

Workshop Report: Today and Tomorrow's Fire Data

**Fire Analysis and Research Division
National Fire Protection Association**

March 26, 2014



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Background

On March 26, 27, 2014, in Gaithersburg, MD, NFPA's Fire Analysis and Research Division, in cooperation with the National Institute of Standards and Technology, facilitated a workshop to bring together the research community and major fire organizations in the United States who are leaders in the collection and use of fire experience data. Its goal was to review how we currently gather, analyze and use fire loss data and explore how we might work together to make all those processes more effective.

The workshop began with a basic overview of the National Fire Incident Reporting System (NFIRS) and the analysis methods used by USFA, NFPA and CPSC to develop national estimates of fire loss based on this data. The insurance industry and IAFC presented on other fire loss data collection activities, and a group of presentations on wildland urban interface data collection was made. Representatives of federal, state and local fire agencies then described how they use this data for decision making on resource allocation, program priorities, etc.

On the second day, several current research projects designed to enhance data collection were described, as well as NFPA standards development activity relevant to this activity. Next, a series of discussion sessions on data needs and gaps and enhanced data gathering were conducted. A final discussion session painted a picture of the future of fire loss data collection and analysis and outlined steps toward that vision. Following the workshop, participants identified their priorities for future activities designed to ensure a robust national fire data collection and analysis program that continues to meet the evolving needs of the fire community.

This Report is a summary of the workshop presentations and discussions. Appendix A consists of the participant list, agenda and presentations; Appendix B describes the detailed outcome of each of the discussion sessions on the second day of the workshop. Finally the report includes priority strategies identified by participants after the workshop.

Thanks are extended to the program committee members:

Marty Ahrens, National Fire Protection Association
Karen Deppa, National Association of State Fire Marshals
Chris Farrell, National Fire Protection Association
Anthony Hamins, National Institute of Standards and Technology
Shawn Kelley, International Association of Fire Chiefs
David Miller, Consumer Product Safety Commission
Lori Moore, International Association of Fire Fighters
Brad Pabody, United States Fire Administration
Kathleen Almand, National Fire Protection Association

and to the National Institute of Standards and Technology, in particular Anthony Hamins, Kris Overholt, and Craig Weinshenck, for hosting the workshop.

Summary of Workshop Presentations

Welcome and Workshop Charge

Marty Ahrens, National Fire Protection Association, welcomed participants to the workshop and provided the following workshop charge:

The goal of this workshop is “Collecting, analyzing, and using fire experience data to reduce the nation’s fire problem”. How can we be sure that the fire service, policy makers, codes and standards developers, life safety educators and others have the information they need to protect the public, and the firefighters who protect them, from fire? What’s working well? Where are the holes? How can we improve?

She encouraged workshop participants to provide input and recommendations for future actions and a collective response to those recommendations.

Overview of National Fire Incident Reporting System (NFIRS)

Jim Heeschen, U.S. Fire Administration, presented an overview of NFIRS, and the nine NFIRS data collection modules and their purpose. He reviewed the web based data resources at the National Fire Data Center and concluded his presentation with information on the enhancements to NFIRS which are underway and planned: a new data entry browser interface (complete); data warehouse and mining capability (limited release July 2014); and future phased updates as follows:

Phase 1- Rules and Core Services Update

Phase 2 – Web Based Modernization and GIS

Phase 3 – Vendor Integration and Incident Management Services

Phase 4 – NFIRS User and Data Interface Enhancements

Panel Session - Fire Data Analysis Approaches

Marty Ahrens, NFPA, Jim Heeschen, U.S. Fire Administration, and David Miller, Consumer Products Safety Commission presented each agency’s approach to analysis of the NFIRS data. Each builds upon a national estimates approach developed jointly by the three organizations over 25 years ago which combines the details collected by NFIRS with estimates derived from NFPA’s annual fire department experience survey. Each organization described the differences in their treatment of the national data, including the handling of unknowns in the data, and what data is and is not included in some estimates. The Panel shared several examples of excerpts of reports on national fire loss, illustrating the differences in analysis approaches. The Panel session concluded with a review of other data resources available from each organization.

Other Fire Data Collection Activities

Laura Bell and Tommy Hicks, International Association of Fire Chiefs, reported on the IAFC Near Miss Reporting System and its innovative approach to data collection, including anecdotal reporting. They are currently making modifications to incorporate a more structured format that would allow more systematic data analysis. Kevin Kuntz, Verisk Analytics, reviewed the ISO Public Protection Classification System and the data collection efforts which support the identification of community risk factors and mitigation strategies.

Wildland Urban Interface (WUI) Fire Data Collection

The speakers in this session described various approaches to fire incident data collection at the wui. Alex Maranghides, National Institute of Standards and Technology, described NIST's in depth incident investigation approach which involves collecting all data (baseline of exposed structures both damaged and destroyed) and defensive actions employed, with a goal of quantifying exposure at the structure level and reconstructing actual fire and event timelines. This approach provides a deep understanding of wui fire spread which can inform future prevention and mitigation strategies. Hylton Haynes, NFPA, on behalf of Keith Smith, USFS, described IRWIN, Integrated Reporting of Wildland Fire Information, a data integration system that orchestrates data exchange between operational applications such as state computer aided dispatch systems, the Wildland Fire Decision Support System (WFDSS), geospatial information systems, and others. He described the key challenges related to data interchange. He then reviewed the Wildland Fire Data Collection Initiative, being conducted through the National Wildland Fire Management Cohesive Strategy, a partnership between the National Association of State Foresters, USFA and, NFPA. The initiative seeks to integrate wildland fire data collection with NFIRS data collection.

Panel Session: Applying Fire Data to Policy Analysis, National Standards Development, State and Local Applications

This Panel session presented various perspectives on the use of fire loss data to inform decision making at the national, state and local level. Anthony Hamins, Building and Fire Research Laboratory, described NIST as a consumer of fire data to prioritize its research. Reliable, accurate, complete, timely data is needed on fire risk and trends over time, as well as detailed information related to causal and performance factors such as ignition, fire spread and fire protection features. Chris Farrell, NFPA, reviewed the role of fire loss data in informing standards development at NFPA and explained how people could participate in the codes and standards process. Keith McCarthy, State of Florida and president of the National Fire Information Council, described the statutory role of fire data in his state, including training, prevention, education and fire and arson information. Karyl Kinsey, Austin Fire Department, presented a local jurisdiction's view on the use of fire data, including city-wide risk analysis to allocate inspections resources, assessment of key performance measures, post incident reviews, and other uses. She also discussed some theories of how individuals select code choices when completing forms. Mike McAdams, Montgomery County Maryland, provided his perspective on the value of data at the local level and emphasized the need for collection methods that are intuitive, data that is reportable and actionable at the local level.

New Data Collection Activities/Research

Catherine Patterson, Department of Homeland Security, presented an overview of the Assistance to Fire Fighter Grants program and its two components: Fire Prevention and Safety and Firefighter Safety Research and Development. She reviewed the current size of the program and the data basis for performance measures in the program analytics. Several current research projects funded through the DHS program were then reviewed.

Karen Deppa, National Association of State Fire Marshals Foundation, described their project on *Addressing Undetermined and Missing Origin and Cause Entries in Fire Incident Reporting*. The goal of the program is to obtain better understanding of reasons behind missing data, and address barriers to reporting. She concluded with a review of the study's recommendations which focus on report updating, mitigating litigation concerns, clarifying the relationship of NFPA 921 to fire incident reports and training and resources at the local level. The project also included a strong endorsement for the next version of NFIRS to address these issues. Phil Tamarro, International Association of Fire Fighters, described their project on *Youth Fire Setting* – a pilot database development activity designed to better capture the extent of this problem. He emphasized the need to link this data collection effort to NFIRS and other data collection activities. Lori Moore, IAFF, described *NFORS – National Fire Operations Reporting System*. This pilot data collection system development focuses on operations required to manage fire incidence at the local level. In its third year, the project is focusing on data reports and software to prepare for a pilot rollout in 2015. The goal of the program is to gather data to inform and enhance local resources for response. Jennifer Taylor, Drexel University, presented the current status of their project on *Fire Injury Research and Safety Trends*. The goal of the program is to research and develop the minimum data elements necessary to conduct public health surveillance of nonfatal firefighter injuries to contribute to a comprehensive, national database. She described related recent Drexel research on the *Firefighter Near Miss Reporting System*, and the project on *Understanding Culture: Assessing the Firefighter Safety Climate*. Ed Plaughner, Chair of NFPA 950, Standard for Data Development, Exchange and Use for the Fire Service, described efforts to establish protocols that will make it possible to link different datasets.

Discussion Sessions

The remainder of the workshop consisted of three focused discussion sessions, designed to identify data needs and gaps in the current collection analysis activities and how new data gathering and integration strategies might address these needs. Finally the participants discussed a possible path forward. The full list of action items from these sessions is located in Appendix B to this summary.

Priority Strategies

Following the workshop, participants were asked to prioritize the various action items identified in these sessions both from a short term and long term perspective, and to indicate what role their organization might like to play in implementation. The four key action items identified as of highest priority by participants (for both the short and long term) were (grouped by strategies addressing the current system and strategies addressing planning for future systems):

Improve the quality of fire data input. Workshop participants gave high priority to this strategy and supporting strategies including creation of incentives for quality data reporting, improvement in usability/automation, support for NFIC, and in particular education and training for fire fighters.

Address reasons for under-reporting of fires and undetermined fire causes. Workshop participants reinforced the need to implement those strategies identified by NASFM in their DHS research study, including the need to address litigation concerns regarding incident reporting and education and training for those reporting at the local level.

Identify and link all relevant existing data systems. Workshop participants reinforced the importance of this strategy in each discussion session. Supporting strategies that were also given high priority include the development of standards for data exchange such as NFPA 950, identification of partners for data collection, avoidance of competition between NFIRS and other databases, and consideration of IRWIN as a model for a systematic strategy and design for database integration.

Develop a strategy for long term maintenance/future updates for NIFRS. Workshop participants focused on the need to create a clear list of goals and vision, to move towards a system which: is continuously adaptable to changing data needs while retaining core set of data fields for benchmarking; includes a strategy for integration of other databases; and makes use of existing formal processes, such as NFPA 901, with full community input to develop a specific path forward. All participating fire service organizations expressed an interest in collaborating to achieve this vision.



Data Workshop Confirmed Participants

Today and Tomorrow's Fire Data

Collecting, analyzing, and using fire experience data to reduce the nation's fire problem

March 26, 27, 2014

National Institute of Standards and Technology, Gaithersburg, MD

Marty Ahrens, NFPA

Kathleen Almand, NFPA

Anthony C. Apfelbeck, City of Altamonte Springs, FL

Laura Bell, IAFC

Patricia Blankenship, USFA

Nelson Bryner, NIST

Dave Butry, NIST

Richard Campbell, NFPA

Tom Cleary, NIST

Gregg Cleveland, La Crosse WI Fire Department

Karen Deppa, NASFM

Drew Dawson, National Highway Traffic Safety Administration

Chris Farrell, NFPA

Shannon Frattaroli, Johns Hopkins University

Alex Furr, USFA

Dick Gann, NIST

John Hall, NFPA

Anthony Hamins, NIST

Tom Hargrove, Scripps News

Hylton Haynes, NFPA

Jim Heeschen, USFA

Tommy Hicks, IAFC

Dave Icove, University of Tennessee

Gayle Kelch, USFA

Shawn Kelley, IAFC

Karyl Kinsey, Austin, Texas

Kevin Kuntz, ISO/Verisk

Alex Maranghides, NIST

Greg Mears, NFORS

Mike McAdams, Montgomery County Fire and Rescue

Keith McCarthy, NFIC

Tim Merinar, NIOSH

David Miller, CPSC

Johnathan Moore, IAFF



Data Workshop Confirmed Attendees

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Collecting, analyzing, and using fire experience data to reduce the nation's fire problem

March 26, 27, 2014

National Institute of Standards and Technology, Gaithersburg, MD

Lori Moore-Merrell, IAFF

Pat Morrison, IAFF

John R. Myers, NIOSH

Frank Nagy, USFA

Allison Nicodemus, Maryland SFO

Kris Overholt, NIST

Tom O'Toole, IAFF

Catherine Patterson, DHS

Ed Plaughter, Chair NFPA 950/951

Kevin Quinn, NVFC

Greg Rogers, Vision 20/20

Jennifer Schottke, ESRI

Karen Short, Fire Sciences Laboratory

Ronald J. Siarnicki, NFFF

Keith Smith, NASF

Rick Stoll, ISO/Verisk

Phil Tamarro, IAFF

Jennifer Taylor, Drexel University

Adam Thiel, Fire Chief City of Alexandria, VA

Craig Weinshenck, NIST

Michael Wieder, FPP, IFSTA



Today and Tomorrow's Fire Data

Collecting, analyzing, and using fire experience data to reduce the nation's fire problem

March 26, 27, 2014

National Institute of Standards and Technology, Gaithersburg, MD

Day 1

8:30 a.m.	Opening Remarks and Workshop Goal	Marty Ahrens, NFPA Alex Furr
	Current Fire Loss Data Activities	
8:45	The National Fire Incident Reporting System	Jim Heeschen, USFA
9:15	Panel Session - Fire Data Analysis Approaches USFA, NFPA, CPSC	Jim Heeschen, USFA Marty Ahrens, NFPA David Miller, CPSC
10:00	Discussion	
10:30	Break	
11:00	Other Current Fire Service Data Activities	
	Near Miss Reporting	Laura Bell/Tommy Hicks, IAFC
	ISO Incident collection	Kevin Kuntz, ISO
11:30	Discussion	
12:00	Lunch	
1:00	Wildland/Urban Interface Fire Data Collection	
	NIST WUI Fire Investigation Approach	Alex Maranghides, NIST
	Overview of IRWIN	Keith Smith, NASF
	Outcome of NFPA Workshop: Gaps and challenges for WUI data collection	Hylton Haynes, NFPA
1:45	Discussion	
2:15	Using Fire Data	
	Panel Session: Applying Data to: Policy Analysis, National Standards Development, State and Local Applications	Anthony Hamins, NIST Chris Farrell, NFPA Keith McCarthy, NFIC Karyl Kinsey, Austin, Texas Mike McAdams, Montgomery County, Maryland
3:30	Discussion	
4:30	Adjourn Day 1	



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March 26, 27, 2014
National Institute of Standards and Technology, Gaithersburg, MD

Day 2

8:30

New Data Collection Activities/Research

AFG Grant Projects Overview	Catherine Patterson, DHS
NFIRS Unknown Project	Karen Deppa, NASFM
Juvenile Fire Setters Project	Phil Tammaro, IAFF, MA
NFORS Project	Lori Moore, IAFF
Fire Department Data and Injury Prevention	Jennifer Taylor, Drexel University
NFPA 950 and 951: Standards for Data Development, Exchange and Use for the Fire Service	Ed Plaughner, Chair NFPA Data Exchange Committee

10:00

Discussion

10:30

Break

11:00

Discussion Session 1 -Data Needs and Gaps: What are the core questions that fire data systems need to address? What are we missing with current systems?	Facilitators: Kathleen Almand, NFPA, Anthony Hamins, NIST
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12:00

Lunch

1:00

Discussion Session 2 – Data Gathering: How do we make data gathering more efficient for the fire service? What synergies might be applied? How do we integrate new data development activities? What is the role for technology?	Facilitators: Kathleen Almand, NFPA, Anthony Hamins, NIST
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2:00

Discussion Session 3 - Preparing for NFIRS 6: What types of research and evaluation activities should be undertaken first? What type of development process might be used to ensure the best possible outcome?	Facilitators: Kathleen Almand, NFPA, Anthony Hamins, NIST
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3:30

Summary/Recommendations

4:30

Adjourn

Opening Remarks from NFPA's Marty Ahrens

Good morning. Thank you all for coming to our workshop on Today and Tomorrow's Fire Data. I also want to extend my thanks to NIST for hosting us here, and specifically Anthony Hamins for all his work behind the scenes making it happen.

I'm also grateful to Kathleen Almand, Vice President of Research at NFPA, for her support. When I mentioned that I wanted this kind of meeting. She said "We could do that. I think Anthony has also wanted to do something like this." So here we are. I also want to thank the advisory panel of Karen Deppa, David Miller, Lori Moore, Chris Farrell, Shawn Kelly, Brad Pabody and Anthony Hammins. Although Brad can't be here today, I appreciate his incredible support and Jim Heeschen's willingness to fill in for him this morning. Lastly, I am grateful to all of the speakers and to all of you who took time out of your busy schedule to be here.

The subtitle of this workshop, "Collecting, analyzing, and using fire experience data to reduce the nation's fire problem," summarizes its goal. How can we be sure that the fire service, policy makers, codes and standards developers, life safety educators and others have the information they need to protect the public, and the firefighters who protect them, from fire? What's working well? Where are the holes? How can we improve?

Each of us brings a piece of the puzzle to the table. You were invited because we believe you can help complete the picture.

America Burning was published in 1973. The authors lamented how little we actually knew about the nation's fire problem, and how poorly the information that did exist was disseminated. In 1974, the Federal Fire Prevention and Control Act established the National Fire Prevention and Control Administration, now the USFA. The National Fire Incident Reporting System, (NFIRS) was one of the primary goals. NFPA is one of the biggest users of NFIRS data. Like everyone who analyzes it or puts data into it, we see quite a few things we would like to change. We also hear regularly from international colleagues how lucky we are to have it. Is NFIRS perfect? Far from it. Could it be better? Definitely. I don't know of any data system that's problem-free. Even the US Census struggles with issues of undercounting certain populations. While we're complaining, we can forget how far we have come.

But it's also clear that there are some important questions NFIRS cannot currently answer and may never be able to answer. NFIRS focuses on fire department responses. The report essentially documents where and when the incident occurred, what the fire department did in general terms, and for fires, the causes, losses, and detection and automatic suppression status. There are issues with data quality and too many unknowns.

Local officials want to be able to evaluate how well their fire department performs in relation to others. Incident commanders need to know the implications of different staffing patterns. What tactics work better than others? NFIRS doesn't provide much in this area.

How many wildland fires are there? What are the losses? The federal and state agencies with wildland firefighting responsibilities use a very different data collection system. We don't even have clear agreement on the definition of a wildland fire.

Many firefighters have been in the firehouse when a frightened parent comes in with a kid, saying “I found him playing with fire. Talk to him.” It’s not a fire department response. We don’t know how often this occurs.

Firefighting has risks. How can we reduce them? It’s important to learn lessons from serious incidents, but it’s better to prevent that tragedy from happening.

There are lots of databases out there- fires, inspections, and so on. How can these be integrated?

Important work is being done by quite a few different groups. Much of it has been grant funded. As we know, grant funding does not last forever. How can the important research that’s being done through the AFG program be incorporated into something more permanent?

Assuming it exists, can we find the data?

How do we prevent duplication of efforts?

Those of us who do not work for the federal government can sometimes forget the constraints that federal employees work under. When USFA was developing NFIRS 5.0, they also had to maintain NFIRS 4.1. They didn’t get additional resources for the additional work. In many cases, decisions about contractors are made by people not directly involved. Data is only one small part of these agencies. Budgets are set at higher levels. If the Secretary of an agency submits a budget that does not have adequate resources for fire data needs, agency employees cannot publicly say they need more. Cyber-security is taking a bigger chunk of resources than in the past.

You’re here because you care about data. Our speakers will provide some background about the data issues they are working to address. These presentations are springboards to discussion. By the end of the day tomorrow, we should have a list of short- and long-term recommendations and action items. We will be publishing the proceedings. The people in this room represent many key stakeholders. If we can agree on a direction, we can focus our efforts. We can be so much more effective when we work together.

Once again, thank you all.

The National Fire Incident Reporting System

An Overview

Jim Heeschen, Statistician
National Fire Data Center / U.S. Fire Administration
Federal Emergency Management Agency
Department of Homeland Security

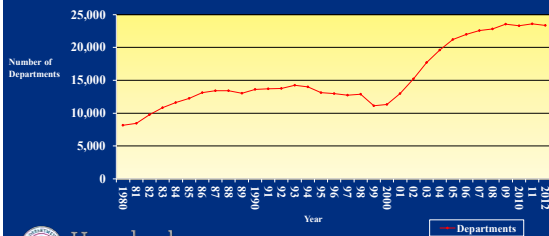
NFIRS What is the National Fire Incident Reporting System?

- Voluntary - 23,000 Departments Participate from all 50 states
- Incident-based
- Locally driven – quality, completeness, content
- More than 1.2 million fires reported for 2012
- 22 million total incidents reported for 2012

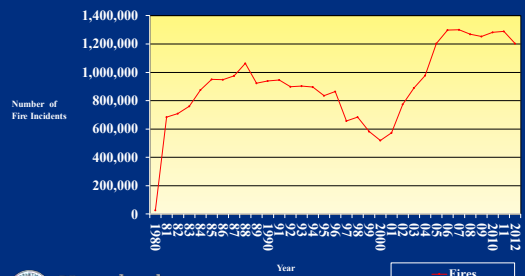


NFIRS Participation

Fire Departments Reporting Per Year 1980-2012



Fire Incidents Reported Per Year 1980-2012



NFIRS Background

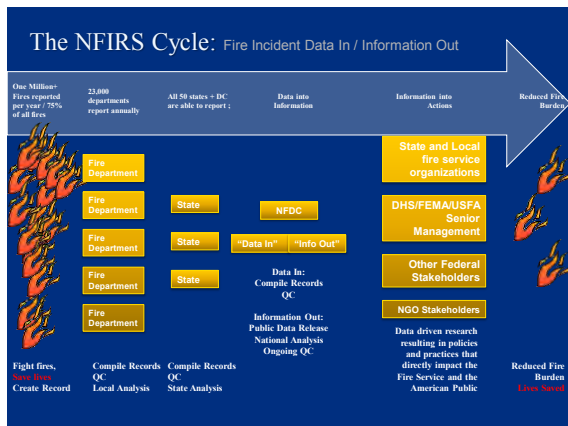
- Initial National Fire Incident Reporting System was created in 1975
 - NFIRS Version 2.0, 1976
 - NFIRS Version 3.0, 1980
 - NFIRS Version 4.0, 1985
 - NFIRS Version 4.1, 1990
 - NFIRS Version 5.0, 1999
 - NFIRS Version X.X, ????



How do we collect fire data?

NFIRS data flow





NFIRS Modules

- The **Basic Module** (NFIRS-1) captures general information on every incident (or emergency call) to which the department responds.
- The **Fire Module** (NFIRS-2) is used to describe each fire incident to which the department responds. For wildland fire incidents, the Wildland Module can be used instead of the Fire Module if that option is available by your state reporting authority.
- The **Structure Fire Module** (NFIRS-3) is used to describe each structure fire to which the department responds. This module is used in conjunction with the Fire Module.
- The **Civilian Fire Casualty Module** (NFIRS-4) is used to report injuries or deaths to civilians or other emergency personnel (e.g. police officers, non-fire department/EMS personnel) that are related to a fire incident. This module is used in conjunction with the Fire Module and, if applicable, the Structure Fire Module. Non-fire-related injuries or deaths to civilians can be reported on the EMS Module.

NFIRS Modules

- The **Fire Service Casualty Module** (NFIRS-5) is used to report injuries and deaths of firefighters. The module can also be used to report the exposure of a firefighter to chemicals or biological agents at an incident where that exposure does not result in any symptoms at that time but that manifest themselves at a later date. This module may be used with any of the other modules.
- The **EMS Module** (NFIRS-6) is completed by fire departments that provide emergency medical services. The module is used to report all medical incidents where the department provided the primary patient care. This includes incidents where there were civilian fire-related casualties and a Civilian Fire Casualty Module was completed and where there were firefighter fire-related casualties and a Fire Service Casualty Module was completed. (This module does not serve as a patient care record, but it can be used in conjunction with the local requirements for patient care.)

NFIRS Modules

- The **Hazardous Materials Module** (NFIRS-7) is completed to report spills or releases of 55 gallons or more of hazardous materials or when special HazMat actions were taken. As appropriate, the module is used in conjunction with the Fire Module or other modules to provide detailed information about incidents involving hazardous materials.
- The **Wildland Fire Module** (NFIRS-8) is completed to report incidents that involve wildland or vegetation fires. The module is used in lieu of the Fire Module for wildland fire incidents.
- The **Apparatus or Resources Module** (NFIRS-9), a department-use module, is completed to report data specific to each piece of apparatus that responds to an incident. It includes information that can be used to calculate response time and time out of service. This module is not used if the Personnel Module is used.

NFIRS Modules

- The **Personnel Module** (NFIRS-10), a department-use module, is completed to report the same information as on the Apparatus or Resources Module, but it also provides for tracking the personnel associated with that apparatus.
- The **Arson Module** (NFIRS-11) is completed to report additional information on fires that have been coded by the department as "intentionally set."
- In addition to the 11 modules, a **Supplemental Form** (NFIRS-IS) can be used to report information on additional persons and entities involved in the incident and to collect additional special studies fields. This paper-only form extends the amount of information collected in the Basic Module.

NFIRS Data Analysis

- National fire data analyses are done by USFA to answer questions about the frequency, causes, spread, and extinguishment of fires and on the causes and nature of injuries.
- Information about the national fire problem is disseminated to the public via the USFA website and published reports and analyses.

Fire Statistics

The USFA website contains statistics on fires that occur in the United States and analytical and topical reports that describe the national fire problem. Also included are statistics related to firefighters and fire departments.

<http://www.usfa.dhs.gov/statistics>



NFIRS Enhancements

In order to facilitate a modular approach to the NFIRS enhancement process, the work has been separated into discrete phases:

Completed/Imminent

- **Data Entry Browser Interface. (Complete)** This feature provides for a totally web based data entry tool eliminating the need to download and install client software on the user's computer. Use of approved 3rd party commercial software as an alternative will still be permitted. *(Released July, 2010)*
- **Data Warehouse & Mining. (Development complete)** This feature will provide flexible and efficient ways of retrieving and exporting data. *(Planned phase 1 limited release date: Summer, 2014)*



NFIRS Enhancements

Phase 1- Rules and Core Services

- Will update the NFIRS Core Services which include the NFIRS Object & Data model. In addition the Core Rules Engine will be updated.
- Additional new functionality provided includes:
 - Improved system stability.
 - Ability of states to set incidents to be released by default or on a schedule, improving speed of data availability.
 - USFA users will be able to maintain many of the system rules themselves using configurable business rules, reducing code changes and maintenance cost.
 - Users will be able to request a reset of their passwords through the system, reducing the need for support services.



NFIRS Enhancements

Phase 2 – Web Based Modernization and GIS.

- Connect Web Users Interface (UI) to the new architecture (along with UI usability enhancements)
- Develop additional data services
- Integrate ISAAC and web based user management
- Develop GIS based solutions



NFIRS Enhancements

Phase 3 – Vendor Integration and Incident Management Services.

- Develop Vendor related services and web interface
- Develop notification and messaging features
- Expose services as web services to external parties

Phase 4 – NFIRS User and Data Interface Enhancements

- The system will provide online help with user manuals, and on-screen help. In addition, tutorials on common functions will be developed to aid the users.
- The system will provide data interfaces with other organizations. The interfaces will be set up using SOA and comply with DHS/FEMA/USFA security guidelines.



NFIRS Enhancements

Once complete, changes to the system will result in the following:

- Improved user experience through improvements to the user interface.
- Improved system performance.
- Overhaul of the USFA NFIRS 5.0 system software, applications and infrastructure.
- Addition of new or enhanced capabilities to USFA NFIRS 5.0 software.
- Brings NFIRS system software in line with Department of Homeland Security (DHS) and Federal Emergency Management Agency (FEMA) enterprise standards.



Contact Information

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Fire Data Analysis Approaches

Today and Tomorrow's Fire Data

Marty Ahrens, NFPA
Jim Heeschen, USFA
David Miller, CPSC

March 26, 2014

Outline

- National estimates of the fire problem
 - NFPA survey combined with NFIRS
 - NFIRS data elements and the fire problem
 - Building vs. structure
 - Home vs. residential
 - Handling unknown, inconsistent data, partially unknown data, and “not required”
 - What’s excluded?
 - Examples

Outline (continued)

- Firefighter fatalities
 - USFA and NFPA definitions
- Incorporating other databases and data activities
 - CPSC’s use of data for regulatory activities
 - NEISS and more
 - CPSC and unreported household fires
 - USFA’s fire department census and other databases
 - NFPA’s fire service inventory and fire incident database (FIDO)
- What’s publicly available?
- Closing points

Building vs. Structure Fires

- Mobile property used as a fixed structure is considered a structure fire
- USFA
 - Generally uses building fires, omitting fires in a structure other than a building
- CPSC
 - Structure fires
- NFPA
 - Structure fires

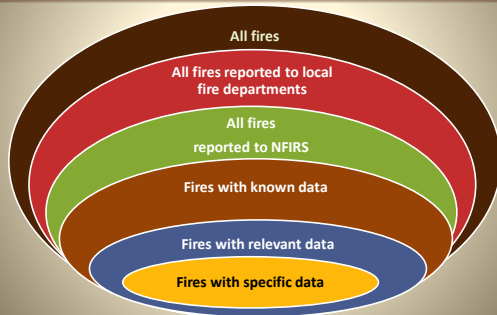
Residential vs. Home

- Residential includes
 - One or two-family homes, including manufactured homes, apartments or multi-family housing, dorms, hotels, and board and care
- USFA
 - Residential; analysis specifies type
- CPSC
 - Residential
- NFPA
 - Homes which include one-or two-family homes and apartments or multi-family housing

What gets excluded from analyses?

- USFA
 - Mutual aid given
 - Confined structure fires not excluded, dependent upon analysis
- CPSC
 - Mutual aid given
 - Confined structure fires excluded from analyses not involving products associated with confined fire incident types
 - Fires and losses from intentionally set fires (except for child play)
- NFPA
 - Mutual aid given
 - Confined structure fires are excluded from some analyses, such as electrical fires, but included in others

What is being counted, calculated?



General approaches to statistics

- Classic sample-based estimates
 - NFPA survey
 - Limited in detail
- Incomplete census
 - Only count what is actually reported
 - No adjustments for unreported fires or unknown data
- Probability model- John Hall's term to describe national estimates model with allocation of unknown data

NFPA Survey

- Allows for big-picture estimates
 - Sent to all local FDs protecting 50K or more and sample of smaller departments
 - Summary data published in *Fire Loss in the United States during...*
- Used with NFIRS to compensate for fires reported to fire departments but not to NFIRS
 - Multiplier to apply to NFIRS
 - NFPA survey results/NFIRS totals*
 - Approach described by Hall and Harwood and
 - Used by all three organizations

NFIRS data elements and the fire problem

- Broad cause categories
 - In multiple data elements, like USFA's hierarchical sort
 - Pulling from separate data elements
 - NFPA, CPSC, sometimes USFA

USFA's cause hierarchy

- Focuses on structure fires
- Integrates multiple fields
 - Initial: 35 categories
 - Mid-level: 16 categories
 - General: 7 categories
 - Pools hierarchically – “trickle down”
- Portrays broad facet of issue
- Restricts double counting
- Identifies unknowns as separate causal category

Types of CPSC analyses

- Annual Fire Loss Estimates
 - By equipment
 - By heat source/item first ignited
 - Double counting – can be a candle/curtain fire
- Estimates for individual consumer product categories

NFPA's major causes

- Done separately for each data element
 - Double counting is possible
- NFPA allocates unknown data proportionally
 - Assumes that if known, the unknown data would resemble the known
 - Non-confined and confined structure fires are analyzed separately and then summed
 - Unknowns are allocated separately for each data element

Handling unknown data

- What's considered unknown?
 - Data that's not required and often not provided
 - Little data required for
 - Structure fires with incident types indicating a confined cooking, fuel burner, chimney, compactor, incinerator or trash fire
 - Outside trash fires
 - Equipment involved is voluntary
 - Coded as "none" but heat source indicates equipment
 - Factor contributing to ignition is none
 - Partial unknowns?

CPSC Analysis Methodology

- Allocate unknowns using *raking*
 - Unknown treated to resemble the known
 - Multiple variables allocated at once without prioritizing
- Non-confined and confined analyzed separately and summed
- Intentional fires and losses excluded

Samples from published reports

- Cooking
 - Combination of cooking equipment involved in ignition plus fires with confined cooking fire incident type
 - Heating stove?
- Smoking materials
 - Heat source of: cigarette, pipe or cigar, or heat from undetermined smoking material
 - Share of "Heat from open flame or smoking materials, other?"

Cooking: USFA

- In 2009-2011 an estimated average of 165,800 cooking fires in **residential buildings** per year resulted in an annual average of
 - 125 civilian deaths,
 - 3,600 civilian injuries
 - \$324 million in direct property damage
- Includes residential building fires with hierarchical cause code "cooking"
 - Confined cooking fire in residential building
 - Non-confined with kitchen heat producing equipment involved
 - Heating stove with item first ignited cooking materials

Cooking: CPSC

- From 2009 to 2011, CPSC staff estimate an annual average of 146,700 fire department-attended residential structure cooking fires:
 - 160 deaths
 - 3,450 injuries
 - \$396 million in property loss
- Includes confined cooking fires and all specific non-confined Kitchen and Cooking Equipment codes
 - plus allocation of blank and unknown equipment
 - no allocation of "No equipment" cases

Cooking: NFPA

- In 2007-2011, an estimated average of 156,600 **home structure fires** per year resulted in an annual average of
 - 400 civilian deaths,
 - 5,080 civilian injuries
 - \$853 million in direct property damage
- Includes all confined cooking fires, non-confined fires with cooking equipment, and proportional shares of
 - Non-confined fires with equipment involved undetermined (20%), blank (40%) or coded as none without confirming heat source (17%)
 - “Kitchen and cooking equipment, other” (0.5%)

Smoking materials: USFA

- In 2009-2011, an estimated average of 7,500 **smoking-related fires in residential buildings** per year resulted in an annual average of
 - 340 civilian deaths and 975 civilian injuries
 - \$320 million in direct property damage
 - 93 percent nonconfined, 7 percent confined
- Smoking-related defined as “Smoking” category from hierarchical cause code

Smoking materials: CPSC

- From 2009 to 2011, there were an estimated annual average of 10,200 fire department-attended smoking material fires resulting in an average of
 - 450 deaths
 - 1,100 injuries
 - \$412 million in property loss
 - Includes non-confined fires only
- Includes “Cigarette”, “Pipe or cigar” and “Heat from undetermined smoking material”
 - plus allocation from “Undetermined heat source”
 - no allocation from “Heat from other open flame or smoking material”

Smoking materials: NFPA

- In 2007-2011, an estimated average of 17,900 **home smoking material fires** per year resulted in an annual average of
 - 580 civilian deaths and 1,280 civilian injuries
 - \$509 million in direct property damage
 - Includes 13,100 (73%) non-confined and 4,800 (27%) confined fires
 - Confined and non-confined fires were analyzed separately and summed
- Includes proportional shares of
 - Non-confined fires heat source undetermined (34% of fires, 57% of deaths) and 3% of heat from other open flame or smoking materials
 - Confined fires in which the heat source was undetermined 2% or not reported (81%) and 1% of heat from other open flame or smoking materials
- Does not include heat source of hot ember or ash

Unknowns cause most of difference

FIREFIGHTER FATALITIES

On-duty firefighter fatalities: NFPA

- Full census
- On-duty
 - At scene, responding to or returning from any type of alarm
 - Participating in other FD activities
 - On call or stand-by other than at home or work
- Fatalities may be due to
 - Injury
 - Illnesses such as cardiac events with exposure or onset **on-duty**
- Death may occur years after
- Definition has been in place for years, allowing for trend analysis

On-duty firefighter fatalities: NFPA

- Types of firefighters included
 - Career and volunteer local firefighters
 - Seasonal, full-time and contract employees of state and federal agencies with fire suppression as part of job description
 - Prison inmates serving on firefighting crews
 - Military personnel performing assigned suppression activities
 - Civilian firefighters at military installations
 - Members of industrial fire brigades

Firefighter fatalities: USFA

- Similar to NFPA
- Plus Hometown Heroes Survivors Benefit Act
 - Since 12/2003
 - Includes heart attacks or strokes occurring within 24 hours of “nonroutine stressful or strenuous physical activity while on-duty”
 - Adds about 10-15 percent per year
 - Also used by National Fallen Firefighter Foundation (NFFF) and Public Safety Officer Benefits (PSOB) Program

INCORPORATING OTHER DATABASES AND DATA ACTIVITIES

How CPSC uses fire data in regulatory activities

- NFIRS Fire Loss Estimates
 - Informs task prioritization
 - Estimating potential benefits from proposed rules
- National Electronic Injury Surveillance System (NEISS)
 - Estimating injuries from fires
- Injury or Potential Injury Database (IPII)
 - Assign cases for investigations
 - Learn details about types of incidents that are occurring

CPSC's NEISS

- National probability sample of hospital ERs
 - About 100 hospitals
 - Collect information about injuries (fire related and non-fire related) and consumer products
 - Variance estimates, confidence intervals, statistical inference
- Non-fire department-attended fires as well as fire department attended fires

NEISS Fire Injury Study

- Follow-up data collected on NEISS fire injuries
 - July 2002 – December 2004
 - Heat Source, Equipment Involved, Item First Ignited, Fire Department Attendance
- Most fire injuries (estimated 56% in 2003 – 2004) were in non-attended fires
- Insufficient data to support estimates for many consumer product categories
 - Hampered by low response rate

CPSC's Residential Fire Survey

- Telephone Survey of U.S. households
 - Conducted in 1974, 1984, and 2004 - 2005
 - In 2004 – 2005, of the approx. 580,000 households dialed, 916 said they had a fire in the past 90 days.
 - Estimated 7.2 million unreported fires (97% of fires) in 2004 – down from 22.9 million in 1984.
 - Fire households were compared to non-fire households
 - Unreported fires are mostly cooking fires (65%)

USFA's fire department census

- 1998 Blue Ribbon Panel/launched in 2001
- Actively managed, voluntary program
- Current directory of registered fire departments includes address, department type, website, number of personnel, and number of stations
- 26,500 fire departments registered / 88 percent of estimated fire departments

Other NFPA activities

- Fire Service Inventory
 - Source for fire department profile
- Anecdotal fire incident database (FIDO)
 - Seeks fire department report on all firefighter deaths, fatal fires, large loss fires, sprinkler activations, and other notable fires
- Needs assessment
 - Survey done every few years of fire department capabilities and resources

WHAT'S PUBLICLY AVAILABLE AND WHAT'S NOT?

USFA

- All reports and materials are free of charge
 - NFIRS Public Data Release (PDR) files
 - Topical Fire Reports
 - Fire Service training materials
 - Public Education resources
 - And More
- Website: <http://www.usfa.fema.gov/index.shtm>

CPSC

- cpsc.gov
 - Technical reports
 - Injury statistics
 - NEISS
- saferproducts.gov
 - Product-related incident reports mostly from consumers


NFPA

- Published reports and fact sheets about research are available at www.nfpa.org/research
 - We do not provide raw data or release something from a fire department unless the fire department consents

Closing points

- For national estimates
 - Different methodologies yield different results
 - While criteria vary somewhat, biggest differences are due to how unknown data are handled
- When looking at trends, be sure the definitions, methods and criteria are the same

What else?



Public Protection Classification and ISO Data

Verisk Insurance Solutions | ISO AIR Worldwide Xactware



Who is Verisk Analytics

Property & Casualty

Verisk Insurance Solutions | ISO AIR WORLDWIDE XACTWARE

Risk Analysis

3E COMPANY | C&E | Verisk Crime Analytics | Intellicorp | Verisk Climate


Healthcare

Verisk Health

Financial Services

ARGUS | interthinx | AEX


Verisk Insurance Solutions | ISO AIR Worldwide Xactware



Our Unique and Valuable Data Assets

<p>16.5B 16.5 billion records in commercial and personal lines</p> <ul style="list-style-type: none"> • Over 1,800 insurers provide data • Almost 3 billion records submitted each year <p>25 25 years of VIN auto information</p> <p>3M+ Detailed information on over 3.0 million commercial buildings</p> <p>840M+ Insurance fraud database with more than 840 million claims</p> <ul style="list-style-type: none"> • Used by >90% of the P&C industry <p>30M+ Over 30 million annual claim assignments for property losses</p> <ul style="list-style-type: none"> • Used by 19 of the top 25 insurers 	<p>90+ Models covering natural hazards in over 90 countries</p> <p>50M Mortgage analytics based on over 50 million applications, borrowers and third-parties</p> <p>67M Healthcare data-driven solutions process over 67 million claims per day and over 2 billion member claims per month</p> <p>4.75M 4.75 million Material Safety Data Sheets (MSDSs) covering hazardous chemicals in the supply chain</p> <p>1.3B Depersonalized information on 1.3 billion credit and debit card accounts</p>
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Verisk Insurance Solutions | ISO AIR Worldwide Xactware



ISO Public Protection Classification

- ISO's PPC program accurately measures the effectiveness of public fire protection for structures in more than 47,000 fire protection areas across the country
- PPC considers the overall fire suppression service capability relative to the risk in the graded area
- Better fire protection – as measured by the PPC – generally leads to a better loss experience for insured structural damage

Verisk Insurance Solutions | ISO AIR Worldwide Xactware



PPC Value for Communities

- Provides a direct and visible incentive for communities to improve the quality of their fire protection
- Promotes business / industry expansion
- Many local officials rely on PPC to assist with protection decisions
 - Budgeting purposes
 - Justification for changes and improvements
 - Free advice regarding improvements to their PPC
- Better PPC can result in insurance savings

Verisk Insurance Solutions | ISO AIR Worldwide Xactware



PPC Value for Property Owners

- Potential lower insurance premiums
- Recognition of building sprinkler systems
- Improved fire suppression capabilities
- Lower fire losses
- Competitive advantage for new business development

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PPC Value for Insurers

- Proven statistical correlation between improved PPC and lower property losses
- Help with marketing, underwriting, and pricing policies
- Identifies different rating factors
 - Properties without a public water supply
 - Automatic aid
 - Nearest recognized responding fire station

FSRs Components

- Emergency Communications (10 Points)
 - Emergency reporting methods
 - Qualifications and training of telecommunicators
 - Dispatch circuits
- Fire Department (50 Points)
 - Engine / Ladder / Service companies
 - Pump capacity / Hose / Equipment
 - Training
 - Deployment analysis (2.5 road miles for ladder-service and 1.5 road miles for engine company or NFPA 1710 evaluation)
 - Automatic aid

FSRS Components

- Water Supply (40 Points)
 - NFF evaluations
 - Capacity of water source
 - Capacity of mains
 - Hydrant distribution / Inspection of hydrants / Fire flow testing
 - Hauled water evaluations / Suction supply / Dry hydrants
- Community Risk Reduction (5.5 points)
 - Adoption and enforcement of fire prevention codes
 - Public fire safety education
 - Fire investigation programs

FSRS Geographic Database

	More than ...
FPA's	47,500
Recognized / Unrecognized fire stations	52,000 / 1,500
Automatic aid fire stations	10,500
Water supply systems	31,300 (28,000 recognized)
Hydrants	6 million
Hauled water systems	3,200
Suction points / dry hydrants	2,400



Statistical Plan Support

- Statistical Plan Support - Premium/Loss data
 - Commercial
 - Business Owners
 - Homeowners
 - Dwellings
- Construction Type (e.g. joisted masonry, non-combustible, fire resistive)
- Classification/Occupancy (e.g. offices, motel-hotel, schools)
- Public Protection Classification
- Territory – ZIP Code level

SCOPES for Commercial Properties

Specific Commercial Property Evaluation Schedule



- Methodology for specific fire rating of commercial properties
- Consistent approach to insurance pricing
- Key data for commercial property underwriting workflow
- Statistically validated
- Industry standard in the United States
- Supplied by database of 3.5 million commercial properties
- Based on COPE



Building Code Effectiveness Grading Schedule

- Code adoption and enforcement
- Promotes code compliance
- Reduction of property losses
- 1 – 10 Scale
- Over 16,000 departments and 20,000 communities
- Local / State adopted codes
- Staffing to workload
- Extent of training
- Certifications of staff
- Plan Review
- Inspections

Verisk Insurance Solutions | ISO AIR Worldwide Xactware

Questions



NIST WUI FIRE INVESTIGATION APPROACH

Alexander Maranghides
NIST

Collecting, Analyzing, and Using Fire Experience Data to Reduce the Nation's Fire Problem

NIST, March 26, 27, 2014

engineering laboratory

Typical WUI Data Collection

- Drive-by study (1 to 2 days in the field)
- Focuses primarily on destroyed structures

NIST, March 26, 27, 2014

engineering laboratory

NIST WUI Case Studies

- Collect all data (baseline of exposed structures both damaged and destroyed)
- Collect defensive actions
- Quantify exposure at a structure level
- Reconstruct event timeline
- 2 to 3 years of effort!

NIST, March 26, 27, 2014

engineering laboratory

Collecting Critical Baseline Information

Baseline* Info Will Help Focus In On The Problem Areas

* Baseline: all destroyed, damaged and undamaged homes within the fireline

NIST, March 26, 27, 2014

engineering laboratory

Post-WUI Fire Data Collection and Analysis

	Sample Population	Destroyed Structures with Wood Shake Roofs	Destroyed Structures with Spanish Tile Roofs	Typical Comparisons	
Typical (only destroyed homes)	74	12	37	16% of destroyed homes had wood shake roofs	50% of destroyed homes has Spanish tile roofs
Complete (all structures within fire line)	275	12	154		
Technically Valid Comparisons		100% of exposed wood shake roofs were destroyed	24% of exposed Spanish tile roofs were destroyed		

From NIST Witch/Guejito Report #2

NIST, March 26, 27, 2014

engineering laboratory

Timeline Reconstruction

- Technical discussions with first responders and residents
- Images and video during the fire
- Radio Logs
- Automatic Vehicle Location (AVL) systems

NIST, March 26, 27, 2014

engineering laboratory

Event Reconstruction

- Timeline reconstruction
- Pre-fire imagery
- Pre-fire LiDAR
- Post-fire imagery
- Digital Elevation Map
- Weather data
- Building construction attributes (pre and post)

NIST, March 26, 27,2014

engineering laboratory

Published Reports

NIST TN1635 (Witch #1)



- Timeline reconstruction
- Structure Ignitions
- Defensive Actions
- Methodology for future developments

NIST TN1796 (Witch #2)



- Exposure quantification!!!
- **WUI EXPOSURE SCALE**
NIST TN-1748
- Defensive Actions
- Effectiveness of Mitigation

NIST TN1708 (Amarillo #1)



- Deployment methodologies
- Damage Assessment Summary

NIST, March 26, 27,2014

engineering laboratory

Ongoing Reports

AMARILLO #2

- Fire Behavior
- "Area/Neighborhood" Case Studies

WALDO #1

- Timeline reconstruction
- Defensive Actions
- Fire Behavior

WALDO #2

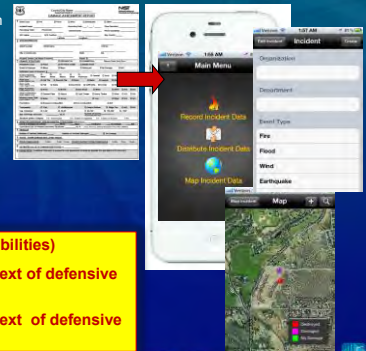
- Exposure quantification
- "Area/Neighborhood" Case Studies

NIST, March 26, 27,2014

engineering laboratory

Post Fire Data Collection

- WUI 1 I-Phone application (Beta tested at Waldo Fire, CO and CALFIRE 2013)
- WUI0, WUI 1 and WUI 2 manuals in 2013/2014



- **WUI 0 (identify vulnerabilities)**
- **WUI 1 (damage in context of defensive actions)**
- **WUI 2 (damage in context of defensive actions and exposure)**

NIST, March 26, 27,2014

engineering laboratory

WUI Data Collection

- Limited data being collected
- Pilot program with CA
- Data collection has to be in line with the mandate of the agency performing the data collection
- *Technology (like the i-pad application) is only 10% of the solution*
- Integration into NIFC* is a possible path forward for part of this data collection

* National Interagency Fire Center, Geographic Area Coordination Centers, 209 Program

NIST, March 26, 27,2014

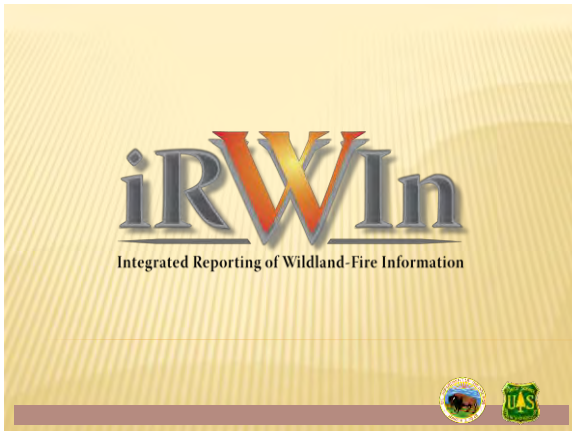
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Different Approaches – Different Results

- NIST WUI Approach
 - Trained data collectors
 - Entire event
 - Detailed local environment
 - Exposure context
 - Detailed defensive actions
 - Analysis of successes and failures
- Traditional methods (NFIRS, local data collections)
 - Limited training
 - Partial event data
 - Limited detail
 - Limited exposure context
 - Limited Defensive actions
 - Limited ability to interpret successes and failures

NIST, March 26, 27,2014

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IRWIN IS NOT



- ✘ Another username and password
- ✘ Intended to replace or eliminate existing applications
- ✘ A monolithic database of all wildland fire data
- ✘ The 100% solution to our data challenges

2

IRWIN IS...



- ✘ A capability that orchestrates data exchange between operational applications
 - + Reduce redundant data entry
 - + Increase data consistency
 - + Provide authoritative operational data

3

YEAR ONE



- ✘ First six applications
 - + WildCAD (Computer Aided Dispatch)
 - + Integrated Fire Management (IFM) – St of Alaska CAD
 - + FireCode
 - + Wildland Fire Decision Support System (WFDSS)
 - + ICS209
 - + Enterprise Geospatial Portal (EGP)
- ✘ Additional Data Integrators
 - + Remote Sensing Application Center
 - + State of Utah
 - + State of Texas

4

CURRENT STATUS

- ✘ Integrated Testing with all applications
 - + Feb 5-6; Feb 25; Mar 10; Mar 21
- ✘ Testing by dispatchers
 - + Mar 13 – IFM; Mar 20 – WildCAD
- ✘ On schedule to “Go Live” April 1, 2014
- ✘ Planned: Holistic testing centers
 - + Observation of the impacts of IRWIN on workflows
 - + Lessons learned / future focus


YEAR TWO



- ✘ Discovery and prototype
 - + Fire Incident Mapping Tools (FIMT)
 - + NWCG Unit IDs
 - + e-ISuite
 - + AK Fire Service CAD - FireBeans
 - + Unified Incident Command Decision Support (UICDS – DHS)
 - + Resource Ordering and Status System (ROSS) (new version)
 - + *NPS and FWS Fire Reporting Systems*
 - + *Inciweb*
- ✘ Live by March 2015
 - + ROSS targeted for 2017

6

OUT YEARS



- ✘ Year Three
 - + WFMI Fire Reporting (BIA, BLM, NPS)
 - + Fire Management Information System (FMIS - FWS)
 - + FireStat (USFS)
 - + FAM Web Data Warehouse
- ✘ Year Four
 - + NFPORS / FACTS
 - + InciWeb
 - + Weather (WIMS, ROMAN)
 - + Aviation (AFF)
 - + ICBS
 - + IQCS
 - + Financial Systems
- ✘ At Any Time
 - + CAD Lite
 - + Other CADS

KEY DATA EXCHANGE REQUIREMENTS


- ✘ Data Exchange Standards
 - + Provides clear definitions and common values
 - + Data must be passed in the standard

KEY DATA EXCHANGE REQUIREMENTS

- ✘ NWCG Data Standards & Terminology SC
 - + Approximately 75 approved standards
 - + 3 New Geospatial Data Layer Standards for review
 - + 21 new/revised Data Elements Standards in development
 - + Approximately 12 more to be assigned

KEY DATA EXCHANGE REQUIREMENTS

- ✘ Authoritative Data Sources
 - + Map data elements across all applications
 - + Define each application's position in a hierarchy
 - ✘ Determines which application can create or update data



Every Data Element is mapped across all applications

KEY DATA EXCHANGE REQUIREMENTS

- ✘ NWCG Data Management Committee
 - + Responsible for business data requirements
 - + Subgroups: Fire Reporting, Geospatial & Data Standards & Unit IDs

GEOSPATIAL DATA



- ✘ Conflict Detection
 - + Uses Point of Origin and Discovery Date/Time to identify potential conflicts
- ✘ Derive based on Point of Origin
 - + State, County, GACC, Point of Origin Owner Unit, Landowner Kind and Category

ENTERPRISE GEOSPATIAL PORTAL (EGP)

- ✘ Geospatial presentation of IRWIN data

The screenshot shows a satellite map of a forested area with several colored markers (blue, yellow, red) representing incidents. To the right is a data table with columns for Name, ID, and various attributes. On the left, four boxes with arrows point to specific markers on the map:

- Validated Incident**: points to a blue marker.
- Complex Parent - Large Member - Small**: points to a yellow marker.
- IRWIN Data**: points to a yellow marker.
- Potential Conflict**: points to a red marker.

THE GOOD (OR GREAT)

- ✘ IRWIN will reduce redundant data entry and provide consistent, current data across participating applications
 - + Averaging 3-5 seconds in testing to:
 - ✘ Get a FireCode from a CAD
 - ✘ Create a record in WFDSS
 - ✘ Display incident in EGP
 - ✘ Have incident available in ICS 209

THE BAD (OR CHALLENGING)

- ✘ Data exchange will require modification and standardization of existing business practices
 - + Dispatch centers and Incident Management Teams will have to adapt their business practices

THE UGLY

- ✘ We've never done this before, *it will be bumpy* and IRWIN will not accommodate every exception to the rule.
- ✘ Complexes
 - + NWCG Task Group to address Complexes this year
- ✘ NWCG Unit IDs
 - + Current Approved Unit IDs don't cover all land owners

'THE STORM BEFORE THE CALM'

- ✘ IRWIN GO LIVE target April 2, 2014

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Gaps and challenges for WUI data collection

Hylton Haynes, M.S., CF



Wildland Fire Data Reporting Initiative

- National Wildland Fire Management Cohesive Strategy – stated goals
- Partnership: NASF, USFA, NFPA
- 18 researchers, managers and analysts from federal, state and local agencies
- Organizations represented: IAFC, TFS, OFS, NH DRED, AFD, USFS, DOI, NASFM, MT DNRC, NFIC

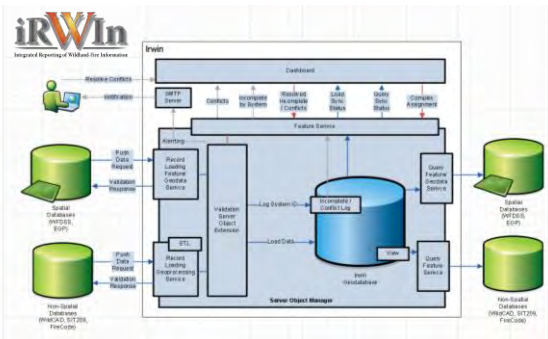
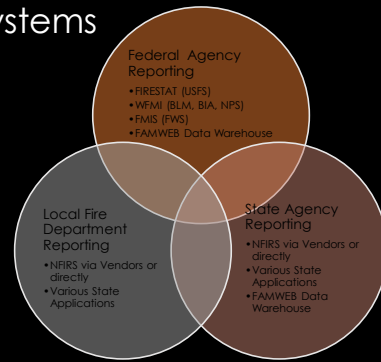


Challenge

- How can wildland fire organizations consolidate existing wildland fire agency and NFIRS fire reporting data sets effectively and efficiently to produce an accurate wildland fire risk profile?
- Simple questions like:
 - How many wildland fires occur each year?
 - How much damage do they do?
 - How many people are injured or killed by these fires?
 - How much does it cost to fight them?
 - How many structures were destroyed?



Systems



iRWin – Integrated Reporting of Wildland-Fire Information
Source: Roshelle Pederson, U.S. Department of Interior



Texas A&M Forest Service Online Fire Reporting User Interface
Source: Don Hanneman, Texas A&M Forest Service

California All Incident Reporting System (CAIRS)

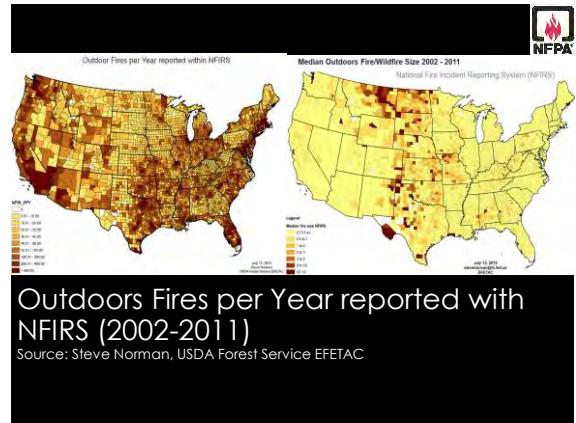
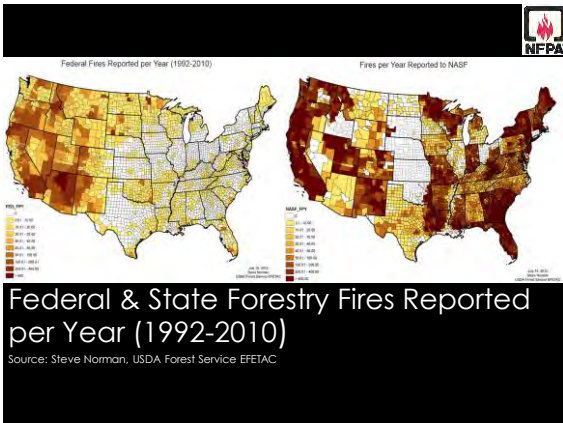
Source: Internet: <http://osfm.fire.ca.gov/cairs/cairs.php>

RESEARCH

- U.S. Fire Burden \$310 billion¹ [Year 2008]
- Wildland-Urban Interface \$14 billion¹

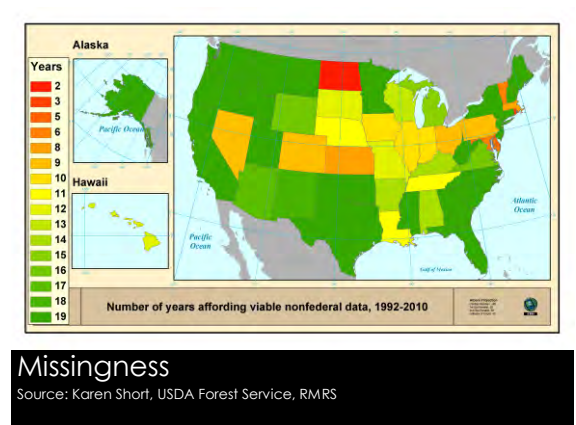
Period	NIFC	NFIRS & NFPA Survey ⁴
2002 - 2006		42% more fires per year ²
2007 - 2011	78,000 per year ³	334,200 per year ⁴

1. Hamins, et al, 2012
2. Thomas & Butry, 2012
3. National Interagency Fire Center, 2014 [Online Records]
4. Ahrens, 2013




GAPS – challenges of integration

- Lack of a standardized approach to data analysis
 - Census data analysis versus the national estimates methodology
- Multiple fire reporting systems built for different purposes
 - Resource versus incident based
 - Land management agencies may be less concerned about factors contributing to structure fires in a wildland area
- Redundancy: mutual aid conflict with AHJ (local, state or federal)
 - Inflate the number of incidents
 - Inflate the number of acres
 - No globally unique identifier



GAPS cont'd



- Geospatial precision
 - Fire Program Analysis Fire Occurrence Database [FPA FOD] fire location at least as precise as a PLSS section (Short, 2014)

Year	NASF	NFIRS
2010	50%	92%
2011	24%	82%


Public Land Survey Section [PLSS] = 640 acres

- Data integration of historical wildfire activity as required by FPA FOD was limited due to the following factors:
 - Lacking viable non-Federal records from certain States and years
 - Information seldom conforms to interagency standards
 - Reports of the same incident often exist in multiple systems, and redundant records cannot be readily identified and purged
 - Completeness of integrated dataset is difficult to gauge quantitatively

- NFIRS
 - Lack of consensus on a standardized approach to analyzing wildland fire
 - Wildland Fire Module is optional
 - Only 1/4 of fires with incident types indicating natural or cultivated vegetation fire were recorded in the Wildland Fire Module [Year 2011]
 - Many factors wildland fire agencies consider crucial are voluntary even in the Wildland Fire Module

Fire Module Incident Code	Fire Module Incident Type Code	Wildland Fire Module Incident Code	Wildland Fire Module Incident Type Code	Number (2011)	Number (2012)	Percent Change (2011 to 2012)
1247	Proportionally	240	Natural vegetation fire, other			
1248	Cultivated vegetation fire, other	542	Forest, woods, or wildland fire			
1249	Brush or brushland grass mixture	242	Brush or brushland grass mixture			
1250	Controlled burning	138	Controlled burning			
1251	Uncontrolled burning	1961	Uncontrolled burning			
1252	Prescribed fire	423	Prescribed fire			

GAPS cont'd



- No national structure loss inventory system
 - Incident Status Summary [ICS -209] reports only accounts for structure losses on large fires (i.e. > 100 acres forestland or > 300 acres grassland)
 - Incomplete methodology to capture structure loss caused by outdoor fires in NFIRS

WFDR I – action items



- Data and Terminology Standardization
- Analysis Standardization
- Data Quality and Completeness

REFERENCES



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THANK YOU

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engineering laboratory



Using Fire Data to Prioritize Fire Research to Reduce the Risk of Fire in Buildings and Communities

Workshop on Today and Tomorrow's Fire Data

March 26, 2014

Anthony Hamins
Fire Research Division



NIST: Basic Stats and Facts

- A non-regulatory agency within the Dept. of Commerce
- 2800 federal employees, 2600 associates & facilities users/yr
- Composed of four labs and three centers:
 - Physical Measurement Laboratory
 - Material Measurement Laboratory
 - **Engineering Laboratory**
 - Information Technology Laboratory
 - Center for Nanoscale Science and Technology
 - Center for Neutron Research
 - Center for Advanced Communications




Goals of NIST's Engineering Laboratory (EL)

1. Smart Manufacturing, Construction and Cyber-Physical Systems
2. Sustainable and Energy-Efficient Manufacturing, Materials and Infrastructure
3. Disaster-Resilient Buildings, Infrastructure and Communities



Expanded National Fire Research Laboratory
Site photo Feb. 2014

Fire Research at NIST

Research supporting the technical basis for:

- Measurement results
- Standard Reference Materials
- Models
- Standards and Codes
- Investigations
- Best practice guidelines
- Software decision-tools
- Databases



mechanical engineering
Taking the Measure of Hell

measurements materials models standards investigations

Prioritizing Research

- Technology-focused strategic roadmaps
- Traceable national needs
- Stakeholder input
- Focus on research impact






Prioritizing Research

NIST is a consumer of fire data to prioritize its research

Reliable, accurate, complete, timely data is needed

- Fire risk (deaths, injuries, direct losses) and trends over time
- Factors related to ignition
- Factors related to fire spread
- Factors related to losses (presence of sprinklers, alarms)

Data Sources: Mainly NFIRS as interpreted by...

- NFPA
- USFA
- CPSC
- NIST (Butry: societal fire costs & uncertainty, cost-benefit analysis of sprinklers, wildfires, furniture fires,...)

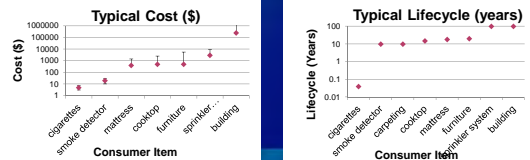
Prioritizing Research

Changing Problem Size

- How big is the problem? What are the costs/losses?
- What are the trends?

Potential Impact of Proposed Solutions

- What portion of the problem can be addressed?
- How effective is a product, technology or guidance?
- What are the barriers to development and implementation?
- Is the solution cost-effective?
- How broadly/fast will a new product/technology be adopted?



How Big is the Problem? (NFPA)

3,100 fatalities & 18,000 injuries (2010 Civilian losses)
 72 fatalities & 72,000 injuries (2010 Firefighter line of duty)
 2010 U.S. Total Cost of Fire: ~ \$330 B ± 100B (~2 % GDP)



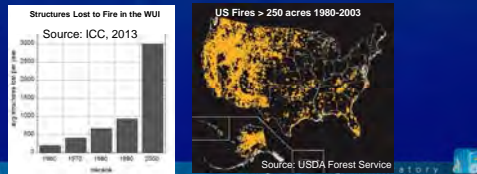
How Big is the Problem? (NFPA)

Year	Reported Fires	Civilian Deaths	Civilian Injuries	Firefighter Deaths	Firefighter Injuries	Core Cost of Fire (\$ B in 2010 dollars)
1980	3,000,000	6,505	30,200	138	98,070	\$74
1990	2,250,000	5,195	28,600	108	100,300	\$86
2000	1,750,000	4,045	22,350	103	84,550	\$102
2010	1,331,500	3,120	17,720	72	71,900	\$108

Source: NFPA, 2013

WUI fires: a growing national problem

- 70,000 at-risk and 4,400 high-risk communities (ICC)
- 60% of new homes are in the WUI (ICC)



How Big is the Problem? (NFPA)

Leading Annual Fire Losses from Home Structure Fires (2003 to 2006) NFPA, 2009

First Item Ignited	Fires	Deaths	Injuries	Property Damage (\$B)
Furniture	7,400	590	900	0.4
Mattress/bedding	11,200	380	1390	0.4
Carpet, electronics, appliances	29,400	280	1160	0.7
Structural member or component	32,500	240	620	1.3
Other furniture or utensils	6,000	170	500	0.2
Confined cooking fire/materials	134,900	130	3670	0.3
Interior wall covering	8,200	120	340	0.3
Undetermined	149,000	1910	4,440	2.5
Totals	378,600	2850	13,090	6.1

Leading Ignition Sources	Fires	Deaths	Injuries	Property Damage (\$ B)
Intentional	17,900	320	870	0.5
Smoking Materials	13,400	710	1,240	0.4
Open flame (candle, lighter, matches)	25,500	440	2,140	0.7
Electrical Distribution/Lighting	21,200	370	840	0.7
Heating Equipment	67,400	620	1,610	1.0
Cooking	150,200	500	4,660	0.8
Undetermined	83,000	90	1,690	2.0
Totals	378,600	2,850	13,090	6.1

How Big is the Problem? (NFPA)

Home structure fires account for large part of life safety problem

- 366,000 home structure fires per year (about 1/4 of fires)
- ~84 % of fire fatalities
- ~80 % of fire related injuries
- ~50 % of fire property damage
- Smoking was the leading cause of civilian home fire deaths.
- ~60% of home fire deaths were from fires in homes with no smoke alarm present (37%) or without an operating alarm (23%).
- Cooking was the leading cause of home structure fires and non-fatal home fire injuries. 42% of reported home structure fires started in kitchen.
- Upholstered furniture was first ignited in 19% of fires starting in a living room, family room or den, accounting for 45% of the deaths and 34% of the injuries

NIST Fire Research Program Objectives

2 programs, 4 thrust areas, ~20 projects:

Fire Risk Reduction in Communities: To improve the resilience of communities and structures to unwanted fires through innovative fire protection and response technologies and tactics

Fire Risk Reduction in Buildings: To increase the safety of building occupants and the performance of structures and their contents by enabling innovative, cost-effective fire protection technologies



Fire Safety Standards Research

Science-based performance metrics for the development of test methods, standards and regulations.

Consumer Products

- Standard Reference Polyurethane foam for furniture flammability
- Toxicity of commodity materials
- Reduced Ignition Propensity (RIP) Cigarettes
- Mattress flammability

Fire Fighter Safety: Emergency Equipment Standards and Guidelines

- Radios
- SCBA facepiece
- Personal Alert Safety System (PASS) device
- Thermal Imaging Cameras
- Fire fighter clothing
- Elevator use and safety
- Firefighter training standards

Public Safety

- Performance metrics for smoke alarms
- Test methods for local suppression systems for residential kitchen fire protection
- Standards for fire model validation that enable performance based codes
- Fire resistant partitions in structures
- Life Safety Code development
- Sprinkler system installation and performance
- Fire and explosion investigations

ENGINEERING LABORATORY

Investigation and Post-Fire Analysis

Earthquakes
Hurricanes
Construction/Building
Tomatoeats

Fires

- DuPont Plaza Hotel, San Juan, PR (1986)
- First Interstate Bank, Los Angeles, CA (1988)
- Loma Prieta Earthquake, CA (1989)
- Hillhaven Nursing Home (1989)
- Pulaski Building, Washington, D.C. (1990)
- Hoppyland Social Club, Bronx, NY (1990)
- Oakland Hills, CA (1991)
- Hokkaido, Japan (1993)
- Watts St. New York City (1994)
- Northridge Earthquake, CA (1994)
- Kobe, Japan (1995)
- Vandalia St. New York City (1998)
- Cherry Road, Washington, DC (1999)
- Keokuk IA (1999)
- Houston, TX (2000)
- Phoenix, AZ (2001)
- World Trade Center (2001)
- Cook County Administration Bldg Fire (2003)
- The Station Nightclub, RI (2003)
- Charleston, S.C., Warehouse Fire (2007)
- Wilca Creek Fire, San Diego, CA (2008)
- Amarillo, TX (2011)
- Waldo Canyon, Colorado Springs, CO (2012)

Purpose:

- Probable technical cause
- Lessons learned
- Improve standards, codes, practices
- Improve forensic methodologies
- Future research priorities

Authorities:

- Fire Prevention and Control Act (1974)
- NCST Act (2002)
- NIST Act (1986)
- NEHRP Reauthorization Act (1990): National Windstorm Impact Reduction Act (2004)
- Federal Response Framework

2001 WTC
2003 RI Station Nightclub
2007 Charleston Furniture Store Fire

ENGINEERING LABORATORY

Data Accuracy, Reliability and Completeness

- Measurements benefit from an uncertainty estimate
 - target areas for measurement improvement
 - provide confidence in measurement results
 - lack of accuracy can disguise the actual problem
- What is accuracy of NFIRS statistics? Are there studies?**
- Can NFIRS accuracy, reliability, completeness be improved?
- How well can trends be distinguished from "noise" (natural variation) ?
- Are there ways to mine NFIRS "undetermined" ?
- Is there a reporting bias in NFRIS?
 - optional versus required data elements
 - rural v. urban
 - volunteer versus career; etc.

ENGINEERING LABORATORY

What Would be Useful to Know?

- What was the fire timeline?
 - Layout, contents, alarms,...
- Building configuration
 - Layout, contents, alarms,...
- Fire Scene
 - How fast did the fire spread?
 - What was the exact point of fire origin?
 - What was burning when? Was it flaming or smoldering?
 - What was the ventilation conditions in the room of origin? And beyond?
- People
 - What did people do? (nothing, hide, fight fire, assist others,...)
- Technology
 - Alarms present? What kind? (dual, ionization, photo, interconnected?)
- Fire Service
 - What did the fire service do when? What were the outcomes?
 - What is the relationship between rate of FF injuries when fire alarms are functioning compared to when they are not functioning , or when first item ignited is furniture, or when,...

ENGINEERING LABORATORY

Cyber Physical Systems and Fire Fighting

NIST
SMART FIRE FIGHTING
WHERE BIG DATA AND FIRE SERVICE UNITE

24 - 25 MARCH 2014 ARLINGTON, VA

Objective: Inform the development of a Roadmap that identifies the research needed to enable the key standards, codes, technologies and best practices that accelerate Smart Fire Fighting and improve the safety and effectiveness of fire fighters

Workshop Breakout Groups

- Group 1 – Data Gathering
- Group 2 – Data Processing
- Group 3 – Decision Making
- Group 4 – Cross-Cutting (Structural)
- Group 5 – Cross-Cutting (Non-Structural)

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Traditional → Smart Fire Fighting Paradigm Shift

From:

- Information-limited decision making
- Lack of awareness
- Untapped/unavailable data
- Tradition-based tactics
- Isolated equipment and building elements
- Human operations

To:

- Global **information-rich** decision making
- Situational Awareness
- Data** collection, analysis & communication
- Data-driven** physics-based tactics
- Interconnected equipment and building monitoring, **data**, and control systems
- Human controlled & automated operations

ENGINEERING LABORATORY

Cyber Physical Systems and Fire Fighting

Under-Armour E-39 shirt
Smart clothing

adidas adizero 50 boot
Information-enriched reality

Google glasses
Camera and Quad-Rotor
Situational awareness

Autonomous vehicles

Real-time data from distributed sources

Shadow C6M Smart Hand
Robotics

Apple Iphone
Smartphone Apps

Satellite Information
UAVs

NY 311 Noise Map
"Urban Science"
Bio Data-analytics

Equiement

Jeff Chen & Jeff Roth, Analytics Unit, FDNY

FireCast

A Data-Driven Predictive Risk Engine

Mar 2013: 1.0 Basic risk model
Employee Citywide

Jul 2013: 2.0 Parametric model deployed

In Development: 3.0 Predictive Risk Engine

Version 1.0

- Focus on platform development
- Predictive weights based on focus group surveys
- Right factors, wrong weights

FDNY's Proof of Concept

- Weights based on statistical model
- 13 building factors

FDNY Next Generation Model

- 2,400 variables and three incident types
- Weights derived from advanced data mining
- Requires interagency data feeds

A predictive building fire risk engine for NYC's annual building inspections

Jeff Chen & Jeff Roth, Analytics Unit, FDNY

FDNY Building Inspections

- 330,000 buildings in inspection portfolio
- 10% inspected per year
- 9 hours of inspections/week by each company

FDNY Tech
Pre-March 2013

Jeff Chen & Jeff Roth, Analytics Unit, FDNY

Fire + Hot Spots

Residential Fires
(One + Two Family Homes)

Commercial + High-rise fires
(FireCast universe)

Jeff Chen & Jeff Roth, Analytics Unit, FDNY

Risk Sequence of FDNY Battalion 2

← Time →

↑ Battalion ↓

FireCast 3.0

Summary

- Data is used to select NIST's research portfolio
- Data, information, and knowledge are critical to the future of fire fighting and fire protection engineering
- Emerging technologies present tremendous opportunities to enhance fire fighting safety and effectiveness

mechanical engineering
Taking the Measure of Hell

measurements materials models standards investigations

**FLORIDA FIRE
INCIDENT REPORTING SYSTEM
USING FIRE DATA
FOR STATE APPLICATIONS**



**PRESENTATION
BY
KEITH MCCARTHY**

Florida Statute 633.136

- The Fire and Emergency Incident Information Reporting Program is created within the division which shall:
 1. Establish and maintain an electronic communication system capable of transmitting fire and emergency incident information to and between fire protection agencies.



Florida Statute 633.136 Continued

2. Initiate a Fire and Emergency Incident Information Reporting System that shall be responsible for:
 - a. Receiving fire and emergency incident information from fire protection agencies.
 - b. Preparing and disseminating annual reports to the Governor, the President of the Senate, the Speaker of the House of Representatives, fire protection agencies, and, upon request, the public. Each report shall include, but not be limited to, the information listed in the National Fire Incident Reporting System.
 - c. Upon request, providing other states and federal agencies with fire and emergency incident data of this state.

Florida Statute 633.136 Continued

3. Adopt rules to effectively and efficiently implement, administer, manage, maintain, and use the Fire and Emergency Incident Information Reporting Program. The rules shall be considered minimum requirements and shall not preclude a fire protection agency from implementing its own requirements which may not conflict with the rules of the division.
4. By rule, establish procedures and a format for each fire protection agency to voluntarily monitor its records and submit reports to the program.

Florida Statute 633.136 Continued

5. Establish an electronic information database that is accessible and searchable by fire protection agencies.
 - (2) The Fire and Emergency Incident Information System Technical Advisory Panel is created within the division. The panel shall advise, review, and recommend to the State Fire Marshal with respect to the requirements of this section. The membership of the panel shall consist of the following 15 members:
 - (a) The current 13 members of the Firefighters Employment, Standards, and Training Council as established in F.S. 633.402.
 - (b) One member from the Florida Forest Service of the Department of Agriculture and Consumer Services, appointed by the director of the Florida Forest Service.
 - (c) One member from the Department of Health, appointed by the State Surgeon General.

Chapter 69A-66.001

Florida Fire Incident Reporting System (FFIRS), means the Florida statewide fire data information system that resides within the Division of State Fire Marshal, Department of Financial Services. FFIRS works in collaboration with NFIRS to report and analyze fire incidents.

- (1) The purpose of these rules is to establish standards and procedures for fire department reporting of fire incidents to the Division of State Fire Marshal.
- (2) The standards and procedures contained in these rules apply to the Division of State Fire Marshal and to each fire department in the State of Florida participating in the Florida Fire Incident Reporting System (FFIRS) program.
- (3) FFIRS is a means for fire departments to report and maintain computerized records of fires and other fire department incidents in a uniform manner. By participating in the FFIRS program, fire departments become a part of the cooperative effort among fire organizations to make Florida a safer state.
- (4) These rules are minimum requirements and do not preclude a fire protection agency from implementing its own requirements which shall not conflict with these rules.

CHAPTER 69A-66 Continued

- 69A-66.002 Definitions
- 69A-66.003 Training
- 69A-66.004 Submission of Fire Incident Data
- 69A-66.005 Submission Deadlines for Fire Incident Data
- 69A-66.006 Reporting
- 69A-66.007 Fire Department Identification (FDID) Number

The Florida Fire Incident Reporting System Section has submitted an average of 2.3 million incidents to the NFIRS database annually over the past 5 years.

How do we apply so much information to state applications?

STATE APPLICATIONS

“To reduce the loss of life and property to fire and other disasters statewide through internal and external leadership, standards and training, prevention and education and fire and arson investigation.”

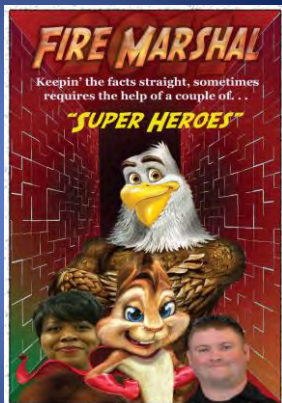
- Create and Respond to Queries.
- Fulfill Public Records Requests.
- Perform Research Request.
- Publish and produce the Division of State Fire Marshal's Annual Report "Florida Fires."
- Provide Local Fire Departments with reports, statistical data to justify budget proposals, additional station location, and where to house special operations equipment.
- Verify statistical data for eligibility of federal grants and assist survey completion.
- Analyze compliance of rules and laws.
- Report the status and progress of FFIRS to The Fire and Emergency Incident Information System Technical Advisory Panel.
- Identify trends and evaluate fire prevention programs.
- Track the fire departments participation in the FFIRS program.
- Identify training needs within local departments.
- Assist in investigative reports on fire deaths and injuries.

LOCAL APPLICATIONS

“The Annual Report provides the Fire Departments within the state with comprehensive data in educating the general public.”



CREATED BY
THE FFIRS SECTION
SUPER HEROES



Austin Fire Department
 Planning & Research Section
 Karyl A. Kinsey, Ph.D.



Analysis and opinions expressed here are those of the author and do not reflect an official position of the Austin Fire Department

How does Austin use NFIRS data?

- Open records
- City-wide risk analysis to allocate inspections resources
- To assess a handful of key performance measures
 - % of fires confined to room of origin
 - # of fires
- As one of several resources for finding fire fatalities and injuries
- Post-incident reviews (apparatus & NFIRS narratives)
- Respond to media requests / brief our Public Information Officers
- Industry surveys (e.g., NFPA, ICMA)

How does Austin use NFIRS data?

- Cautiously
- Lots of variety in how officers code incidents
- Narratives are invaluable in clarifying how well code measures what it is meant to measure

Local examples:

- 100 codes & room of origin measure
- Undercounts of smoking and fireworks fire causes
- Carbon monoxide calls often really false alarms

- **Data quality a continuing issue, no easy solutions**
 - Competing data bases, data silos – NFIRS not the main “database of record” for arson, firefighter injuries, civilian injuries.
 - Limited resources for integrating databases, improving training, and building in quality control
- **But even with more resources, there would still be data reliability issues**
 - At AFD, even the data “champions” have difficulty agreeing on what’s the best coding decision
 - Problems inherent in the structure of the coding scheme itself
 - “Miscodes” often make sense, they aren’t unreasonable or random, they just aren’t reported the way the creators of NFIRS 5.0 intended.

NFIRS 5.0 is a **categorization system** structured in a highly analytic fashion with many detailed codes

NFIRS field name	# of codes
Incident type	176
Property use	153
Actions Taken	66
Area of fire origin	84
Item first ignited	78
Heat source	37
Ignition factor	55
Equipment involved in ignition	286

NFIRS is a “thinking slow” coding scheme for a “thinking fast” occupation

(Kahneman, 2011)

Research in cognition identifies two alternate modes of information processing humans have developed

- **Thinking slow** – deliberative, thorough, analytic, break into component parts, consciously weigh alternatives – “rational decision making”
- **Thinking fast** -- environmental cues trigger pre-existing categories stored in memory that are linked to action plans, scripts. Happens automatically -- seems “intuitive”

Early research focused on the limits of “thinking fast”

- Tend to think especially memorable events are more likely to happen than they really are (plane crashes, murders)
- Initial judgment shapes what gets paid attention to later on (confirmatory biases)
- Tunnel vision, lose sight of the big picture because too focused on detail

Fire commanders use *recognition- primed* decision making

- Under time constraints, people don’t consider and weigh alternate options
- Instead, they recognize patterns in environmental cues that match prototypes stored in memory.
- Prototypes have associated actions and scripts (mental models) that become the basis for decisions
- Prototypes and mental models become more sophisticated with experience – expertise matters

Example:

Fire and smoke-related incident type codes scattered. Hostile fires in the 100 series, controlled burns and smoke-related in the 500 & 600 series.

- Similar stimulus conditions (smoke), codes far apart

Lately, greater appreciation of the value of thinking fast

- One of the first studies to point to the benefits was Gary Klein’s 1985 study of fire commanders
- Purpose was to try to understand how decisions were actually made in real life under time constraints
- Funded by the military, which wanted to know why their commanders were not using decision aid tools developed for the battlefield

Well, what does this have to do with NFIRs?

- NFIRs clearly organized in the first mode, very analytic and deliberative
- Reflects a fire researcher’s way of looking at the world, not a firefighter’s
- Minimal use of cues, prompts, reminders.
- Grouped in ways that may not reflect the way firefighters experience incidents.

Oddly enough, NFIRs 5.0 only indirectly measures some of its “biggest” concepts

- Key divisions of structure versus non-structure fires and categories of fire causes are not asked directly
 - Yet officers readily refer to these concepts in their narratives
 - Despite all the focus on fire, there are no fields asking what was the state of the fire upon arrival.
- “Big concepts” are only created at the data analysis or report stage, by aggregating groups of codes
 - Structure fire= Incident types 111-123
 - USFA’s cause matrix

Recommendations for developing NFIRS 6.0

- Sponsor cognitive mapping studies of how firefighters actually categorize incidents
 - Text analysis of NFIRS narratives; cluster analyses of key words and concepts coded
 - Card-sorting techniques utilized by cognitive researchers (web-based versions available)
 - Look for **shared** category structures
- Re-structuring coding scheme to emphasize recognition over recall
 - A coding rule documented only in the Complete Reference Guide will never be as effective as a coding rule that is built into the question wording and flow
- Replace long code lists with branching tree structures (more fields, fewer codes per field).
 - Working memory can handle 5 to 9 items at a time (“The magic number 7 plus or minus 2,” Miller, 1956)
- Consider organizing more as an interview than a form
 - Survey researchers have a great deal of experiencing eliciting information and many are well aware of cognitive research
- Usability testing (Test, rinse, repeat.)

With the right investment of time and resources up front, we can develop a new NFIRS that is both:

- Intuitive for firefighters – let’s them tell the story of their experiences
- Provides reliable data for fire research and for the fire service

Collecting, analyzing and using fire data to reduce the nations fire problem.

March 26, 2014

Goals

- Discuss data from the local fire lens
- Discuss collection methods
- Discuss definitions
- Process of data at the fire house

Collecting data

Title	Complexity	Time	View
Firefighter Rescuer	Data few	3 -5 minutes	1
Firefighter EMT	Data some	5 - 8 minutes	1
Firefighter Paramedic	Data most	12 minutes plus	1

Process of input

- Desktop
- Mobile Device
- I phone



Choosing the words

Definitions (What is the correct word)

Engine 3 people
Ladder Truck 3 people
Special Service 3 people

This is important to compare the same elements.



Feedback to personnel

What are the elements in the run sequence the station personnel can change?

- Phone to dispatch.
- Turnout time.
- Travel.
- Arrival on the scene.

Daily Reporting

Building Fire	Alert Call to Alert	Turnout Out the door	Enroute Traveling	AOS Wheels stopped
E1	1:30	1:16	2:29	
E2	1:30	2:06	3:12	
T1	1:30	:34	2:50	

Link the data to value

1. Collection methods that are intuitive.
2. Data that is reportable.
3. Data that is actionable.



Grant Programs Directorate
Assistance to Firefighters Grant Program
March 26, 2014



FY 13 AFG \$335 million
FY 14 AFG \$340 million



FY 13 AFG \$335 million
FY 14 AFG \$340 million



FY 13 AFG \$32 million
FY 14 AFG \$34 million

Fire Prevention and Safety

- General education and awareness
- Code enforcement and awareness
- Fire and arson investigation
- National/state/regional programs and studies

Firefighter safety research and development

- Clinical studies
- Technology and product development
- Database system development
- Dissemination and implementation research
- Preliminary studies.

AFG Application Summaries 2010 thru 2013

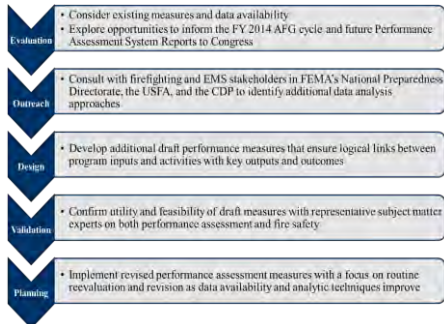
Service Areas, Department Types, and Activity Quantities

AFG	2010			2011			2012			2013
	Submitted	Awarded	% Awarded	Submitted	Awarded	% Awarded	Submitted	Awarded	% Awarded	Submitted*
Total No. of Applications Submitted	15,211			16,494			11,057			10,655
Service Area										
Rural	12,189	1,264	10%	12,011	934	8%	8,259	1,607	19%	7,112
Suburban	2,874	651	23%	3,118	458	15%	2,357	583	25%	2,242
Urban	1,948	301	15%	1,365	317	23%	1,041	300	29%	1,281
No. of Applications Awarded		2,016			1,709			2,490		
Department Type										
All Paid/Carver	2,363	565	24%	2,588	517	20%	2,040	546	27%	1,978
All Volunteer	8,828	1,212	14%	8,440	542	6%	5,659	1,079	19%	4,965
Combination	3,896	961	25%	4,220	574	14%	3,128	696	22%	2,933
Paid On-Call / Dispatch	1,144	178	15%	1,246	76	6%	678	169	25%	712
Activity										
EMS Equipment	11,730	523	4%	10,115	327	3%	372	52	14%	366
EMS Training	17,027	810	5%	6,375	1,177	18%	70	8	11%	46
Equipment	398,399	134,873	34%	375,167	107,517	29%	4412	1,267	29%	4,239
Facility	53,802	12,844	24%	14,748	26,981	18%	536	84	16%	466
PPF	477,411	94,306	20%	114,746	40,769	35%	3,958	1,052	27%	3,904
Training	78,661	27,797	35%	101,972	91,639	90%	954	310	32%	726
Vehicle	5,580	416	7%	5,931	313	5%	3,959	101	3%	3,036
Wellness	11,524	5,099	44%	18,144	4,316	24%	185	78	42%	109

*FY2013 submission numbers do not include State Fire Training Academy applicants

*FY2012 activity specific data is based on applications, FY2010-2011 is based on units

Performance Measures



AFG - SAFER - FP&S

Thank You!



Grant Programs Directorate
Assistance to Firefighters Grant Program
March 26, 2014



FY 13 AFG \$335 million
FY 14 AFG \$340 million



FY 13 AFG \$335 million
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FY 13 AFG \$32 million
FY 14 AFG \$34 million

Fire Prevention and Safety

- General education and awareness
- Code enforcement and awareness
- Fire and arson investigation
- National/state/regional programs and studies

Firefighter safety research and development

- Clinical studies
- Technology and product development
- Database system development
- Dissemination and implementation research
- Preliminary studies.

AFG Application Summaries 2010 thru 2013

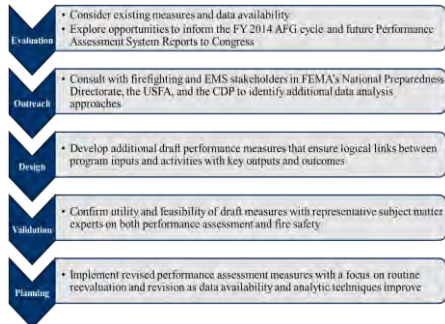
Service Areas, Department Types, and Activity Quantities

AFG	2010			2011			2012			2013
	Submitted	Awarded	% Awarded	Submitted	Awarded	% Awarded	Submitted	Awarded	% Awarded	Submitted*
Total No. of Applications Submitted	15,211			16,494			11,057			10,655
Service Area										
Rural	12,189	1,264	10%	12,011	934	8%	8,259	1,607	19%	7,112
Suburban	2,874	651	23%	3,118	458	15%	2,357	583	25%	2,242
Urban	1,968	301	15%	1,365	317	23%	1,041	300	29%	1,301
No. of Applications Awarded	2,016			1,709			2,499			
Department Type										
All Paid/Carver	2,363	565	24%	2,588	517	20%	2,040	546	27%	1,978
All Volunteer	8,828	1,212	14%	8,440	542	6%	5,659	1,079	19%	4,965
Combination	3,896	961	25%	4,220	574	14%	3,128	696	22%	2,933
Paid On-Call / Dispatch	1,144	178	15%	1,246	76	6%	678	219	32%	712
Activity										
	Unit Qty REQUESTED	Unit Qty AWARDED	% Awarded within Activity	Unit Qty REQUESTED	Unit Qty AWARDED	% Awarded within Activity	Applications REQUESTED*	Applications AWARDED*	% Awarded within Activity	Applications REQUESTED*
EMS Equipment	11,730	523	4%	10,115	327	3%	372	52	14%	306
EMS Training	17,027	193	1%	6,375	1,177	18%	70	8	11%	46
Equipment	398,399	134,873	34%	375,167	107,517	29%	4412	1,267	29%	4,239
Facility	53,802	12,844	24%	14,748	26,981	18%	536	84	16%	466
PPF	477,411	94,306	20%	114,746	40,769	35%	3,958	1,052	27%	3,904
Training	78,661	27,797	35%	101,972	91,639	90%	954	310	32%	726
Vehicle	5,580	416	7%	5,931	313	5%	3,993	101	3%	3,036
Wildness	11,524	5,099	44%	18,144	4,316	24%	186	78	42%	109

*FY2013 submission numbers do not include State Fire Training Academy applicants

*FY2012 activity specific data is based on applications, FY2010-2011 is based on units

Performance Measures



AFG - SAFER - FP&S

Thank You!

Conquering the Unknowns: Addressing Undetermined and Missing Origin and Cause Entries in Fire Incident Reporting

TODAY AND TOMORROW'S FIRE DATA WORKSHOP

MARCH 27, 2014
GAITHERSBURG, MD



Karen F. Deppa
NASFM Foundation

Project Overview

- **General recognition that our nation's fire data is hampered by high percentage of missing and "undetermined" responses in the causal factors sections of National Fire Incident Reporting System (NFIRS) reports**
 - Causal factors include ignition source, heat source, factors contributing to ignition, area of origin, equipment contributing to ignition

Project Overview

- **NFPA Home Structure Fires Report (Ahrens, April 2013)**
 - For non-confined home structure fires, cause of ignition known in:
 - × 70% of the fires
 - × 43% of the civilian deaths
 - × 68% of the civilian injuries
 - × 57% of the direct property damage
 - Factor contributing to ignition coded as none, undetermined or left blank in:
 - × 47% of the non-confined home structure fires
 - × 66% of the associated deaths
 - × 45% of the associated injuries
 - × 55% of the associated direct property damage

Project Overview

- Anecdotes and hypotheses about why this is so – but real need for more and better data
- **Grant to NASFM Foundation from FEMA's Assistance to Firefighters Grants – Fire Prevention & Safety Program, FY 2011**
 - Final report issued January 2014

Project Overview

- **Goals**
 - Obtain better understanding of reasons behind missing data, or excessive use of "undetermined" or "none" in causal factors section of fire incident data reports
 - Report on findings, emphasizing how departments can overcome barriers to more effective fire incident data reporting
 - Identify gaps in available resources to educate/train fire department personnel on complete and accurate recording and reporting of fire incident data

Project Overview

- **What We Did**
 - Appointed Advisory Committee
 - Collected fire department policies, guidelines, communications on fire incident data collection
 - Conduct in-depth interviews with personnel who input fire incident data (20 departments in 8 states)
 - Administered online survey to confirm issues from in-depth interviews (~3,500 responses from 43 states)
 - Conducted in-depth interviews with data specialists in non-fire professions

Identified Problem/Gap

- Associated Recommendation
 - Possible strategies to address the recommendation

Available information about investigated fires is too often not included or underreported in NFIRS

- Close the Loop
 - Dispel misconception that reports cannot be updated in NFIRS once submitted.
 - Enable investigators to update fire incident data reports.
 - Assign one department member to update fire incident reports and follow up after investigations.
 - States that complete investigations for departments should send them the final report and encourage NFIRS update
 - Link NFIRS and other related databases (e.g., BATS) to avoid redundant data entry.

Some incomplete cause and origin data reflects a hesitation to declare a cause due to liability concerns

- Clear the Litigation Cloud
 - Provide option of indicating a level of certainty that underlies causal determinations
 - Inform instructions with a formal interpretation of NFPA 921 to clarify levels of certainty for different types of incidents
 - Provide immunity from liability for those who report fire **incident data while acting “in good faith and without malice”**
 - Explore whether incident reports and investigation reports are treated differently in lawsuits and courtrooms – is it valid to make a distinction?
 - **Form a “brain trust” of trained investigators to share expertise/resources, and collaborate on investigations**

NFIRS training does not convey the importance of data collection; belief that NFIRS reports end up in a “Black Hole”

- Fill the Black Hole
 - Training for chiefs, officers, front-line personnel on concepts and reasons behind the need for reporting
 - Training on how fire incident data can be used to advance fire prevention and suppression goals
 - Offered at no cost where possible
 - Use of alternative training formats (online, video, smartphone)

The current NFIRS system is viewed as overly complex and not user-friendly

- If the System Is Broke, Fix It!
 - Time for NFIRS 6.0!
 - Codes that reflect incidents that modern departments face
 - Simple, user-friendly design
 - Use of modern technologies and capabilities
 - Examples of model reports for different incident types
 - Option for Turbo-Tax-style interview vs. form
 - Standardized software language and process to certify vendors
 - Rigorous testing of redesign for validity, reliability, use-ability
 - Clear instructions for how departments can get reports on their own data back out of the system
 - **Model “user” reports**

Protocols and systems to improve QA/QC in fire incident reporting are needed

- Put In Quality Data, Take Out Quality Data
 - **Designate a “Data Champion” in the department to be responsible for quality assurance/quality control**
 - **Provide a way for departments to report “no incidents”** periodically vs. not reporting at all
 - Emphasize importance of dedicated State NFIRS Program Managers to work with departments
 - Adopt a Standard Operating Procedure/Guideline on completing incidents reports and review regularly with personnel
 - Revitalize NFIC with a focus on developing strategies and training to improve the quality of NFIRS data

Thank You!

- Questions?
- Full report at <http://www.firemarshals.org/resources/fireincidentdatacollectionresearch.html>
- For more information:
Karen Deppa, Director of External Relations,
NASFM Fire Research & Education Foundation,
kdeppa@firemarshals.org



National Youth Firesetting Database Project

Phil Tammaro

IAFF 3rd District Burn Coordinator
YFS Database Project Manager



INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS CHARITABLE FOUNDATION

The Problem of Youth Involved Fires

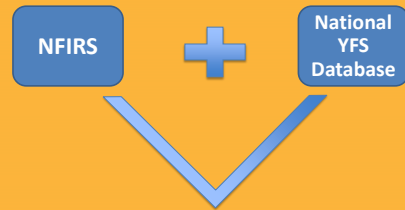
- Current sources for incidence data incomplete
 - NFIRS: Requires fire dept. response
 - Local or regional programs
- 2011 NFPA report "Children Playing with Fire"
 - 53,000 fires, 110 civilian deaths, 880 civilian injuries, \$286 million property damages
- Expert consensus = Major under-reporting issue



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Example: Non-fire service YFSI program > only 25% referrals from fire depts.



True National Scope of the YFS Problem



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AFG FP&S Grant Project



- Phase I – FY 2010
 - Develop "framework" for future comprehensive database
 - Bring together key stakeholders: brainstorm & consensus
 - Document need for national database
- Phase II – FY 2011
 - Research existing YFS databases
 - Create YFS Data Dictionary
 - Pilot test YFS data collection system



INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS CHARITABLE FOUNDATION

Multidisciplinary Advisory Committee

- | | |
|--------------------|---|
| • Jim Crawford | Vision 20/20 |
| • Marty Ahrens | NFPA |
| • Brad Pabody | USFA National Fire Data Center |
| • Karen Deppa | National Association of State Fire Marshals |
| • Justin Dillard | Image Trend Software |
| • Sanjay Kalasa | Firehouse Software |
| • Martin King | West Allis, WI Fire Department |
| • Karla Klas | University of Michigan Trauma Burn Center & ABA |
| • Don Porth | SOS FIRES |
| • Gerri Penney | Palm Beach County Fire Rescue, NFPA 1035 |
| • Paul Schwartzman | Finger Lakes Regional Burn Foundation |
| • Tom Flamm | IAFF Charitable Foundation |
| • Phil Tammaro | IAFF Charitable Foundation-Burn Fund |
| • Brent Smith | Cedar Rapids, Iowa Fire Department |



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Summary of Nationwide Precursory Research on Existing YFS Databases		
Contacted -- States and/or known major YFS programs	91% response rate	65
Responses Received (includes Martin King's previous research inquiry as applicable)		59
National Database		4
States Reporting Existing Statewide Database		7
States Reporting Plans Underway to Develop Statewide Database		11
NFIRS or No Electronic Database	70% No database; NFIRS; or spreadsheet	28
Basic Database (i.e. spreadsheet)		13
"Advanced" Database		8
Provided Screenshot Examples of Database		16
Provided Data Collection Sheet		16
Propose to Include in Phase 2 Review		4 - 7*
Potential Pilot Group		18

*Note: Burn NTRACS/NBR not included in this number. Not YFS, but model example of comprehensive, flexible secure local program database (Burn NTRACS registry) with annual upload of mandatory minimal data set to de-identified national database (NBR).

Database Dictionary

Minimum Dataset

1. Gender
2. Age at time of incident
3. Grade in school at time of incident
4. Youth address- zip code
5. Previous firesetting incidents by youth
6. Family type of youth
7. Day of week of incident
8. Time of day of incident
9. Location of incident
10. Ignition source
11. First item ignited
12. Associates involved in incident
13. Referral to program initiated by
14. Final disposition of case
15. Was an incident report created in NFIRS



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Next Steps

- Develop demo database into robust live product
- Expand basic national database into local program case management (must benefit locals)
- Acquire long-term funding & managing organization
- Research project: Pilot data compared to NFIRS
- Recommendations on potential NFIRS revisions for better data capture



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Integration into Other Fire Data Collection

- NFIRS: simple checkbox "youth involved" would greatly increase data capture & YFS incidence reporting
- Fire service doing YFSPI work, but not being reported centrally = funding, staffing, support barriers
- Accurate data might alter priority CRR issues: Iowa example
- Clearer picture of schools & hospitals not reporting incidents & injuries



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Gaps and Barriers

- Known problem for over 35 years
- Funding and "ownership"
- No data, no problem, no money
- Unique database, no benchmark model: Integrating interests of multiple disciplines and agencies



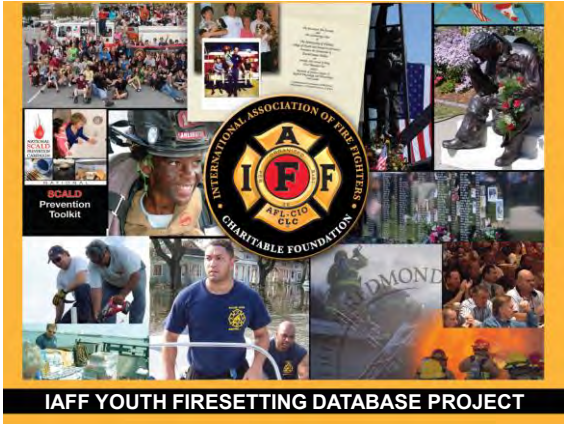
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Burn Related Data

- American Burn Association's National Burn Repository
- Karla Ahrens Klas, BSN, RN, CCRP Chair ABA Burn Prevention – apologies couldn't attend due to ABA conference
- Potential areas of fire data integration: YFS, fireworks, home medical oxygen & smoking, injuries/deaths, cooking, etc.



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TODAY AND TOMORROWS FIRE DATA:

Collecting, Analyzing, and Using Fire Experience Data to Reduce the Nation's Fire Problem



National Fire Operations Reporting System

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PROJECT POWERED BY
Emergency Performance

A COLLABORATIVE EFFORT WITH



- Assistance to Fire Fighters Grant Program
- 2011 & 2012 Fire Prevention & Safety Grant



Vision to Reality

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Project History

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2011 National Fire Service Data Summit



Project Goals

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Assure Adequate Fire Resources



Optimize Fire Operations




Reduce Firefighter Injury and Death



Minimize Civilian Injury and Death



Minimize Property Loss



Project Importance

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NIST National Institute of Standards and Technology
NFIRS

- Fire Service is Part of a Larger Community
- Capability, Availability, and Performance Matter
- It is the **How**, more than the **What**
- Outcomes Matter Most!
- **NFIRS** Documents the Incident of Fire
- **N-FORS** Documents the Operations Required to Manage It



How Should We Make Decisions?

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NIST National Institute of Standards and Technology
NFIRS



Fast
Availability

Affordable
Capability

Quality
Effectiveness




Multi-Year Initiative

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NIST National Institute of Standards and Technology
NFIRS

Currently in Year 2 of 3

- Fire Industry Collaborative Process
- Focus on Fire Operations and Metrics
- Design a Fire Operations Data System
- Create an Atmosphere for Safe Data Use
- Ultimately Create Software for Local Operational Performance Improvement



N-FORS Dataset

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A COLLABORATIVE EFFORT WITH
NIST National Institute of Standards and Technology
NFIRS

Dataset Components

- N-FORS Configuration (C-Elements)
 - Demographic Data used to better understand and analyze fire operations
 - Completed initially and then updated as necessary
- N-FORS Event (E-Elements)
 - Operations Data associated with a structural fire event
 - Describing the FD's availability, capability and the effectiveness of the fire operations
 - Minimal Data Entry with each Fire Event



N-FORS Configuration Data Elements

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NIST National Institute of Standards and Technology
NFIRS

N-FORS Configuration Sections

- Fire Department Information
- Community Demographics
- Codes and Standards
- Community Resources
- Firefighters and Fire Officers
- Apparatus/Vehicles
- Capability and Equipment
- Deployment Policy



N-FORS Event Data Elements

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NIST National Institute of Standards and Technology
NFIRS

N-FORS Event Sections

- Deployment
- Utilization
- Fire Event Demographics
- Dispatch
- Response
- Fire Ground Operations
- Times
- Outcome
- Health and Wellness



Proposed Year 3 N-FORS Software

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Proposed Year 3 of 3 (FP&S)

- Continue Fire Industry Collaborative
- Develop the N-FORS Software
 - Local Fire Department Tool
 - National Fire Operations Database
- Develop N-FORS Reports
 - Local Reporting and Business Analytics
 - National Aggregate Reports
 - Benchmarking and Best Practices



Year 3 N-FORS Software Rollout

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Proposed N-FORS Rollout

- Available to all local US Fire Departments in 2015
 - User Materials
 - Recommended Data Elements
 - Recommended Operational Reports
- Development of a Sustainability Model and Plan
 - Long-Term Viability
 - Ongoing Technical



VISION OF A PERFECT DAY



VISION OF A PERFECT DAY



- Structural Fire
- Automated Alarm
- Suppression System Activated
- Known 2 Story Structure
- Sensors
 - 2 Occupants on 2nd Floor
- Personal Health Records
 - 2 Geriatric Occupants



FIRE RESPONSE



- Resources Located using vehicle location and CAD analysis
- Additional Rescue Resources Deployed Including EMS
- Hospital Notified of Potential Victims



ON-SCENE SIZEUP



Data Feeds

- Structure Floor Plan
- Room Temperatures
- Occupant Location
- Suppression System Status
- Active Utilities



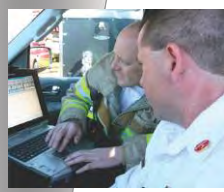
ATTACK PLAN




- Data on Building Type
- Front and Rear Access
- Front Suppression
- Rear Rescue
- Crew and Equipment Location Tracking




OUTCOME



- Occupants Rescued
- Fire Contained
- Automated Documentation
 - CAD
 - Structure
 - Scene Events
- Minimal Crew Effort
- NFIRS Data Uploaded
- N-FORS Data Uploaded
- Reports Available for



PERFORMANCE EVALUATION AND PREVENTION



- Feedback via Reports
 - Fire Chief
 - Crew
 - Community
- Analysis of Similar Risks
 - Community
 - Structure
- Suppression System Limitations Identified
- Prevention Plan Enacted



COMING 2015

www.N-FORS.org

Firefighter Injury Research and Safety Trends

Today and Tomorrow's Fire Data, March 2014

Jennifer Taylor, PhD, MPH

Associate Professor

Department of Environmental and Occupational Health

Drexel University School of Public Health

Philadelphia, PA



Drexel University – Philadelphia, PA



2



Relevance



- #1 - Define and advocate the need for a cultural change within the fire service relating to safety; incorporating leadership, management, supervision, accountability, and personal responsibility.
- #2 - Enhance the personal and organizational accountability for health and safety throughout the fire service.

- #7 - Create a national research agenda and data collection system that relates to the initiatives
- #9 - Thoroughly investigate all firefighter fatalities, injuries, and near misses.
- #12 - National protocols for response to violent incidents should be developed and championed.

4

Advisory Board and Council



Drexel's Fire Service Research

- Data Systems Development and Evaluation
 - Non-fatal injury
 - Near-miss
 - Policy
- Methods
 - Data Linkage
 - Narrative text mining
 - Interviewing and focus groups
 - Survey development and assessment
- Emerging Topics
 - EMT Assaults
 - Women in the Fire Service
 - Community Use of 911



Drexel's Fire Service Research



Data Systems Development and Evaluation

- Studies that “focus on the design and feasibility of a new database system”



- FIRST and FIRST-RS
 - FEMA AFG grant # EMW-2009-FP-00427 (2010-2013)
 - FEMA AFG grant # EMW-2012-FP-00205 (2013-2016)

What is the Fire Service telling us they need?

- Data that tell a story at the **local** level
- Data collection that **does not increase the reporting burden** for firefighters
- Data that describe **all firefighter injuries**
- A clear **connection** between the data collection system and benefits for the Fire Service

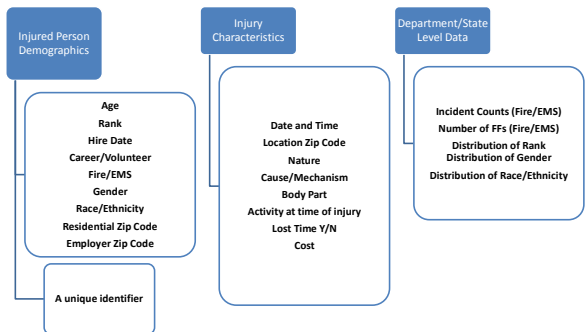
FIRST Goals

- To research and develop the **minimum data elements** necessary to conduct public health surveillance of non-fatal firefighter injuries.
 - To learn from **existing firefighter injury data** collection.
 - To explore how **non-firefighter injury data** sources can contribute to a comprehensive, national database of firefighter injuries.
 - To examine relevant **federal, state, and local regulations** which empower or challenge the functions of FIRST.
 - To **develop and test a system** in the city of Philadelphia, Pennsylvania, and the State of Florida.
 - To provide **recommendations** to FEMA for a national implementation plan.

FIRST Main Results

- 3 paths...
- Developing **fire department-level systems** by linking injury reports to other existing data and standardizing the resultant master database for comparative purposes.
 - Linking first report of injury to human resources demographic information, risk management data, disability data, and dispatch run data were critical to create a robust and longitudinal understanding of injuries to firefighters.
- Developing **state-level systems** by linking workers’ compensation, hospital and emergency department encounters to a statewide registry of firefighters and standardizing the resultant master database for comparative purposes.
 - This is a faster method to national implementation than #1, but sacrifices some of the granularities of injury data present at the department-level (e.g., on-scene/first-aid injuries).
- Changing policy** to adopt industry and occupation codes in all hospital-level healthcare encounters in the United States.
 - In the FIRST grant, we succeeded in getting to the halfway point in this process. Achieving such a change in policy will enable all inpatient and emergency department hospital visits by career and volunteer firefighters to be systematically captured.

FIRST: Recommended Core Variables



Informs New Research

- Philadelphia Fire Department
 - Over 200,000 medical calls annually.
 - 40 ALS ambulances, each staffed with two Paramedics.
- Interviewing **male and female paramedics** assaulted during a medical call.
- Prevention Strategy Report to PFD and IAFF Local 22



Recommendation

Use standard classification systems for “body region” and “cause of injury” to allow comparisons

- FDSOA 2011 Meeting
- For example:
 - Barell Matrix http://www.cdc.gov/nchs/data/ice/final_matrix_post_ice.pdf
 - E-code Matrix http://www.cdc.gov/injury/wisqars/ecode_matrix.html

Policy

Path 3: Petition to change data collection policy to adopt industry and occupation standards in all hospital-level healthcare encounters in the United States.

- Specifically, add **SOC** (occupation) and **NAICS** (industry) standards to the uniform bill (UB04)
- UB04 used by the Centers for Medicare and Medicaid Services (CMS) and private insurers.

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National Coalition

Federal Agencies

- Occupational Safety and Health Administration, U.S. Department of Labor
- National Institute for Occupation Safety and Health, Centers for Disease Control and Prevention
- States
- Council of State and Territorial Epidemiologists
- Michigan State University, Division of Occupational and Environmental Medicine
- New Hampshire Division of Public Health Services, Occupational Health Surveillance Program
- Florida Department of Health, Occupational Health Surveillance Program
- New Jersey Department of Health and Senior Services, Consumer, Environmental and Occupational Health Service
- Public Health Organizations
- American Public Health Association, Injury Control and Emergency Health Services Section
- National Safety Council
- Association of Occupational and Environmental Clinics
- Workers Compensation Research Institute
- American Association of Occupational Health Nurses

Fire Service Organizations

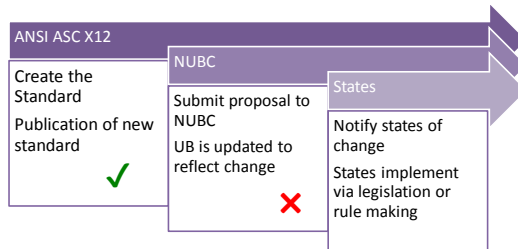
- Congressional Fire Service Institute
- National Fallen Firefighters Foundation
- National Fire Protection Association
- International Association of Fire Chiefs
- National Volunteer Fire Council
- International Association of Fire Fighters
- Members of Congress
- Sen. Bob Casey, Jr.
- Rep. Michael Fitzpatrick
- Rep. Allyson Schwartz
- Rep. Chaka Fattah
- Rep. Robert Brady

16



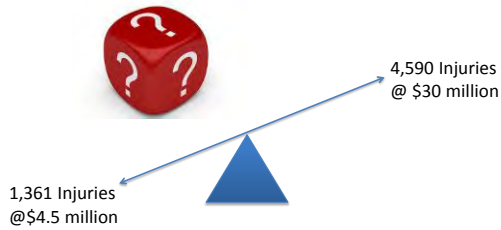
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Petitioning X12 and NUBC



18

Florida Hospital Encounters, 2010 What is the real cost?



19

State Policy Inventory

20

Methods

- LexisAcademic: Searched state statutes, laws, codes & mandates
- Online survey distributed through **NASFM & NAFTD** to list serve members
 - 84% response rate

21

State	Law Requiring the Reporting of Firefighter Injuries	Text
Florida	Fla. Stat. § 633.808 and 633.809	633.808: "(4) Adopt rules prescribing recordkeeping responsibilities for firefighter employers, which may include maintaining a log and summary of occupational injuries, diseases, and illnesses. "
Oklahoma	Oklahoma Municipal Code, Laws 1977, c. 256, § 11-29-102	"Activity report forms shall be designed by the State Fire Marshal and shall include, but not be limited to ... firefighter deaths in the line of duty and of firefighter injuries in the line of duty requiring the services of a hospital or physician or both. "
Texas	37 Tex. Admin. Code § 435.23 (2012)	"A fire department shall report all Texas Workers' Compensation Commission reportable injuries that occur to on-duty regulated fire protection personnel on the Texas Commission on Fire Forms. "
Washington	Wash. Admin. Code § 296-305-01501	"(2) Recordkeeping - Written reports; all fire service employers shall maintain records of occupational injuries and illnesses. Reportable causes include every occupational death, every occupational illness, or each injury that involves one of the following: Unconsciousness, inability to perform all phases of regular duty-related assignments, inability to work full time on duty, temporary assignment, or medical treatment beyond first aid."
Wisconsin	Wis. Admin. Code SPS 330.06	"Every fire department shall (1) Establish a data collection system and maintain permanent records of all reported accidents, injuries, illnesses and deaths that are or may be job related. "

22

FIRST-Reliability Study (FIRST-RS)

FEMA AFG grant # EMW-2012-FP-00205 (2013-2016)

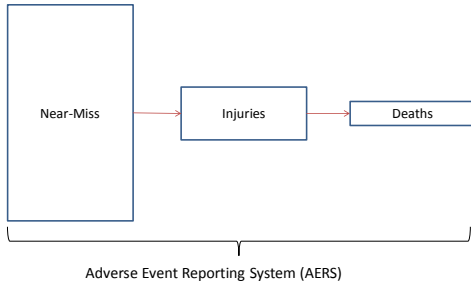
23

Methods: Near Miss Data

Artificial Intelligence: Narrative Text Analysis (Natural Language Processing)

24

Why do we capture Near-Misses in the Fire Service?



25

Drexel Firefighter Injury Research

- National Firefighter Near Miss Reporting System
 - IAFC Contract, 2007-2011: Data Quality and Research Opportunities
 - NIOSH grant "Near Miss Narratives from the Fire Service: A Bayesian Analysis", 2011-2013 5R03OH009984-02
 - "Let the computer do the work for you"
 - Problem: no coded data elements for injury or cause in Near Miss
 - Created 2 new data elements:
 - Injury yes/no
 - Cause of injury



www.firefighternearmiss.com

SECTION 3: EVENT DESCRIPTION

Describe the event.

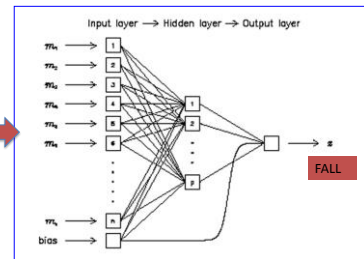
Keep in mind the following logic when preparing your narrative:

Chain of events	Equipment	Sleep patterns	Staffing	Rain
Communication	Incident command	Operational awareness	Task allocation	Weather
Decision making	Role	SOP / OCS	Teamwork	

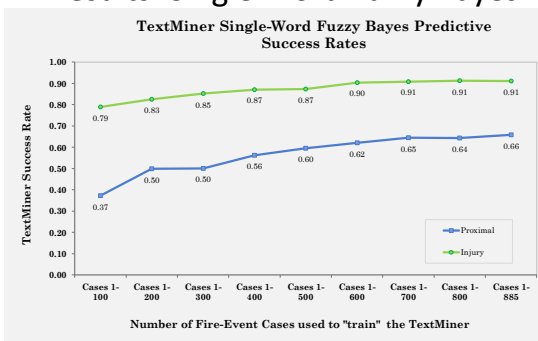
Please provide narrative below. If additional spaces are needed, please attach additional pages and refer SECTION 2: EVENT DESCRIPTION

Narrative Text Mining: Schematic

"While working on a house fire near the chimney, one of my personnel came through the ceiling while checking the area. He was not hurt, but it could have been bad."

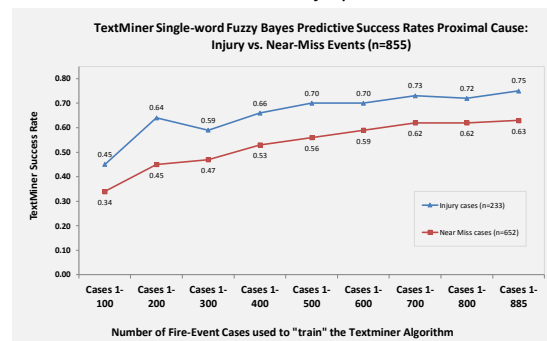


Results: Single Word Fuzzy Bayes



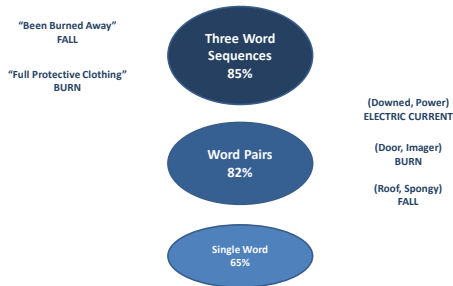
29

Single Word Fuzzy Proximal predictions: near-miss versus injury



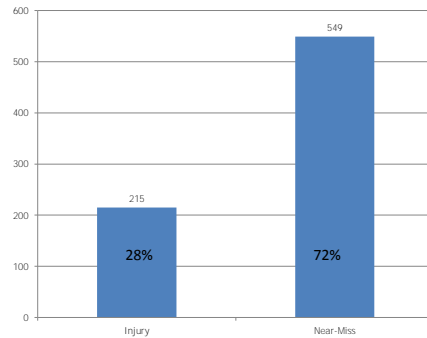
30

Fuzzy bayes: Proximal Code results improve with pairs and sequences



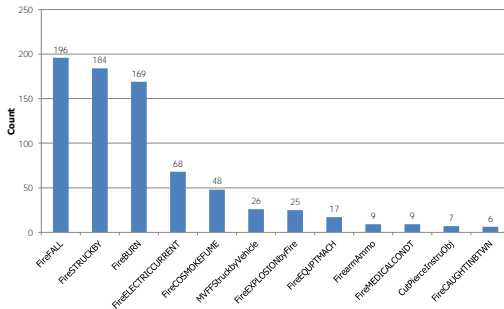
31

Fire Emergency Events: Injury Outcome
n=764



32

Fire Emergency Events: Proximal Mechanism of Injury
n=764



33

Drexel Firefighter Injury Research

- National Firefighter Near Miss Reporting System, 2005-2011
 - Reviewed 769 "non-fire emergency event" reports
 - 185 reports identified as emergency medical calls
 - Leading Mechanisms of Near-Miss or Injury:
 - » Assault
 - For reports in which an assault was identified, the most commonly identified weapon was firearm
 - » First Responder Struck-by Motor Vehicle
 - » MV Collision



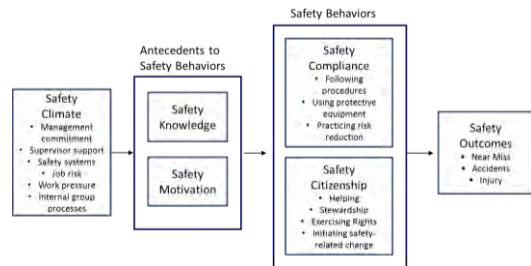
Understanding Culture: Assessing Firefighter Safety Climate



FEMA AFG grant # EMW-2011-FP-00069 (2012-2015)



Safety Climate Conceptual Framework



Adapted from Christian et al JAP 2009, vol 94 (5): 1102-1127

36

Phase I: Qualitative Research

Year 1-1.5:

- Thirteen fire departments: ~90 focus groups and individual interviews
- All ranks
- East, Central, and Western regions of the United States
- Career and volunteer
- Ensure that the safety climate survey is specific to the U.S. fire service



Phase II: Quantitative Research

Year 1.5-3:

- The safety climate survey will be administered to a geographically stratified random sample of U.S. fire departments:
 - 90 fire departments
 - 280 fire stations
 - 6,000 active firefighters
- Psychometric Validation: structural equation modeling and factor analysis.
- Valid + Reliable = Trust
- Free survey and user guide disseminated



Safety Attitudes: Frontline Perspectives from this Patient Care Area

I work in the (clinical area or patient care area where you typically spend your time): _____ This is in the _____
 Department of: _____ Please complete this survey with respect to your experiences in this clinical area.

• Use number 2 pencil only. Correct Mark Incorrect Marks Not Applicable
 • Erase cleanly any mark you wish to change.

Please answer the following items with respect to your specific unit or clinical area.
 Choose your responses using the scale below:

Disagree Strongly	Disagree Slightly	Neutral	Agree Slightly	Agree Strongly	Not Applicable
1	2	3	4	5	

- Nurse input is well received in this clinical area.
- In this clinical area, it is difficult to speak up if I perceive a problem with patient care.
- Disagreements in this clinical area are resolved appropriately (i.e., not who is right, but what is best for the patients).
- I have the support I need from other personnel to care for patients.
- The physicians and nurses here work together as a well-coordinated team.
- I would feel safe being treated here as a patient.
- Medical errors are handled appropriately in this clinical area.
- I know the proper channels to direct questions regarding patient safety in this clinical area.
- I receive appropriate feedback about my performance.
- I am encouraged by my colleagues to report any patient safety concerns I may have.
- In this clinical area, it is difficult to discuss errors.
- The culture in this clinical area makes it easy to learn from the errors of others.
- My suggestions about safety would be acted upon if I expressed them to management.
- I like my job.
- Working here is like being part of a large family.
- This is a good place to work.
- I am proud to work in this clinical area.
- Morale in this clinical area is high.
- When my workload becomes excessive, my performance is impaired.
- I am less effective at work when fatigued.
- I am more likely to make errors in tense or hostile situations.
- Fatigue impairs my performance during emergency situations (e.g. emergency resuscitation, seizure).
- Management supports my daily efforts.
- Management doesn't knowingly compromise pt safety.
- Management is doing a good job.
- Problem personnel are dealt with constructively by our _____

The Safety Attitudes Questionnaire

- The physicians and nurses here work together as a well-coordinated team.
 Agree/Strongly Agree:
 - MD = 77%
 - RN = 40%

Contact Information

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Questions



Fireman's Hall Museum, Philadelphia

NFPA 950

Standard for Data Development and Exchange for the Fire Service

Proposed 2015 Edition

Chapter 1 Administration

1.1 Scope

1.1.1* This standard is designed to standardize data for operable information sharing in support of the all-hazards response.

1.1.2 To describe a digital information structure and associated requirements and workflows common to fire and emergency services delivery and management for emergency response and administrative use.

NFPA 950

Chapter 1 Administration

1.2 Purpose.

1.2.1 The purpose of this document is to provide a standard framework for the development, management, and sharing of data for all-hazards response agencies and organizations.

1.2.2 This standard defines system structure, design, process and performance management, and data requirements to support the fire service and enable consistent and accurate data exchange between systems.

NFPA 950

Chapter 1 Administration

1.2.2.1 Standard data formats and other key attributes support the administration, planning, prevention, preparedness, mitigation, response, and recovery missions of local, state, and federal fire service operations and administration.

1.2.2.2 Data elements shall be enabled for geospatial attribution.

1.2.2.3 Data use shall be determined locally by the AHJ including analytical and geospatial data use in decision making in an interoperable data environment.

NFPA 950

Chapter 1 Administration

1.3 Application.

1.3.1 This standard will leverage existing industry standards.

Nothing herein is intended to restrict any jurisdiction from exceeding these minimum requirements.

NFPA 950

Chapter 1 Administration

1.4 Equivalency

Nothing in this standard is intended to prohibit the use of systems, methods, or approaches of equivalent or superior performance to those prescribed by this standard. Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

NFPA 950

Chapter 1 Administration

1.5 New Technology.

1.5.1 Nothing in this standard shall be intended to restrict new technologies or alternate arrangements, provided the level of compliance prescribed by this standard is met.

NFPA 950

Chapter 2 Referenced Publications

2.1 General.

The documents or portions thereof listed in this chapter are referenced within this standard, and shall be considered part of the requirements of this document.

NFPA 950

Chapter 2 Referenced Publications

2.2 NFPA Publications

2.3.1 ISO Publications

2.3.2 Other NIST Publications.

- North American Datum of 1983 (NAD 83)
- Federal Geographic Data Committee Homeland Security Working Group Standard for Symbology
- Federal Geographic Data Committee United States Thoroughfare, Landmark, and Postal Address Data Standard (DRAFT)
- United State Geological Survey Topographic Mapping Standard for Symbology- U.S. Department of the Interior — U.S. Geological Survey

NFPA 950

Chapter 2 Referenced Publications

2.3.3

- National Fire Information Record System (**NFIRS**)
- National Emergency Medical Services Information System (**NEMSIS**)
- International Committee on Electromagnetic Safety (**ICES**) Data Backup Standard
- National Institute of Standards and Technology (**NIST**) Data Backup Standard

NFPA 950

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used.

NFPA 950

Chapter 3 Definitions

3.2.3 Shall.

Indicates a mandatory requirement.

3.2.4 Should.

Indicates a recommendation or that which is advised but not required

NFPA 950

Chapter 3 Definitions

3.3.7 Data.

The lowest fractional element from which information and then knowledge can be derived; as electronically, acquired, captured, stored, queried, analyzed, or transmitted; , and being electronic or computerized in nature.

NFPA 950

Chapter 4 Processes

4.1 * General.

This chapter establishes requirements for data acquisition, management, and sharing of data as it pertains to fire and emergency services functions.

4.2 Acquisition.

Data elements referenced within this standard shall be captured and updated on a regular basis as per requirements set forth in Chapters 5 & 6.

4.3 Data Management.

Policies and procedures shall be in place to support data elements within this chapter:

NFPA 950

Chapter 4 Processes

4.4 * Application of the Standard.

4.4.1 Data elements under the authority of this standard shall consist of the following categories.

4.4.1.1 Spatial

4.4.1.1.1 Vector 4.4.1.1.2 Raster

4.4.1.1.3 Triangulated Irregular Network (TIN)

4.4.1.2 Non-Spatial

4.4.1.2.1 Text 4.4.1.2.2 Graphic Image 4.4.1.2.3 Audio

4.4.1.2.4 Video

4.4.2 * Processes associated with data acquisition, management or exchange to accomplish conflation, deflation, interchange of data to or from one or more sources or applications shall meet the elements required in Chapter 5 & 6.

NFPA 950

Chapter 5 Data Administration

5.1 External Data.

5.2 Internal Data

5.2.1 At a minimum, policy shall meet the following requirements (All categories);

5.2.1.1 Quality assurance and control.

5.2.1.1.1 The state of completeness, validity, consistency and timeliness of data shall be documented in the metadata as described in 5.2.1.3

5.2.1.1.2 The underlying accuracy and precision of data shall be expressed within the limits and tolerances of the devices and means used to collect the data.

5.3 * Data Exchange.

NFPA 950

Chapter 6 System and Data Design Standards (Scalable)

6.1 General.

6.1.1 This chapter provides minimum requirements for specific data types and information management systems for data acquisition, display, interchange, and management.

NFPA 950

Chapter 6 System and Data Design Standards (Scalable)

6.2 Addresses.

6.2.1 Addressable locations shall contain street number, prefix direction (where applicable), prefix type (where applicable), street name, suffix direction (where applicable), street type, municipality, postal code, county, state in accordance with the FGDC United States Thoroughfare, Landmark, and Postal Address Data Standard.

NFPA 950

Chapter 6 System and Data Design Standards (Scalable)

6.3 Date and Time.

6.3.1 Date and time shall be formatted as MM/DD/YYYY
YYYYMMDDHHMMSS.

6.3.2 Time shall be referenced in Coordinated Universal Time (UTC).

6.3.3 Local time shall be calibrated against National Institute of Standards and Technology (NIST) at least every 24 hours within plus or minus (+/-) 0.25 seconds.

6.4 Time.

6.4.1 Time

6.4.1 Time shall be recorded in "decimal time" (Lotus Time).

6.4.2 Time shall be referenced both from Universal Coordinated Time (UTC).

6.4.3 Local time shall be calibrated against NIST at least every 24 hours.

NFPA 950

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs. A.1.1.1 The standardization of existing and future mission critical data for emergency services facilitates safe, effective, and efficient decision making

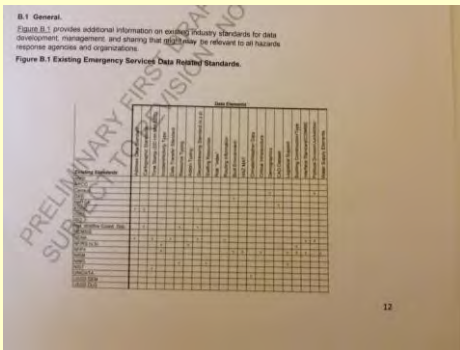
NFPA 950

Annex B Additional Resources

B.1 General.

Figure B.1 provides additional information on existing industry standards for data development, management, and sharing that might be relevant to all hazards response agencies and organizations. Figure B.1 Existing Emergency Services Data Related Standards.

NFPA 950



NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

First Draft NFPA® 951 Guide to Building and Utilizing Digital Information Proposed 2016 Edition

Scope

The intent of this document is to provide guidance in the development of an integrated information management system that facilitates information sharing. The resulting system should be designed to support a communications pathway for all relevant components of the national preparedness and response framework.

NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

Chapter 1 Administration

Scope. 1.1.2 *

This document provides information for the development of consistent methods, processes, and tools to capture, utilize, and share data within scalable information systems. This framework supports and sets the stage for effective data exchange at all operational levels and components.

1.1.2.1

As an example, time and location are identified as critical components. Specific format for time and location are established in this guide. This guide provides explanation to the authority having jurisdiction (AHJ) as to why a specific format for time and location is necessary and how it should be used within the organization's operational environment.

NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

Chapter 1 Administration

Scope. 1.1.3

The intent of this guide is to provide a framework and environment consistent with NFPA 950 that results in an integrated information management system for computer aided dispatch (CAD), record management systems (RMS), and other associated data systems in common use by fire departments.

NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

Chapter 1 Administration

1.2 Purpose.

The purpose of this guide is to help public safety users envision, plan, and build an operable, scalable, and integrated information management system.

NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

Chapter 1 Administration

Purpose. 1.2.1

A standard approach is essential to manage, use, and exchange data. This guide assists fire department administration and support personnel in establishing a vision for information management within their organization.

NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

Chapter 1 Administration

Purpose 1.2.2

Technology planning is an essential step in creating an integrated information management environment. NFPA 950 mandates a methodology for a step-by-step process for technology planning. This guide recommends a framework for the governance and oversight needed to establish an effective planning process based on NFPA 950.

NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

Chapter 1 Administration

Purpose. 1.2.3

To create an integrated information management system, the AHJ must understand the specific requirements for the interoperable use of the data. NFPA 950 sets forth the overarching technical standards these requirements must satisfy. The information in this document assists the agency in creating a flexible and scalable system that supports data sharing.

NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

Chapter 1 Administration

Purpose 1.2.4

Adhering to these standards supports the wide variety of applications required by the fire service. This guide provides references and resources for fire service personnel to help identify applications of and uses for data to improve the organization's ability to perform fire prevention, damage mitigation, emergency response, and recovery from emergency incidents.

Purpose 1.2.5

This document is a reference tool and job aid providing practical guidance and specific steps forward.

NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

Chapter 1 Administration

1.3 Application.

1.3.1

This guide was designed to be used by fire and emergency service organizations to develop an information structure and associated requirements and workflows common to fire protection delivery and management for emergency response and administrative use.

NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

Chapter 1 Administration

Application

1.3.2

When implemented, this guide also creates an environment whereby fire and emergency service organizations will be able to identify best practices, internal and external to the agency, to ensure data operability in mutual and automatic aid environments.

NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

Application. 1.3.3

The purpose of this guide is to describe for all levels of the organization the mechanisms for establishing a standards-based information management environment, which is an essential element for optimal functioning of a fire department. Effective information management is a key to be utilized in keeping fire fighters safe, improving outcomes, and satisfying performance metrics. An integrated information technology strategy that adheres to the specifications of NFPA 950 will accomplish these goals by achieving the following objectives:

- (1) Establish and maintain accurate and up-to-date understanding of operations and the events that affect them
- (2) Collect, organize, exchange, and discover through research relevant and authoritative information
- (3) Proactively support community fire planning needs and activities
- (4) Exchange information to establish data streams into and out of the field
- (5) Integrate data from multiple internal and external sources
- (6) Enable a higher level of collaborative decision making with other stakeholder partners
- (7) Maximize value from technology investments

NFPA 951

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Chapter 1 Administration

Application 1.3.4

To achieve an NFPA 950-compliant data environment,

senior executive leadership must support the decision to implement the framework principles described in this guide.

For many in the fire and emergency services, managing information technology is a new endeavor. Therefore, this guide is written to enhance knowledge of fundamental information management principles in the context of the work that is done in the fire and emergency services. It is intended to enhance the knowledge of all members of the organization, as well as related entities, which is essential for successful implementation. This allows leadership the framework for implementing the department's technology plan in the context of a shared vision.

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Chapter 1 Administration

Application. 1.3.5*

NFPA 950 is a standard that identifies the critical building blocks of a fire department information management system. The standard provides a common framework for all departments regardless of size, shape, and technological resource availability. Embracing this framework will provide the foundation as an organization begins to assess its particular landscape, analyze its specific technology requirements, and develop a plan that fits its unique environment. These are the pieces of the puzzle that are needed to begin or complete the building of a system.

NFPA 951

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Chapter 1 Administration

1.3.5.1 provides a framework for how an organization-wide strategy for information management can support the entire organization. A wide range of players within an organization contribute data, perform analysis, and exchange important field intelligence. Utilization of these key elements provides the framework for organizations and their members to perform their mission effectively and will enhance the overall safety environment. These different functions within a fire and emergency service organization also have different requirements for data and applications. The integrated information management platform illustrated in Figure 1.3.5.1 will support all of these key elements and the ability to leverage their respective

expertise, perspectives, and skills within this data environment.

1.3.5.1 Figure



NFPA 951

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Chapter 2 Referenced Publications

2.1 General.

The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document. 2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471. NFPA 950, Standard for Data Development and Exchange for the Fire Service, 2015 edition. 2.3 Reserved 2.4 Reserved

NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. Merriam-Webster's Collegiate Dictionary, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1 * Approved.

Acceptable to the authority having jurisdiction.

3.2.2 * Authority Having Jurisdiction (AHJ).

An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 * Guide.

A document that is advisory or informative in nature and that contains only nonmandatory provisions. A guide may contain mandatory statements such as when a guide can be used, but the document as a whole is not suitable for adoption into law.

3.2.4 * Listed.

Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.5 Standard.

A document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law.

Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the Manual of Style for NFPA Technical Committee Documents

NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

Chapter 3 Definitions

3.3 General Definitions.

3.3.1 Integrated Information Management System.

The management of multiple and often disparate data sources and software systems to create new information sets.

3.3.2 Text.

Computer-coded text in American Standard Code for Information Interchange (ASCII); the numerical representation of a character, such as "a" or "@," or an action of some sort. ASCII was developed a long time ago and now the nonprinting characters are rarely used for their original purpose. ASCII was actually designed for use with teletypes, so the descriptions are somewhat obscure. A request for ASCII format simply means "plain" text with no formatting such as tabs, bold, or underscoring, that is, the raw format that any computer can understand. ASCII format allows for easy importation of files into other applications without issues. For example, Notepad.exe creates ASCII text; in MS Word a file can be saved as "text only" (From www.ascitable.com.)

NFPA 951

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Chapter 4 Process

4.1 General.

The goal of NFPA 950 is to create integrated information management systems. The purpose of this chapter is to describe the process of developing an information system to acquire, manage, use, and share information as it pertains to fire and emergency service functions.

Section 4.1 provides the "why," and

Section 4.4 provides the "how."

Each of the **steps** outlined in Sections 4.2 through 4.4 are requisite to successful implementation of NFPA 950.

4.2 Technology Strategic Visioning.

A strategic visioning process helps to clarify where the organization, its employees, the political leadership, and other stakeholders see the organization in the future in terms of its fundamental objective and/or strategic direction. To be meaningful and relevant, a vision must be realistic and believable. A strategic vision must inspire and motivate.

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Chapter 4 Process

4.3 * Technology Strategic Planning.

Once a vision has been established, the next step is how to implement the vision. Technology strategic planning is the tool that should end with objectives and a roadmap of ways to achieve the organization's vision. Section 4.3 covers the fundamental steps in the strategic planning process.

4.3.1 Establishment of a strategic visioning construct is an underpinning to drive the technology strategy.

4.3.2 A properly written strategic plan will provide the organization with the necessary guidance to develop resources needed to satisfy the vision. An effective strategic plan should be all-encompassing and constructed only after a deliberative process such as that suggested in A.4.3. By definition getting this step is a journey, not a destination.

4.3.3 Critical to the strategic planning process will be learning how to incorporate technology planning into the fabric of the organization's culture and core functions. Technology planning must be developed with a clear and common understanding of the workflow goals (functions) that support the agency's vision and that are based on established industry best practices.

4.3.4 NFPA 950 describes and prescribes the workflows that accomplish functions of the fire service. In addition, that standard provides a framework for the information system and its associated workflows. It is critical that an agency's relevant functions be incorporated into the technology planning process. Fundamental to this process is the notion that technology planning is integral in supporting the overall strategic plan and vision.

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4.4.1 Guiding Principles.

4.4.1.1* Meeting Mission Requirements and End User Needs.

The mission of fire and emergency service organizations is to protect lives and property. Each agency will have its own vision of how to fulfill its mission, which should be articulated in the strategic plan as described above. Once this mission is clearly understood and articulated in the organization's policy and planning documents, the technology planning committee will identify the workflows and associated applications that technology can support. The next step is to prioritize which of these will be included in the technology plan, based on mission priorities, cost-benefit timelines, and funding availability. Regardless of how the planning committee evaluates these tradeoffs, it is the mission requirement that must drive the technology—not the other way around. Information systems for the fire and emergency service organization provide support for the following two broad categories of users:

NFPA 951

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Chapter 5 Data Administration

Once a clear vision, strategy, and technology plan has been developed to guide implementation of the system, this plan will guide the actual administration of the data environment.

•Chapter 5 frames the elements necessary for successful data administration.

•Developing policies and guidelines for the effective administration of an information system should be based upon and is a function of the system architecture.

• Management of issues associated with data administration such as integration, security, replication, modification to, import and translation processes, and updates should be included in the policy in accordance with Sections 5.1 and 5.2 of NFPA 950.

•The approach the committee has chosen recognizes a distinction between internal and external data

5.1 Internal and External Data.

5.2 Management/Organization.

5.3 * Data Models and Data Dictionaries.

5.4 * Data Sources and Acquisition, to create a new dataset.

5.5 Security.

5.6 Maintenance.

5.7 Data Exchange

NFPA 951

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Chapter 6 Data Sharing and Exchange

6.1 Introduction.

This chapter sets forth the technical specifications and business rules all fire departments should follow in creating an interoperable data sharing and exchange environment. The technical specifications for acquisition, display, and management are set forth in the previous chapters. This chapter includes a description of the fundamental data components that need to be exchangeable and specifies the format for each of those data components. This in no way limits the AHJ from creating local policies with additional requirements, but for data exchange to be compliant, all components must, at a minimum, be in the formats specified within NFPA 950.

NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

Chapter 6 Data Sharing and Exchange

6.2 Addresses.

This standard follows the protocols established by the Federal Geographic Data Committee and maintained by the U.S. Census Bureau. This format is most often and easily recognized by geocoding engines. It is readily accepted and recognized by responders and the general public. Addressing in many jurisdictions has traditionally evolved from non-standards-based conventions that do not follow these standards. This often creates challenges for agencies attempting to comply with nationally recognized standards such as NFPA 950. Several approaches exist to resolve these discrepancies. The jurisdiction should adopt a strategy that best fits the data and resource environment within which they operate. The most direct and short-term method for becoming compliant with NFPA 950 is to supplement the street address with a geographic coordinate (in accordance with NFPA 950, USNG, or lat/long). While this will not make an address data NFPA-compliant, it will allow the agency or department to deliver services on time in the right place without a significant change to the jurisdiction's naming conventions. Over time the agency can move toward becoming compliant through various conversion and translation methods. Recommendations and references regarding these options are in the annex. The committee recommends these options to help solve system shortcomings in the near term to support operational success. This will allow the agency or department to become increasingly compliant over time without impeding short-term operational success.

NFPA 951

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Chapter 6 Data Sharing and Exchange

6.3 Date

This standard follows the most commonly recognized protocol currently in use in the United States. The committee recognizes that other date schemas are available and preferred by some agencies. This format is widely recognized by civilian and governmental agencies.

NFPA 951

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Chapter 6 Data Sharing and Exchange

6.4 Time. It is recommended that the time stamp be recorded based on the incident record time reference.

6.4.1 Decimal time is a universal standard format that allows for numeric computations.

6.4.2 Time is referenced to the local time zone and UTC. The committee acknowledges that storing the date twice is redundant but recognizes the inconsistency of time zone applications across regional boundaries.

6.4.3 Time calibration is a critical component of all incident record keeping because of the legal implications associated with incident response. As such, calibration provides a legal framework for incident records.

NFPA 951

PRELIMINARY FIRST DRAFT SUBJECT TO REVISION - NOT FOR PUBLICATION

Chapter 6 Data Sharing and Exchange

6.5 Incident Typing Information.

6.5.1 NFPA 950 recognizes the standard format for incident typing as based on the National Fire Incident Reporting System (NFIRS) and the National EMS Information System (NEMIS) currently required by most U.S. states and territories. This framework establishes a transfer-able data set and as such meets the intent of NFPA 950. As such, this standard does not imply the use of any particular software for recording incident data. This component of the standards refers only to the typing standards within these frameworks

6.5.2 The "plus 1" append provides the local jurisdiction with an opportunity to amend data for local use. This gives jurisdictions the ability to review subsets of data for incident analysis.

NFPA 951

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Chapter 6 Data Sharing and Exchange

6.6 Text.

ASCII is a universally accepted text standard. As such, compliance with this protocol will enable ready transfer of text data using all of the standard data exchange methods specified herein.

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Chapter 6 Data Sharing and Exchange

6.7 CAD, RMS, CAD/CAD, CAD/RMS, and RMS/RMS Exchange.

6.7.1 Design and construction of CAD/CAD, CAD/RMS, and RMS/RMS interfaces and applications should comply with all technical elements set forth in Chapters 4.5, and 6.

6.7.2 The intent of this language is to emphasize the importance of a seamless flow of data among data subsystems. This will enable appropriate utilization of data assets throughout the organization and into the entire public safety ecosystem. This environment will enhance data accuracy and drive the ability to leverage data resources for data driven decisions, comprehensive situational awareness, and essential communications to all stakeholders in the community. In short, unlocking data assets from proprietary systems and structures will provide the data environment that can support effective management.

(6.7.3 6.7.4 6.7.5. 6.7.6. 6.7.7 6.7.8. 6.7.9. 6.7.10 6.7.11 all go into great detail on the CAD data exchange elements)

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Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

Annex B Informational References.

The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

NFPA/NIST Fire Data Workshop

Today and Tomorrow's Fire Data

Collecting, analyzing, and using fire experience data to reduce the nation's fire problem

March 26-27, 2014

Action Items

Section A. Action Items to Address Data Needs and Gaps

- 1) Address inconsistencies among different data analyses (USFA, NFPA, CPSC) and work toward **resolution of different types of statistical approaches** used and assumptions made
- 2) **Reconcile level of detail** desired against other goals of fire data (NFIRS)
- 3) Address **reasons for underreporting** of fires and undetermined fire causes
- 4) **Reduce the time** for an accurate and complete data set to reach end users
- 5) Gather information **on how NFIRS data are used** to inform decisions at the local, state and federal level and develop analysis templates to output data based on specific needs
 - a) Local fire departments
 - b) Research/policy
 - c) etc
- 6) **Identify and link all relevant existing data systems.**
 - a) Develop standards for data exchange
 - b) Leverage the many existing data assets from local governments and provide training/skills to fire service for this
 - c) Exploit various databases for elaboration not replacement of NFIRS; coordinate data identification, definition, and linking; avoid duplicative case data and efforts
 - i) state and local data systems
 - ii) non-redundant wildland fire information from fed and non-fed sources (IRWIN +)
 - iii) NFORS data
 - iv) Youth Fire Setters Database
 - v) Firefighter Injury Database
 - vi) Near-Miss data
 - vii) ISO data
- 7) **Collect the following data** which is not currently being collected in NFIRS
 - a) Real time operational data: SITSTAT, RESSTAT
 - b) Fire phenomenon related data – fire state at time of first unit arrival
 - c) Complex centric data (eg wui event)
 - d) Data to enable assessment of financial impact of fire service operations -- money saved

versus loss data

- e) Data to support fire department performance measurement
 - f) Visual data
 - g) data sets for departments to quantify performance and impact
 - h) Demographic information (victim, fire starter, etc)
 - i) In depth fire fighter injury data Develop a model first report of injury form
- 8) **Encourage use of standards for data collection** such as NFPA 901 and 950
 - 9) Develop **mechanisms to encourage partnerships** between fire departments and academia during data development stage (especially epidemiologists)
 - 10) **Consider special studies** to accomplish specific research goals

Section B. Action Items to Enhance Data Gathering

- 1) Provide broadly accessible access **to lessons learned** (in data gathering)
- 2) **Take advantage of narratives** for elaboration (not replacement) of NFIRS and codings/classifications as appropriate
- 3) **Improve the quality** of fire data input (eg. NFIRS)
 - a) Identify organizational factors that hinder quality control
 - b) Create accountability and incentives to encourage quality recording - Consider EMS model/system and procedures for post-incident (both internal and external) peer review of fire incident data.
 - c) Conduct benchmarking exercises with end-users to ensure consistent data entry and data quality issues, esp. for quantifying the impact of proposed changes
 - d) Develop routine/benchmarked data entry tests to check coding accuracy
- 4) Ensure **fire service considerations** are included in data gathering activities – i.e. develop means to make data entry easy, fun and rewarding
- 5) **Do usability testing** – develop an NFIRS that is intuitive for fire fighters
- 6) **Study** the IAFC near miss data gathering process and **other data systems** such as NACS, ICD for possible application to NFIRS data collection
- 7) **Explore wiki** approaches for data gathering (ie collective/shared data entry)
- 8) **Conduct an assessment of data entry architecture**
 - a) Monitor impact of changes in architecture or entry (eg text searches)
- 9) Develop **education and training** for fire fighters and administrative personnel on data gathering, its use, and its value
 - a) Provide fire phenomenology training to increase accuracy, using principles in NFPA 921
 - b) Balance fire science and fire protection engineering concepts in training
- 10) Promote **allocation of adequate state and local level organizational resources** (personnel and infrastructure) for data (e.g., champions)
- 11) Develop **strategies to address litigation concerns** regarding incident reporting (NFPA 921, NFPA 1033)

- 12) **Establish performance standards for technology** to gather data (bring vendors on-board early)
- 13) Identify **appropriate partners** in data collection, e.g. law enforcement
- 14) **Automate data collection** as much as is feasible; ensure QA/QC
- 15) Institutionalize **rewards/recognition** for NFIRS reporting
- 16) Encourage national organizations to **advocate** (through development of position statements) **for the importance of data collection**
- 17) **Outreach to departments not contributing** data to NFIRS
- 18) Evaluate and **enhance user interfaces**

Section C. Preparing for the Future of Fire-Related Data (including NFIRS 6.0 and beyond)

- 1) Create a clear list of **goals/vision** for the future of fire related data
- 2) Develop a **strategy for long term maintenance and future updates to NFIRS**
 - a) shortfalls of NFIRS (deployment scheme, implementation, design, exploiting advancing technology, integrating different datasets, user interface)
 - b) Sort short and long term needs
 - c) Clarify what can be done before a new version of NFIRS is issued (ie training, data entry issues)
 - d) Develop a specific process for development of NFIRS 6.0
- 3) Methodology should be **peer reviewed**
- 4) Use relevant **NFPA standards**, guides, and committees
- 5) **Learn from other communities**
- 6) **Enhance NFIRS accessibility** (note that there are already plans underway)
- 7) Incorporate a means to **continuously adapt** data collection to meet changing emerging trends/issues of concern **while maintaining a core set** of data fields for benchmarking over time.
- 8) Develop strategy **for longevity and continuity** of databases;
 - a) Do not lose legacy data with changes
- 9) **Do not create a competition** between NFIRS and other databases (encourage coordination)
- 10) **Communicate NFORS plan**
- 11) Develop a systematic **strategy/design for integration** of databases
 - a) Consider IRWIN as a model
 - b) Consider connecting NFIRS to appropriate databases such as NEMESIS and wildland databases
- 12) Establish a **formal process for proposals** with technical justification to change NFIRS and other databases (such as NFORS)
- 13) Promote the role/**importance of State agencies in** data collection process(NFIC)

- 14) **Create model regulations** that will improve data collection including injuries (privacy, data security, best practices)
- 15) **Share best practices**/identify beneficial case studies and databases (e.g., building footprint, Texas Forest Service, California all incident reporting system) beyond NFIRS (share them and use to inform NFIRS development)
- 16) Consider **streamlining NFIRS modules** in concert with linking to other data streams/databases
- 17) Establish ways to **demonstrate the value** of all fire related data including NFIRS
- 18) **Evaluate the optional modules** and voluntary fields