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Why Fire Departments Should Prioritize Technology

Second by second, minute by minute, time is crucial in a fire-related emergency. A small fire can grow to twice its intensity in less than a minute, posing a life-threatening situation. As metropolitan cities continue to expand and become more compact, and as temperatures across the nation change due to climate change, there is immense pressure on fire departments to increase efficiency and response time. Fire departments can no longer rely solely on human resources and experience, because although that plays a significant role, technology offers vital solutions that enable more to be accomplished with less. Digital communication platforms, analytics, GIS maps, and other tools will allow fire departments to function more effectively. They provide better information to on-site firefighters, enhance teamwork, and help prevent a fire outbreak. Fire departments should prioritize technology because it improves response times, strengthens communication during emergencies, and enhances fire prevention efforts.

The difference between a rapid knockdown and a complete catastrophe is the ability to arrive at a fire more quickly. The method that has long been used to address this is dispatching and communicating information to responding units over the radio. The responding units have to navigate using maps and knowledge of the neighborhoods. This plan is functional but inefficient and prone to errors. Modern technology is available to provide real-time navigation and to deliver building information directly to responding units. However, this is taken to a whole other level within a city like Louisville. The city worked with analytical professionals to fashion a fire risk map that also included information such as past event occurrences, construction type, and property conditions within neighborhoods. This allowed them to dispatch units to zones based on predicted danger levels rather than mere possibilities. As stated within

Harvard Kennedy School's publication “Bringing Big Data to Fire Safety,” this type of method allowed units to travel quickly to danger zones while also avoiding low-risk zones. This type of specific response saves time that would otherwise be wasted and ensures that what is available is used to the maximum capacity. This matters because risk-based mapping does more than shorten travel time. It allows dispatchers to send units where fires are more likely to occur before conditions worsen. Smaller departments especially benefit because predictive mapping saves minutes they cannot recover simply by hiring more staff. Increasing staff numbers is a bonus; however, without technological implementation to direct these units, any increase is limited by time. Technology is merely an aid to what is already being accomplished in firefighter training, making these individuals faster and better equipped upon arrival.

Besides shortening the time to arrival, technology is also beneficial for communication within departments during emergencies. Most fire outbreaks may require assistance from more than one firefighting apparatus. More so in metropolitan areas and during massive disasters. Without a technology platform to coordinate these processes, confusion can result. The fire units may end up doing similar work, fail to receive final information, or arrive at a scene without knowing what other units are doing there. Digital technology helps by offering each apparatus access to a similar live information session on how to proceed, including which units to dispatch and which parts of the fire scene to cover. In 2024, Julian Weidinger, an expert on Emergency Response Information Systems, realized that this is one challenge that puzzles solved communication processes within most departments. With departments implementing technology on similar platforms, they responded swiftly and without delay. This enabled units across separate departments to coordinate as if they were one entity. Another part of Julian Weidingers' work showed that fire units can adopt technological innovations within their work environment if they appear extremely useful for accomplishing a specific objective and function smoothly within each operating routine. These innovations don't necessarily have to work very hard to produce results. The best technologies to roll out within this line should assist fire units in their work rather than requiring them to take on additional tasks that consume extra time and resources. Technology also helps

by offering units within departments access to live proceedings across scenes, making them more useful regardless of whether they operate within an area that can afford more workers. This is important because miscommunication is one of the leading causes of operational delays during emergency responses. When all responding units share the same live data, they avoid duplicate tasks and time-consuming radio clarifications. This improved clarity directly increases response effectiveness and reduces avoidable delays during critical incidents.

Technology gives departments not only the ability to respond to fires but also to anticipate them. This is because predictive analytics enable departments to analyze past experiences to identify future hazards, such as buildings that may be prone to electrical fires and neighborhoods that are vulnerable to more house fires. Thousands of pieces of information gathered from property records, past fires, and environmental factors can be easily analyzed by machine learning to identify locations hazardous to habitation due to increased fire risk. A 2021 study carried out by Katharine Robb revealed how this technology can revolutionize fire prevention. The study indicated that using city-wide information and machine learning algorithms, inspectors can trace buildings violating severe housing codes twice as fast as usual. Most violations involve early warnings to building occupants about pending fire hazards, such as illicit warnings and structural defects. Technology helps fire departments use limited staff much more effectively to trace such buildings first, rather than just guessing which one to visit next. This is significant because early identification of high-risk properties prevents fires before they occur, protecting residents long before a 911 call is made. Machine learning gives departments the ability to act proactively instead of reacting once conditions become dangerous. This turns fire prevention into a strategic, data-driven practice rather than a system based on guesswork or complaints. This implies fire departments can go beyond just responding to fires to actually preventing them. This is crucial because previously, there were no more innovative approaches to using limited staff to prevent fires than simply visiting each

building occasionally. Now, technology helps trace dangerous buildings, saving more lives than ever before.

Technology is not only practical but also increasingly affordable and achievable for departments of all sizes. Multiple fire departments, both small and large, are beginning to adopt modern technology and are seeing its benefits. For example, in Nevada, the Boulder City Fire Department has implemented cloud-based collaboration and communications software to connect better its personnel, who are dispersed over 200 square miles, at an affordable price (StateTech Magazine). Metro fire departments are also making great strides. The Los Angeles Fire Department, CA, has successfully developed an AI-enabled response system to improve firefighter response time and efficiency, and they claim greater success in response times as a direct result of implementing technology into their workflow(Los Angeles Fire Department Foundation). Along with that, modern technology has also become more affordable and available to those fire departments with smaller financial resources. Even though the initial out-of-pocket expenses may seem steep with such software, technology, or data analysis application programs, overall, fire chiefs find it advantageous to make such investments down the road, with long-term benefits of improved efficiency and overall firefighter and community safety outweighing initial financial burdens by far (Vega). This means cost is no longer a barrier to modernization, as cloud-based software, Shared municipal licenses, and federal grants have lowered overall expenses. As a result, even small fire departments can invest in life-saving technology previously accessible only to major metropolitan agencies. Additionally, government support with implementing life-saving technology at public fire agencies doesn't encroach upon, impede, or interfere with vital secondary services such as firefighting training; these agencies seek assistance from external financial support services and corporations, making such technology investments not an afterthought, but affordable and feasible. Fire departments that have already modernized show improved outcomes, proving that investing in technology is both practical and attainable for those operating under typical budget constraints. Many departments also benefit from regional partnerships that reduce costs even further. Nearby cities often share software licenses, training

programs, and risk assessment tools, allowing each municipality to benefit from advanced technology without paying full price. Federal programs such as the Assistance to Firefighters Grant (AFG) and the Urban Area Security Initiative (UASI) often fund upgrades to radios, mapping systems, and data platforms for qualifying agencies. This means modernization does not rely solely on local tax dollars. As outside support grows, the financial barriers continue to shrink, making modern technology a realistic investment for almost any department.

Some individuals feel that caution is needed when incorporating technology into fire departments. This is because technology could fail during emergencies, leading working firefighters in the wrong direction. Another perspective is that technology could lead to a lower priority being given to other human aspects, such as teamwork, awareness, and timely decision-making. However, National research disputes this fear. According to the U.S. Fire Administration, GIS mapping, AVL tracking, and integrated CAD systems actually reduce miscommunication and routing errors, improving coordination and decision making during emergencies (Vega). Firefighters take pride in being resourceful and courageous during emergencies, and technology could compromise these attributes. These are real concerns, but it doesn't mean that they don't want technology to be implemented. Instead, they just want to make sure technology is used effectively. Technology should complement training, not substitute for it. Firefighters have to continue to rely on experience and gut feeling, but this is not to say they can't use technology to make their work easier and better. As Weidinger's work illustrates, there is more willingness to embrace technology when it is rolled out to them, when they can train appropriately with it, and when they can see its positive effects. Effective implementation involves having a contingency plan available, access to information beyond technology, and the ability to work with both technology and manual processes on a regular basis. A combination of technology and effective training ensures that these organizations don't

lose that human element to firefighting but enhance it. These technologies aren't replacing these firefighters. They are improving their alertness, communication, and decision-making at this critical stage.

Fires are not becoming easier to extinguish. As more people live in cities, weather patterns change, and buildings become more intricate, fire departments need more creative ways to handle their growing workload. Adding more employees is a positive, but many cities do not have enough money to hire more workers at a rate that keeps up with this increased need. Technology can effectively complement these employees and elevate their abilities. This solves a crucial issue: how to equip faster, better, and more informed fire crews to deal with danger more effectively ahead of schedule. Investing in technology is no longer a bonus but the next step. Of course, having more employees on staff is a positive thing, but having employees ready to accomplish more is what matters. The difference is clear; while more employees help, technology can truly bring out what a fire department is capable of.

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