REQUEST FOR PROPOSALS FOR PROJECT CONTRACTOR

ITM Data Exchange

29 April 2019

Background: Many NFPA codes and standards establish minimum frequencies for periodic inspection, testing, and maintenance (ITM) for fire protection systems, including for example, NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, and NFPA 72, National Fire Alarm and Signaling Code. These frequencies are often historical requirements that are often not based on empirical ITM data or observed deficiencies. In recent years there has been growing interest in risk/occupancy-based and performance-based ITM frequencies; however, to be effective there is a need for a more data-based approach to ITM frequencies. While the use of digital ITM data collection software are evolving, there remains great variation in the format that ITM data is collected, stored, and analyzed. Due to the inconsistency in ITM data collection methodologies, it is difficult to implement data-informed decision making regarding system reliability, ITM frequencies, and risk acceptability.

The Fire Protection Research Foundation (FPRF) has previously lead projects on ITM Data Collection and Analytics that have concluded that additional work needs to be done in order to evaluate and correlate fire protection equipment reliability with code requirements. Some of the identified gaps are the lack of standardization of ITM data format, collection, and submission processes, as well as unresolved issues regarding data access, ownership, security parameters, and others.

Data from the Inspection, Testing, and Maintenance of Fire Protection Systems have value to a large variety of stakeholder groups including Contractors (i.e. inspectors), Building Owners/Facility Managers, Authorities Having Jurisdiction, Equipment Manufacturers, Insurance companies, NFPA Codes and Standards Technical Committees, Consultants, and others. Despite the widespread appreciation of the importance of ITM data, there is currently no universally adopted data model, or standardized data format, that all stakeholders utilize to share and compare data. This lack of standardization not only limits the ability to determine sound performance-based inspection frequencies, but it also limits the abilities of all stakeholder groups to exchange and analyze data to inform decisions for their own local needs.

Defined Terms and Phrases. The following are definitions of terms and phrases used throughout this project prospectus:

- All references to the term “data exchange model”, shall be interpreted as “the logical inter-relationships and data elements involved in the information world. It also documents the way data are stored and retrieved and represents what data is required and what format is to be used for different business processes1.” This is distinct from and not related to fire protection engineering models, predictive analytics models, fire dynamic simulator models, etc.

1 https://www.techopedia.com/definition/18702/data-model
All references to “extensible” technology shall be interpreted as “extensibility is a measurement of a piece of technology’s capacity to append additional elements and features to its existing structure.”\footnote{https://www.techopedia.com/definition/7107/extensible}

All references to “pilot test” within this project is intended to be interpreted as the testing of the data exchange model in a real-world user environment where the collected diverse sample of ITM data is input into the initial, extensible, ITM data model to demonstrate and evaluate the use and functionality of the ITM data exchange model.

All references to “data standardization” within this project is intended to be interpreted as the process in which similar data received in various formats is transformed to a common format that enhances the comparison process.

**Key Assumptions.** The following are key assumptions used by this project:

- There are many different stakeholders who have varying interests and/or investments in how ITM data are collected and shared, including but not limited to, fire protection system manufacturers/designers/installers, ITM inspectors, software vendors specializing in collecting and/or exchanging ITM data, building owners, facilities managers, and Authorities Having Jurisdiction (AHJ). Each of their use cases may differ in terms of what data they need, value, or are willing to share.
- There are various existing approaches for collecting ITM data in equally diverse formats across the fire protection community.
- Given the diversity of use cases based on the different types, formats, and reasons that data are collected and shared across the ITM community, it is anticipated that any data exchange model developed will need to be dynamic and designed to allow for growth, typically known as extensibility.
- It should be noted that some companies, vendors, and other stakeholders may have different limitations on what data can be shared, in what format, and how anonymized it must be.

**Research Goal:** The goal of this project is to develop and pilot test a comprehensive, scalable, and extensible data exchange model to facilitate ITM data sharing from diverse ITM data sources.

**Contractor Project Tasks:** The research goal shall be achieved through the following tasks, which will be conducted under the auspices of the Research Foundation in accordance with Foundation Policies and will be guided by a Project Technical Panel of industry stakeholders:

**Task 1: Participate in Focus Group Meetings and Assess Stakeholder Needs and Use Cases for an ITM Data Exchange.** Focus group meetings shall be held to solicit feedback from participants to support the assessment and documentation of all applicable use cases and needs for an ITM data exchange. The contractor shall participate in all focus group meetings, document all information gathered during these sessions, and utilize this information in the subsequent tasks.

**Task 2: Conduct a literature review on existing data architectures, data models, and exchange approaches.**

- **Task 2(a): Review existing ITM Data Architectures.** Utilizing the information gathered from the focus group sessions in Task 1 and additional background research, review existing ITM data collection methodologies and data architectures, specifically looking at the data elements collected, data formats, data security protocols, etc. and assess the data infrastructure requirements and implementation considerations for an ITM data exchange. Identify any key challenges with the existing ITM data architectures.
• **Task 2(b):** Conduct a literature review on existing data models and exchange approaches. Provide an overview of existing data models that could be used for ITM data and discuss the data ingestion, analysis and exchange approaches. Make a recommendation for the optimal data model and proceed with this methodology for the following steps.

**Task 3:** Develop the Methodology and Framework for an ITM Data Exchange Model. This data exchange model should utilize international best-practices (e.g. graph approaches for linking data or other well documented approaches) for the collection and exchange of ITM data. Justify how this approach is extensible and applicable for new types of data and systems. Address how future revisions to the developed data exchange model would be handled. This task shall consist of the following subtasks:

- **Task 3(a):** Collect and assess ITM data elements and datasets. Collect a sample of diverse ITM data from multiple sources to capture the various formats and nomenclatures for at least 3 specific applications (e.g. fire pumps, fire alarms, wet-pipe sprinkler systems, etc.)
- **Task 3(b):** Establish ITM Vocabulary. From the collected data, develop a draft ITM vocabulary.
- **Task 3(c):** Develop preliminary ITM Data Relationships. Identify connections between relational data based on the established vocabulary.
- **Task 3(d):** Establish draft project deliverables for Workshop Evaluation. The draft project deliverables are intended to include 1) the development of an initial, extensible, data exchange model for the ingestion, storage, use and exchange of diverse ITM data; and 2) a draft report documenting the analysis, methodology, and model development strategies. The draft deliverables shall be reviewed with the project technical panel prior to the workshop.

**Task 4:** Workshop. The baseline materials developed in the previous tasks will be further evaluated, discussed, and refined at the workshop. The workshop will seek to clarify, confirm, add, or refine detailed information and deep insight based on group discussions and additional field experience of ITM activities and data collection.

- The project contractor is expected to present an overview of the draft deliverables developed in Tasks 1, 2, and 3 at the workshop and participate in workshop discussions to solicit and gather feedback from workshop attendees.

**Task 5:** Post-Workshop Refinement. Based on the feedback from the stakeholder workshop and further analysis, the contractor shall refine the data exchange model, as necessary.

**Task 6:** Pilot test the initial and extensible ITM data exchange model. Using the sample of diverse ITM data collected in Task 3, pilot test the initial, extensible, ITM data model to demonstrate and evaluate the use and functionality of the ITM data exchange model.

- The data collected during this project should be used to consolidate the various formats of ITM data, and to test and validate the common assumptions in ITM inspection frequencies, among other questions to support the NFPA Codes and Standards.

**Task 7:** Develop a final report. Develop a final report that fully documents all aspects of this project in a user-friendly format that will be published on the FPRF website.

**Project Meetings:** The project contractor is expected to participate in the following project meetings, which will all be administratively handled by FPRF.
Advisory Panel Meetings: The Fire Protection Research Foundation will appoint and administratively handle an advisory panel of project partners, sponsors, user organizations, and other subject matter experts to provide overall administrative oversight and guidance over the course of the project. Participation and discussion is required by the project contractor in a minimum of three conference calls with the advisory panel to review progress at critical stages of the project as follows:

1. At project initiation to review the work plan, project scope and other project details;
2. Prior to the project workshop to review the data model and methodology;
3. Near the end of the project to review final project deliverables.

Focus Group Meetings: This project will include focus group meetings, which will be held to assess stakeholder needs and to identify use cases for an ITM Data Exchange.

- FPRF will identify and select focus group participants from diverse stakeholder groups (e.g. AHJs, manufacturers, designers, inspectors, software vendors specializing in collecting and/or exchanging ITM data, building owners, facilities managers, insurers, etc.) with consideration of targeted ITM data focus areas.
- FPRF will establish a plan detailing the focus group meeting details, agenda, content, logistical details (including venue), and other key variables.

Workshop: This project will also include a workshop, planned and facilitated by FPRF, to review the draft deliverables to enable constructive review and refinement by technical experts. At the workshop, attendees will discuss, define, and categorize ITM data and identify the logical interrelationships of ITM data elements and how it fits into the proposed data model methodology.

- The logistical details for the workshop including identifying and coordinating attendees, the workshop venue, overall workshop facilitation and documentation will be directly handled by FPRF.

Implementation: This research program will be conducted under the auspices of the Research Foundation in accordance with Foundation Policies and will be guided by a Project Technical Panel of industry stakeholders who will provide input to the project, recommend contractor selection, review periodic reports of progress and research results, and review the final project report.

Deliverables: The deliverables of this project shall include the following:

- An initial, extensible data exchange model that is capable of accepting ITM data in its existing diverse formats and re-align it into a format that can be utilized and appropriately shared to support revisions to existing, relevant codes and standards.
- An interim draft report (including Tasks 1, 2, and 3 to document the analysis, methodology, and model development strategies)
- A draft final report (documenting all tasks)
- A final report (after panel review)
- At least one presentation to an applicable NFPA Technical Committee or a relevant technical conference.

Intellectual Property: The Research Foundation will retain rights to the project report which will be published on the Foundation website.

Requisite Knowledge, Skills, and Abilities: The individual or firm proffering services, if requested, shall provide evidence or be able to demonstrate the following knowledge, skills, and abilities outlined below.
**Required Subject Matter Expertise:** It is recommended that the project contractor have the following experience, either solely or in partnership:

- Established knowledge of and experience with fire protection systems or related types of data, along with background knowledge on the fire protection community and the infrastructure that supports it.
- Experience developing extensible and flexible data models for exchange.
- Partnership between organizations with both of the aforementioned attributes is viewed as a strength.

**Proposal Guidelines:**

- The submitter, solely or in partnership, should demonstrate how they will successfully gather an appropriate quantity of diverse ITM data to test the developed data model.
- Proposals must clearly indicate all work or services that must be performed by, outsourced to, or contracted through an organization other than the party submitting the proposal.
  - If any items require outsourcing, the proposal must include full contact information for the third-party organization and description of services to be contracted.

**Schedule and Costs:** The tentative project schedule is as follows:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposals due</td>
<td>May 31, 2019</td>
</tr>
<tr>
<td>Contractor Selected/Project Initiation</td>
<td>2 weeks after proposal deadline</td>
</tr>
<tr>
<td>Panel Kick-Off Call</td>
<td>2 weeks after project initiation</td>
</tr>
<tr>
<td>Select and Hold Focus Group Meetings</td>
<td>2 Month after project initiation</td>
</tr>
<tr>
<td>Interim Draft Report and Pre-Workshop Review of Tasks 2, 3 and 4</td>
<td>6 Months after project initiation</td>
</tr>
<tr>
<td>Stakeholder Workshop</td>
<td>7 Months after project initiation</td>
</tr>
<tr>
<td>Review Pilot Test Results</td>
<td>9 months after project initiation</td>
</tr>
<tr>
<td>Draft Report Due</td>
<td>11 months after project initiation</td>
</tr>
<tr>
<td>Final Deliverables Due</td>
<td>12 months after project initiation</td>
</tr>
</tbody>
</table>

This is a fixed price project in the amount of $110,000. All indirect and travel costs incurred are intended to be included within this fixed price. The Foundation does not have a limit on indirect costs, but the total proposal cannot exceed this fixed price.

**How To Respond:** Letter proposals (not to exceed six pages) shall be submitted electronically to Victoria Hutchison, Research Project Manager of the Foundation, at vhutchison@nfpa.org no later than 5:00 pm Eastern time 31 May 2019. For additional details see the “Research Foundation Policies for the Conduct of Research Projects”, the Foundation Operating Principles, and “Research Project Guidelines for Contractors” on the Foundation website at: https://www.nfpa.org/foundation. Each proposal shall include a description of the following which will be used as the basis for proposal evaluation: scope and approach, problem understanding, technical merit, and prior relevant experience and personnel expertise. This is a fixed price project in the amount of $110,000, which includes any indirect costs and travel to in-person meetings and presentations.

**Note:** This project will proceed only on the basis of receipt of a proposal deemed acceptable to the Foundation and the project sponsor(s). Information on the Foundation’s policies for the conduct of research can be found on our website.