted in the Firefighter Safety and Deployment Studies, data that describe the operation fire ground activities were identified as missing. Working with the fire service, a research process was established and completed at the National Fire Data Summit.<sup>39</sup>

Research from the National Fire Data Summit identifies the need for a new set of terms to explain the allocation of resources required to combat the structure fire problem. This gap in outcome terms as identified in this thesis reinforces the need for documentation of the availability of resources that are able and ready to respond, capability of those resources allocated to manage the event, and state operational effectiveness.

The NIST firefighter safety and deployment documents comprise this section of the literature review. These documents describe the technical assessment of firefighting tasks critical to the sequence of actions required to suppress a structure fire. Funded in a multiyear study from the Department of Homeland Security, the documents set in a frank manner the current state of fire operation data recorded.<sup>40</sup> The NIST firefighter safety and deployment reports provide a statement for the correct number of firefighter personnel to accomplish the critical tasks to manage a structure fire.<sup>41</sup> In addition, the report provides a statement linking the critical tasks for structure fire management into a logical model.

This stream of tasks links the phases of the response together, which develops a set of relationships among the responding resources to coordinate the fire attack and manage the structure fire incident. The effectiveness of fire departments to demonstrate

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<sup>38</sup> National Fire Protection Association, *NFPA 1901, Standard for Automotive Fire Apparatus* (Emmitsburg, MD: National Fire Protection Association, 2009).

<sup>39</sup> National Institute of Standards and Technology, *NIST Fire Data Summit*.

<sup>40</sup> National Institute of Standards and Technology, *Report on Residential Fireground Field*.

<sup>41</sup> Ibid.

available resources that are ready and able to respond, linked with capabilities that match the resources to the incident type, produces operational effectiveness.

Operational effectiveness is a statement that the resources matched the incident type and that the deployed resources were able manage the event. This is important for the reader to acknowledge the terms of availability, capability, and operational effectiveness are terms needed to accurately describe the resources allocated to manage a structure fire incident. These terms build the elements of data measures produced in the National Fire Operations Reporting System software focused to assign the correct resource to reduce firefighter and civilian injury, death, and property loss.

## **5. The National Fire Operations Reporting System**

The National Fire Operations Reporting System is performance improvement software for fire ground operations.<sup>42</sup> The goal of the national fire operations reporting system is to improve firefighter safety. Local fire departments, using N-FORS software, can assess the impact of their response availability, capability, and operational effectiveness on the outcome of a structure fire event. For this project, an optimal outcome minimizes the risk of firefighter and civilian injury, death, and property loss.

The National Fire Operations Reporting System software will allow local fire departments to easily document how they prepare and manage structure fire events. Customized N-FORS reports will be available immediately, which can encourage benchmarking and promoting best practices between local fire departments and across the fire service. In addition, the National Fire Operations Reporting Software is built with the configuration module. This module gathers a significant amount of demographic information about the community in which the fire department serves. These are attributes that allow a fire department to develop a community vulnerability model that describes the resources ready and able to respond to a structure fire incident.

The event side of the software documents the key operational components that describe the capability of the firefighters and resources to perform fire ground operations

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<sup>42</sup> N-FORS, “National Fire Operations Reporting System.”

at the scene to manage the incident. The software also includes health and wellness records to track firefighter events, civilian injuries, and rehabilitation process. Equipped with business analytics, the software can produce operationally effective real-time reports with strong visuals to allow the explanation of the complex details required to allocate the correct resource to a structure fire incident.<sup>43</sup> This combination of terms availability, capability, and operational effectiveness empower the local fire service and political leaders with the knowledge to develop policy that allocates the correct resources to address the fire problem in the community.

### **C. CONCLUSION**

The reader is provided with a literature review that contains historical documents, national standards, practices and emerging solutions to address the complex issue of assigning resources to the structure fire incident. Providing the reader the background from the America Burning document establishes the federal government's observations, findings, and specific recommendations to address the problem of fire. By developing policy to assign those resources, the Fire Preventions and Control Act of 1974 develops the United States Fire Administration and the sub parts to support the mission. The National Fire Data Center developed the National Fire Incident Reporting System, which is a voluntary process to collect fire incident data to characterize the problem of fire in the United States.

Working with the National Fire Protection Association to adopt previous fire incident terms and definitions, the NFIRS system reference text replicated some of the previous work. The education process for the firefighter to learn the NFIRS documentation process was built into a modular format for self-paced learning. The NFIRS terms describe the ignition of the fire, cause of the fire, and spread of flames inside the structure.

As research funds expanded the National Institutes of Standards and Technology launched a series studies to explore the complexities of fire ground operations. The firefighter safety and deployment studies identified the critical tasks firefighters are

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<sup>43</sup> Ibid.

required to perform on the fire ground. One of the critical findings from this work is the gap in terms to describe the resources required to address a structure fire incident. Additional work continued to identify these areas at the National Fire Data Summit. Gathering fire industry experts, this platform launched a research program to investigate and address these fire service data concerns.

The National Fire Operations Reporting System moved to develop the terms availability of resources ready and able to respond, capability of fire resources to manage the scene and operational effectiveness. Through the development of a performance improvement software, fire service and political leaders are equipped with the tools to develop policy to allocate the correct resources to address the problem of structure fire in the community. With the correct policy, a community will experience a reduction in firefighter and civilian injury, death, and property loss.

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### III. BACKGROUND

The background for this thesis is set up into three separate sections exploring the national fire service data process. The reader receives a focused review of the national documents, standards, and research to assemble a working knowledge of these components. Equipped with this insight the reader can identify the process that deliver straight line data output. This allows the reader to build on observations of process in the data terms, definition, and process that are gaps. Working these gaps with new information the reader can question the process to understand and gather information for solutions.

The first section is the description of the National Fire Protection Association (NFPA) *Standard 901 Standard Classifications for Incident Reporting in Fire Protection Data*.<sup>44</sup> The second section is the National Fire Information Reporting System (NFIRS) that reviews the historical background of fire data process.<sup>45</sup> To better understand the fire service data gap a review from the *Firefighter Safety and Deployment Study*, National Fire Service Data Summit proceedings are summarized to state the need for data elements to quantify new terms. These terms are the availability of resources that are ready and able to respond to a structure fire incident, the capability of those resources to manage the structure fire incident, and the operational effectiveness. The operational effectiveness is the combination of availability and capability to state the degree to which the resources deployed matched the incident type and managed the event. This defines the level of risk that a community calculates.<sup>46</sup>

#### A. NATIONAL FIRE PROTECTION ASSOCIATION

The National Fire Protection Association was the first agency to define fire terms and definitions. Based on work for the early 1890s, the NFPA established a solid presence to define terms. In 1938, the International City Manager's Association

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<sup>44</sup> National Fire Protection Association, *NFPA 901*, -1

<sup>45</sup> United States Fire Administration, *National Fire Incident Reporting System*, i.

<sup>46</sup> National Institute of Standards and Technology, *Report on Residential Fireground Field*.

published a fire reporting system prepared by NFPA. This system served as a start toward the uniform reporting of fire incident information.

In 1951, the NFPA Committee on Fire Casualty Statistics was formed. The report of that committee was adopted as NFPA 3 in May 1953. In its introduction, that states, “The absence of accurate and detailed statistics on fire casualties has hindered attempts by educational and other means to reduce the number of deaths and injuries from fire.”<sup>47</sup> In 1961, the NFPA Board of Directors, after two years of surveying the need, called a national conference on fire reporting. On the recommendation of that conference, an NFPA committee was formed in February 1963 to devise a uniform and useful system of fire reporting adaptable to the needs of the fire service in the United States and Canada. From 1963 to 1969, the committee strived to develop a uniform language for fire defense management and issued tentative documents as work progressed.

In 1969, the five tentative documents were combined and officially adopted as the first edition of NFPA 901. The document was updated in 1971 with minor revisions. With the 1973 edition, data elements were added to report mobile property and details of fire casualties (deaths and injuries). By the time the 1976 edition was released, the committee was getting feedback from persons using the data elements in reporting systems and was able to effect modifications improve the understanding of the data elements. Data elements were also added to report structural fire defenses and their performance at the time of an incident.

In 1981, data elements were added to enhance the reporting of wildland fires, fire fighter casualties, and pre-hospital medical care administered. Five years later, the 1986 edition introduced data elements for reporting hazardous material. These were expanded to a comprehensive set of hazardous materials data elements in the 1991 edition. Then the 1995 edition reorganized the document editorially to better group the data elements as they relate to each other. The new editions included a discussion of how the data elements intended to be used, and classifications within some of the data elements were revised to reflect changing needs when capturing or using data.

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<sup>47</sup> National Fire Protection Association, *NFPA 901*, 1.

The 2001 edition added several new data elements and extensively revised others based on a detailed analysis by the United States Fire Administration and the National Fire Information Council on the way that data is collected and used by fire departments. Some of the changes split data elements so that a data element focuses on a single question or issue rather than mixing multiple issues in the same data element as had sometimes been done in the past. The changed technology available for data captures and storage no longer places limitations on record size and data manipulation that have sometimes been obstacles in the past.

The 2006 edition was revised to comply with the manual of style for NFPA Technical Committee documents. Various sections were updated editorially for clarification. The 2011 edition is a reconfirmation of the 2006 edition. There were no substantive edits or changes made to the document.<sup>48</sup>

The gap provided by the NFPA 901 regulation and follow up regulations for fire incident documentation (NFPA 902, 903, 904, and 906) do not address the terms and definition for availability of resources that are ready and able to go to the scene of a structure fire incident or the capability of those resources when they arrive on the scene to manage the fire, and measure an operational effectiveness.<sup>49</sup>

## **B. THE NATIONAL FIRE INCIDENT REPORTING SYSTEM**

The National Fire Incident Reporting System is the basis for the entire fire ground incident reporting in the United States. The description of the history of the development of this fire incident documentation process provides the reader with insight into the policy application delivered by the federal government to address the fire issue. With new insight into the pillars of the fire data process, readers are better prepared to address the gaps in service, describe questions about fire data to gain clarity, and to formulate alternatives.

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<sup>48</sup> National Fire Protection Association, *NFPA 901*, 1.

<sup>49</sup> *Ibid.*, 901–1.

In 1973, the National Commission on Fire Prevention and Control published the report titled *America Burning*. This report stated the facts about the fire problem in the United States, demonstrating the impact that fire had in injury, death, and property loss. A direct result of that sentinel report was the creation of the Federal Fire Prevention and Control Act, Public Law 93-498, passed October 29, 1974.<sup>50</sup> The Fire Prevention and Control Act created the United States Fire Administration nested under the Federal Emergency Management Agency. As recognized in the Federal Fire Prevention and Control Act of 1974, the collection of data from fire incident scenes across the United States needed a centralized agency to set standards, established training, and provide process for the fire incident information.<sup>51</sup>

The United States Fire Administration created the National Fire Data Center (NFDC) and assigned objectives to the center to develop tools that would document fire incidents.<sup>52</sup> The NFDC drilled into the organization to create the National Fire Information Council (NFIC) to manage components of fire data and provide a subcommittee for focus of report information and special studies to address the needs of the fire service.<sup>53</sup>

Using current terms and definitions from the NFPA Standard 901, the NFDC created the National Fire Incident Reporting System (NFIRS) and the fire incident data information collection process. NFIRS is a voluntary fire information process that fire departments can enter into and out of at any time. The entire documentation library is contained in 11 modules. Each of these modules describes a particular sequence of a fire incident starting from basic information provided by each fire department and working its way forward to allow the fire incident commander, individual unit, or member to document a fire incident.

The NFIRS *Complete Reference Guide* is a companion manual that provides personnel a step-by-step method to document the information presented at a fire incident

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<sup>50</sup> National Commission on Fire Prevention and Control, *America Burning Report*.

<sup>51</sup> Federal Fire Prevention and Control Act, §9.

<sup>52</sup> *Ibid.*, §9 (c).

<sup>53</sup> *Ibid.*, §9.

scene. This 500-page document is a comprehensive describe the fire elements in depth. A numeric assignment is linked to each descriptive component and to provide focused detail so the author can complete a report.

NFIRS is designed to help state and local governments develop the local fire departments ability collect fire data, sort this data into meaningful categories, analyze that data for trends or other special study needs, package that information, and distribute the information in reports. These reports contain a wide array of data and observation about a fire service that requires a fire service leader to translate the data for local application. The NFIRS data terms and definitions are from the National Fire Protection Association *Standard 901 Standard Classification for Incident Reporting and Fire Protection Data*.

### **C. NFIRS SOFTWARE AND THE GAP**

Currently, the NFIRS computer software version is 5.0; this version was released in January 1999 and has received minor upgrades during the last 16 years. This version of software includes data elements to document the fire origin, cause, and spread within a structure. This type of software reporting does not include the terms or definitions to describe the availability of fire department resources that are ready and able to respond to a structure fire incident, the capability of those resources once they arrive on the scene to manager the structure fire, or the operational effectiveness achieved by the combination of availability and capabilities resources.

The operational effectiveness is gathered from the availability and capability. Operational effectiveness refers to the resources deployed match the incident type and if those resources were able manage the event states the deployed resource match to the incident type and ability to manage the events. The assignment of risk allows local communities to describe the threat in strategic terms, allocating resources to combat the fire problem in the community reducing firefighter, and civilian injury death, and property loss.

## **D. NFIRS PROCESS**

Within the fire service, participating local fire departments complete a basic report after each incident as required. This requirement for entry into a national database is problematic because NFIRS is a voluntary system. No consequences are rendered against a fire department for not participation in fire incident data collection on a national level.

However, if the fire departments wish to qualify for grant funds for a variety of staffing features, fire department station enhancements, or firefighting equipment additions, they must submit fire incident data to the national fire information reporting system in order to qualify for the Assistance to Firefighters Grant funds. These funds are distributed to the fire service in federal grants and distributed to states to achieve enhancements in the local fire service.

Once the records are completed, those documents are sent to state wide aggregating data agency, usually the state fire marshal or another office located within the state bureaucracy. The fire data is then forwarded to the United States Fire Administration at a convenient time for the agency charged with data storage and transfer. NFIRS does not have a reporting time schedule and currently the burden of checking the fire data is placed at the local fire department level.

It is important to acknowledge this gap in the transfer of data in a timely fashion and understand this gap in data processing for analysis is subject to major flaws. These include incomplete data, incorrect data entry, and missing data.

For more than a decade, fire department data gathered in NFIRS process has been static with few changes. This is not the fault of anyone agency or system, it is an attribute of the fire service and the lack of attention to the power of numbers in the ability to claim a value in strategy of resource assignment, calculation of efficiency or statement of sustained needs.

In an effort to better understand the complex components of the fire service, and in specific the structure fire incidents, grant dollars were given to the Firefighter Safety and Deployment Program. This multiphase study searched the tasks associated with

structure fire incidents, emergency medical services incidents, and high rise fires to identify the critical components required for leaders to have the information to view these dynamic, complex, and dangerous environments. One of those grants was specifically point at structure fire incident data.<sup>54</sup>

#### **E. FIREFIGHTER SAFETY AND DEPLOYMENT STUDY, NATIONAL FIRE SERVICE DATA SUMMIT**

Many fire departments across the nation are challenged by budget crises, rising call volume, personnel and equipment shortages, security issues, and the overall expectation to do more with less. Effectively managing these challenges requires a basic understanding of how changes in resource allocation affect community outcomes. Specifically, it is imperative that fire department leaders, as well as political decision makers, know how fire department resource allocation in their local community affects community outcomes in three important areas: firefighter and civilian injury, death, and property loss.

However, even with recent technological advances and substantial fire department efforts in data collection, the fire service is not yet able to scientifically quantify incidents to determine the relative effectiveness of different deployment decisions, including: type of emergency event, staffing level, crew size, asset configurations, response time frames, frequency and manner of personnel training, and fire prevention programs. A technical basis must be developed to gather data that enables leaders to match resource allocation and resources deployed to the risks in the community. Data gathered must be easily accessible, shared, and must follow necessary policy mandates.

#### **F. OBSTACLES TO GAINING AND STANDARDIZING FIRE SERVICE DATA**

The National Fire Incident Reporting System (NFIRS) was created after the *America Burning Report* in the 1970s to characterize the incidence of fire in the United States. While limited fire service response information is collected, the primary purpose is to characterize the primary attributes of the fire incident, cause of the fire, spread of the

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<sup>54</sup> National Institute of Standards and Technology, *Report on Residential Fireground Field*.

fire and origin of the fire. Each individual fire department collects incident response information for its own internal use and generally issues an annual report.

### **1. Vendor and Fire Record Systems**

There are 105 software vendors that support the NFIRS.<sup>55</sup> Each vendor and each fire department can customize data script to customize reports for local use. This practice does not allow for the aggregation of data between fire departments and prevents any development of best practices or benchmarking.

### **2. Report Quality**

There is lack of adequate attention to data quality. Fire service data entry systems have multiple data entry points, generally lack consistent and critical lack oversight, and have limited use at the local level.<sup>56</sup>

## **G. CONCLUSION**

Documents from the National Fire Protection Association (NFPA), the National Fire Incident Reporting System (NFIRS), and the National Institutes of Standards and Technology (NIST) Firefighter Data Summit allow leaders to understand the fire data process terms and definitions. By linking one system to the next, the reader develops the insight and is able to apply the common practices fire data process. These common practices deliver data output that must be evaluated against the needs of community. Developing the working knowledge of these systems provides the reader insight to the problems in the current data terms definitions and process. The problem section in this chapter states specific issues in software, process, and quality assurance that limit the accuracy of the fire service data reports. Linking that observation into the NIST research aligns the reader into the analysis of data process. Building this focus on the problem creates a space for planning, including the new terms of availability, capability, and operational effectiveness.

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<sup>55</sup> United States Fire Administration, *Common Reference Guide*, i.

<sup>56</sup> National Institute of Standards and Technology, *Report on Residential Fireground Field*, 20.

This action facilitates designing solutions that best designate and assign current resources structure fire incident. With firm solutions leaders can craft policy that reduces firefighter and civilian injuries, death, and property loss placing correct focus on efficient use of resources to address for the complexities of structure fire incidents.

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## IV. POLICY OPTIONS ANALYSIS

The goal of the policy options analysis method is to identify a policy that is not workable and provide two or more alternatives to solve the problem.<sup>57</sup> The objectives of the policy analysis option are to consider the alternatives, develop a measurement matrix, and determine the best alternative.

This review is comprehensive for the fire service data process regulation, standards, and guideline practices for structure fire incidents. These documents may not be all encompassing and other research or documents may be available that the author did not identify.

Alternate views were considered in this policy options analysis. At this time, the political factors to make change in the fire service data policy are not technically capable to make these changes. Current software security measures prohibit the ability of manipulation of the data terms and definitions or process to accept or push out data product to other systems.<sup>58</sup>

### A. DOCUMENTS REVIEWED

The method used to review the policies for the fire service data process is a chronological path following the sentinel documents that link together over several decades. The National Fire Prevention and Control Act passed in October 1974 as a result of the *America Burning Report*.<sup>59</sup> This policy options analysis seeks to review the documents linked to the Federal Fire Prevention and Control Act to assess the elements, terms, and guidelines that define the fire service data process.

From those data elements, additional analysis will identify the critical terms that describe the operational effectiveness of resources deployed to structure fire incidents.

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<sup>57</sup> Paul M. Pitman, "Policy Analysis and Policy Options Analysis, Research Methods, Part II: Policy Options Analysis," course handout for NS4081, Naval Postgraduate School.

<sup>58</sup> United States Fire Administration, administrator, and technical director, personal interview/correspondence, October 2, 2014.

<sup>59</sup> National Commission on Fire Prevention and Control, *America Burning Report*, 167.

That action will provide additional insight into the complexity of the structure fire incident. With additional knowledge and armed with policy options to address these gaps, fire service and political leaders will develop solutions that allocate the correct resources reducing the firefighter and civilian injuries, death, and property loss.

The documents selected for review build a history of the fire service data process. One of these is a sentinel report identifying the fire problem in America and that data is required to understand the magnitude. Federal regulations establishing the United States Fire Administration and sections to support the fire service data collection process and include national industry standards that describe structure fire definitions. Finally, components and software that connect the manipulation of resource allocation to structure fire incident outcome. These documents are:

- The report published from the National Commission on Fire Prevention and Control, *America Burning*.<sup>60</sup>
- The National Fire Prevention and Control Act of 1974 Public Law 93-498.<sup>61</sup>
- The National Fire Protection Association Standard 901, Standard Classifications for Incident Reporting and Fire Protection Data, 2011 edition and all associated NFPA standards that clarify the elements and terms.<sup>62</sup>
- The National Fire Incident Reporting System, *Complete Reference Guide*, published January 2013, all other modules that clarify the elements and terms.<sup>63</sup>
- The National Institutes of Standards and Technology, Technical Report 1698, National Fire Service Data Summit, May 2011, and all other studies that clarify the elements and terms.
- Report from the National Fire Operations Reporting System project.<sup>64</sup>

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<sup>60</sup> Ibid.

<sup>61</sup> Federal Fire Prevention and Control Act, §9.

<sup>62</sup> National Fire Protection Association, *NFPA 901*, 901–1.

<sup>63</sup> United States Fire Administration *National Fire Incident Reporting System 5.0*.

<sup>64</sup> N-FORS, “National Fire Operations Reporting System.”

## **1. America Burning Report**

*America Burning* is sentinel document that stated the impact of fire on the nation. The National Commission on Fire Prevention and Control Appointed by President Johnson delivered the report with a frank statement about the devastating impact fire had on the nation. Statistics outlined to the America public the significant gaps in training, education, and resources required to address this crisis.<sup>65</sup> Additionally, this report described the devastation that fire brings to a community and provided 90 recommendations to improve the fire service. Based on a strong federal to local approach, the report provides a focus on the fire problem and policy to address the gaps.<sup>66</sup>

## **2. Fire Prevention and Control Act of 1974**

Fire Prevention and Control Act was passed in October 1974. This regulation created the National Fire Prevention and Control Administration assigned into the Department of Commerce. This agency was renamed as the United States Fire Administration in 1978.<sup>67</sup> The Fire Prevention and Control Act of 1974 has 34 sections that provide structure, goals, and objectives for the United States Fire Administration. Of specific interest for this thesis is §9, the National Fire Data Center (NFDC).<sup>68</sup> The NFDC is assigned the selection, analysis, publication, and dissemination of information related to the prevention, occurrence, control, and results of fires of all type.

The objectives of the NFDC are to gather and analyze information on the frequency, causes, and spread of fire. Additionally, the NFDC is to gather information on the number of injuries and deaths resulting from fires including the maximum available information on the specific causes and nature of such injuries and deaths and information on property loss. In an effort to complete this task, the National Fire Incident Reporting System (NFIRS) was designed.<sup>69</sup>

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<sup>65</sup> National Commission on Fire Prevention and Control, *America Burning Report*.

<sup>66</sup> *Ibid.*, 167.

<sup>67</sup> *Ibid.*, 164.

<sup>68</sup> Federal Fire Prevention and Control Act, §9, 12.

<sup>69</sup> *Ibid.*, 13.

### **3. The National Fire Incident Reporting System**

NFIRS is a reporting standard that fire departments use for uniform reporting on the full range of their activities from firefighting incidents to emergency medical services equipment involved in response. It is a voluntary system for submission of fire data on incidents. The structured documentation is composed of 11 modules—each unique to the firefighting incidents focused at the origin of a fire, cause of the fire, and direct flame spread within the structure.<sup>70</sup>

NFIRS is the largest database collecting national and annual information on 75 percent of the fires that occur in the United States. Every state and the District of Columbia report some fire incident information into the NFIRS database. Nationally, about 23,000 departments report into the national fire information database each year, and the participating fire departments report about 22 million incidents and one million fires each year.<sup>71</sup> Information from fire departments from the Department of Defense and the Native American Tribal Authority<sup>72</sup> is also included in the NFIRS database.

### **4. The National Fire Protection Association, NFPA 901 Standard Classifications for Incident Reporting and Fire Protection Data**

The National Fire Protection Association (NFPA) produces more than 300 documents including codes, standards, recommended practices, and guidelines commonly known as NFPA documents. These documents serve as a foundation for the fire department policy and procedure development at the local level. The NFPA 901 *Standard Classifications for Incident Reporting and Fire Protection Data* is the platform by which fire incident data is defined with respect to elements, which build the terms that define the condition and determine a value.

The NFPA 901 document describes and defines data elements and classifications used by fire departments in the United States to describe fire damage potential and experience during incidents. This document has broad common language for the

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<sup>70</sup> United States Fire Administration *National Fire Incident Reporting System 5.0*.

<sup>71</sup> Ibid.

<sup>72</sup> National Fire Protection Association, *NFPA 901*, 901–1.

collection of pre-incident information such as fire defense features of the structure fire and other emergency incident data. Post-incident damage assessment is also defined as the mayor classifications for various data elements that describe fire protection and fire service information.

In addition to NFPA 901, there is a set of supporting documents that provide additional incident documentation. These documents include: *NFPA 902 Fire Reporting Field Incident Guide*, *NFPA 903 Fire Reporting Property Survey Guide*, *NFPA 904 Incident Follow-up Report Guide*, *NFPA 906 Guide for Fire Incident Field Notes*.<sup>73</sup> The NFPA 901 standard is the common language for NFIRS. The NFPA is the common language type for the national fire service creation of policy and procedure at the local. Included in that fire community is a comprehensive set of building codes and standards that direct the new construction process and existing structure for compliance to life safety code standards. This system establishes the elements that compose the terms that link to the definitions and to the value of words used to qualify structure fire incidents. These incidents are quantified in the NFPA 901 standard for encoding process within the current NFIRS.

These documents provide the local fire department a mechanism to develop policy and procedure for fire data definition construction. By using the qualifying elements to describe the structure fire incident, assembling the terms and assigning numbers to define the value for classification in the fire incident documentation process.

## **5. National Fire Service Data Summit**

This National Fire Data Summit was part of the Multiphase Study on Firefighter Safety and Deployment Project. The study team has been working for several years to develop science-based tools for the fire service in order to optimize fire service leaders' ability to match resources to risks. Incident data collection remains part of the critical path toward project success. After significant multi-year effort to collect fire and EMS incident data from a statistical sampling of fire departments across the United States, this

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<sup>73</sup> National Fire Protection Association, *NFPA 902*; National Fire Protection Association, *NFPA 903*; National Fire Protection Association, *NFPA 904*, National Fire Protection Association, *NFPA 906*.

symposium was arranged in order to not only share the project team findings with a broad stakeholder group but also document other data collection efforts, in order to identify a viable path to a national fire service data infrastructure.<sup>74</sup>

The output of that summit was the selection of key terms to describe the fire operational management. These terms define the critical elements of availability of the resources that are ready and able to respond to a structure fire incident, the capability of the deployed resources to manage the event, and operational effectiveness. Operational effectiveness is statement demonstrating the deployed resources matched the incident risk type and managed the event.

## **6. The National Fire Operations Reporting System**

The National Fire Operations Reporting System (N-FORS) is a performance improvement software tool to assist fire service and political leaders in explaining the complexities of assigning resources to the structure fire incident. Focused at the local fire department, N-FORS builds a vulnerability statement about the community from a robust set of data points. Linking those elements into an event record, N-FORS empowers fire service and local leaders with the insight to create policy to designate the correct resources to reduce firefighter and civilian injury, death, and property loss.

## **B. METHODOLOGY**

Working with the Bardach model provides a sequential method to define the problem as stated in Chapter II. Identify the background material and gather the evidence as stated in Chapter III. Chapter IV will construct the alternatives for the policy options, define the criteria for assessment and project the outcomes to implement the option. Chapter V will deliver the summary, conclusion, and decision for these options to improve the fire data analysis process outcome terms. The Bardach provides a broad view of the policy option analysis methods but requires additional reading.

This measure provides the categories to best assess the issue and state those values in categories. These categories include the following:

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<sup>74</sup> Averill et al., *National Fire Service Data Summit*.

1. Political acceptance is the climate within which leaders, organizations, and the community will tolerate change.
2. Organizational acceptance is the climate within which leaders, organizations, and the community will tolerate change.
3. Budget acceptance is the climate within which leaders, organizations, and the community will tolerate change.
4. Legal acceptance is the current laws, regulation, or policy in place.

### **C. FURTHER ANALYSIS TO DEVELOP OPTIONS**

Drilling into the policy options analysis section of the Naval Postgraduate School master's program in homeland security and defense research colloquium identifies the multi-goal policy options analysis.<sup>75</sup> This five-step method focuses the measurement matrix categories refining the solution set to variables that are qualitative, predictive, and bring value.<sup>76</sup>

Stating qualitative terms to describe the fire service data process provides valuable insight into the expectations of fire service personnel, obstacles perceived, and benefits of a robust system. Review of the National Fire Data Summit report reveals these gaps and concerns in the current collection process. The results from this process are included at the end of this chapter.

### **D. THE FIRE POLICY ALTERNATIVES**

The following scale is a nominal scale of measurement for the documents identified to state policy in the United States fire service data process terms for outcome.<sup>77</sup>

- 4 = High to contribute to the feasibility of the fire data policy option process.
- 3 = Medium to contribute to the feasibility of the fire data policy option process.
- 2 = Low to contribute to the feasibility of the fire data policy option process.
- 1 = No value to contribute to the feasibility of the fire data policy option process.

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<sup>75</sup> Pitman, "Policy Analysis and Policy Options Analysis."

<sup>76</sup> Ibid.

<sup>77</sup> Paul D. Leedy, and Jeanne, E. Ormrod, *Practical Research Planning and Design*, 8<sup>th</sup> ed. (Upper Saddle, NJ: Pearson Education, Inc., 2006), 21.

### **America Burning value = 1**

#### Political

- Provides the sentinel report for change in the fire service.
- Presidential authority to research, provide analysis, and recommendations at policy level.
- The document served the purpose as described.

#### Legal

- Does not have authority in the current fire data process environment.
- Organizational
- Established the pathway to create policy for the United States Fire Administration.
- Established the national fire problem space in the America public.

#### Budgetary

- Does not have any influence on the current budget process for fire service data process.

### **Federal Fire Prevention and Control Act P.L. 93-498 value = 3**

#### Political

- Established the policy for the fire data process.
- Is the current regulation to set the fire data process.

#### Legal

- Contains the policy language for the fire service data process.
- Contains the policy language for the United States Fire Administration.

#### Organizational

- Contains the policy language for the United States Fire Administration.
- Established the national process for the creation of the NFIRS system.

#### Budgetary

- Contains the policy language for funds the United States Fire Administration

### **National Fire Protection Agency Standard 901 value = 2**

Political

- Provides a consensus process development for the standards for data process.

Legal

- Develops the standards for the fire service process.

Organizational

- Provides leadership to the fire service in the consensus development process.

Budgetary

- Does not have any contribution to the national fire service data process budget.

**National Fire Information Reporting System value = 2**

Political

- The NFIRS process is the established program collecting.

Legal

- The NFIRS process is cited in policy to create the national data process.
- Fire departments must submit NFIRS to receive federal funds.

Organizational

- The NFIRS process does not deliver any outcome data in real time to the fire service.
- The NFIRS data does not define the outcome terms availability, capability and operational effectiveness.

Budgetary

- The NFIRS process is funded through the USFA.
- The NFIRS process does not have the financial structure to meet the needs of the U.S. fire service in outcome measures.

**National Fire Data Summit value = 2**

Political

- The National Fire Data Summit Report drive the need for the fire service data process improvement.

- The National Fire Service Data Summit unifies leaders in the fire service to request policy options for the fire data process to outcome definitions.

#### Legal

- The National Fire Data Summit influences policy assignment of resources to expand the fire service data process to include outcome measures.

#### Organizational

- The National Fire Data Summit Report provides the comprehensive and unified position on current fire service data process.

#### Budgetary

- The National Fire Data Summit Report provides support for assignment of resources in the Assistance to Firefighter Grant program.

### **National Fire Operations Reporting System value = 3**

#### Political

- The N-FORS process is a product of the National Fire Data Summit Report representing the fire service.
- The N-FORS process is the fire service data program that contains the outcome terms availability, capability and operational effectiveness.
- N-FORS represents the major fire service industry members to include private, public and all levels of government to include NFIRS USFA staff.

#### Legal

- N-FORS does not have a policy statement in the fire service data process.

#### Organizational

- N-FORS represents the major fire service industry members to include private, public and all levels of government.

#### Budgetary

- The N-FORS program software is funded by the Assistance to Firefighter Grant process evolving to a sustainability model.
- The N-FORS software is developed and free to the 30,052 fire departments in September 2015.
- The N-FORS program has budget staff to assist in the software implementation for local fire departments.

## **E. RESULTS FROM MEASURING THE POLICY OPTION ANALYSIS**

The policy options measures process evaluated the six documents identified as key documents in the research portion of this thesis. The results of that policy option analysis method identified the Fire Prevention and Control Act P.L. 93-498 and the National Fire Operations Reporting System (N-FORS) as feasible options. This measurement included a review from the political, legal, organizational and budgetary lens as described in the NPS multi-goal options analysis process.<sup>78</sup>

## **F. QUALITATIVE MEASURES FOR DETERMINING THE OUTCOME DATA POLICY**

- Burden refers the effort required to complete data entry.
- Usefulness is the inherent value of the data elements to the fire department and local communities.
- Motivation refers to commitment of the participants to produce accurate and complete reports.
- Accuracy requires that the elements be measurable and reproducible any analysis yields reliable and effective conclusions.

The National Fire Data Summit built the foundation for the fire service and political leaders to assess the current fire data policy process and request resources for outcome measures. The three-day sentinel conference included a session to identify the existing gaps and deficiencies in the data collection process. That brain storming session resulted in the qualification of terms used to describe the need for data.

As part of the NPS CHDS multi-goal policy options analysis process, a portion is dedicated to valuing the predictive impacts of policy options. This measurement section will compare the two policies identified from the nominal technique to identify the most appropriate policy option analysis.

### **1. Scoring**

The qualitative terms from the National Fire Data Summit are categorized from the summit with the top three words or phrases to measure the term.

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<sup>78</sup> Pitman, "Policy Analysis and Policy Options Analysis."

- 1. Burden**
  - a. Complete the data capture for the best information.
  - b. Ensure the data harmonized.
  - c. The data for an event/incident may come from multiple sources
- 2. Usefulness**
  - a. May not be enough local data to inform local decisions.
  - b. All fire departments consider themselves unique.
  - c. Current databases were created to document the fire problem not necessarily answer policy questions deployment issues everyday issues faced by the fire service managers.
- 3. Motivation**
  - a. Need to provide firefighters with the reasons that fire data are important.
  - b. No quality assurance process for fire reports.
  - c. Marketing strategy show people here is the information and how it will be used.
- 4. Accuracy**
  - a. Civilian and firefighter fatalities have different causation.
  - b. There is a lack of training for personnel entering data for producing reports.
  - c. There is a lack of accuracy of the data that are provided to leaders.

Scoring process:

- Y the document has qualifying terms.
- N the document does not have qualifying terms.

Table 1. PL 93-498 and N-FORS Scoring

<p><b>SCORING PROCESS</b>  <b>Y</b> the document has qualifying terms   <b>N</b> the document does not have qualifying terms</p>	<p><b>PL 93-498</b></p>	<p><b>N-FORS</b></p>
<p><b>Burden</b>                       Complete the data capture fore the best information                       Ensure the data harmonized                       The data for an event/incident may come from multiple sources</p>	<p>Y                       N                       Y</p>	<p>Y                       Y                       Y</p>
<p><b>Usefulness</b>                       May not be enough local data to inform local decisions.                       All fire departments consider themselves unique.                       Current databases were created to document the fire problem not necessarily answer policy questions deployment issues everyday issues faced by fire service managers.</p>	<p>Y                       Y                       N</p>	<p>Y                       Y                       Y</p>
<p><b>Motivation</b>                       Need to provide firefighters with the reasons that fire data are important.                       Quality assurance process for fire reports</p>	<p>Y                       N</p>	<p>Y                       Y</p>

Marketing strategy show people here is the information and how it will be used.	Y	Y
<b>Accuracy</b>		
Civilian and firefighter fatalities have different causation.	Y	Y
There is a lack of training for personnel entering data for producing reports.	Y	N
There is a lack of accuracy of the data that are provided to leaders.	Y	Y

## 2. Results

The results for the qualifying measure of burden, usefulness, motivation, and accuracy indicate both policies demonstrate value that must be described in the policy option analysis plan of action. PL 93-498 as stated in the fire policy alternatives section provides strength in the components of organizational structure and legal statement. The N-FORS as stated in the fire policy alternatives demonstrates strength in the political consensus building process and budgetary value with federal funds.

## 3. Plan of Action

Policy option analysis begins with the assumption that existing policy is unworkable, flawed, irrelevant, or all of the above and hence sets out to start anew trying to solve the basic policy problem that the inadequate existing policy attempted to address.<sup>79</sup> The combination of the National Fire Operations Reporting System (N-FORS)

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<sup>79</sup> Ibid.

and the Federal Fire Prevention and Control Act PL 93-498 provide the best two policy options.

N-FORS provides the organizational stakeholder group from a diverse section of the fire industry to market the product. In addition the N-FORS product is funded to sustain the project for implementation over the next three years. The Fire Prevention and Control Act provide the structure of established policy and access to expand the outcome terms through an amendment to current regulation.

## **G. POLICY OPTION IMPLEMENTATION**

### **1. The National Fire Operations Reporting System**

- National Fire Operations Reporting System (N-FORS) completed year three in software development and is planned for release at major fire service conferences in the fall of 2015. The software is funded by the Assistance to Firefighter Grant and is free to all fire departments.
- Inoculating the fire service with the terms for outcome prompts requests from the local fire department to the fire service and political leaders for the N-FORS product.
- The N-FORS staff provides the face-to-face training, customer support, and fire data policy process to link data sources. Working with the local fire departments facilitates policy development for fire data process and power user personnel.
- This performance improvement software is for management of the fire ground and empowers fire service and political leaders with the knowledge to create policy. That policy allocates the correct resources for the structure fire incident to reduce firefighter and civilian injury, death and property loss.

### **2. Federal Fire Prevention and Control Act PL 93-498**

- Working with executive stakeholders to craft language for the amendment of language to include outcome measures and the specific terms availability, capability, and operational effectiveness as part of PL 93-498 §9, Paragraph (C).
- Working with executive stakeholders to craft language for the amendment of language to include Safe data and the specific terms for peer review of fire incident reports as part of PL 93-498 §9, Paragraph (C).

## **H. CONCLUSION**

The policy options analysis as stated at the Naval Postgraduate School Center for Homeland Defense and Security (CHDS) Master's Degree Program is a process in which a policy is unworkable, flawed, or irrelevant. The purpose of policy options analysis is not on improving and revising the existing policy but rather on positing and analyzing two or more alternatives to the existing policy and determining which alternative is most viable.

Following that direction, the fire service data process key documents were reviewed with two scoring processes. The first filter triaged the documents for the political, organizational, budgetary, and legal environment to identify which two policies were most viable. The second filter identified the qualitative key terms specific to the fire service data process as identified from the National Fire Service Summit report. This report is the current sentinel document that describes the gaps and needs of the fire service.

The National Fire Operations Reporting System and Federal Fire Prevention and Control Act PL 93-498 were identified as the two most viable policy options. An action plan was created incorporating parts from each of the policies and process is in motion to start the delivery of those policy option analysis components in the fall of 2015.

## **V. SUMMARY, CONCLUSION AND RECOMMENDATIONS**

### **A. INTRODUCTION**

Fire service and political leaders across the United States face a set of complex issues on how to best allocate fire department resources to structure fire incidents in a timely, safe, efficient, and effective manner. Complicating this decision is the lack of outcome terms that describe the availability, capability, and operational effectiveness of resources deployed to a structure fire incident.

### **B. SUMMARY**

In order to understand this problem, a comprehensive literature review was completed using open source information about the United States fire service data process documents. This review included fire service industry texts, manuals, reports, testimony, standards, research papers, online assessment, and personal communications. The entire list of more than 100 research materials is cited in the appendix of this document.<sup>80</sup>

The open source findings identified that the fire data outcome term problems were not limited to any one specific document. Instead, a series of documents were identified that had become unworkable, flawed, or irrelevant. Those documents were further refined to identify the critical few that provide current policy impact on the fire service data process terms.

This problem state clearly identified that the policy options analysis method as the preferred solution. Following methods as taught in the Naval Postgraduate School (NPS), the Eugene Bardach text was selected along with materials presented during the in-resident cohorts on policy option analysis. These resources established a solid method to attack this problem. The result of that work was presented previously in this thesis.<sup>81</sup>

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<sup>80</sup> See thesis appendix.

<sup>81</sup> Pitman, "Policy Analysis and Policy Options Analysis."

The goal of policy options analysis method is to identify a policy that is not workable and provide two or more alternatives to solve the problem. The objectives of the policy option analysis option are to consider the alternatives, develop a measurement matrix, and determine the best alternative.<sup>82</sup> The policy documents were evaluated using a scale from the NPS multi-goal policy options analysis section as part of the cohort session.<sup>83</sup> This scale evaluated the policy in four categories to weigh the probability that the policy could work to provide alternatives in the current situation. The results of that assessment are contained in previous work.

To refine those results and identify the most appropriate policy option the NPS multi-goal policy options analysis step valuing and predicting impacts qualitative process was applied.<sup>84</sup> Reviewing previous documents these terms were included as part of the National Fire Summit report.<sup>85</sup> The combination of NPS process and fire service information delivered a very focused measure. This work is discussed in previous sections of this thesis.

The open source literature review provides a broad scope of the fire service documents and describes the fire service data problem. Selecting the policy options analysis method as provided during the CHDS master program refined the process to select the most achievable policy. Utilizing the multi-goal policy options identified a path to select criteria to measure the policy options under consideration. Moving into more in-depth assessment, the policy provided a qualitative option to refine the policy selection. The results of that process produce the goal of policy options analysis that is to select the best alternative. The results are stated in Chapter IV.

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<sup>82</sup> Ibid.

<sup>83</sup> Ibid.

<sup>84</sup> Ibid.

<sup>85</sup> Averill et al., *National Fire Service Data Summit*.

## C. CONCLUSION

This thesis is directly related to homeland security issues as stated by subject matter experts with regard to the need to understand fire. Assistant Chief Joseph Pfeifer testified before the House Committee on Homeland Security's Subcommittee on Counterterrorism and Intelligence on Protecting the Homeland against Mumbai Style-attacks and the threat from Lashkar-E-Taiba. Chief Pfeifer makes a series critical points to support this thesis work, citing the numerous times that fire has been used as a weapon.<sup>86</sup> Pfeifer continues to cite recent terrorist attacks in which fire was used as an opportunity to deflect responding resources and injure and kill civilians.<sup>87</sup> His subject matter expertise and testimonial points add value to this thesis, citing that outcome measures are required for leaders to explain the complexity of structure fire and allocate the correct resources.

The value of this thesis to develop outcome terms and build policy is further demonstrated in the statistics gathered by the National Fire Protection Association annual fires in the United States report.<sup>88</sup> The NFPA cities in 2013 more than 3,000 civilian deaths were directly related to fire and more than 15, 000 civilians were injured in the incident.<sup>89</sup> The NFPA reports that statistics for the fire service and in 2013 identified there were 97 firefighters killed in the line of duty and there were 66,000 firefighters' injured. Property loss for the nation is reported at \$11.5 billion and does not include the calculations for indirect property damage or lost business revenue. Fire is a community problem with direct implication for homeland security policy.

This thesis provides fire service and political leaders with the outcome terms to understand the structure fire problem. Applying those terms to the structure fire incident provides leaders the ability to analyze the resources and form evaluations of resources.

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<sup>86</sup> *Testimony of Assistant Chief Joseph Pfeifer before the Congressional Committee on Homeland Security the House Committee On Homeland Security's Subcommittee on Counterterrorism*, 113<sup>th</sup> Cong. (2013).

<sup>87</sup> *Ibid.*

<sup>88</sup> National Fire Protection Association, "Fires in the United States," 2013, <http://www.nfpa.org/research/reports-and-statistics/fires-in-the-us>

<sup>89</sup> *Ibid.*

Working with the policy options analysis provides a structured method to identify the problem and create workable solutions.

This thesis provides a set of policy options tasking the Federal Fire Prevention and Control Act to add outcome terms. Second, the National Fire Operations Reporting System adds performance software for management of the fire ground. Both of these options have the categories and attributes to make an immediate change in the fire service data process.

Future activities from this thesis policy options analysis will establish a foundation for fire service organizations to perform a level of benchmarking within the fire department or external to other fire departments. This level of analysis opens a pathway for additional fire department peer review building research opportunities engaging the fields of information technology, human science behavior and business analytics.

#### **D. RECOMMENDATIONS**

The NPS policy option analysis process identified two policy option alternatives that meet the criteria for implementation. These options are detailed in the following policy implementation section. Policy option analysis begins with the assumption that existing policy is unworkable, flawed, irrelevant, or all of the above and hence sets out to start anew trying to solve the basic policy problem that the inadequate existing policy attempted to address.<sup>90</sup> The combination of the National Fire Operations Reporting System (N-FORS) and the Federal Fire Prevention and Control Act PL 93-498 provide the best two policy options.

N-FORS provides the organizational stakeholder group from a diverse section of the fire industry to market the product. In addition the N-FORS product is funded to sustain the project for implementation over the next three years. The Fire Prevention and Control Act provide the structure of established policy and access to expand the outcome terms through an amendment to current regulation.

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<sup>90</sup> Pitman, "Policy Analysis and Policy Options Analysis."

## **E. POLICY OPTION IMPLEMENTATION**

The following two alternatives were selected from the policy option analysis process. The action plan for each of the policy is in a bullet point format with the responsibility to complete the action assigned to the author of this thesis.

### **1. The National Fire Operations Reporting System**

- N-FORS completed year three in software development and is planned for release at major fire service conferences in the fall of 2015. The software is funded by the Assistance to Firefighter Grant and is free to all fire departments.
- Inoculating the fire service with the terms for outcome prompts requests from the local fire department to the fire service and political leaders for the N-FORS product.
- The N-FORS staff provides the face-to-face training, technical assistance, and fire data policy process to link data sources. Working with the local fire departments facilitates policy development for fire data process and power user personnel.
- This performance improvement software is for management of the fire ground and empowers fire service and political leaders with the knowledge to create policy. That policy allocates the correct resources for the structure fire incident to reduce firefighter and civilian injury, death and property loss.

### **2. Federal Fire Prevention and Control Act PL 93-498**

- Work with executive stakeholders to craft language for the amendment of language to include outcome measures and the specific terms availability, capability, and operational effectiveness as part of PL 93-498, §9, Paragraph (C).
- Work with executive stakeholders to craft language for the amendment of language to include Safe data and the specific terms for peer review of fire incident reports as part of PL 93-498, §9, Paragraph (C).

This thesis is consistent with the goals of the Center for Homeland Defense and Security to assist local and federal officials to improve homeland security preparedness by conducting “real-world,” actionable policy option analysis. Equipped with the terms of availability of the resources that are ready and able to respond to a structure fire incident, the capability of the deployed resources to manage the event, and operational effectiveness. Fire service and political leaders can allocate the correct resources for

structure fire incidents. This policy action will reduce firefighter and civilian injury, death, and property loss.

## APPENDIX. ADDITIONAL SOURCES

The following is some sources that are relevant to the explanation of fire service documents in the data process.

**The following parts from the United States Fire Administration, National Fire Data Center, *National Fire Incident Reporting System 5.0 (NFIRS): Complete Reference Guide* (Emmitsburg, MD: United States Fire Administration, 2013)**

1. Self-study modules and appendices
2. [Table of Contents, Introduction and Overview](#)
3. [Unit 1 – Basic Module: NFIRS-1](#)
4. [Unit 2 – Fire Module: NFIRS-2](#)
5. [Unit 3 – Structure Fire Module: NFIRS-3](#)
6. [Unit 4 – Civilian Fire Casualty Module: NFIRS-4](#)
7. [Unit 5 – Fire Service Casualty Module: NFIRS-5](#)
8. [Unit 6 – Emergency Medical System \(EMS\) Module: NFIRS-6](#)
9. [Unit 7 – Hazardous Materials Module: NFIRS-7](#)
10. [Unit 8 – Wildland Fire Module: NFIRS-8](#)
11. [Unit 9 – Apparatus or Resources Module: NFIRS-9](#)
12. [Unit 10 – Personnel Module: NFIRS-10](#)
13. [Unit 11 - Arson & Juvenile Firesetting Module: NFIRS-11](#)
14. [Summary](#)

Leonard Krueger. *Determining NFIRS Reporting Accuracy by Alachua County Fire Rescue Company Officers*. Emmitsburg, MD: Federal Emergency Management Agency, 2007.

Mark V. Smith. *Garbage IN? Evaluating the Consistency of the Data Input into the MTFPD NFIRS Complaint Database*. National Emergency Training Center Learning Resource Center. Emmitsburg, MD: Federal Emergency Management Agency, 2010.

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## **National Fire Protection Association (NFPA) Standards and Guidelines**

1. NFPA 901 Standard Classifications for Incident Reporting and Fire Protection Data (2011 edition)
2. NFPA 902 Fire Reporting Field Incident (1997 edition)
3. NFPA 903 Fire Reporting Survey Guide (1996 edition)
4. NFPA 904 Incident Follow-up Guide (1996 edition)
5. NFPA 906 Guide for Fire Incident Field Notes (1998 edition)
6. NFPA 951 Draft Guide to Building and Utilizing Digital Information (Draft 2012 edition)
7. NFPA 1001 Standard on Firefighter Professional Qualifications (2014 edition)
8. NFPA 1021 Standard for Fire Officer Professional Qualifications (2014 edition)
9. NFPA Standard for Providing Fire and Emergency Services to the Public (2010 edition)
10. NFPA 1250 Recommended Practice in Fire and Emergency Services Organization Risk Management (2012 edition)
11. NFPA 1401 Recommended Practice for Fire Service Training Reports and Records (2012 edition)
12. NFPA 1561 Standard on Emergency Services Incident Management System and Command (2014 edition)
13. NFPA 1583 Standard on Health Related Fitness Programs for Fire Department Members (2008 edition)

14. NFPA 1500 Standard on Fire Department Occupational Safety and Health (2013 edition)
15. NFPA 1620 Standard for Pre-Incident Planning 2010 (2010 edition)
16. NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations Emergency Medical Operations and Special Operations to the Public by Career Fire Departments (2010 edition)
17. NFPA 1720 Standard for the Organization and Deployment of Fire Suppression Operations Emergency Medical Operations and Special Operations to the Public by Volunteer Fire Departments (2010 edition)
18. NFPA 1901 Standard for Automotive Fire Apparatus (2009 edition)
19. NFPA 450 Guide for Emergency Medical Services and Systems (2013)
20. NFPA Fire Statistics 2013. Accessed December 15, 2014.  
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3. Federal Emergency Management Agency. *United States Fire Administration Fire Data Analysis Handbook*. 2<sup>nd</sup> ed. Washington, DC: Federal Emergency Management Agency, 2004.

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7. Federal Emergency Management Agency. *United States Fire Administration Firefighter Fatalities in the United States in 2013*. Washington, DC: Federal Emergency Management Agency, 2014.
8. Federal Emergency Management Agency, United States Fire Administration, Assistance to Firefighters Fire Prevention and Safety Grant Program, National Association of State Fire Marshals Research and Education Foundation Conquering the Unknowns Research and Recommendations on the Chronic Problem of Undetermined and Missing Data Casual Factors Sections of the National Fire Incident Reporting System
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Fire Services Orientation and Terminology. 5th ed. IFSTA at Oklahoma State University. 2011. [https://shop.ifsta.org/product\\_info.php/products\\_id/70320](https://shop.ifsta.org/product_info.php/products_id/70320)

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