



Review of Smart Features of Buildings & Systems Impacting Fire, Electrical & Life Safety

Background

Smart buildings, smart cities and the smart and connected devices that power them and bring new insights are gaining popularity around the world. But smart devices enable more than just connectivity. A smart device typically has an operating system that will let you connect with other information services, entertainment services, or apps. More complex than connected devices, smart devices often contain sensors, microprocessors, data storage, controls, software, and an embedded operating system, which may utilize artificial intelligence. A key benefit of smart features in buildings and fire and life safety systems are the data and analytics that can be gleaned from the building systems to give the end user insights into its operation and performance.

For building safety professionals, this represents an exciting time. The addition of smart technology to fire and life safety building systems presents many benefits, however, this connectivity may also introduce new security concerns, such as cyber risk. As manufacturers continue to push their technologies and products to the market, and codes and standards begin to recognize and address these technologies, guidance is needed.

In 2022, the SFPE Foundation launched the Grand Challenges Initiative to develop a comprehensive research, education, and outreach strategy around four priority topics that are not unique to fire engineering, but instead represent pressing global challenges where fire safety science and engineering can contribute to ongoing discussions that affect the daily lives of billions. These four focus areas included [1] Energy & Infrastructure, [2] Resilience & Sustainability, [3] Climate Change and [4] Digitalization, Artificial Intelligence, & Cybersecurity.

The recently published GCI Whitepaper on “Digitalization, Artificial Intelligence and Cybersecurity” identified a number of knowledge gaps to be filled through research projects. One specific research need identified through this GCI initiative needed to establish recommendations to optimize integrated smart systems in buildings is to establish a full understanding of the landscape of smart and connected devices and systems with respect to fire and life safety and affiliated systems. This project is intended to address this specific gap and serve as an initial first step in response to the findings of the GCI Whitepaper on “Digitalization, Artificial Intelligence and Cybersecurity”.

Research Goal

The goal of this study is to systematically characterize the landscape of smart or connected devices, technologies, systems or features as they relate to fire, electrical and life safety, to provide a technical basis for guidance and updates to applicable codes and standards.

Research sponsored by

Automatic Fire Alarm Association (AFAA), American Society of Healthcare Engineering (ASHE), Honeywell, National Electrical Manufacturer’s Association (NEMA), National Fire Sprinkler Association (NFSA), and Siemens.



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Scope

- All building systems (active and passive) and sensors that have an impact on fire, electrical and life safety.
- Scope shall be focused on buildings and their affiliated systems and sensors.
- This project should be global in scope, and not be limited to building systems or sensors used in the US.

Project Tasks

This research project, with technical oversight from the project technical panel, will involve the following tasks:

Task 1: Stakeholder Workshop.

A stakeholder workshop will be held with a diverse array of subject matter experts with experience in different aspects of the smart and connected systems revolution in buildings to gather information, insights, opportunities, or concerns that can serve as input to the subsequent tasks. The goal of the workshop will be to brainstorm with subject matter experts and industry leaders to discuss and gather baseline information on the landscape of smart features of buildings and systems impacting fire, life and electrical safety. The workshop will seek to identify, clarify, and define detailed information and insight of smart and connected devices as they relate to fire, life and electrical safety based on group discussions and additional field experience. The workshop will be planned, hosted, and facilitated by FPRF, in collaboration with SFPE-Foundation. But the project contractor shall:

- a) Have an active role in planning the event agenda, objectives, etc. to ensure the outcomes support the needs of the subsequent tasks.
- b) Participate in the stakeholder workshop by providing a presentation, if requested, and participating in and supporting facilitation of group discussions to solicit insight or feedback from attendees.
- c) Incorporate the findings from the stakeholder workshop into the overall project deliverables.

Task 2: Literature Review

- a) Through a review of available literature and a globally-focused case study evaluation of smart buildings and features in diverse geographic locations, define and identify smart devices, technologies and building features related to fire, electrical and life safety systems or relevant connected building systems and components that are in development or already on the market that could be incorporated into smart building designs. Clarify the landscape of what currently exists, what is in development and what is proposed for the future.
- b) Define and categorize the identified technologies (e.g., IOT/connected devices, systems, sensors, etc.) and smart features (e.g., integration of artificial intelligence) by a specific set of elements or characteristics. This should, at a minimum, identify the equipment/technology, its intended purpose, functionality, connectivity, data reporting, and security features or concerns. Additionally, any information that the equipment or system reports or gathers to analyze or process the data to deliver a given output for smart decision making, should also be documented. The positive and negative attributes of the technologies/features, such as their impact on safety, system performance, security, reliability, level of interoperability with other systems/platforms, etc. should be documented.
- c) Provide an overview of all applicable Codes and Standards (e.g., building, fire and life safety, and data standards) that address smart and connected systems or may be required to address them in the near future.
- d) Summarize the findings of Task 1(a – c) in a table or matrix format.
- e) Identify the key stakeholders in the smart buildings and systems landscape and clarify their respective roles and responsibilities.



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Task 3: Incident Case Study Review:

- a) Where available, identify documented case study incidents, globally, where the smart system or technology contributed to a hazard (e.g., cyber vulnerability, negatively impacted system performance/activation, etc.)
- b) Where available, identify documented case study incidents, globally, where the smart system or technology helped reduce risk or prevent a hazard.

Interim Deliverable #1: Develop an interim draft report summarizing the findings from Tasks 1 and 2, submit to FPRF and review with the project technical panel.

Task 4: Gap Analysis and Research Roadmap

- a) Identify knowledge gaps and assess the appropriateness of the existing provisions and guidance related to smart technologies, systems, and features as it relates to fire, electrical and life safety.
- b) Identify and prioritize future research/information needs.
- c) Based on the findings of the previous tasks, develop a research roadmap that clarifies the additional research and stakeholder engagement needed to fill the identified knowledge gaps.

Deliverables

- Interim Draft Report 1
- Final Draft Report
- Final Report
- At least one presentation at a relevant conference or technical committee meeting.

Schedule and Implementation

This research project is led by the Fire Protection Research Foundation and will be conducted in accordance with the [“Research Foundation Policies for the Conduct of Research Projects”](#). The project will be guided by a Project Technical Panel who will provide input to the project, recommend contractor selection, review periodic reports of progress and research results, and review the final project report. At a minimum, three Panel meetings will be held: project kick-off, review of interim report, and review of draft final report. The Foundation will provide documentation of all Panel meetings.

Intellectual Property

The Research Foundation will retain rights to all project deliverables including, the project report, which will be published on the Foundation website. The project deliverables may also include data collected over the course of the project.

Schedule and Costs

This is a fixed price project in the amount of \$35,000. 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. Proposals for this project shall include a breakdown of costs by task.

The proposed schedule is provided in the table below. Suggested modifications to the proposed schedule can be provided with substantiation.



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Table 1: Proposed Project Schedule

Proposed Tasks	Schedule
RFP Released	April 10, 2024
Proposals Due	May 8, 2024
Contractor Selection Date	May 31, 2024
Task 1: Stakeholder Workshop	8 weeks from project initiation
Task 2: Literature Review	14 weeks from project initiation
Task 3: Case Study Analysis	16 weeks from project initiation
Interim Draft Report #1	16 weeks from project initiation
Task 4: Gap Analysis and Research Roadmap	20 weeks from project initiation
Draft Final Report	20 weeks from project initiation
Final Report	24 weeks from project initiation

How to Respond

Letter proposals shall be submitted electronically to Jacqueline Wilmot, Research Project Manager, of the Foundation, at jwilmot@nfpa.org no later than 5:00 pm Eastern time on Wednesday, May 8, 2024. 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 weighted evaluation criteria: problem understanding (30 %), technical merit (include scope and approach) (30 %), and prior relevant experience and personnel expertise (30%). An additional criterion, current level of active foundation engagement, will be considered as the remaining 10 % weighted evaluation criteria.

Please note, the body of the research proposal submittals shall not exceed six pages in length, including a short bio of the proposed personnel and not including the cover page. Any additional relevant information (e.g., Project participants' CVs or resumes, letters of support, detailed description of past relevant experience, detailed description of RFP-Respondent's organizational facilities, competencies, other capabilities, and references) not covered in the body of the proposal should be appended to the proposal, with a maximum combined page limit of 12 pages, including the body of the proposal and appendices.

Additionally, all bidders must submit a completed [disclosure statement](#) with the proposal (this does not count towards the page limit). This form can be downloaded [here](#).

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](#). Services received are subject to our [standard contractual terms](#).