Using new technologies in disaster prevention

Lt. Col. Péter Pántya PhD.
Ludovika University of Public Service
Faculty of Law Enforcement, Institute for Disaster Management
Department of Fire Protection and Rescue Operations Management
associate professor
Email: pantya.peter@uni-nke.hu
ORCID: 0000-0003-2732-2766

Exploring new opportunities to support firefighting and disaster management activities (both prevention and intervention) is always relevant and timely. This is based on different national requirements and needs, depending on the social and development levels of each country. Changes caused by external factors such as global climate change, which means increasingly extreme and variable weather with more pronounced fluctuations, also place a significant burden on the populations of individual countries, and thus on disaster management and firefighting organizations.

New development and support opportunities for disaster management and prevention may include organizational and training aspects, as well as logistical improvements using already available tools. This topic primarily provides an opportunity for a brief overview of new technological possibilities and their background from the above perspectives.

When it comes to new technologies, the question arises: how new are they really? To illustrate this with a brief example, the use of drones can now be considered a novelty, as every disaster management agency in Hungary has drones at its disposal and is gaining more and more experience in their use. Here, technical and IT enhancements can bring about innovations that significantly and demonstrably increase existing disaster management capabilities.

Examples of this in the technical field include significantly increased flight distances, increased payload capacities, and the provision of multiple sensors or active intervention capabilities, while in the IT and software field, autonomous activities (programmed reconnaissance flights, autonomous sampling) and adaptive response to incoming data using artificial intelligence solutions could be another direction for development, which could result in the emergence of new capabilities.

When categorizing new technologies, it is worth analysing their usefulness as well as their individual advantages and disadvantages.

Examining three directions:

1. Prevention and Intervention remotely such as **drones, robots**
   Advantages: improved safety for interveners, more place to reach in different circumstances, can carry more sensors
   Disadvantages: purchase cost, Maintenance, Trainings for their users

2. Supporting the devices, equipment and the experts, responders, incident commanders by **databases, sensors** (i.e. handheld or positioned), more way to detect important elements of the environment
   Advantages: More and wide range of data for reconnaissance
   Disadvantages: purchase cost, maintenance, data abundance, needs skilled staff

3. Control equipment and Support devices, responders, decision-makers by filtered data using **Artificial Intelligence**
   Advantages: More capabilities in data-analysing (widely), auto-control possibilities in different ways
   Disadvantages: installing cost, needs skilled staff, security issues, responsibility of the decisions what made finally

Taking all these aspects into account, this paper presents a number of new specific technical solutions that can be used to expand and improve disaster management, firefighting prevention and response capabilities. More specifically, the automatic remote sensing systems, the wider use of sensors, certain remote-controlled and robotic solutions, as well as the already visible results and possibilities of applying artificial intelligence in this field.

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