

Future Trends in Fire and Emergency Services

James D. Weed, Sr.

Steven Tang

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University of Florida

### Abstract

Emergency services have been evolving continuously ever since its inception. New challenges arise every year that force emergency management leaders to adopt new strategies to maintain the same level of protection they offer to their communities. At the same time, products of technological advancements are readily added into emergency personnel's arsenal to give them an edge against the evolving and dangerous natural disasters and other emergency incidents. Because the emergency services profession is constantly changing both externally and internally, it is essential for both emergency management leaders and practitioners to regularly monitor emerging trends and prepare for any changes relevant to the field.

This paper discusses the potential for emergency services in the next 15 to 20 years. The author will make open but logical speculations on the future of emergency services, putting key emphases on the upcoming technological, demographical, and social changes/developments that will affect how emergency services operate both on local levels and the national level. The author will also explain how emergency services may likely transform in response to these environmental changes, and the approximate timeline of the occurrence of speculated changes.

The information and data that will be used to support the paper's contents will be collected from textbook materials, relevant articles over the internet, and the author's existing knowledge on the subject. The paper will be written with professional and easy to understand languages to allow readers both inside and outside the emergency services profession to easily understand the subject conveyed.

## Future Trends in Fire and Emergency Services

### **Introduction**

Fire and emergency services have been an integral part of the social structure of the United States since day one. Ever since 1776, fire and emergency services in the United States have entered the process of continuous transformation and improvements to provide better protection of its citizens and visitors against both natural disasters, medical emergencies, and man-made emergencies.

The evolution of fire and emergency services is partly due to emergency management leaders' mission in continuously improving the services they render and partly due to the necessity of adapting innovating methods to combat new types of emergencies brought by technological, demographical, social, and global relationship changes.

Changes in the above-mentioned sector bring both opportunities and challenges to leaders of emergency services. Many of these changes can creep under the radar and catch emergency services off guard, and subsequently pose enormous threats to the emergency management system if no pre-emptive measures are made in advance to counter these threats.

Fortunately, today's leaders in emergency services are actively collaborating with social scientists and researchers in an effort to speculate future trends that will impact the emergency management system, for better or for worse, and use this information to proactively prepare the current system and its personnel in seizing potential opportunities while mitigating imminent threats.

### **Advancing Technologies**

Much of the excitement toward the future of fire and emergency services revolve around new technologies. From many perspectives, including that of an emergency manager's, technologies are often double-edged blades. A prime example of this will be the invention of cars and airplanes, while these vehicles greatly speed up the response time, increase the carrying capacity, and widen the area a fixed amount of personnel can cover, the popularization of vehicles also introduced and increased the occurrence of transportation accidents and terrorist attacks.

Thus, it is essential for emergency services leaders to foresee possible technology advancements in the future and make plans so that they maximize the benefits these technologies can bring to the emergency management so that the advantages outweigh the issues brought by them once these technologies are materialized.

### **Autonomous Vehicles**

Cars and trucks that drive themselves, also known as auto-pilot or autonomous vehicles have been around for years and are rapidly taking over the civilian market. With Tesla primarily focusing on electric auto-pilot vehicles while other U.S. fleet vehicle manufacturers such as Ford and General Motors also investing in the technology. The scenario of replacing some and eventually all fleet and civilian vehicles to autonomous models doesn't seem too distant. As autonomous vehicles become more feasible financially, they can benefit fire and emergency services in a multitude of ways.

**Detect Emergency Services Vehicles** When responding to a fire or medical emergency incident, every second counts. Since autonomous vehicles can detect and analyze surrounding

vehicles, it is easy for them to detect emergency vehicles such as fire trucks, ambulance and law enforcement vehicles and act according to make way for these vehicles. Tesla announced in 2018 that the company will be adding the functionality into their autonomous vehicle models, this upgrade will greatly increase response speed and drastically decrease vehicle accidents related to emergency vehicles (Miley, 2018).

Furthermore, many traffic jams are caused or at least compounded by human errors. With every vehicle on the road connected to an overseeing network and driven by computers, vehicles will travel through the roadways in an orderly and efficient fashion, further decreasing emergency vehicles' response time during peak hours by reducing traffic congestions.

**Decrease Number of Vehicle Accidents** When it comes to consequences of human errors behind wheels, collisions and accidents are daily occurrences that emergency services need to deal with. Autonomous vehicles can potentially eliminate all auto accidents caused by human errors, vehicle accidents and the need for law enforcement, fire department, and ems resources that were previously spent on handling auto accidents will be drastically cut back (Donohue, 2017).

**Deployment & Operating Environment** Donohue (2017) illustrated the increased mobility and the immense boost in logistics that autonomous vehicles will bring to fire and emergency services personnel. As technologies allow emergency managers to control vehicles remotely, emergency vehicles are no longer tied to personnel. The newly granted autonomy of emergency vehicles enables emergency managers to deploy, maintain, and dispatch emergency vehicles like never before. Many speculate that fire stations will be replaced by the less costly automated garages. When a call is received, dispatch can remotely assign specific vehicles to incident locations and follow the fastest route possible. While the autonomous vehicles are on

the way, responding personnel closest to the incident location can travel to the scene in separate vehicles. Donohue (2017) also pointed out that future autonomous emergency vehicles may also be programmed in advance to conduct preliminary incident engagement once they arrive at the incident scene.

Currently, most emergency vehicles are ground vehicles operated by humans. Due to the environmental limitation, there are still many locations, especially high up places or locations underwater are still very challenging to reach. Autonomous drones and marine vehicles can effectively fill in this gap. As the technologies on aerial and marine autonomous vehicles mature they will become efficient options emergency managers can utilize to conduct recon, research & rescue, and possibly even suppression activities.

### **Virtual & Augmented Reality**

Unlike autonomous vehicles which are not expected to become popularized for at least another 3 years. Virtual and augmented reality technologies are already adopted by many emergency services organizations such as law enforcement, fire departments, and aerial support agencies in personnel training today, and are expected to increase in popularity as the technologies' effectiveness for fire and emergency services is further corroborated.

**Simulation & Training (VR)** Virtual reality (VR) and augmented reality (AR) are similar but different technologies. VR mostly comes in the form of headsets, users of VR put on headsets to immerse in lifelike environments within the virtual reality, by using voice commands and controllers VR users can interact with elements that exist in the virtual environment.

Many fire and emergency services agencies have implemented VR technology in personnel training due to the technology's powerful capacity in simulating the visual and audio elements of

emergency incidents such as structure fires, wildland fires, medical situations, and active shooter incidents (Corrigan, 2019).

One of the biggest advantages VR emergency training has over traditional training is its power to expose personnel to immersive and realistic emergency incident simulations at a very low cost, zero risks, and at any time during the day. For instance, VR software developed by companies such as FLAM TRAINER for fire services can place firefighters inside a virtual burning structure via VR headsets so they can observe in first person view how real (captured by 360 degrees camera) or realistically simulated fire spreads through a structure, change a room's visibility, and react to suppression activities (Coady, 2017).

**Real-time Personal Intelligence Support (AR)** While the primary use of VR technology is personnel training, augmented reality technologies' main potential is to provide on-scene first responders with intelligence and communications support.

Personal AR helmet can greatly increase firefighters' effectiveness and survivability when operating in hazardous environments such as forests and burning buildings. In fact, AR helmets are already issued to fighter jet pilots to assist them with flying and targeting. An AR helmet puts a transparent screen in front of its user's eyes and projects a layer of images, data, and videos into its user's retina. Unlike VR headsets, AR helmets do not obstruct one's view of surroundings, it works like a head-mounted computer or smartphone that has its screen displayed in front of one's eyes at all times (New augmented reality technology could help firefighters save lives, 2018).

Many leaders in fire services have already acknowledged the potential benefits AR technologies can bring to firefighters and made detailed plans on integrating the technology into

fire services. The main purpose of AR helmet is to provide visualized data and information to first responders when they are mobile on the incident scene. Key information that can be integrated into firefighters' and law enforcement officers' AR helmets are (New augmented reality technology could help firefighters save lives, 2018):

1. Structure Layouts
2. Real-time Coordinates of the Responder and Their Teammates
3. Oxygen Level
4. Temperature
5. Enhanced Vision (thermal & night vision)
6. Location of Stranded Civilians and Threats
7. Condition of Each Area & Room

Eventually, AR helmet will allow each first responder to access most of the information available to the command center today, and revolutionize how first responders operate on the ground.

### **Demographics**

Demographic factors may not be as conspicuous as technological innovations. Many demographical changes occur slowly such as aging, urbanization, and population increase but these issues are like ticking time bombs, once they take form these issues will be irreversible and impact emergency services in major ways.



## **Aging**

Many leaders and scholars of emergency management, including Robert S. Fleming (2010) have indicated that the aging of our population will become one of the complicated challenges emergency services will face in the next 5 to 20 years. Population aging is an imminent problem shared among many developed nations such as Japan and the U.S. The phenomenon is mainly attributed to rising life expectancy and/or declining fertility rate, and as records indicate, both have been taking place in the U.S. in the past decades (Steen, 2011).

Steen (2011) speculates that by 2030, 19 percent of the U.S. population will be 65 years old or older, a 7 percent increase from 2006. Population aging is a societal problem that will disrupt the sustainability and stability of both the public and the private sector. For emergency services, an aging population means more people in retirement homes and assisted-living facilities, higher demands for emergency medical services, additional manpower and resources required for evacuations, an overall less self-sufficient population during all phases of emergency management, and a smaller pool of volunteers (Steen, 2011).

## **Population Increase & Urbanization**

The U.S. population is predicted to keep increasing in the following decades from domestic childbirths and immigration (Fleming, 2010). Increases in population drive urbanization and put further pressure on the emergency management system. To successfully transition into the future, the current emergency services infrastructure must make appropriate and timely adjustments to become more robust in handling higher volumes of emergency calls.

**Expansion & Shift of Focus** If emergency managers put together the future demographical and social trends that will impact emergency services and conduct an overall analysis. It is

logical to come to the conclusion that expanding the current emergency medical response system can solve, or at least mitigate many imminent challenges that above-mentioned trends, which are population aging, population increase, and urbanization will bring. As the number of fire incidents per capita continues to rapidly decrease (Stoll, 2018), and the demand for emergency medical services keep on rising, emergency leaders can effectively prepare the emergency management system and its personnel to handle the upcoming influx of EMS related calls by shifting the focus from fire management to providing urgent life support and emergency medical transportation.

### **Conclusion**

To summarize, the above passages discussed some of the major trends and changes to be expected for emergency services in the next 20 year, but the list is certainly not all-inclusive. The best mean to ensure that emergency services can successfully keep up with the constantly transforming natural, social, technological, demographical, and global environment is to employ emergency managers and leaders who are farsighted and lead proactively so that potential future events relevant to emergency services can be foreseen and prepared for years in advance.

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