

NFPA[®]

950

Standard for
Data Development and
Exchange for the Fire Service

2020



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NFPA® 950

Standard for

Data Development and Exchange for the Fire Service

2020 Edition

This edition of NFPA 950, *Standard for Data Development and Exchange for the Fire Service*, was prepared by the Technical Committee on Data Exchange for the Fire Service. It was issued by the Standards Council on November 4, 2019, with an effective date of November 24, 2019, and supersedes all previous editions.

This edition of NFPA 950 was approved as an American National Standard on November 24, 2019.

Origin and Development of NFPA 950

In 2007, at the recommendation of the late Bill McCammon, NFPA treasurer, a letter was advanced by the Metro Fire Chiefs Association (a joint section of the NFPA and the IAFC) and signed by six of the major international fire service organizations, requesting that the NFPA Standards Council embark on an effort to develop a standard on data exchange for fire departments.

As described in the letter, the purpose of the new standard would be to enable a higher level of technology penetration in the fire service to enhance data sharing and analytic capability. The issue was framed to support effective communication and information management on a routine basis and to enhance situational awareness before, during, and after disasters. This need for information exchange was identified as particularly critical with respect to the following:

- (1) The ability to exchange geographic information between local systems and evolving regional and national systems to support such functions as vulnerability/risk assessment and coordinated incident management
- (2) The requirements of evolving mutual aid and resource exchange programs
- (3) The requirements for participation in systems designed to monitor local, regional, and national preparedness levels during times of high risk
- (4) Fire and emergency service access to and utilization of critical infrastructure data collected and distributed through national systems

The effort was initiated to enhance the analysis of organizations, promote exchange of concepts and data development, focus on GIS systems efforts with an industrywide perspective rather than a "one-off," per-organization approach, and streamline and maintain comprehensive inducements to invest in data systems for the digital age.

Solicitation of members was approved by the Standards Council, and subsequent industrywide response created the membership necessary to draft code-type and scope documents. Efforts by that group at the initial meeting, held at the IAFC headquarters in Fairfax, Virginia, resulted in the Standards Council creating a committee and approving efforts to create a standard on fire service data exchange (NFPA 950, *Standard for Data Development and Exchange for the Fire Service*) in 2008.

The new Technical Committee on Data Exchange for the Fire Service met several times between November 2008 and February 2011 and produced a draft, approved by the Standards Council, that went out for public input in the Fall 2014 cycle. The 2015 edition was the inaugural edition of NFPA 950.

The 2020 edition of NFPA 950 incorporates a major change with the addition of a chapter on records management, which covers various types of software used in the industry, including scheduling, equipment management, and community risk reduction. Also, a chapter was added for data exchange and now includes both JSON and GeoJSON and allows for UDP. The chapter on system design standards was moved to a different chapter, and the concept of time formatting was set with a local UTC offset. The end of the chapter on data administration was used as the basis for the new Chapter 6.

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This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents that establish frameworks to 1) provide for the identification, development, management, and exchange of essential data; and 2) enhance an interoperable geospatial data environment for fire and emergency services. This includes documents that establish criteria for and promote the exchange and use of data in common formats critical to the support for decision making in all phases of administration, planning, prevention, preparedness, mitigation, response, and recovery.

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NFPA 950

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced and extracted publications can be found in Chapter 2 and Annex C.

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 This standard describes a digital information structure and associated requirements and workflows common to fire and emergency services delivery and management for emergency response and administrative use.

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.

1.2.2.1 Standard data formats, data services, 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.

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.

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.

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.

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. (Reserved)

2.3 Other Publications.

2.3.1 ISO Publications. International Organization for Standardization, ISO Central Secretariat, BIBC II, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland.

ISO 6709, *Standard representation of geographic point location by coordinates*, 2008.

ISO 8601, *Data elements and interchange formats — Information interchange — Representation of dates and times*, 2004.

ISO 8879, *Information processing — Text and office systems — Standard Generalized Markup Language (SGML)*, 1986.

ISO/IEC 14766, *Information technology — Telecommunications and information exchange between systems — Use of OSI applications over the Internet Transmission Control Protocol (TCP)*, 1997.

ISO 19115, *Geographic information — Metadata*, 2003.

ISO 19136, *Geographic information — Geography Markup Language (GML)*, 2007.

ISO/IEC 21778, *Information technology — The JSON data interchange syntax*, 2017.

ISO/IEC FCD 24706, *Information technology — Metadata for technical standards*, 2013.

2.3.2 U.S. Government Publications. U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

National Fire Incident Reporting System (NFIRS), version 5.0, January 1999.

Standard for Symbology, Homeland Security Working Group, Federal Geographic Data Committee, July 2012.

Topographic Mapping Standard for Symbology, U.S. Geological Survey, U.S. Department of the Interior.

United States National Grid Standard FGDC-STD-011-2001.

Federal Geographic Data Committee (FGDC), *United States Thoroughfare, Landmark, and Postal Address Data Standard (DRAFT)*, 2011.

2.3.3 Other Publications.

International Committee on Electromagnetic Safety (ICES) Data Backup Standard.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

National Emergency Medical Services Information System (NEMSIS), version 3.3.1, February 2013.

National Institute of Standards and Technology (NIST) standards.

National Oceanic and Atmospheric Administration, North American Datum of 1983 (NAD 83), National Geodetic Survey.

RFC 7946, *The GeoJSON format*— IETF tools, 2016.

2.4 References for Extracts in Mandatory Sections.

NFPA 951, *Guide to Building and Utilizing Digital Information*, 2016 edition.

NFPA 1026, *Standard for Incident Management Personnel Professional Qualifications*, 2018 edition.

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 Shall. Indicates a mandatory requirement.

3.2.4 Should. Indicates a recommendation or that which is advised but not required.

3.2.5 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to

indicate requirements and that 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 NFPA Manuals of Style. When used in a generic sense, such as in the phrase “standards development process” or “standards development activities,” the term “standards” includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

3.3.1 Acquisition. The process of creating, collecting or purchasing data for use in a system.

3.3.2 All-Hazards. Any incident or event, natural or human-caused, that warrants action to protect life, property, environment, public health, or safety, and to minimize disruption of government, social, or economic activities [1026, 2018].

3.3.3 Application Program Interface (API). A set of commands, functions, protocols, and objects that programmers can use to create software or interact with an external system, providing developers with standard commands for performing common operations so they do not have to write the code from scratch.

3.3.4 Attribute Data. Information about a geographic feature.

3.3.5 Audio Data. Auditory presentation of sounds stored as a file.

3.3.6 Community Healthcare Organizations. Framework for the design and evaluation of comprehensive community healthcare programs provided by local EMS systems, which can include disparate elements of government and the private sector.

3.3.7 Computer Aided/Assisted Dispatch (CAD). A combination of hardware and software that provides data entry, makes resource recommendations, and notifies and tracks those resources before, during, and after alarms, preserving records of those alarms and status changes for later analysis.

3.3.8 Conflation. The process or result of fusing items into one entity; fusion; amalgamation.

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

3.3.10 Data Development. The act of capturing or improving by expanding, enlarging, or refining systems in the data environment.

3.3.11 Data Exchange. The structured transmission of data from one discrete system to another by electronic means.

3.3.12 Data Sharing (Information). The act of exchanging electronic information.

3.3.13 Database Audit. The process of monitoring access to and modification of database objects and resources, including the documentation of sources and any subsequent custody changes.

3.3.14* Decimal Degrees. Values of latitude and longitude expressed in decimal format.

3.3.15 Deflation. The partitioning of one data group into smaller blocks or units of data.

3.3.16 Enterprise Data Approach. A natively integrated software system that provides a range of typically required functionalities in one unified infrastructure.

3.3.17 Extensible Markup Language (XML). A mark-up language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable.

3.3.18 External Data. Data acquired from and/or maintained by an outside source.

3.3.19 Federated Data Approach. A series of discrete software systems configured and integrated so that data can easily and readily be exchanged from one discrete system to another, where multiple data or software systems remain independent yet are integrated so that they function in a coordinated and interoperable manner.

3.3.20* Geography Markup Language Encoding Standard (GML). Extensible Markup Language (XML) schema for expressing geographical features.

3.3.21 Geospatial JavaScript Object Notation (GeoJSON). An open-standard format designed for representing simple geographic features along with their nonspatial attributes based upon JSON.

3.3.22 Geospatial/Spatial. Pertaining to the location and dimensions of geographic entities which may be represented in a geographic context.

3.3.23 Image Data. Visual representation of an object, scene, person, or abstraction produced on a surface.

3.3.24 Interchange. The act of replacing one data item with another.

3.3.25 Internal Data. Data captured, created and/or maintained by the AHJ's computing systems.

3.3.26 JavaScript Object Notation (JSON). An open-standard file format that uses human-readable text to transmit data objects consisting of attribute-value pairs and array data types or other value that can be serialized.

3.3.27 Line Data. Represented by a series of connected points (nodes or vertices).

3.3.28 Logical Security. Security protocols preventing unauthorized access to systems and/or data.

3.3.29 Metadata. A detailed description of content and context of the data being exchanged.

3.3.30 Near-Real-Time Data Sharing. Data sharing that occurs within 24 hours of a record being created and/or approved for release by the AHJ.

3.3.31 Nonspatial Data. Data lacking a spatial component.

3.3.32 Performance Management. Oversight of process management to ensure that the ensemble of activities consistently meet organizational goals in an effective and efficient manner.

3.3.33 Physical Security. Protection that encompasses the areas containing system hardware, locations of wiring used to connect the systems, support services, backup provisions, and any other parts of systems.

3.3.34 Point Data. Data that can be represented by a single coordinate set.

3.3.35 Polygon Data. Data represented by a series of connected points (nodes or vertices) that form a closed loop.

3.3.36 Process Management. Ensemble of activities to ensure that data and process goals are consistently being met in an effective and efficient manner.

3.3.37 Raster Data. A spatial data type that defines space as an array of equally sized cells arranged in rows and columns and composed of single or multiple bands.

3.3.38 Real-Time Data Sharing. Data sharing that occurs within a subsecond to 2 seconds of a record being created and/or approved for release by the AHJ.

3.3.39 Records Management System (RMS). A system that stores and organizes records to facilitate data-driven decisions.

3.3.40 Scalable. The ability to transition in size or complexity without showing negative effects. [951, 2016]

3.3.41 System Development. The creation of a system or interoperable system of systems designed to exchange data, use, or visualize data.

3.3.42 System Integration. The process of creating a complex information system that can include designing or building a customized architecture or application and integrating it with new or existing hardware, packaged and custom software, and communications.

3.3.43 System Security. The protection of hardware, software, networks, and data from physical and logical events that could cause serious loss or damage to an enterprise, agency, or institution. This includes, but is not limited to, protection from fire, natural disasters, burglary, theft, vandalism, terrorism, intrusion, or cyber attack.

3.3.44 Text Data. Data limited to display as UTF-8 characters.

3.3.45 Transmission Control Protocol/Internet Protocol (TCP/IP). The set of communications rules used for wired and wireless networks.

3.3.46 Triangulated Irregular Network (TIN). A vector data structure that partitions geographic space into contiguous, nonoverlapping triangles.

3.3.47 United States National Grid Standard (USNG). An alphanumeric referencing system derived from the Military Grid Reference System (MGRS) that has been overlaid on the Universal Transverse Mercator (UTM) numerical grid.

3.3.48 User Datagram Protocol (UDP). A connectionless, transport layer protocol that exchanges data packets with minimal error recovery services and without guaranteed delivery or acknowledgement.

3.3.49 Vector Data. Spatial information that can be geographically represented as a point, line, or polygon with accompanying attribute data.

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 and 7.

4.3 Data Management. Policies and procedures shall be in place to support data elements within this chapter:

4.3.1 Policies and procedures shall ensure the integrity, security, and accuracy of data pertinent to the scope of this standard and in accordance with Chapters 5 and 7.

4.3.2 Policies and procedures shall include a method for validating the successful transfer of data through the use of a checksum or similar error checking methodology to ensure data integrity during the exchange.

4.3.3 Policies and procedures shall ensure the timeliness of data supporting fire and emergency services covered by the scope of this standard and in accordance with Chapters 5 and 7.

4.3.4 Policies and procedures shall ensure that a spatial component is included with each appropriate piece of data covered by the scope of this standard and in accordance with Chapters 5 and 7.

4.3.4.1* The precision of all fixed geospatial features shall be depicted in data sources at an accuracy of 10 m (33 ft) or better.

4.3.4.2* The precision of all mobile geospatial features shall be depicted at an accuracy of 5 m (16 ft) or as determined by the AHJ.

4.3.5 Policies and procedures shall provide metadata for all data covered by the scope of this standard and in accordance with Chapters 5 and 7.

4.4* Application of the Standard.

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

- (1) Spatial
 - (a) Vector
 - (b) Raster
 - (c) Triangulated Irregular Network (TIN)
- (2) Nonspatial
 - (a) Text
 - (b) Image
 - (c) Audio
 - (d) Video

4.4.2* Processes associated with data acquisition, management, or exchange to accomplish conflation, deflation, or interchange of data to or from one or more sources or applications shall meet the elements required in Chapter 5 and 7.

Chapter 5 Data Administration

5.1 Data Ownership. The AHJ shall establish policies that articulate ownership and intellectual property rights of the data.

5.2 External Data. Policies that describe acquisition, management, and application of external data shall be established and reviewed annually.

5.3 Internal Data. Policies shall be established and reviewed annually that describe acquisition, management, and application of internal data.

5.3.1 At a minimum, policy shall meet the requirements (all categories) for quality assurance and control, system and data security, and physical and logical security as given in 5.3.1.1 through 5.3.1.4.2.3.

5.3.1.1 Quality Assurance and Control.

5.3.1.1.1 The state of completeness, validity, consistency, and timeliness of data shall be documented in the metadata as described in 5.3.1.3.

5.3.1.1.2 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.

5.3.1.1.3 A policy shall be established for the annual evaluation of data covered by the standard with respect to 5.3.1.1.1 and 5.3.1.1.2.

5.3.1.2 System and Data Security.

5.3.1.2.1 Policies for the protection of hardware, software, and networks from physical and logical events that could cause serious loss or damage to an enterprise, agency, or institution shall be established.

5.3.1.2.2 Data under the purview of this standard shall be backed up and maintained in accordance with applicable Institute for Computational Engineering and Sciences (ICES) and National Institute of Standards and Technology (NIST) standards.

5.3.1.3 Metadata.

5.3.1.3.1 Metadata shall be provided for all data covered by this standard.

5.3.1.3.2 Metadata shall conform to International Standards Organization requirements for metadata as stated by ISO 19115 for data having a geographic component and ISO/IEC FCD 24706 (draft) for nonspatial data.

5.3.1.3.3 Metadata shall be completed for author, date and time of creation, date and time of last change, units of measure used, description of attributes, and, where applicable, spatial reference or coordinate system (projection, datum, and units).

5.3.1.4 Physical and Logical Security. Data exchange shall include physical and logical security.

5.3.1.4.1 Database Audit. All data exchanged under the purview of this standard shall support database auditing.

5.3.1.4.2 Permissions. Rights regarding the distribution of data shall be retained by the data provider.

5.3.1.4.2.1 A policy shall be written that documents these rights and establishes a means for documenting release of information.

5.3.1.4.2.2 A data provider shall establish physical and logical security requirements for data contributed.

5.3.1.4.2.3 It shall be the responsibility of the data recipient to ensure that such security requirements are maintained upon receipt from the provider.

Chapter 6 Data Exchange

6.1* General. Data exchange attributes shall be constructed in compliance with existing data exchange standards as identified in this section.

6.1.1* Coordination and Sharing of Nongeospatial and Geospatial Data.

6.1.1.1 The exchange of nongeospatial data shall conform to JavaScript Object Notation (JSON) as defined in ISO/IEC 21778.

6.1.1.1.1 Information that cannot be encoded in JSON encoding format shall conform to Extensible Markup Language (XML) as defined in ISO 8879 for the transfer of nonspatial data elements.

6.1.1.2 The exchange of geospatial data shall conform to requirements of Geospatial JavaScript Object Notation (GeoJSON) as defined in RFC 7946.

6.1.1.2.1 Information that cannot be encoded in GeoJSON shall conform to Geographic Markup Language (GML) as defined in ISO 19136.

6.1.2* Protocol. Data exchange shall use Transmission Control Protocol/Internet Protocol (TCP/IP) standards or User Datagram Protocol (UDP).

6.1.2.1 When using TCP/IP, data exchange shall comply with ISO/IEC 14766.

6.2 Spatial Data.

6.2.1 A spatial data component shall accompany all data elements for which a location is determined and described.

6.2.2 The accuracy and precision of data exchanged shall not exceed that of the device or service through which the data were acquired, collected, or calculated as described in the metadata.

6.2.3* The geographic component of spatial data shall be exchanged as unprojected latitude and longitude in decimal degrees referenced to the North American Datum of 1983 (NAD83).

6.2.4 Attribution. An attribute shall exist that depicts the geographic feature or resource type.

6.3 Nonspatial Data.

6.3.1 Text shall be stored and exchanged as UTF-8 text, with data elements separated by commas.

6.3.2 All other nonspatial data shall be exchanged in their native format.

Chapter 7 System and Data Design Standards (Scalable)

7.1 General.

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

7.2 Addresses.

7.2.1 Addressable locations shall be validated and contain street number, prefix direction (where applicable), prefix type

(where applicable), street name, suffix direction (where applicable), street type, municipality, postal code, county, and state in accordance with the *FGDC United States Thoroughfare, Landmark, and Postal Address Data Standard*.

7.3 Date and Time.

7.3.1 Date and time shall be formatted according to ISO 8601 and shall include the local UTC offset.

7.3.2 Local time shall be calibrated against National Institute of Standards and Technology (NIST) every 24 hours and have an absolute accuracy of plus or minus (+/-) 0.25 seconds.

7.4 Incident Typing Information.

7.4.1 Incident typing shall conform at a minimum to National Fire Incident Reporting System (NFIRS)/National Emergency Medical Services Information System (NEMSIS) coding.

7.4.2 Incident typing shall support "Plus 1" NFIRS coding locally.

7.5 Text.

7.5.1 Text shall be written using UTF-8 characters (nonextended).

7.6 Media.

7.6.1 Images. Images shall be exchanged in a generally accepted reception format as determined by the AHJ.

7.6.2 Video. Video shall be exchanged in a generally accepted reception format as determined by the AHJ.

7.6.3 Audio. Audio shall be exchanged in a generally accepted reception format as determined by the AHJ.

7.7* CAD, RMS, CAD/CAD, CAD/RMS, and RMS/RMS Exchange.

7.7.1 Design and construction of CAD/CAD, CAD/RMS, and RMS/RMS interfaces and applications shall comply with all technical elements set forth in Chapters 4, 5, and 7 of this standard.

Chapter 8 Data Development and Records Management

8.1 General.

8.1.1 Data and records shall be stored in any type of records management system that complies with the requirements of this chapter.

8.1.2 The AHJ shall have the choice of any combination of a federated data approach and an enterprise data approach to collect, maintain, and manage data within their organization.

8.1.2.1 An enterprise records management system shall not prohibit, inhibit, or otherwise limit the ability of the AHJ to utilize and share data among other software platforms that might offer competing capabilities or functionalities.

8.1.2.2 An enterprise records management system shall affirmatively and unambiguously notify the AHJ of the inherent functionalities and system integrations and the costs including, but not limited to, initial and ongoing licensing, ongoing maintenance, updates, support, implementation, and training, of any optional features, functionalities, and system integrations with other software platforms.

8.2 Base Requirements for All Fire Department Specific Software Applications.

8.2.1 Requirements for all types of software shall comply with all elements of Chapters 3, 4, 5, 6, and 7 of this document unless explicitly exempted and clients are notified.

8.2.2 Software vendors shall notify the AHJ of limitations, licenses, or restrictions regarding datasets provided through the software.

8.2.3 Data storage, transmission, and exchange shall be in accordance with federal, state, and local privacy laws and policies.

8.3 Record Collection and Records Management Software.

8.3.1 Software intended for the collection and management of fire service data shall also meet the requirements of Section 8.2.

8.3.2 Emergency Incident Documentation Software.

8.3.2.1 Emergency incident documentation software shall provide a map-based interface for users to view, manipulate, and correct, inclusively, the actual location of an incident, the perimeter of burned or affected areas, and the location and assignments of deployed resources.

8.3.2.2 Emergency incident documentation software shall provide the means to populate incident reports with validated and editable property data, inclusive of the assessed property value, square footage, owner information, occupant information, construction materials, occupancy type, and zoning, from a list of all properties within responsibility of the AHJ.

8.3.2.3 Emergency incident documentation software shall be provided with an application program interface (API) or other standardized means capable of exchanging data in order to connect discrete software systems.

8.3.2.4 Software intended for the collection and management of fire incident data shall provide the means to document fire incidents in accordance with the most recent NFIRS version in effect, or as specified by the AHJ.

8.3.2.4.1 Software shall provide the means for inclusion of locally created data fields and "Plus-1" codes, or as specified by the AHJ.

8.3.2.5 Software intended for the collection and management of fire incident data shall provide the means to document emergency scene operations timestamp data in accordance with the most recent National Fire Operations Reporting System (NFORS) version in effect, or as specified by the AHJ.

8.3.2.6 Software intended for the collection and management of deployable apparatus and resources shall provide the means to transmit unit availability and capability data in accordance with the most recent National Mutual Aid System (NMAS) version in effect, or as specified by the AHJ.

8.3.2.7 Software intended for the collection and management of emergency medical incident data shall provide the means to document emergency medical incidents in accordance with the most recent NEMSIS version in effect, or as specified by the AHJ.

8.3.2.8 Software intended for the collection and management of wildland fire incident data shall provide the means to exchange wildland fire incident information in accordance with the most

recent Integrated Reporting of Wildland-Fire Information (IRWIN) specification in effect, or as specified by the AHJ.

8.3.2.9 Emergency incident documentation software shall provide the means to share geo-coded incident data in near-real-time to the National Fire Data System (NFDS), or as specified by the AHJ.

8.3.3 Fire Investigation Documentation Software.

8.3.3.1 Software intended for the collection and management of fire and arson investigation data shall provide the means to document fire investigation incidents and activities according to the most recent Bomb and Arson Tracking System (BATS) version in effect, or as specified by the AHJ.

8.3.3.1.1 Fire and arson investigation software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.3.3.2 Software intended for the collection and management of youth firesetter data shall provide the means to document youth firesetter incidents according to the Youth Firesetting Information Repository and Evaluation System (Y-FIRES) format, or as specified by the AHJ.

8.3.3.3 Youth firesetter case management software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.3.4 Emergency Incident Record Quality-Assurance Software.

8.3.4.1 Software intended for documenting and managing a quality assurance workflow shall provide the means to identify incidents that contain timestamp outliers, data entry validation errors, and other user-defined flags, as specified by the AHJ.

8.3.4.1.1 The software shall timestamp all quality-assurance activities including when and who reviewed a record, any changes and corrections made or requested, and when changes were approved and by whom, as specified by the AHJ.

8.3.4.1.2 The software shall perform and report validation checks prior to the creation of export files in accordance with enterprise data system rules in effect at the time of export, or as specified by the AHJ.

8.3.4.1.3 The software shall flag records with data validation errors and automatically resubmit updated and corrected records with subsequent exports, or at a time specified by the AHJ.

8.3.4.1.4 Emergency incident records quality assurance software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.4 Personnel Scheduling, Safety, and Administration Software.

8.4.1 Software intended for the management of fire and emergency service personnel scheduling, safety, and administration data shall also meet the requirements of Section 8.2.

8.4.2 Scheduling and Rostering Software.

8.4.2.1 Software intended for the management of fire and emergency service personnel scheduling, safety, and administration data shall provide a means to assign personnel to specific assignments, equipment, and locations based upon

business rules, contractual obligations, and legal mandates as specified by the AHJ.

8.4.2.2 Personnel scheduling software shall be able to transmit data about the specific personnel assigned to each piece of equipment to an incident report as specified by the AHJ.

8.4.2.3 Personnel scheduling software shall be able to flag personnel who do not possess current, valid, and appropriate credentials to function in the position as specified by the AHJ.

8.4.2.4 Personnel scheduling software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.4.3 Health, Wellness, and Medical Records Software.

8.4.3.1 Software intended for the management of fire and emergency service personnel health, wellness, and medical records data shall ensure that all personal health information (PHI), personally identifiable information (PII), and any other sensitive data is maintained securely using industry-accepted access control and encryption practices when at rest, in transit, and when transmitted to other applications, as specified by the AHJ.

8.4.3.2 Personnel health, wellness, and medical records software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.4.4 Occupational Exposure and Injury Tracking Software.

8.4.4.1 Software intended for the management of fire and emergency service personnel occupational exposure and injury tracking data shall provide means to document known or possible occupational exposures including, but not limited to, communicable diseases, hazardous materials, known carcinogens, and any other potential hazards as specified by the AHJ.

8.4.4.2 Occupational exposure and injury tracking software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.4.4.3 Occupational exposure and injury tracking software shall provide the means to transmit data about occupational injuries and casualties to external reporting and oversight bodies in a format specified by the AHJ.

8.4.4.4 Occupational exposure and injury tracking software shall maintain exposure and occupational injury data in accordance with medical records retention, storage transmission, and security policies, as specified by the AHJ.

8.4.4.5 Occupational exposure and injury tracking software shall affirmatively notify any affected employee whose exposure or occupational injury data might have been destroyed, rendered inaccessible, or otherwise become access limited at least 6 months prior to the time at which access to those affected records could be limited or destroyed, and specify necessary actions to gain or maintain access to the records.

8.4.5 Training, Certifications, and Qualifications Software.

8.4.5.1 Software intended for the management of fire and emergency service personnel training, certifications, and qualifications data shall be able to maintain and retain records for all personnel for a period specified by the AHJ.

8.4.5.2 Training, certifications, and qualifications software shall be designed to notify the affected personnel and supervisors when certificates and credentials are scheduled to lapse in a time period and interval specified by the AHJ.

8.4.5.3 Training, certifications, and qualifications software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.4.6 Human Resources and Hiring Software.

8.4.6.1 Software intended for the management of fire and emergency service personnel human resource and hiring data shall ensure that all PHI, PII, and any other sensitive data is maintained securely using industry-accepted access control and encryption practices when at rest, in transit, and transmitted to other applications, as specified by the AHJ.

8.4.6.2 Personnel human resource and hiring software shall maintain personnel data in accordance with records retention, storage, transmission, and security policies, as specified by the AHJ.

8.4.6.3 Personnel human resource and hiring software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.4.7 Emergency Service Billing Software.

8.4.7.1 Software intended for the management of fire and emergency service billing data shall ensure that all PHI, PII, and any other sensitive data is maintained securely using industry-accepted access control and encryption practices, as specified by the AHJ.

8.4.7.2 Fire and emergency service billing software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.5 Equipment and Facilities Software.

8.5.1 Software intended for the management of fire and emergency service equipment and facilities data shall also meet the requirements of Section 8.2.

8.5.2 Maintenance Software.

8.5.2.1 Software intended for the management of equipment and facilities maintenance data shall be capable of documenting and timestamping service requests, who made the request, who performed the service, and the status and outcome of the service.

8.5.2.2 Equipment and facilities maintenance software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.5.3 Equipment Inventory Software.

8.5.3.1 Software intended for the management of equipment and facilities inventory data shall be provided with a mechanism to timestamp when and where inspections are completed and by whom.

8.5.3.2 Equipment and facilities inventory software shall be provided with a mechanism for notifying personnel or entities when equipment is found to be missing, deficient, hazardous, or otherwise in a nonoperational condition.

8.5.3.3 Equipment and facilities inventory software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.5.4 Apparatus and Equipment Inspection and Testing Software.

8.5.4.1 Software intended for the management of equipment inspection and testing data shall provide templates for documenting fire service equipment including, but not limited to, hoses, self-contained breathing apparatus, hand tools, hydraulic equipment, fire extinguishers, and others as specified by the AHJ.

8.5.4.2 Equipment inspection and testing software shall be provided with means to import and export bulk records from external third-party testing entities in standard formats covered in Section 8.2, or as specified by the AHJ.

8.5.4.3 Equipment inspection and testing software shall be provided with an API or other standardized means capable of exchanging data in order to connect to discrete software systems.

8.5.5 Hydrant and Water Supply Management Software.

8.5.5.1 Where software is represented as being specifically intended for the management of hydrant and water supply data, it shall include geospatial location information in accordance with Section 8.2, or as specified by the AHJ.

8.5.5.2 Hydrant and water supply management software shall be provided with means to import and export bulk records from external third-party testing entities in standard formats covered in Section 8.2, or as specified by the AHJ.

8.5.5.3 Hydrant and water supply management software shall include information about the type of hydrant, orifice configuration and sizes, main size, last inspection date, last flow rating, and other information as specified by the AHJ.

8.5.5.4 Hydrant and water supply management software shall be provided with an API or other standardized means capable of exchanging data in order to connect to discrete software systems.

8.6 Incident Command and Situational Awareness Software.

8.6.1 Software intended for the management of fire and emergency service incident command and situational awareness data shall also meet the requirements of Section 8.2.

8.6.2 Incident Command Software.

8.6.2.1 Software intended for the management of incident command data shall provide an interactive interface that allows users to manipulate the location of units and assign tasks and task personnel, as specified by the AHJ.

8.6.2.2 Incident command software shall be provided with an API or other standardized means capable of exchanging data in order to connect to discrete software systems.

8.6.3 Responder Notification/Alerting Software.

8.6.3.1 Software intended for the management of responder notification data shall be capable of sending an emergency alert within a time threshold agreed by the AHJ.

8.6.3.2 Responder notification software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.6.4 Pre-Incident Planning Software.

8.6.4.1 Software intended for the management of fire and emergency service pre-incident planning data shall be provided with an interactive interface capability for the documentation of the location of means of ingress and egress, fire protection systems, life safety systems, utilities, stairwells, hazardous materials storage, known life safety hazards, and other features as specified by the AHJ.

8.6.4.2 Pre-incident planning software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.7 Analytical and Decision Support Software.

8.7.1 Software intended for the management of fire and emergency service analytical and decision support data shall also meet the requirements of Section 8.2.

8.7.2 Geographic Information Systems (GIS)/Mapping Software.

8.7.2.1 GIS/mapping software intended for fire and emergency services shall be capable of management, display, and analysis of geospatial data.

8.7.2.2 GIS/mapping software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.7.3 Business Intelligence Software.

8.7.3.1 Software intended for the management of fire and emergency service business intelligence data shall be capable of programmatically identifying records that are outliers based upon a defined process, or as specified by the AHJ.

8.7.3.2 Business intelligence software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.7.4 Analytical Software.

8.7.4.1 Software intended for the management of analytical and decision support data shall provide the AHJ with a clear and unambiguous visualization or representation of any algorithms, workflows, or analytical models that includes, but is not limited to, data included in the analyses, data that are excluded, specific statistical operations that are utilized, and other details as specified by the AHJ.

8.7.4.2 Analytical software shall be capable of creating user-defined ad hoc analyses as well as predefined, standardized, and repeatable analyses based upon key performance indicators, accreditation performance tables, community risk assessments, or any other business process defined by the AHJ.

8.7.4.3 Analytical software shall be configured to export data in its raw, original format as well as formatted and post-analysis in common data formats as specified by the AHJ.

8.7.4.4 Analytical software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.8 Risk Reduction Software.

8.8.1 Software intended for the management of fire and emergency service risk reduction shall meet the requirements of Section 8.2.

8.8.2 Inspection Records Software.

8.8.2.1 Software intended for the management of inspection records data shall be capable of importing batch records of previous inspection activities as specified by the AHJ.

8.8.2.2 Software intended for the management of inspection records data shall permanently timestamp all activities, including, but not limited to, when an inspection occurred, the inspector's name, violations found, reinspection date, violation correction date, and other pertinent timestamps as specified by the AHJ.

8.8.2.3 Software intended for the management of inspection records data shall identify, flag, and transfer violations that are due for reinspection to the AHJ to ensure the violations have been corrected.

8.8.2.4 Inspection record software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.8.3 Mobile Inspection Software.

8.8.3.1 Software intended for the management of risk reduction data shall be able to retain data created and updated when disconnected from a wireless signal and transmit that data at a later time when connection is re-established.

8.8.3.2 Mobile inspection software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.8.4 Plans Review Workflow Management Software.

8.8.4.1 Software intended for the management of plans review data shall permanently timestamp all activities, including, but not limited to, when a plan was submitted, plans examiner's name, errors and violations identified, plan review completion date, plan resubmittal date, and other pertinent timestamps as specified by the AHJ.

8.8.4.2 Software intended for the management of plans review data shall be capable of annotating the plan with the specific code requirement that mandates a revision as specified by the AHJ.

8.8.4.2.1 Fire protection and life safety systems that permit information shall exchange digital data with the inspection records management system.

8.8.4.3 Plans review software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.8.5 Community Risk Reduction Management Software.

8.8.5.1 Software intended for the management of community risk reduction data shall allow for source metadata and unformatted data used to support the forms in comma separated values (CSV) or a format as specified by the AHJ.

8.8.5.2 Community risk reduction software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.8.6 Mobile Integrated Healthcare Management/Community Paramedicine Software.

8.8.6.1 Software intended for the management of mobile integrated healthcare and community paramedicine data shall provide case management functionality to include, but not be limited to, identifying specific actions taken, care rendered, referrals made, follow-up interactions, emergency call history, and other elements as specified by the AHJ.

8.8.6.2 Mobile integrated healthcare management software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.8.7 Public Education/Outreach Software.

8.8.7.1 Software intended for the management of fire and emergency service public education and outreach data shall document the type of outreach or training delivered, number of persons in attendance, instructors, learning objectives, any testing or evaluation conducted, or any other items as specified by the AHJ.

8.8.7.2 Software intended for the management of fire and emergency service public education and outreach data shall include a calendar, as specified by the AHJ.

8.8.7.3 Public education software shall provide means to query, export, and print reports that include, but are not limited to, activities conducted within a customizable range of dates, persons reached, educator activity, learning objectives measured, and other activity measures as specified by the AHJ.

8.8.7.4 Public education and outreach software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.8.8 Permit and License Management Software.

8.8.8.1 Software intended for the management of fire and emergency service permit and license data shall document active, expired, and past-due permits and licenses; fees collected, due, and in arrears; and inspection and enforcement activity related to the issuance of permits or licenses.

8.8.8.2 Permit and license management software shall provide means to query, export, and print reports that include activities conducted within a customizable range of dates, past-due permits, inspection activity, activity by personnel, and other activity measures as specified by the AHJ.

8.8.8.3 Fire protection and life safety systems permit information shall exchange digital data with the inspection records management system.

8.8.8.4 Permit and license software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.9 Imaging Software.

8.9.1 Software and data for imaging applications shall meet the requirements of Section 8.2.

8.9.2 Vehicle-Mounted Imaging Software.

8.9.2.1 Software intended for the management of imaging data from vehicles shall meet the requirements of Section 8.2.

8.9.2.2 Vehicle-mounted camera software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.9.3 Body/PPE-Mounted Imaging Software.

8.9.3.1 Software intended for the management of imaging data from devices designed to be mounted on the body or personal protective equipment (PPE) shall meet the requirements of Section 8.2.

8.9.3.2 Body- and PPE-mounted imaging software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.9.4 Deployable Device-Mounted Imaging Software.

8.9.4.1 Software intended for the management of imaging data from deployable devices shall meet the requirements of Section 8.2.

8.9.4.2 Deployable device-mounted imaging software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.9.5 Augmented Reality/Virtual Reality Software.

8.9.5.1 Software intended for the management of augmented reality and virtual reality data shall meet the requirements of Section 8.2.

8.9.5.2 Augmented reality and virtual reality software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.10 Sensor Software.

8.10.1 Software intended for the management of fire and emergency service sensor data shall utilize universal parameters for sharing and also meet the requirements of Section 8.2.

8.10.2 Apparatus-Mounted Sensor Software.

8.10.2.1 Software intended for the management of apparatus-mounted sensor data shall utilize universal parameters for exchanging vehicle telemetry, fire pump telemetry, and maintenance alerts as specified by the AHJ.

8.10.2.2 Apparatus-mounted sensors shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.10.3 Body-Worn Sensor Software.

8.10.3.1 Software intended for the management of body-worn sensor data shall utilize universal parameters for sharing and meet the requirements of Section 8.2.

8.10.3.2 Body-worn sensors shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.10.4 Equipment-Mounted Sensor Software.

8.10.4.1 Software intended for the management of equipment-mounted sensor data shall utilize universal parameters for sharing and meet the requirements of Section 8.2.

8.10.4.2 Equipment-mounted sensors shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.11 Community Risk Awareness Software.

8.11.1 Software intended for the management of fire and emergency service community risk awareness data shall meet the requirements of Section 8.2.

8.11.2 Hazardous Materials Emergency Awareness Software.

8.11.2.1 Software represented as being specifically intended for the management of hazardous materials emergency awareness data shall create a timestamped and searchable history of each location as specified by the AHJ.

8.11.2.2 Hazardous materials emergency data software shall be capable of importing batch records from external sources and matching records based upon location, chemical type, and business name.

8.11.2.3 Hazardous materials emergency data software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.11.3 Inspection, Testing, and Maintenance Notification Software.

8.11.3.1 Software intended for the management of inspection, testing, and maintenance (ITM) data shall identify properties with unresolved deficiencies, violations, and errors within a timeframe specified by the AHJ.

8.11.3.2 ITM notification software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.11.4 Hazardous Materials Pipeline Location Software.

8.11.4.1 Software intended for the management of hazardous materials pipeline data shall identify the location, depth, size, pressure, pipe material, and other required data as specified by the AHJ.

8.11.4.2 Hazardous materials pipeline location software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.11.5 Railroad Carrier Inventory Software.

8.11.5.1 Software represented as being specifically intended for the management of railroad carrier inventory data for emergency responders shall allow credentialed and authenticated emergency personnel to view shipping manifests including the materials being transported, quantities, container type, container size, physical properties, international chemical identification numbers, special precautions, and information as specified by the AHJ.

8.11.5.2 Railroad carrier inventory software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.11.6 Community Risk Assessment Software.

8.11.6.1 Software represented as being specifically intended for the management of community risk assessment data shall include access to curated census data and other publicly available datasets.

8.11.6.2 Community risk assessment software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.11.7 Citizen Notification, Automatic External Defibrillator (AED) Locations, and Emergency Alerting Software.

8.11.7.1 Software intended for the management of citizen notification, AED location, and emergency alerting data shall provide the AHJ with metrics on system performance, message transmission outcome, and metrics as specified by the AHJ.

8.11.7.2 Citizen notification and emergency alerting software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.12 Digital Alert Warning Systems for Emergency Response Vehicles.

8.12.1 Responder-to-Vehicle Citizen Motorist Alerts. Software intended to function as a digital alert warning system (DAWS) shall at minimum include the following data parameters:

- (1) The DAWS shall be capable of exchanging the data in real-time or as specified by the AHJ.
- (2) The service shall be capable of transmitting alerts in real-time or as specified by the AHJ.
- (3) The intended recipient shall be capable of receiving alerts in real-time or as specified by the AHJ.
- (4) DAWS shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.12.2 Responder-to-Vehicle Citizen Motorist Alerts.

8.12.2.1 Software intended for the management of responder-to-vehicle citizen motorist alerts shall utilize universal parameters for sharing and meet the requirements of Section 8.2.

8.12.2.2 Responder-to-vehicle citizen motorist alerts software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.12.3 Responder-to-Responder Apparatus Alerts.

8.12.3.1 Software intended for the management of responder-to-responder apparatus alerts shall utilize universal parameters for sharing and meet the requirements of Section 8.2.

8.12.3.2 Responder-to-responder apparatus alerts software shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

8.13 Building Information Modeling Software.

8.13.1 Software intended for the management of building information modeling (BIM) software for fire and life safety shall utilize universal parameters for sharing and meet the requirements of Section 8.2.

8.13.2 BIM software applications shall be provided with an API or other standardized means capable of exchanging data in order to connect discrete software systems.

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.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.3.14 Decimal Degrees. An example of decimal degrees is 33.484758, -118.373644 where the number of digits to the right of the decimal point reflects the accuracy. For additional information, see ISO 6709.

A.3.3.20 Geography Markup Language Encoding Standard (GML) GML serves as a modeling language for geographic systems as well as an open interchange format for geographic transactions on the Internet. As with most XML-based grammars, there are two parts to the grammar — the schema that describes the document and the instance document that contains the actual data. A GML document is described using a GML schema, which allows users and developers to describe generic geographic data sets that contain points, lines, and polygons.

A.4.1 Standardized data provide for more reliable interoperability between entities, systems, and processes to support incident-related operational objectives.

A.4.3.4.1 These fixed geospatial features can include permanent or temporary buildings and structures, hydrants, power stations, streams, and so forth. The precision of fixed features is generally thought of in latitude, longitude (x,y) data, but technology is allowing incorporation of the vertical (z) plane.

A.4.3.4.2 The precision of mobile features is generally thought of in latitude, longitude (x,y) data, but new technology is opening up avenues to allow incorporation of the vertical (z) plane. Displaying accuracy within the context of a margin-of-error buffer enhances the ability of the AHJ to adopt these features. The AHJ should also consider adding the heading and speed of mobile assets.

A.4.4 The committee recognizes the rapidly changing nature of technology. As such, the standard is not intended to limit the development or implementation of processes or systems. However, the results of advances in technology should not violate the core intent of this document.

A.4.4.2 Examples of applications and systems requiring the exchange of data include records management systems interfacing with the National Fire Incident Reporting System and the National Emergency Medical Services Information System. These should support the requirements established herein or as also modified locally.

A.6.1 A National Information Exchange Model (NIEM) data model is a mature and stable data dictionary of agreed-on terms, definitions, and formats, independent of how information is stored in individual agency systems.

A.6.1.1 The primary encoding format is JSON/ GeoJSON and the secondary choice is XML/GML for use with larger more robust data sets.

A.6.1.2 The framework of the protocols will typically be the determining factor. Mission critical data exchange that needs to be validated should use TCP/IP protocols. The AHJ might consider UDP when the data exchange does not need to be validated or lost data packets in the exchange are not a concern. UDP might be appropriate when smaller, faster exchange is necessary.

A.6.2.3 An example of decimal degrees is 33.484758, -118.373644 where the number of digits to the right of the decimal point reflects the accuracy.

A.7.7 A standard approach should be used for implementation of all system interfaces. Information sharing initiatives should conform to the NIEM.

Annex B Additional Resources

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1 Introduction. The references in this annex are from complementary standards development organizations and can be used by an AHJ as supplementary material.

B.2 APCO ANS 1.116.1-2015, *Public Safety Communications Common Status Codes for Data Exchange*, 2015. This standard provides a standardized list of status codes that can be used by emergency communications and public safety stakeholders when sharing incident-related information. Creating a common status code does not mean that an agency must change the codes they use internally. The intent is to have each agency map their internal codes to the standardized list.

B.3 APCO ANS 1.111.2-2018, *Public Safety Communications Common Disposition Codes for Data Exchange*, 2018. Disposition codes are used by public safety answering points (PSAPs) and public safety to identify the outcome of an event (incident). These codes typically involve the use of numeric, alpha, or

alphanumeric characters that are meaningful only to a specific agency or region. This standard provides a list of Common Disposition Codes for use by PSAPs and public safety when sharing incident information with disparate agencies and authorized stakeholders.

B.4 APCO ANS 2.103.1-2012, *Public Safety Communications Common Incident Types for Data Exchange*, 2012. This APCO ANS focuses on providing a standardized list of Common Incident Type Codes to facilitate effective incident exchange between Next-Generation 9-1-1 (NG9-1-1) PSAPs and other authorized agencies, which is a critical component of public safety interoperability. If an agency is receiving information about an incident, a basic level of incident classification will be required to assure they understand the type of situation. The creation of this standardized incident type code list does not mean that the agency is required to change the codes they use internally. The intent is to have each agency map their internal codes to the standardized list.

B.5 APCO/CSAA ANS 2.101.2-2014, *Alarm Monitoring Company to Public Safety Answering Point to Computer Aided Dispatch Automated Secure Alarm Protocol*, 2014. The purpose of the APCO/CSAA ANS 2.101.2-2014, also known as ASAP 3.3, documentation is to provide a standard data exchange for transmitting information using automation between an Alarm Monitoring Company and a PSAP. There are three primary uses for this information exchange package documentation (IEPD):

- (1) Initial notification of an alarm event by an alarm monitoring company to a PSAP
- (2) Update of status by the PSAP's computer-aided dispatch CAD system to the alarm monitoring company as follows:
 - (a) Alarm Notification Accepted, call-for-service created
 - (b) Alarm Notification Rejected due to invalid alarm location address, invalid event type, alarm notification too old, or other reason(s)
- (3) Bidirectional update of other events between an alarm monitoring company and a PSAP, such as the following:
 - (a) Requests for cancellation by the alarm monitoring company
 - (b) Updates concerning key-holder information by the alarm monitoring company
 - (c) Notice by the PSAP that the primary response agency has been dispatched
 - (d) Notice by the PSAP that the primary response agency has arrived on scene
 - (e) Notice by the PSAP that the event has been closed (with a disposition if applicable)
 - (f) Updates from the PSAP telecommunicator or field resource requesting additional information, such as an estimated time of arrival for the key-holder

B.6 APCO/NENA ANS 2.105.1-2017 NG9-1-1, *Emergency Incident Data Document*, 2017. The Emergency Incident Data Document (EIDD) provides a standardized, industry-neutral National Information Exchange Model (NIEM)-conformant (XML-based) specifications for exchanging emergency incident information to agencies and regions that implement NG9-1-1 and internet protocol (IP)-based emergency communications systems. Emergency incident information exchanges supported by the EIDD include exchanges between disparate manufacturers' systems located within one or more public safety agencies and with other incident stakeholders. The EIDD IEPD is a NIEM-conformant package that describes the construction and content of the EIDD information exchange.

It contains all of the schemas necessary to represent and validate the data content of the exchange. It also contains supplemental artifacts, such as documentation, business rules, search and discovery metadata, and sample instances.

B.7 APCO ANS 1.110.1-2015, *Multi-Functional, Multi-Discipline Computer Aided Dispatch Minimum Functional Requirements, 2015.* The Multi-Functional Multi-Discipline Computer Aided Dispatch (CAD) Minimum Functional Requirements standard identifies the minimum functional requirements that a CAD system is required to include, broken down by public safety discipline. Also identified are the optional functional requirements that a CAD system should include. Attachment A: the Unified CAD Functional Requirements (UCADFR) provides a comprehensive list of functional requirements for CAD systems that can be used by public safety communications centers to assist with the request for proposal (RFP) process when a need exists to conduct a solicitation for a new CAD system or an upgrade to an existing CAD system.

Annex C Informational References

C.1 Referenced Publications. 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.

C.1.1 NFPA Publications. (Reserved)

C.1.2 Other Publications.

C.1.2.1 APCO International Publications. Association of Public Safety Communications Officials, 351 N. Williamson Boulevard, Daytona Beach, FL 32114-1112.

APCO ANS 1.110, *Multi-Functional, Multi-Discipline Computer Aided Dispatch Minimum Functional Requirements, 2015.*

APCO ANS 1.111, *Public Safety Communications Common Disposition Codes for Data Exchange, 2018.*

APCO ANS 1.116, *Public Safety Communications Common Status Codes for Data Exchange, 2015.*

APCO/CSAA ANS 2.101.2-2014, *Alarm Monitoring Company to Public Safety Answering Point to Computer Aided Dispatch Automated Secure Alarm Protocol, 2014.*

APCO ANS 2.103.1, *Public Safety Communications Common Incident Types for Data Exchange, 2012.*

APCO/NENA ANS 2.105.1 NG9-1-1, *Emergency Incident Data Document, 2017.*

C.2 Informational References. (Reserved)

C.3 References for Extracts in Informational Sections. (Reserved)

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APCO ANS 2.103.1-2012, Public Safety Communications Common Incident Types for Data Exchange, 2012, B.4

APCO/CSAA ANS 2.101.2-2014, Alarm Monitoring Company to Public Safety Answering Point to Computer Aided Dispatch Automated Secure Alarm Protocol, 2014, B.5

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