

DATA in the Fire Service:

Can We Improve Our Planning and Response While Documenting Our Value to Our Community?



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Abstract:

The United States Fire Service has realized a great deal of change over the last three decades. We have witnessed the introduction of enhanced Personal Protective Equipment, the accepted use of the Self-Contained Breathing Apparatus, the advancement of the Fire Service into technical areas such as Hazardous Materials Response, Technical Rescues and Advance Cardiac Life Support services that require fire fighters to be highly educated and trained.

With these advances comes additional challenges. One of these challenges involves properly recording, documenting and reporting the full breadth of the services our fire fighters provide and the manner in which they are provided. Data can provide valuable information to make good decisions when developing deployment strategies and evaluating fire department incident activity. But data can also be used to justify actions that do not support effective fire department operations when political agendas and poor analysis interfere with honest evaluation and use of data.

Traditionally, the Fire Service has utilized the National Fire Incident Reporting System (NFIRS). Over time, gaps in the ability of NFIRS to capture operational data and yield timely reports have been identified. There are additional technologies and data systems that assist fire departments in filling gaps within NFIRS or to replace it altogether to improve the services provided. This project will illustrate how data can be misused, identify national resources for fire service data collection and identify gaps in the existing national fire data collection system. The results of a survey taken by Work Group Members will be presented to illustrate how data is currently used and provide a users perspective to the discussion.

Data in the Fire Service - Can We Improve Our Planning and Response While Documenting Our Value to Our Community?

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The content, opinions and conclusions contained in this report are solely those of the authors and do not necessarily represent the views of the NFPA. NFPA makes no guaranty or warranty as to the accuracy or completeness of any information published herein. Development of this SMART Fire Fighting white paper took place as a bi-product of the NFPA Responder Forum in Indianapolis, Indiana in November 2015. The Responder Forum was developed by NFPA to build a bridge from research to practice. Participants attended the Responder Forum meeting, and worked collaboratively with peers in the months that followed addressing emerging topics, including SMART Fire Fighting. Responder Forum scholarship recipients, considered to be rising stars and emerging leaders in the fire service, were nominated by thirteen leading fire organizations including:

International Association of Fire Chiefs (IAFC)	<u>International Society of Fire Service Instructors (ISFSI)</u>	The International Association of Women in Fire and Emergency Services (IWomen)
International Association of Fire Fighters (IAFF)	<i>National Volunteer Fire Council (NVFC)</i>	<u>National Association of Hispanic Firefighters (NAHF)</u>
Metro Chiefs	<u>National Association of State Fire Marshals (NASFM)</u>	<u>International Association of Black Professional Firefighters (IABPF)</u>
North American Fire Training Directors (NAFTD)	NFPA Fire Service Section (FSS)	International Association of Arson Investigators (IAAI)
United States Fire Administration (USFA)		

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INTRODUCTION

In 2015 the National Fire Protection Association (NFPA) hosted the inaugural NFPA First Responder Forum. Emerging leaders from 13 key Fire Service National Organizations representatives participated in the event and were responsible for completing a project following the event. This paper represents the effort of Work Group 2, which was focused on Data and fire service.

The Work Group was tasked with answering the following:

- How does data impact the Fire Service?
- How does data define the fire service?
- How can data improve the fire service?

During Work Group discussions, a fourth question was posed, “Can data actually harm the Fire Service?”

NATIONAL DATA REPORTING SYSTEMS

National Fire Incident Reporting System:

In the early 1970’s President Nixon authorized the National Commission of Fire Prevention and Control Report. This report is typically known as *America Burning*. A direct result of the issuance of this report was the authorization and establishment of the National Fire Incident Reporting System (NFIRS).

NFIRS provides detailed information to help us understand the fire problem and describe the wide range of other fire department responses. The National Fire Incident Reporting System (NFIRS) is the source of much of what we know about the U.S. fire experience. Under the umbrella of the U.S. Fire Administration’s National Fire Data Center, NFIRS allows fire departments around the country to use a standard system to describe their responses. It provides valuable information about fire department responses of all types and fire causes and circumstances. It has been reported some feel the system has grown too complex and unwieldy, with concerns about ease of entering incident data and quality of resultant data.. (Ahrens, 2016)

NFIRS has undergone a number of revisions since its inception, both in the format utilized and summary/analytic reports available. None the less, there continues to be a serious debate about the validity of the information and if it is truly a reflection of the “fire problem” in the United States.

One concern is the accuracy of coded incident types with the actual incident as described in the narrative. Recently NFPA established a small-scale study to test whether coding NFIRS narratives would be a useful way of studying data quality. This effort was led by Marty Ahrens and Karyl Kinsey and the small-scale study was assisted by three communities. The resulting report; (*NFIRS Incident Types: Why Aren’t They Telling a Clearer Story?*) was issued in January, 2016. The abstract and a link to the report is included for further evaluation.

Abstract from *NFIRS Incident Types – Why aren’t they telling a clearer story?*

The U.S. Fire Administration’s (USFA’s) National Fire Incident Reporting System (NFIRS) collects more than 22 million incident reports from 23,000 fire departments in the United States on an annual basis. The purpose of this project was to evaluate issues related to data reliability for a key field in NFIRS, the incident type. Related studies were reviewed and a series of coding exercises testing reliability were conducted by coding narratives from samples of incidents

provided by three urban fire departments and comparing the codes with incident types selected by reporting officers. Reliability was generally low at the detailed code level, but showed marked improvements when incident types were grouped into smaller numbers of categories. Both qualitative and quantitative analyses identified several challenges to data reliability, including the length and complexity of code lists and inconsistencies in documentation and coding guidance. Of particular note was the problem of fitting complex, multifaceted situations into a single code list that incorporates multiple attributes. The analysis also noted the lack of codes capturing community risk reduction efforts occurring in the course of emergency responses. Recommended improvements include developing and disseminating clearer coding guidance for common problems identified and making greater use of social science expertise when designing future versions of NFIRS. Of key importance is the need to understand better how firefighters categorize incidents at the operational level. (Ahrens, 2016)

<http://www.nfpa.org/research/reports-and-statistics/the-fire-service/administration/nfirs-incident-types>

The NFPA First Responder Data Work Group encourages Fire Service organizations and industries to examine the eighty-three-page report and identify solutions to the various gaps and challenges identified.

National Fire Operations Reporting System (NFORS):

Currently under development, NFORS could be the next generation Fire Service analytical system, providing a comprehensive way to get accurate, real-time information for improving operations and safety. It uses a simple-to-use online tool, developed through years of research and stakeholder input and is the result of collaboration by the fire industry and its lead federal and professional organizations, including the NFPA, the International Association of Fire Fighters (IAFF), International Association of Fire Chiefs (IAFC), National Institute of Standards and Technology (NIST), the National Association of State Fire Marshals (NASFM) and the Commission on Fire Accreditation International (CFAI).

One of the main goals of NFORS is to measure how well the dispatched resources match the risk and ultimately manage the structure fire incident. In the effort to measure success, NFORS will capture the various components related to response times and various components to placing water on the fire (i.e. laying line, connecting to a water supply, flow of water, etc). In addition, the program will capture subsequent companies and efforts in suppression.

NFORS is also utilized to capture information regarding civilian and fire fighter injuries and death including potential exposures to harmful atmospheres.

By making a commitment to proper reporting through NFORS, local fire departments can measure their performances in comparison to similar cities or departments. They can produce accurate reports detailing actual deployed resources and quantify the work performed, training accomplished and injury or exposure rates. (National Fire Operations Reporting System)

FireCARES:

If fire department resources are deployed to match the risk levels inherent to hazards in the community, it has been scientifically demonstrated that the community will be far less vulnerable to negative outcomes in firefighter injury and death, civilian injury and death and property loss. FireCARES analyzes massive

amounts of fire department data to identify if resources are appropriately deployed to match a community's risk level.

FIRECARES can provide data that will assist in strategic planning and developing organizational blue prints for the next three, five and ten years. By creating a layered system utilizing many traditional and non-traditional data sets, FIRECARES will gather current data that identifies risks based on structure types, occupancy types, identified fire risks, community health risks and population. A complete package of information permits accurate assessments of the risk a community is encountering in real time. This effort should lead to better planning results which should be a positive impact on response performance. (FireCares)

Phoenix ASU Study:

The Phoenix Fire Department partnered with Arizona State University's (ASU) Business School to develop a reliable and accurate assessment method to determine the value of fire suppression intervention. To address potential issues of exaggerated claims or inconsistencies, a conservative and collaborative approach was undertaken.

Fires occurring in commercial buildings where Fire Department personnel responded and extinguished the fire were considered. Each incident was reviewed by a select panel of fire service experts to measure the true impact of the fire suppression efforts. The Department wanted to be conscientious of incidents that may cause inconsistencies.

Once an incident was determined to be a candidate for evaluation, members of the ASU Business School worked with the company themselves to measure the various impacts and costs that would have occurred had there been no intervention. They also measured the amount of savings realized by the suppression efforts including saved wages, buying power, tax revenues, etc. The conclusion revealed an impressive impact of savings and value to the local, regional and state governments.

A recent National Fallen Firefighters Foundation's Research Workshop recommended NFPA develop an Industry Standard based on this program, providing a valuable tool for local fire administrators to measure their local performance and impact.

Equipment:

This category could be very expansive but the committee realized our task was not to identify specific technologies or products that should be developed. Rather our charge was to identify potential gaps and avenues to solutions.

The fire and emergency scene is a challenging place for fire fighters let alone a computer based tool or device. Yet the committee has identified a large gap in the accuracy of reporting is the reliance on reporting officers to retain or remember pertinent information correctly until they return to the station and enter it by hand into the records management system (RMS). This reliance has led to errors in recording and subsequently in reporting.

The NFPA FR Data Work Group urges Fire Service organizations and applicable industries to develop affordable and reliable reporting platforms that may be utilized on an emergency scene to permit accurate real time data. These devices could double as Accountability Tools, Inspection Devices, etc., as the possibilities are numerous. These devices can also prompt officers to verify specific important information about the incident including types of structures or the presence and operations of smoke alarms.

Software:

Current practice requires Fire Officers to manually complete the NFIRS fire report in the respective department's preferred software, (examples are Firehouse, Zoll, etc). These reports can be onerous and lengthy. There are also many cases where these reports are completed hours after the incident forcing the officer to try and recall the aspects of the incident. Due to the limitations of the drop down boxes there are a number of information gaps where actual materials involved in the fire are not recorded or recorded incorrectly.

By creating an artificial intelligence software program, modeled after similar software in use in other disciplines, the officer could simply dictate their report into the computer allowing the software to extract the desired information. It will also permit the officer to give a broad, yet accurate, report outlining the type of construction, occupancy and materials involved in the fire incident providing us a more accurate picture of the nation's fire experience. Leading questions can be provided to ensure a complete picture of the incident is recorded.

CAN FIRE DATA CAUSE HARM?

There has been precedent where well intended programs incorporating increased data, more specifically analytics, led to numbers focused deployment decisions without regard for the actual impact to the response areas or responding Fire Companies.

In the 1970's, The Fire Department of New York's (FDNY) Charles O'Hagan was a strong believer in the use of an analytic approach. He approached Robert McNamara, who had established the RAND Corporation (Research and Development), to analyze FDNY responses to determine the most appropriate deployment of the city's fire companies. This occurred at a time when the City of New York was under a great deal of financial stress. It was also a period of time where there were neighborhoods battling blight, personal hardships and overcrowding. Arson was actually only a small percentage of the problem but it received a great deal of attention or blame as the main culprit.

These conditions led to an increase of fire incidents causing a strain on FDNY. This was a financial strain plus the physical and emotional strain of responding to the increased workload. During this period of time the city was financially strapped causing the Mayor's Administration to look at funding reductions. These reductions led to the decision to reduce the number of fire companies staffed each shift.

Using models developed by RAND, Chief O'Hagan began making decisions on specific company deployments, openings and closings. By simply evaluating the raw numbers, decisions to open and close companies seemed logical. Unfortunately, decision makers became so focused on numbers they did not account for the real ramifications on surrounding fire companies. By closing seemingly expendable companies, the impacts were felt by the fire fighters serving in the suppression companies that suddenly jumped into the top ten busiest Engine Companies and by reducing coverage to the neighborhoods they were meant to protect.

Understanding this is only a brief synopsis of a complicated situation, it is important to remember the mistakes of data focus were recognized after the situation had run its course. This reflection is recorded by Joe Flood in his book *The Fires: How a Computer Formula Burned Down New York City – and Determined the Future of American Cities*, describing FDNY's experiment with analytics.

“Had the analytics taken a step back from the models, perhaps they would have thought there was something fishy about closing companies in the most fire-prone neighborhoods in the country and opening them in Staten Island. But lost in a modeler’s world was increasingly divorced from reality, the fire project had stepped through the looking glass, as RAND physicist Sam Cohen once said of his colleagues who worked on systems analysis, where people did the weirdest things and (used) the most perverse kind of logic imaginable and yet claimed to have the most precise understanding of everything...because it all sounded so damn rational and so damn reasonable as to be unassailable.”¹

But there are also cases where analyzing non-traditional data can have positive impacts on fire fighter and civilian safety by reducing the fire risk or identifying potential dangerous conditions prior to an incident. An example of this can also be found within the New York City and FDNY.

In the early 2000’s in New York City, an attorney was looking to make an impact in his world. This search took him to Iraq but when he returned he began to apply his analytic skills he developed overseas, to combating crime in his hometown. He built a team of data scientists to create an analytics department. “One of the first projects to tackle was illegal conversions – the practice of cutting up a dwelling into many smaller units so it can house as many as ten times the number of people it was designed for.” (Cukier, 2013)

By analyzing multiple data bases, over 900,000 property lots, and connecting some dots - foreclosures, ambulance visits, crime rates, rodent complaints, etc - they documented indicators of potential illegal renovations. With this knowledge he was able to re-direct the city’s under-staffed inspectors to visit these locations to inspect the buildings and adjudicate the illegal and dangerous conditions found. In a short period of time, this effort resulted in a vacate order rate increase from 13 percent to more than 70 percent. This impacted the fire service as fires in illegal conversions are 15 times more likely than other fires to result in injury or death for firefighters. (Cukier, 2013)

There is no dispute of the need and value of data collection within the Fire Service. In the past, the Fire Service has relied on the National Fire Incident Reporting System (NFIRS) to record and report the conditions encountered and the services provided. But is this singular data set enough to accurately serve the needs of the Fire Service?

In recent years there has been a move towards collecting additional and timely data. Proponents have strongly advocated the Fire Service needs a more robust reporting system that can report data concerning the services provided and the situations encountered. The challenge includes identifying what information to collect, what collection format to use, and how to apply the information for maximum impact.

This short White Paper is not intended to answer all of the above questions or concerns. Rather, the goal of this effort is to identify potential gaps in information and possible solutions in data sets and technology. The hope is that organizations can identify areas of interest, or expertise, in order to expand the research and knowledge of a particular subject. With multiple efforts, or collaboration, there is a possibility of identifying avenues to increase the data collection and reporting capacity for the Fire Service. The resulting projects could then be applied to improve fire department planning, services, operations and efficiency.

¹ The Fires, Joe Flood, Riverhead Books 2010

Gaps

Incidents Encountered:

Incidents are identified through the NFIRS. Incident identity is based on a numerical system to provide a consistent and consolidated format. This allows fire service members to utilize a computer based reporting system to record their experiences.

The greatest challenge is the wide scope of incidents or situations fire fighters encounter on a daily basis. To make the system manageable, NFIRS identified a finite number of situations. This invariably leads to some confusion in reporting when the scenario may not exactly fit into a specified category. This further is complicated by an overwhelming number of incident codes and inconsistent training leading to a lack of consistent reporting or interpretation.

This confusion manifests itself in a number of ways, through erratic reporting, inaccurate reporting and frustration from the reporting members. This leads to an inaccurate set of data and a reporting membership with a lack of confidence in the data they are recording.

Timely Collection and Dissemination of Reported Data:

One of the difficulties in assessing the Fire Service experience and building on short term needs is the lack of a timely reporting system. Currently the majority of the data reported and compiled in a usable format is at least two old at the time of release.

The current NFIRS requires a three-tiered reporting format at the local, state and federal levels with each level scrubbing the reports and data for accuracy. This is a time consuming process. A nationally based instant reporting process and system would permit real time reporting. This would permit the use in short and long term planning within the Fire Service.

Identifying Areas of Interest:

What information is pertinent to the Fire Service? Obviously reporting of the types of incidents encountered and the type of occupancies involved. But a wider scope of possibilities needs to be explored.

In today's world we are realizing an incredible expanse of available data and the ever increasing data collection points. The fire service has traditionally collected data to report the incident type and services provided. But is this actually an accurate portrayal of the fire situation within our communities or the services we, as a Fire Service, provide?

Fire Service partners should work together to identify additional non-traditional data collection sets and points to analyze how interweaving traditional and non-traditional data sets may benefit Fire Service operations. Many may ask, what is a non-traditional data set? As a Fire Service that is what we need to identify. These can be purchasing trends, healthcare data bases, rental information, business trends and more. The challenge for the Fire Service is to identify the data sets available and if, or how, these can potentially be utilized by the Fire Service, locally, regionally and nationally, to increase the effectiveness of our planning and our response. It is important to clarify that response includes Emergency Response, Public Education Response and Prevention Efforts Response as all of these responsibilities, or efforts, are conducted in response to the communities to which we serve.

Additional information can be utilized to identify trends or population shifts within the community. This information could be used to develop neighborhood targeted messaging or resource deployment of medical or fire services.

Another area of interest is in big data analytics. Big data analytics is the process of examining large data sets containing a variety of data types to uncover hidden patterns, unknown relationships, trends, and other useful information. The analytical findings can lead to more effective decision making, new opportunities, better public service, and improved operational efficiency. Big data is an evolving term that describes any voluminous amount of data that has the potential to be mined for information. Because big data doesn't fit well in traditional databases for analysis, new approaches to storing and analyzing data have emerged that rely less on data schema and data quality. Big data analytics is the analysis of large data sets in real time and it requires a platform that typically uses cloud computing. The FireCARES (Community Assessment Response Evaluation system) is such a platform and is destined to become a staple for fire service leaders in assessing impact of risks and resource deployment decisions.

Identifying Accurate Risks Within the Community:

Imagine a local Fire Administrator being able to access a data collection that he/she can utilize to identify areas of concern within their community. What if there was a multi-layered map of a specific community that can identify the types of occupancies, the age of the building stock, the location of known health risks, and a multitude of information? The layers are limited by one's imagination or available data bases.

Fire and city administrators could regularly review the community profile to determine any needed changes to policy or response coverage. Communities could potentially, and accurately, anticipate an increase or decrease in specific demands based on the current community profile.

Fire Service organizations should dedicate time and resources to build an accurate system that is accessible for communities across the country.

Accurate Reporting of Resources Utilized During Emergency Situations:

The current NFIRS records the incident encountered and various other information regarding the specific situation. What we currently do not record is the performance of our members on scene. How many members are operating, which members are operating, and what assignments they are completing, are questions that are often left unanswered.

Developing a reliable reporting system that can actually record, and report, the performance measurements of the members of the Fire Service during operations could be utilized in many possible formats. It could potentially be utilized by NFPA and FEMA to identify resource allocation or needs in addition to other possibilities. These possibilities should be thoroughly explored.

Accurate Reporting of Employee Exposures:

Today's modern fire environment utilizes an increasing number of synthetic products. This has led to a smokier and more contaminated environment for fire fighters operating on the scene of a working fire. The incidences of cancer within the Fire Service appear to be increasing annually. Due to these increases, a growing number of States and Provinces are advocating Presumptive Language legislation.

Although these legislative efforts are intended to provide a safety net for fire fighters who have contracted work related cancers, they do not automatically approve all applications. The majority of legislative efforts require careful documentation of an exposure or repeated exposures to contaminated atmospheres.

This can be a very difficult process, sometimes requiring someone to physically review a career of previous journals to document each potential incident and exposure.

Increased awareness of communicable diseases also requires a reliable documentation of the potential exposure. Developing a reliable reporting system that can accurately record each exposure a member encounters, and operates in, will assist members with necessary documentation should illness occur.

Identifying Data Sets to Utilize in Strategic Planning:

Creating a Strategic Plan for a Fire Department, or a Community, requires a great deal of time, information and resources. This plan is the blueprint on how the community will prepare to meet the demands of the public for emergency services.

For the Strategic Plan to be accurate, and applicable, it requires an accurate data set. If the community leaders, or planners, utilize inaccurate information the resulting plan could have fatal flaws. This in turn could have unintended consequences for the public. As stated above, to effectively prepare, the Fire Service needs current and accurate data not old data to prepare for the future. Utilizing old data and chasing this data, or chasing the next incident, is not a formula for success.

Determining the Value of Fire Prevention Efforts:

How do we measure the incident that does not occur? This has been a topic of conversation for many years. Members of the Fire Service intuitively understand the importance of Fire Prevention efforts. The constant challenge has been to demonstrate this importance and the level of impact to city administrators.

Fire Service organizations should research reliable methods to measure the impact of fire prevention efforts and the value provided to the community, as a whole, in relation to lives and property preserved. A model should be able to evaluate the funds invested with a measured return.

Determining the Value of Suppression Efforts:

Fire Departments have traditionally reported fire activities in terms of loss. Many in the Fire Service believe we are actually reporting our failures. How do we measure and report our successes? What is success?

As with Fire Prevention, there is value to determining a benchmark of measurements to record and report the value provided by the fire service to their communities. In Municipal and District reporting systems, administrators are looking for specific measurables usually in the form of financial gains or losses. Traditionally, the fire service has been viewed as a cost to a community. With an accurate and consistent format, the Fire Service could start reporting their value to the community. This would provide local Fire Administrators a valuable tool to identify the value of their services to their communities.

The resulting research may possibly lead to a NFPA Standard outlining a program with a consistent method of measurement and evaluation.

Reducing the Burden of Input:

A consistent complaint received from fire officers and fire fighters, who we rely on to provide accurate data into the NFIRS, is the cumbersome method of recording this information. Many times the Records Management System has limited auto-population. This requires the officer to actively enter the information pertaining to all aspects of the incident from memory or repeatedly.

Many times these reporting officers are also entering the information anywhere from a few minutes after an incident to several hours after an incident. The large set of requested data is difficult, requires officers to hand write the information, then transfer it into the Records Management System back at the station. This results in a loss of information as it is recorded by memory or best guess.

Fire Service organizations should work with software developers to reduce the input burden on fire officers. One example is to use Inspection programs to provide building and occupancy information that is pre-populated. This would reduce the burden on data collection for the officer, reduce the duplication of data entry and improve the consistency of reporting.

Industry should continue to strive to develop reliable and durable computer based equipment for use on emergency scenes for direct reporting while on the scene. This would improve the accuracy of the reporting while reducing the burden of the officer to hand record and enter the information upon return to the station.

Fire Service organizations developing partnerships with industry to provide real world input to product development may improve data reporting. The need to continue to develop consistent Fire Based Reporting programs that provide the opportunities to accurately report real time information would improve data collection and reporting.

Consistency of Terminology:

Terminology in the Fire Service can vary across the United States. In fact, terminology can vary in the same county. This has been a challenge in reviewing various data bases or reports. It can require a great deal of man hours to comb through and understand the terminology and correlations. By developing a common terminology, standard or practice, the fire service can narrow the challenges of correlating or consolidating data sets. Could this common terminology be included in NFPA 950, Standard for Data Development and Exchange for the Fire Service? It is certainly worth the discussion.

Data Center:

Who should be responsible for the collection, processing and reporting of data? There have been a number of efforts to identify who is the most appropriate responsible party. Currently the United States Fire Administration is responsible for the data collection and reporting. Some complaints have included the inability of the USFA to effect change in a timely manner or the inherent built-in bureaucratic processes and security within the federal government that limit data exchange necessary to assure timely collection, assimilation and reporting. There is limited funding to address the constant review and modifications many believe are required within the data processes.

Real discussions are needed by multiple stakeholders to outline a process that meets the changing dynamics and demands of the fire service and our requirement to collect, process and report our data. Identifying the potential multitude of collection points and applications should be identified so that a proper assessment of who can, and should, provide the centralized services can be determined. The very future of the fire service as we know it may depend on this very point.

The Fire Service has struggled with this specific issue as competing entities produce conflicting data to strengthen their purported goals. A typical example is proposed staffing levels for a community. Competing consultants utilize conflicting data points to reinforce their respective position. A Central Data Center outside the federal government would theoretically supply consistent data to drive strategic decisions.

PATH FORWARD

As the Fire Service moves forward, challenges can appear be daunting but each journey begins with a single step. By prioritizing initiatives and identifying short term goals and long term goals, the First Responder Data Group believes the leaders of the Fire Service can achieve success.

Short term goals can include:

- Establish consistent terminology throughout the reporting fire service;
- Create a multi-agency work group to begin to address Data Within the Fire Service to identify and meet these challenges;
- Continue to develop NFORS to provide a tool for measuring the operations of the fire service on emergency scenes. NFORS will collect the same incident data as NFIRS plus operational data to enhance real time decision making. This effort will permit local Fire Administrators to truly quantify cause and origin of a fire and the performance of their members on the scene. This will also assist in the accurate recording of employee exposure events;
- Develop a streamlined reporting process for the data to permit real time reporting. This will permit more accurate annual reporting and the ability for fire departments to modify response strategies or prevention programs to meet issues as they are presenting themselves.
- Revisions to NFIRS with associated interactive training programs designed to maximize reporting accuracy and consistency;
- Gather multiple disciplines to build the FireCARES database with multiple layers of data to create an accurate and efficient community risk review. This information can be very useful for administrators in developing strategic plans for efficient deployment of department resources;
- Develop durable and easy to use electronic reporting devices for use in emergency and data reporting situations;
- Develop Artificial Intelligence software to permit fire officers to dictate their fire reports. This software should be able to extract pertinent information based on the data required.
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Longer term goals may include:

- Establishing a Central National Data Center outside of the federal government for the consistency and accurate reporting of response and prevention data;
- Identify potential non-traditional databases that may assist the Fire Service planning and response strategies moving forward;
- Establish a NFPA Standard on reporting the value of prevention and Suppression efforts;
- Continue to identify additional non-traditional data sets that may be layered into Strategic Planning exercises to identify future risks or avenues for improvement;
- Develop additional resource funding to ensure NFIRS becomes more dynamic and flexible to modifications as gaps are identified;

The challenges are potentially complicated and appear difficult but members of the NFPA First Responder Data Work Group believe the Fire Service has the talent and capabilities to meet these challenges. Fire Service leaders will be required to place some individual goals to the side in order to drive cooperation and results. We all have common goals, now we need a common effort to realize these goals and improve the United States Fire Service, not only in the short term but for years to come.

Appendixes

Potential Model Reports/Tools:

The NFPA First Responder Data Group discussed creating model samples of reporting out. These reports could be monthly, quarterly or annual reports fire administrators are required to provide or should supply. We have included one sample, due to time restraints, of one report model. Possible subsequent efforts could expand these efforts to create formats that local fire administrators could populate with local information. **(See Appendix A)**

Another potential tool that could be created to provide a more consistent reporting system is an algorithm based on incident type. This algorithm could assist the reporting officer specifically identifying the coding classification for an incident. This may result in more consistent coding by field officers. The First Responder Data WorkGroup created an example based on a potential #111 Building Fire. **(See Appendix B)**

APPENDIX A

MODEL DATA REPORTS

Model Small Suburban Annual Incident Report

Calls by Type

Type of Call	2015	2014	2013	2012	2011	2010
Animal Rescue	6	3	-	-	1	-
Assist Police	6	7	5	14	7	2
Automatic Fire Alarm	76	41	66	57	71	51
Boat Fire	1	-	-	-	-	-
Burning Without a Permit	3	4	6	2	8	4
Carbon Monoxide	2	2	3	5	2	-
Cellar/Water Pumping	4	4	1	3	7	4
Dumpster Fire	1	-	-	1	-	1
Elevator Rescue	1	-	-	-	1	2
EMS	381	328	306	305	303	292
Explosion/Rupture/Overhead	2	3	4	4	4	6
Hazmat	12	7	12	8	5	9
Lightning Strike	-	-	2	2	-	-
Missing Person	-	-	1	1	-	-
Motor Vehicle Crashes versus Pedestrian	-	-	-	-	1	1
Motor Vehicle Crashes with Injury	22	28	37	21	32	35
Motor Vehicle Crashes without Injury	28	19	24	19	13	17
Motor Vehicle Fire	3	1	4	6	1	2
Mutual Aid - EMS	46	45	50	44	47	33
Mutual Aid - Fire	9	12	9	11	9	9
Mutual Aid - MVC	19	11	10	12	12	14
Mutual Aid - Other	17	18	9	10	9	4
Mutual Aid - Coverage	15	15	14	11	15	19
Oil Burner Malfunction	-	1	1	1	3	-
Other	1	3	-	1	2	-
Outside Equipment Fire	-	-	-	-	1	-
Prescribed Fire (Local and Regional)	10	-	-	-	-	-
Public Assist	34	33	11	11	21	11
Ring or Jewelry Removal	4	-	-	-	-	-
Smoke in the Building	3	4	2	3	2	-

Data in the Fire Service

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Standby/Coverage	1	1	1	-	2	1
Structure Fire	3	2	3	6	-	1
Structure Fire - Chimney Fire	-	1	3	3	3	1
Structure Fire - Cooking Fire	2	-	-	2	3	10
Structure Fire - Electrical Fire	6	3	5	2	16	4
Unfounded/Mistakes/False	22	20	26	17	27	25
Utility Pole Fire/Wires Down	10	6	14	5	12	4
Water Rescue	4	1	1	1	-	2
Weather Emergencies	1	2	19	2	-	1
Wildland Fires	5	5	5	18	9	3
Total	760	630	654	608	649	568

Comments

Comments here

Model Small Suburban Fire Department											
Inspection Data											
Inspection Type	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Smoke Detectors & CO Detectors	21	26	37	36	33	30	34	40	42	42	42
New Fire Alarm Systems	7	18	12	13	11	8	11	9	2	7	9
Oil Burner Installations	6	15	13	16	8	4	7	5	6	4	1
Oil Tank Installations	9	7	7	11	3	4	9	7	9	4	1
Oil Tank Removals	-	-	2	1	1	-	-	-	-	7	2
Propane Tank Installations	-	-	3	2	2	3	7	4	4	11	2
Fire Suppression Systems Installations	-	-	-	3	1	-	2	-	1	-	-
Propane Tank Installations - Underground	-	-	-	3	-	-	-	-	-	-	-
Fire Suppression Systems Installations - SP	-	-	-	-	-	1	-	-	-	-	-
Fire Suppression Systems Installations - SUP	-	-	-	-	-	-	-	-	-	-	1
Ammo Storage	-	-	-	-	-	-	-	-	-	-	3
Welding Permits	-	-	-	-	-	-	2	-	-	-	-
Propane Tank Installations - Above Ground	-	-	-	-	-	-	-	-	1	-	-
Fuel Tank Truck	-	-	-	-	-	-	-	-	-	2	-
Total	43	66	74	85	59	50	72	65	65	77	61
Comments											
Comments here											

**Model Small Suburban Annual Fire Loss Data Report
Fire Loss Data**

2015 Fire Loss Data by Property Type					
Incident Type	Count	Total Value	Total Losses	Total Saved	Percent Saved
Boat Fire	1	\$ 10,000	\$ 10,000	\$ -	-
Building Fire	2	\$ 205,000	\$ 4,000	\$ 201,000	98.05%
Vehicle Fire	3	\$ 11,020	\$ 11,020	\$ -	-
Total	6	\$ 226,020	\$ 25,020	\$ 201,000	88.93%

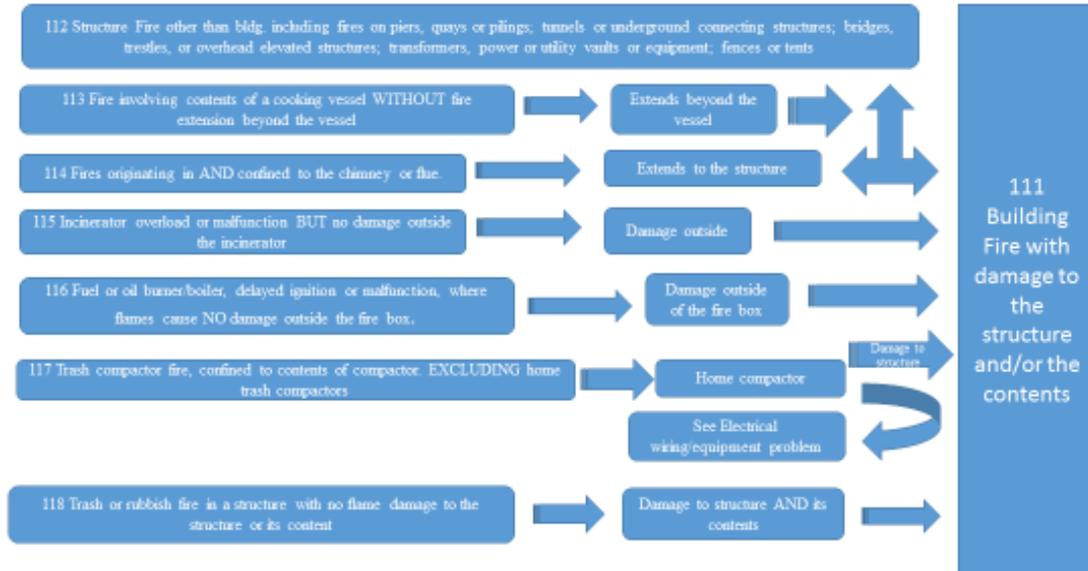
Historical Fire Loss Data by Year					
Year	Count	Total Value	Total Losses	Total Saved	Percent Saved
2010	10	\$ 9,811,000	\$ 123,000	\$ 9,688,000	98.75%
2011	6	\$ 1,853,900	\$ 15,250	\$ 1,838,650	99.18%
2012	11	\$ 2,470,200	\$ 262,600	\$ 2,207,600	89.37%
2013	9	\$ 1,668,950	\$ 371,700	\$ 1,297,250	77.73%
2014	6	\$ 817,300	\$ 215,000	\$ 602,300	73.69%
2015	6	\$ 226,020	\$ 25,020	\$ 201,000	88.93%

Comments
The fire chief can use this comments block to explain any specific losses or comment on trends.

APPENDIX B

INCIDENT TYPE ALGORITHM FOR INCIDENT REPORTING

Incident Type - 100 Structure Fires



REFERENCES

- [1] J. Flood, " The Fires: How a Computer Formula, Big Ideas, and the Best of Intentions Burned Down New York City--and Determined the Future of Cities" [Paperback]. Available: Riverhead Books (2011)