



RESEARCH

NATIONAL FIRE DATA SYSTEM INSIGHTS
WEST COAST SUBJECT MATTER EXPERT WORKSHOP
INSIGHTS

NOVEMBER 2017

Acknowledgements

The National Fire Protection Association thanks all who took part in this workshop, especially for your energy and can-do spirit in support of improving fire data.

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CONTENTS

- Executive Summary ----- 2
- Overarching Themes ----- 4
 - Inconsistency ----- 4
 - Working within Existing Systems ----- 4
 - Addressing Change ----- 4
- Recommendations ----- 5
 - Comprehensive Approach to Data ----- 5
 - Behavioral and Cultural Change ----- 6
 - Need for Standardization ----- 7
 - Building Systems for Humans ----- 8
 - Collaboration ----- 9
 - Future Innovations ----- 10
- Appendix A: National Fire Data Survey Summary ----- 12
- Appendix B: Meeting Agenda ----- 13
- Appendix C: Meeting Attendees ----- 14
- Appendix D: Scenarios ----- 15
 - Incidents ----- 15
 - Operations ----- 17
 - Health and Wellness ----- 17

EXECUTIVE SUMMARY

This report provides insights gleaned from the first fire data subject matter expert workshop, held March 23, 2017 in Garden Grove, CA and co-located with the Center for Public Safety Excellence's annual Excellence Conference. Attendees represented all levels of the fire service, including local departments, state agencies and national organizations. To kick off the discussions, attendees were provided with specific scenarios and challenges to help channel insights and recommendations that can be addressed within the scope of this project. Attendees were candid about the challenges of fire service data but positive and energetic about moving this conversation forward.

Interwoven Themes

Attendees repeatedly referred to three overarching concepts:

1. Inconsistency in how fire data is collected and used across the fire service; and
2. The need to find a balance between encouraging innovation and leveraging existing systems and investments.
3. Without cultural change and leadership that values accurate fire service data, technological advancements will only accomplish so much.

Recommendations

This report catalogues the feedback received from attendees into a series of recommendations that range from long-term strategic goals with national impact to near-term programmatic changes to address smaller fire data challenges. The recommendations are categorized as within the scope of the National Fire Data System project, or outside the project's scope but within the purview of the National Fire Protection Association (NFPA), or in partnership with the wider fire service.

Outcomes for the National Fire Data System:

- **Comprehensive Approach to Data:** The NFDS project will support the identification of mechanisms that standardize integration of various data systems.
- **Behavioral and Cultural Change:** The project will undertake a multi-faceted outreach and education campaign in collaboration with fire service partners to help educate the fire service and others on the value, importance, and technical needs of an effective fire data system.
- **Need for Standardization:** Work with existing efforts such as the NFPA [950](#) and [951](#) standard development process to drive standardization.
- **Building Systems for Humans:** NFDS will focus on linking existing systems rather than building enterprise solutions.

- Collaboration: These recommendations are key components in improving fire service data overall but are currently outside the scope of the project.

Conclusion

Fire data challenges mimic fire departments: there is no one solution that fits all needs.

Nonetheless, through the National Fire Data System and other ongoing projects, the fire service is finding solutions and leveraging technology that will answer the call for data that can improve knowledge and decision-making on all fire department activities.

OVERARCHING THEMES

Throughout the meeting, attendees repeatedly touched on 3 themes:

INCONSISTENCY

A consistent theme throughout the workshop was inconsistency. Both the National Fire Data Survey (see Appendix) and the workshop affirmed that no universal fire data problem appears to affect all fire departments the same way. Well-known challenges in the collection process, such as selecting the easiest drop-down option versus searching for the most accurate code, undermine data accuracy. At the local level, there are a wide spectrum of ways in which fire departments capture and maintain their data. Some departments noted that they don't own or control their data, especially in CAD systems.

The meeting attendees found differences in sources and types of data; systems used to store and analyze it; inconsistent resource nomenclature; lack of standardization; and different formatting are just some of the issues a national fire data system must contend with.

WORKING WITHIN EXISTING SYSTEMS

Overall, meeting attendees expressed a can-do, hopeful attitude towards addressing fire service data challenges. While the challenges are complex, attendees found value in existing systems and capabilities. The focus should not necessarily be on dismantling and replacing current systems but instead on leveraging existing capabilities and investments. There was widespread recognition that there are lots to be done and that efforts must be tempered by realistic expectations.

ADDRESSING CHANGE

The attendees also found that change will come in many ways. There was a strong emphasis on culture change, training, and leadership. Attendees found that changes in behavior and attitudes towards data will be made:

- Through leaders increasingly demanding data to assist with decision-making;
- Through changes and improvements in technology which will address some challenges;
and
- Through increased data-related education and training.

They repeatedly made mention that no matter the changes made in systems, success will only be realized through changes in the behavior and culture of the fire service towards data.

RECOMMENDATIONS

This report catalogues the feedback received from attendees into a series of recommendations that range from long-term strategic goals with national impact to near-term programmatic changes to address smaller fire data challenges. The recommendations are categorized as within the scope of the National Fire Data System project, or outside the project’s scope but within the purview of the National Fire Protection Association (NFPA), or in partnership with the wider fire service.



Comprehensive Approach to Data

Traditionally, data reporting has focused on fire incidents. Increasingly, fire departments are capturing massive amounts of data on their own activities; however, this siloed data often remains inconsistently formatted and captured. Attendees also raised the concern that since data are typically local, analytics is hard because of a lack of integrated data sets. The analytics is therefore unnecessarily challenging.

Recommendation	Within Project Scope	Out of Project Scope	
		Within NFPA	Partner with Fire Service
Support improvements to the NFIRS system		X	X
Building awareness at the local and state level about accurate and timely reporting to NFIRS	X	X	X
Identify ways for fire departments to tap into other data sources for comparison purposes and big data analytics efforts (i.e., NFORS, FireCares)	X	X	X

National Fire Data System Outcome:

The NFDS project will support the identification of mechanisms that standardize integration of various data systems.



BEHAVIORAL AND CULTURAL CHANGE

Attendees highlighted the need for data-related education and training. They made mention that no matter what changes are made in systems, success will only be realized through changes in the behavior and culture of the fire service towards data. The attendees stressed the need to better communicate “What’s In It For Me (WIIFM)” in terms of data (i.e., underscoring with younger members the benefit of their department’s ability to justify investments in operations, health and safety resources, and equipment. Attendees also indicated the need to identify and support regional and/or state-level champions who are on the leading edge of technology adoption and innovation. These trusted voices can leverage their experiences to help other fire service leaders embrace the concept of data-driven decision-making.

Recommendation	Within Project Scope	Out of Project Scope	
		Within NFPA	Partner with Fire Service
Defining and educating decision-makers on the value of data for fire departments	X	X	X
Better educating new and/or younger fire service members about the importance of data		X	X
Build educational materials on the concepts of data, including terminology, technology, and analysis	X	X	X
Build educational materials on the importance of skill sets that support data collection and analytics within a fire department’s staffing structure	X	X	X
Build education materials for fire service leaders on data requirements and managing increasing expectations emerging from local government and elected leaders	X	X	X
Educate fire service members on how to manage large-scale technology projects		X	X

National Fire Data System Outcome:

The project will undertake a multi-faceted outreach and education campaign in collaboration with fire service partners to help educate the fire service and others on the value, importance, and technical needs of an effective fire data system.



NEED FOR STANDARDIZATION

Attendees underscored a challenge in that fire data problems do not affect all fire departments in the same way. As such, forward progress becomes overwhelmingly complex if over 30,000 different solution sets are needed. To combat this complexity, attendees repeatedly highlighted the need to identify and standardize data that is most meaningful and necessary.

Recommendation	Within Project Scope	Out of Project Scope	
		Within NFPA	Partner with Fire Service
Prioritize what questions need to be answered		X	X
Develop a comprehensive fire data model that will link incident data, operational data and other activity data	X	X	X
Develop a position description and skill sets for a Fire Department Data Analyst		X	X
Leverage increasing involvement with accreditation process to support data efforts		X	X
Create templates to help firefighters and others entering data to follow when entering narratives		X	X
Support Quality Control/Quality Assurance efforts	X	X	X

National Fire Data System Outcome:

Work with existing efforts such as the NFPA [950](#) and [951](#) standard development process to drive standardization.



BUILDING SYSTEMS FOR HUMANS

Several times during the meeting, attendees stressed the reality that fire data is based upon firefighters capturing and entering data, often repeatedly, into systems that can be redundant, difficult to navigate, and time-consuming. There are several weaknesses to this approach:

- Lack of understanding and training on the importance of good data
- Cumbersome systems that require manual entry of vast amounts of data
- Systems that can be gamed – in other words, the fire service can find ways to get through the data collection as fast as possible, often with little regard for the quality of the data on the other side

“Not everything that can be counted counts and not everything that counts can be counted.”

- West Coast Meeting Attendee

Recommendation	Out of Project Scope		
	Within Project Scope	Within NFPA	Partner with Fire Service
Identify mechanisms to streamline reporting needs	X	X	X
Identify interfaces that are natural and intuitive for firefighters to use		X	X
Identify and address ways to reduce data inaccuracy by identifying valid, relevant data sources (i.e., housing values)	X	X	X

National Fire Data System Outcome:

NFDS will focus on linking existing systems rather than building enterprise solutions.

Many attendees commented on the importance of working with other agencies to improve a department's data. The ability of a department to do this is complicated by many factors – budget, politics, local resources, accessibility, and unknown data sets within a community. The attendees underscored this as an important piece of the puzzle for any department looking to improve its data systems.

"Sharing data and sharing feedback on response and working with water, roads, etc. – you can't do it on your own or you'll only focus on turnout time."
 - West Coast Meeting Attendee

Recommendation	Within Project Scope	Out of Project Scope	
		Within NFPA	Partner with Fire Service
Identify ways to help departments find and use data sources that may already exist within their own localities		X	X
Publish case studies or other documentation of successful collaboration and sharing of data between local agencies		X	X
Identify ways for departments to access larger data sets to help with analytics		X	X
Identify ways to educate fire service agencies on benchmarking and other metrics		X	X

National Fire Data System Outcome:

These recommendations are key components in improving fire service data overall but are currently outside the scope of the project.



FUTURE INNOVATIONS

The following is a list of future innovations that meeting attendees believe could be leveraged to address fire service challenges. Some of these technologies are far along in the development progress, while others may take years to be fully realized.

- ❑ Predicting Service Needs: Using data to identify and understand activities that happen repeatedly to determine what, if anything, can be done to predict and mitigate these risks. Community risk reduction can be positively affected by using factors such as population needs, growth, and challenges to understand what is going on within a community.
 - Example: Aging population in a high-value area cannot move out of their homes so they are using EMS services more.
- ❑ Health and Wellness: Leveraging the decreasing physical size of electronics to track, measure, and prevent certain health risks.
 - Example: Modified/hardened fitness trackers that can compile data on firefighters. Such data can later be used to build algorithms that help incident commanders understand when a firefighter might be reaching their maximum capacity.
- ❑ Patient Care Systems/Digital EMS Solutions: Leveraging investments in electronic medical records and health care systems to provide improved services.
 - Example: Tablets and other mobile devices that can scan a driver's license and pull up data on a patient.
- ❑ Leveraging Technological Improvements
 - Example: Using "Talk to Text", automated timestamping and other improvements that leverage both technology and human factors to lessen the burden of reporting while improving data accuracy and quality.
- ❑ Effects of Innovations Outside the Fire Service: Finding ways to work within the fast pace of technological innovation outside of the fire service. These innovations may positively or negatively affect service delivery.
 - Example: False 911 calls (i.e. swatting) using technology to mask and/or trick an agency into thinking the call was locally placed is on the rise. The practice creates unnecessary costs, diverts resources and increases risk for first responders and citizens.
- ❑ Generational Changes/Younger Staff Members: leveraging the resources and skills of younger firefighters who have experience in using technology.

- ❑ Non-Traditional Sources of Data: Using data sources outside the fire service to make better operational and administrative decisions.
 - Example: Leveraging socioeconomic data and community demographics to build new fire stations, improve staffing models and support community risk reduction activities.
 - Example: Leverage existing governmental and/or third-party systems along with validated industry algorithms to capture loss estimates, removing the burden from untrained fire officers (or firefighters) reporting building loss or damage costs.

APPENDIX A: NATIONAL FIRE DATA SURVEY SUMMARY

In April 2017, the NFPA published the *National Fire Data Survey: Findings on the State of the Existing American Fire Data Ecosystem*. The survey was designed to learn what types of data fire departments collect; what software they use to capture, store and analyze data; and how they use that data for local decision-making.

The survey found a growing paradigm shift away from simply creating static fire records to the emergence of a dynamic fire data environment where digital records are being created through a host of systems. While some fire service agencies seem to primarily use data for reporting compliance and record-keeping processes, an increasing number of fire service agencies appear to be using data to manage their organization and their operations.

Two key themes emerged when we asked the fire service to sum up fire data in one word (see right) and continued throughout the survey findings. Underlying these themes is the intricate, seemingly disparate reality: that current systems store substantial quantities of fire data but the benefits of these systems are often limited by data quality, accuracy, and access.

Theme 1:

The Fire Service recognizes the value of data.

Theme 2:

The Fire Service isn't satisfied with the status quo.

Increasingly, fire departments are analyzing data for local decision-making. Fire departments collect and maintain data on a wide variety of fire activities, including response information, patient care, fire inspection, training, public education, and many other types of records. These records go beyond the type of information collected by the National Fire Incident Reporting System (NFIRS). A comprehensive approach to connect all fire activity data is needed to ensure that fire departments work with data that truly accounts for the full picture of their activities.

Finally, there does not appear to be one overarching fire data problem, nor does there appear to be one overarching one-size-fits-all fire data solution. Depending on the size of the agency, their current capabilities and need, fire departments seem to have different fire data problems. Challenges that one department may be struggling with are likely issues recently solved by another department or other data domains outside of the fire service. Identifying, leveraging, and sharing best practices across the fire service and beyond can likely have significant benefit.

Full Report: www.nfpa.org/news-and-research/resources/fire-service-resources/national-fire-data-system-project

APPENDIX B: MEETING AGENDA



NATIONAL FIRE PROTECTION ASSOCIATION
The leading information and knowledge resource on fire, electrical and related hazards

FIRE DATA SUBJECT MATTER EXPERT WORKSHOP
March 23, 2017 • 9:00a – 4:30p
Hyatt Regency Orange County • Pacific Room (Second Floor)

Meeting Purpose:

Bring key fire service stakeholders representing various backgrounds, experiences, and types of organizations together to address persistent fire data challenges.

Meeting Objective:

To identify workable strategies to refine the scope and execution of the National Fire Data System project.

8:30a – 9:00a	Attendee Check-In <i>Continental Breakfast Available</i>	
9:00a – 9:30a	Welcome and Introductions	<i>Nathaniel Lin</i>
9:30a – 10:00a	About the National Fire Data System	<i>Matt Hinds-Aldrich</i>
10:00a – 10:15a	Break	
10:15a – 11:00a	Forum: Current State of Fire Service Data	
11:00a – 11:15a	Break	
11:15a – 12:30p	Data Collection: Assessing the Pain Points	
12:30p – 1:30p	Lunch	
1:30p – 2:45p	Data Analysis: Assessing the Pain Points	
2:45p – 3:00p	Break	
3:00p – 4:00p	Forum: Turning the Corner on Fire Data	<i>Matt Hinds-Aldrich</i>
4:00p – 4:30p	Next Steps and Wrap-Up	<i>Ken Willette</i>
4:30p	Adjourn	

Funding for this meeting has been provided by a DHS/FEMA/Assistance to Firefighters Grant/Fire Prevention and Safety grant award.

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APPENDIX C: MEETING ATTENDEES

Preet Bassi, Chief Executive Officer, Center for Public Safety Excellence (VA)
Scott Bliss, Assistant Chief, Central Arizona Fire & Medical Authority (AZ)
Allan Cain, Fire Chief, Cary Fire Department (NC)
Kristin Chaffee, Strategic Program Manager, Tualatin Valley Fire Rescue (OR)
Leonard Chan, Data Analyst, Cedar Park Fire Department (TX)
Dov Chelst, Director, Quantitative Research, Center for Public Safety Management (DC)
Tom DeMint, Fire Chief, Poudre Fire Authority (CO)
Holgre Durre, Deputy Chief, Boulder Fire Rescue (CO)
Mike Duyck, Fire Chief, Tualatin Valley Fire Rescue (OR)
Tom Fagan, Captain, Lee's Summit Fire Department (MO)
Jim Golden, Fire Chief, Alabaster Fire Department (AL)
Edward Hartin, Fire Chief, Central Whidbey Island Fire & Rescue (WA)
Byron Kennedy, Assistant Chief, Atlanta Fire Rescue Department (GA)
Kevin Lundy, Fire Chief, Gulfport Fire Department (MS)
Robert McNally, GIS Analyst, Spartanburg Fire Department (3rd party) (SC)
Lori Moore-Merrell, Assistant to General President, International Assoc. of Firefighters (DC)
Eric Nickel, Fire Chief, Palo Alto Fire Department (CA)
Ed Plaughter, Fire Chief (Retired) / Chair, IAFC / NFPA 950 Technical Committee (SC)
Maura Power, Analyst, Fairfax County Fire Department (VA)
Erich Roden, Battalion Chief, Milwaukee Fire Department (WI)
Neil Rosenberger, Fire Marshal, Fairmount Fire Protection District (CO)
Paul Rottenberg, Fire Data Instructor, FireStats LLC (CA)
Elizabeth Russell, Fire Statistical Analyst, Rockford Fire Department (IL)
Oscar Sepulveda, Captain, Pasadena Fire Department (CA)
Amy Valdez, Battalion Chief, Virginia Beach Fire Department (VA)
Sara Wood, State NFIRS Manager, Kansas State Fire Marshal's Office (KS)

Matt Hinds-Aldrich, NFPA
Nathaniel Lin, NFPA
Ken Willette, NFPA
Melissa Knight, NFPA

APPENDIX D: SCENARIOS

INCIDENTS

1. Location

When national, state, or local fire agencies attempt to analyze the location of fire incidents and other emergency activities using NFIRS, the location information included often does not comply with traditional addressing standards or include geographical coordinates that can be used to easily plot those fire service activities on a map. This requires considerable data cleaning and geo-coding efforts of the locations to successfully analyze or utilize the data geo-spatially.

Questions:

- What is the best solution to ensure that the location information included in externally-shared fire activity records complies with recognized addressing standards?
- What is the best solution to ensure that externally shared fire activity records include geo-spatial coordinates (e.g. XY Coordinates) using recognized national standards and spatial projections?

2. Location

The adage “a picture is worth a thousand words” could possibly apply to documenting an emergency incident. Documenting and verifying where an incident occurred as well as where emergency personnel, equipment and operational activities were located could be used for several future analyses.

Question:

What is the best solution to allow fire personnel to document or capture the location of an incident, the configuration of the response, or areas affected in a consistent and cost-effective way?

3. Original Dispatch

When firefighters are dispatched to an emergency incident, the situation they find is often different from what they were originally dispatched to address. For example, a passerby might see smoke behind a building and report a structure fire. When the fire department arrives, they might find a controlled barbeque or bonfire. This would typically be coded based upon the situation that the fire department found. However, they would likely deploy resources based upon the information they originally had (structure fire) which would seem unreasonable based upon the situation found (controlled barbeque).

Question:

What is the best approach to document what they were originally “dispatched to” in order to assist fire agencies in their deployment analyses and to justify resources?

4. Most Likely Cause

The responsibility for investigating fires differs from community to community based on local resources, capabilities, and legal environment. In some communities, fire investigation records are stored in siloed systems that may or may not be connected to their primary records management system (RMS) for technological (not integrated) or security (law enforcement only) reasons. This can create a situation where the incident record in the RMS may not have the most up-to-date information about the cause determination or case status, leaving a significant number of incidents coded as “undetermined”, “under investigation” or “unknown” for perpetuity. This situation was highlighted in a recent NASFM project: *Conquering the Unknowns*.

Question:

What is the best approach to ensure that changes or updates in the cause determination of a fire incident in the local RMS or fire investigation case management system are consistently reflected in the national system despite the fact that fire investigation cases may take weeks or months to complete?

5. Property Information

Part of the existing fire reporting model requires the person completing the incident report to determine or estimate the pre-fire value of the property and the value of the loss. Firefighters are not generally trained to conduct detailed property or loss assessments. This can lead to wild speculation as to the value of the property and the amount and value of the loss from the fire while other firefighters simply skip that non-mandatory field to avoid guessing or to save time. Simply encouraging firefighters to search for the property records in their local tax or property assessor’s office or waiting for the insurance company to make an official determination does not appear to be a robust or scalable solution.

Question:

What is the recommended best practice for improving the accuracy of the estimations of the pre-fire property value as well as determining the likely value of the loss? Does this best practice mitigate the time firefighters to spend searching external databases or contacting third parties?

OPERATIONS

1. Documenting Operational Activities

The fire service has expressed a strong interest in improving the documentation of fireground operational activities (such as establishing water supply, completing forcible entry, applying water on the fire, etc.) Many of these operational timestamps have been identified through the series of fireground studies and outlined in the National Fire Operations Reporting System (NFORS) data dictionary. Consistent documentation across different systems is critical.

Question:

What is the recommended approach to accurately capture these key operational timestamps?

2. Real-Time Timestamps

A barrier to documenting operational activities is simple: how is this being captured? Is this through sensors? Where are these sensors located? How is dispatch involved? When is this information captured – real-time or after an incident?

Question:

How do we begin consistently capturing these key operational timestamps?

3. Innovation and Standardization

The ecosystem of fire data continues to evolve and expand, yet as innovations emerge, there are challenges to maintain standardization.

Question:

How do you encourage data standardization without stifling innovation?

HEALTH AND WELLNESS

1. Security and Portability

There is increasing interest in capturing many levels of data on firefighter health and wellness.

Question:

How do you balance data security and data portability for firefighter health and wellness records?

2. Balancing Collection Needs

Data collection efforts are focusing on gathering data from individual firefighters using apps and other tools.

Question:

How do we ask for new and additional information without increasing the burden on firefighter?