



Application of immersive learning on firefighter skills, health, and safety during training

Short Title: Firefighter Immersive Learning Environment (FILE)

Project Summary

Last Updated: 1 December 2021

1. Background

Training is a critical part of the fire service. As new technological innovation applications emerge and are proven in other arenas, fire service training academies must investigate (e.g., virtual reality, augmented reality, artificial intelligence, machine learning, robotics, etc.) these to see their impact of the safety and wellness of firefighter trainees. This project seeks to leverage the immersive learning technologies that have proven to be beneficial in other high-risk occupations, such as military, law enforcement, health care, and identify the value of immersive learning in firefighter training. This 2-year effort seeks to evaluate the application of immersive learning in firefighter training as a tool to reduce risk during training and enhance firefighter safety.

2. Project Goal & Objectives

The overall goal of this project is to identify, assess, and summarize the available and emerging technological tools, techniques, and innovations, to support the application of immersive learning environments in fire service training and address its impact on firefighter skills, health, and safety during training. The objectives are:

- Describe the value of immersive learning on firefighter skills, and competency-based testing and evaluation
- Establish baseline knowledge of Immersive Learning Environment that could be adapted to fire service training
- Identify, prioritize the future needs and barriers of fire training academies to implement immersive learning
- Communicate the needs of fire academies recognized and understood by others, especially technology innovators
- Create a firefighter immersive learning environment roadmap to provide guidance to fire training academies and others in support of implementing immersive learning

3. Project Tasks

Project will identify, assess, and summarize the available and emerging technological tools, techniques, and innovations to support the application of immersive learning environments in fire service training and address its impact on firefighter skills, health, and safety during training. The two-year effort is composed of the following six primary project tasks, including a task completion timeline based on specific months of the 24-month performance period:

Task 1. Advisory Panel. Fire Protection Research Foundation (FPRF) will appoint a project advisory panel composed of key stakeholders to assist with scoping, direction, oversight, implementation, dissemination,

and other details of overall effort. Project Technical Panel will provide project oversight and guidance throughout the project in accordance with the FPRF policies. The Panel will include representatives involved in the delivery of training from fire service training academies, fire departments, both career, volunteer, fire Service organizations, and SMEs from immersive learning technology innovators.

Task 2. Project Work Plan Review. Project team will develop a workplan and convene with the advisory panel to review and clarify the project work plan, scope, tasks, and related details.

Task 3. Baseline Content Development. Project Contractor will be identified to conduct a comprehensive review of available information from literature, ongoing research studies, current fire service practices that has implemented immersive learning techniques and generate applicable background supporting information as a written report. This includes:

- a) **Current Landscape:** Summarize the current use of immersive learning in fire service training and education; Summarize the characteristics and features of immersive learning environment that could be adapted to fire service training.
- b) **Future Needs:** Summarize the needs of fire service training academies and others, including a clear focus on the anticipated concepts, approaches, methods, and activities required to support the firefighter immersive learning environment.
- c) **Barriers:** Identify the barriers in implementing immersive learning in fire service training, examining the role, technological, regulatory, financial, cultural, organizational, and other factors play. Deploy a generic questionnaire survey to capture the feedback of fire training instructors, firefighters, and others about the implementation of immersive learning in fire service training. No personal identifiable information will be collected, and an IRB exemption (if applicable) request shall be obtained.
- d) **Gap Analysis:** Generate a prioritized summary of the gaps between the current firefighter immersive learning environment against anticipated future needs and identified barriers, for increased adaptation of immersive learning in fire service training.
- e) **Immersive learning knowledgebase:** Establish an online immersive learning knowledgebase, for use by fire service community and innovators. Identify, the known providers of technological tools, techniques and software for immersive learning environment that can be applied to fire service training and fire academies, including those who are actively addressing similar technology applications in parallel professions.
- f) **Final Report:** Develop a final report summarizing the overall effort of baseline information collected and review with the advisory panel to clarify and confirm final enhancements. This will also be presented at the stakeholder Summit to stimulate further discussion.

Task 4. Targeted Focus Group Meetings. Conduct three geographically diverse targeted focus group meetings with key types of NAFTD representative fire academies (e.g., large, small, community college based, etc.) to gain insight about the distinct training delivery systems of fire training academies and to gather participant's thoughts and experiences in support of generating content on the current and future needs of immersive learning in fire service training. This will provide additional review, evaluation and refinement of the baseline material developed in Task 3.

Task 5. Stakeholder Summit. One-day stakeholder summit will be conducted to present, review, and evaluate the overall state of immersive learning technology in fire service training. This is intended to be an in-person gathering of a minimum of 30 fire service training stakeholders, technology providers, and interested parties, possibly held in conjunction with NAFTD 2022 Annual Conference or as a standalone one-day event. The Summit Proceedings will provide a future roadmap for the development of the

firefighter immersive learning environment, providing guidance for innovators and all engaged in fire service training to promote forward progress with its implementation.

Task 6. Dissemination & Outreach. Project deliverables will report on the technologies and innovation in place to support the fire service and fire training communities. The final report, Summit proceeding, and immersive learning knowledgebase will be published online, made openly available at no cost via FPRF and NAFTD’s communication channels. Project deliverables will also be disseminated through a webinar.

4. Implementation and Schedule:

The project is funded by a DHS/FEMA Assistance to Firefighters Grant (AFG) Program. This research project is led by the Fire Protection Research Foundation (FPRF) along with North American Fire Training Directors (NAFTD) as the principal project partner. The project is scheduled to be completed by August 2023.



5. Project Deliverables

This two-year project consists of three primary components (1) Baseline content and material development; (2) Targeted focus group meetings & Stakeholder Summit for evaluation; (3) Dissemination and outreach. The baseline content and materials developed will be documented through a final written report. A standalone Proceeding will be documented to summarize summit discussions clarifying the roadmap for the development of the firefighter immersive learning environment. All these deliverables will be published in the NAFTD and FPRF website and made freely available.