



# Drones for Hazmat Response

Role of Drones and FlytNow  
in HAZMAT Response



HAZMAT is a classification that includes materials that are harmful to organisms and the environment at large; the word itself is an abbreviation for “Hazardous Materials”. The classification includes all agents that are either biological, radioactive, or chemical in nature.

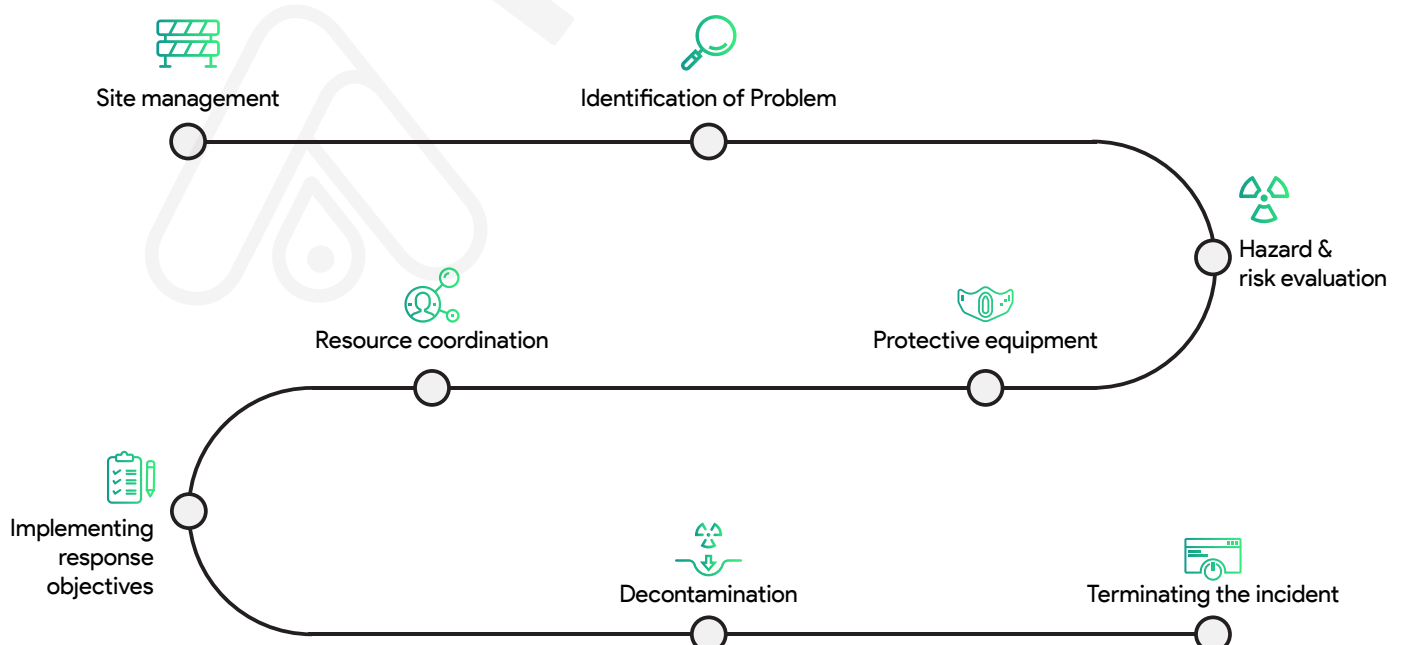
Sometimes, due to an accident, an act of war, or terrorism hazardous agents are released into the environment that causes damage to all living beings. In such an event, an urgent response becomes vital to contain the agent and mitigate the further loss of life.

In this blog, we will discuss how drones can help agencies involved in such emergency response situations and how FlytNow increases the effectiveness of drones through data-driven decisions.

Before diving into the benefits of FlytNow, it is important to understand the general process followed during a HAZMAT response and how drones are currently being used.

## General Process Followed During a HAZMAT Response

HAZMAT response is an occupational hazard for people who are involved, which is why careful planning and strict protocols are very important. It is common for teams to deal with acids, gasses, cyanide, radioactive materials, inflammable substances, etc. during such responses.



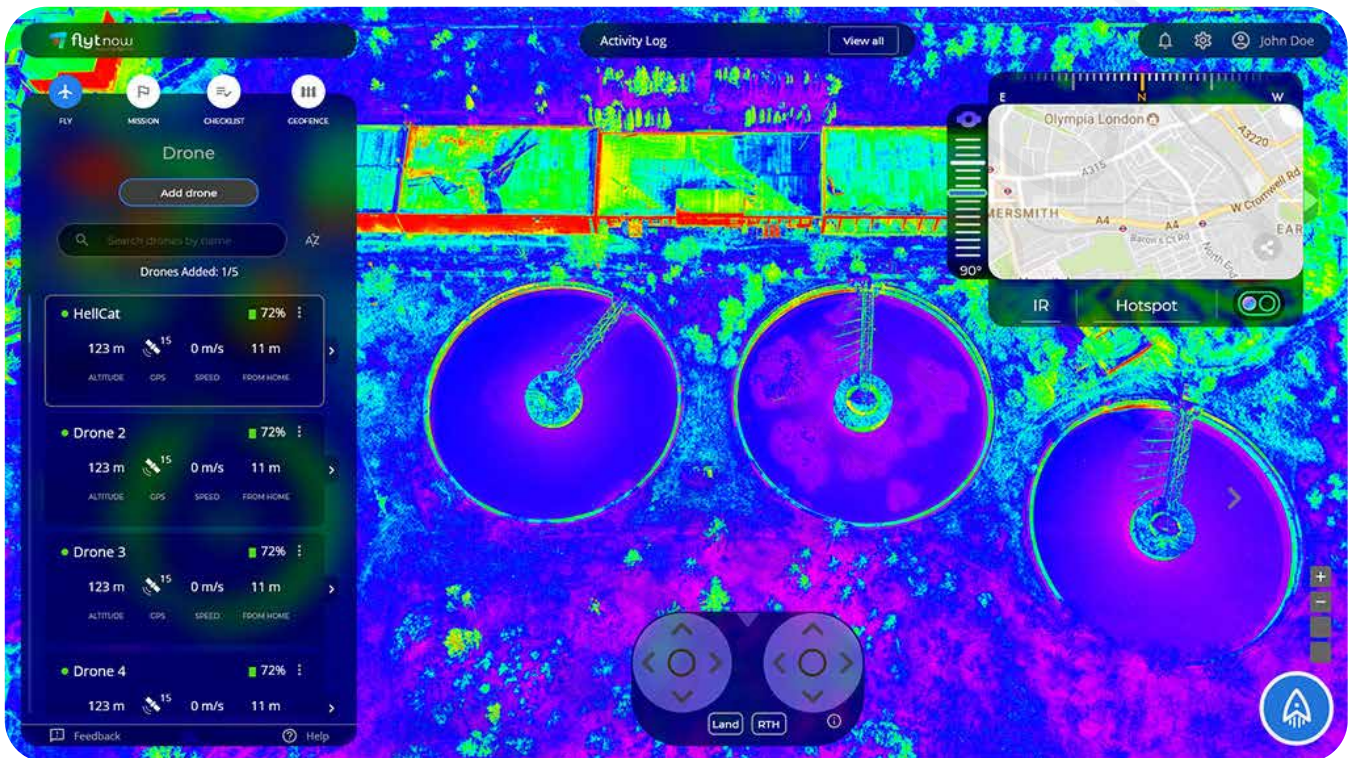
According to CRAM for HAZMAT Technician, there are 8 steps for managing a HAZMAT situation, which could be treated as a general protocol.

- **Site management and control:** This step is a tactical one, where the response team determines the safest way to approach a hazardous situation and take charge of the site. Here the aim is to create a secure staging area by cordoning off the area. The core activities of this stage are survey and monitoring, collecting data on the hazard, determining the extent of the damage, and assessing the contaminants and the overall risk.
- **Identification of the problem:** Based on the data collected in the first stage, the hazardous material is identified and the source of the contamination is determined. The worst-case scenario and effect on the workers and the people, in the surrounding areas, is also considered.
- **Hazard & risk evaluation:** The response team assesses the physical damage caused by the hazardous agent to the people and the area. Such an evaluation would reveal a lot about the contaminants, and its symptoms; based on which, suitable mitigative measures could be taken. For example, during a burning inferno, if people nearby are complaining of asphyxiation and headaches, then it could be a sign of carbon monoxide poisoning, based on which medical assistance can be provided.
- **Protective clothing and equipment:** The response team deploys protective gear and measuring instruments that would allow the investigators to closely examine the contamination and acquire important information regarding the air quality, level of radioactivity (in a case dealing with radioactive substances), and other environmental factors.
- **Information management and resource coordination:** In any kind of response, coordination is important, which is achieved through the sharing of information with various agencies and also the media. Coordination encourages cooperation and the effective utilization of the available resources.
- **Implementing response objectives:** Based on the acquired knowledge an action plan is prepared considering the available resources. The plan focuses on the best way to stop the spread of the contaminants keeping the safety of the technicians in mind.
- **Decontamination:** With an action plan, decontamination efforts begin with the aim of putting the damage and spread of the contamination under control. For example, in the event of a leak of a biological agent, like a virus, people who came into contact are immediately quarantined and put under observation.



- **Terminating the incident:** This is the final step that can be broken down into four sub-steps, which are: (1) debriefing after a successful containment, (2) preparing a post-incident report, (3) a formal review highlighting the strengths and shortcomings of the response operation, (4) and complete documentation.

## How Drones are Used During a HAZMAT Response



### Visual Inspection

On 13 November 2019, there was an anhydrous ammonia leak in a food distribution center in Sarasota, Florida. The fire alarm inside the building was connected to the chemical monitoring system, which picked up the leak.

The fire department of Sarasota County swung into action. On arrival, the team began investigating the source of the leak, but it was proving to be difficult from inside the building. On investigation, it was found that the leak was coming from one of the chiller units on the roof. SMFR's (Southern Manatee Fire & Rescue) and Sarasota County Fire Department HAZMAT teams were called in to deal with the situation. They had DJI Mavic 2 Enterprise drones, adapted for disaster response, with a thermal camera. The drone was flown over the roof to track the ammonia cloud using thermal vision. Thus, the source of the leak was quickly and safely determined, and appropriate action was taken.

## Identifying the Hazard Material

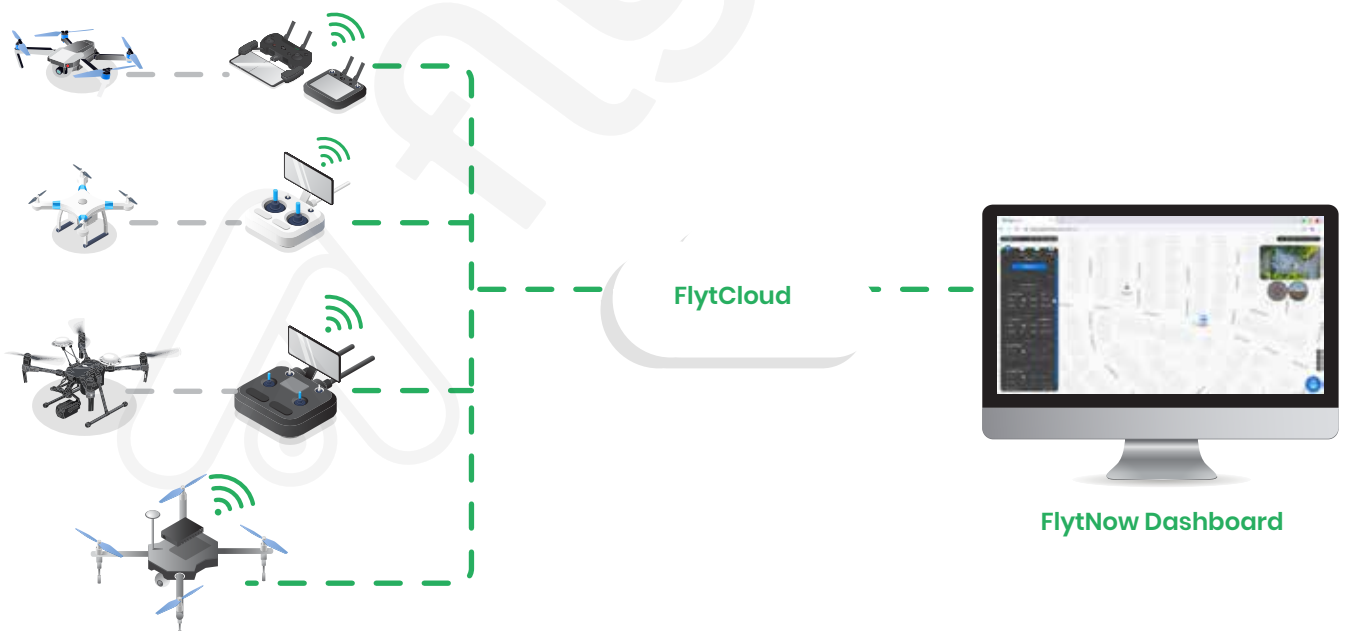
Firefighters at Southern Manatee Fire & Rescue department have customized the Matrice 200 series of DJI drones for detecting hazardous agents in the environment by strapping the drones with sensors that can detect vapor, chemical, and radiation.

A drone with such sensors is far more capable and safe than a man in a HAZMAT suit. One major benefit of using drones for HAZMAT identification is the speed with which the process can be done.

## How FlytNow Enhances the Capabilities of Drones for HAZMAT

FlytNow is a cloud-based drone fleet management solution that provides a single dashboard to manage and control multiple drones over a 4G/LTE/5G network. The web-based dashboard has panels to see the live telemetry and the video feed of every connected drone.

### How Drones are Connected



FlytNow is a hardware-agnostic platform that supports both off-the-shelf DJI drones and custom drones based on PX4 and Ardupilot.

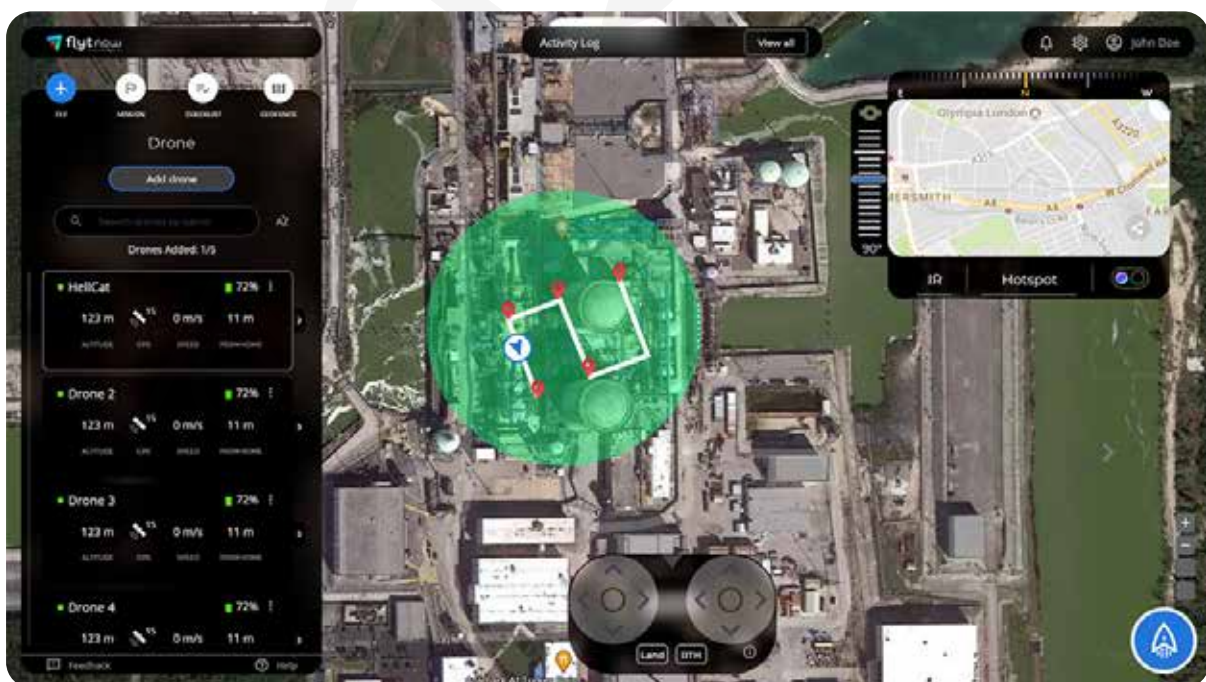
Emergency response teams using DJI drones can easily connect with FlytNow using the FlytOS mobile app. The FlytOS mobile app connects with the drone RC and becomes a relay between the drone and the FlytNow cloud.

Connecting custom drones require a single board computer (DJI Manifold 2, Raspberry Pi 3b, Odroid N2, Jetson Nano Developer Kit, etc.), with the FlytOS operating system, connected to the autopilot. The SBC establishes the connection between the drone and FlytNow over the internet.

## Using FlytNow Business for Standard HAZMAT Response

The business version of FlytNow is a standard offering. It comes with ready-to-use features that can be used in a HAZMAT response in the following ways:

- An operator can use the web-based dashboard to create advanced missions for the drones. This feature is especially useful in site management of a hazardous situation. A drone can be programmed to do a perimeter check and provide vital situational information.

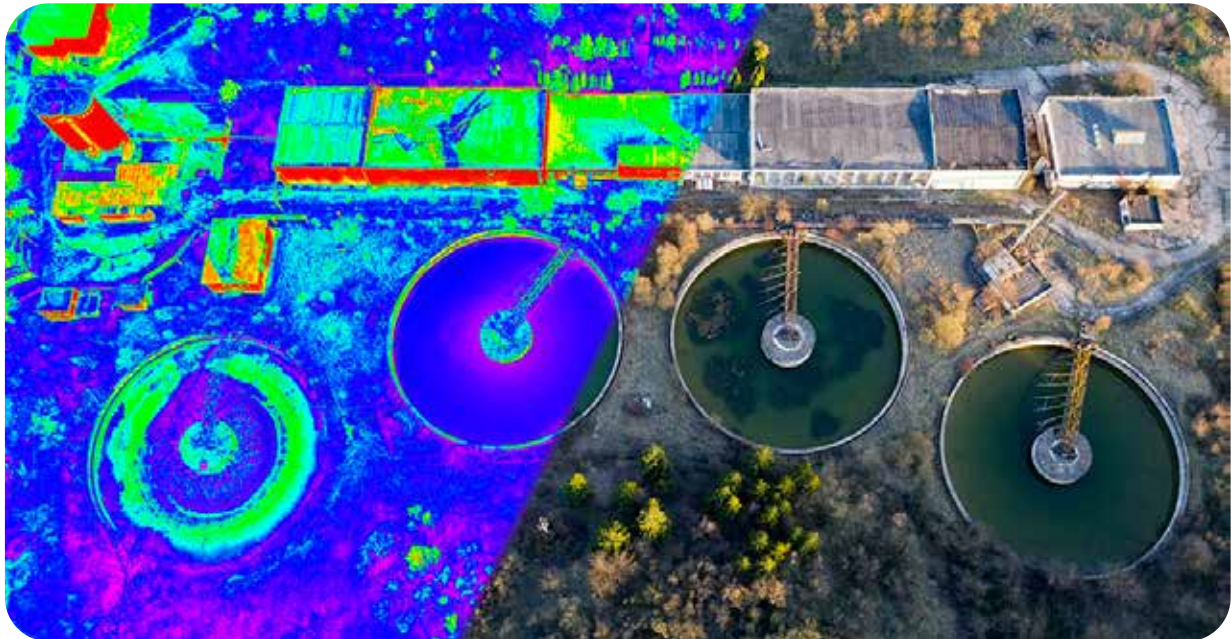




- FlytNow supports live video streaming from all connected drones. Using this feature a HAZMAT technician can broadcast a live recon to remote experts, who can then guide the technician in identifying the hazard material and source of the leak.



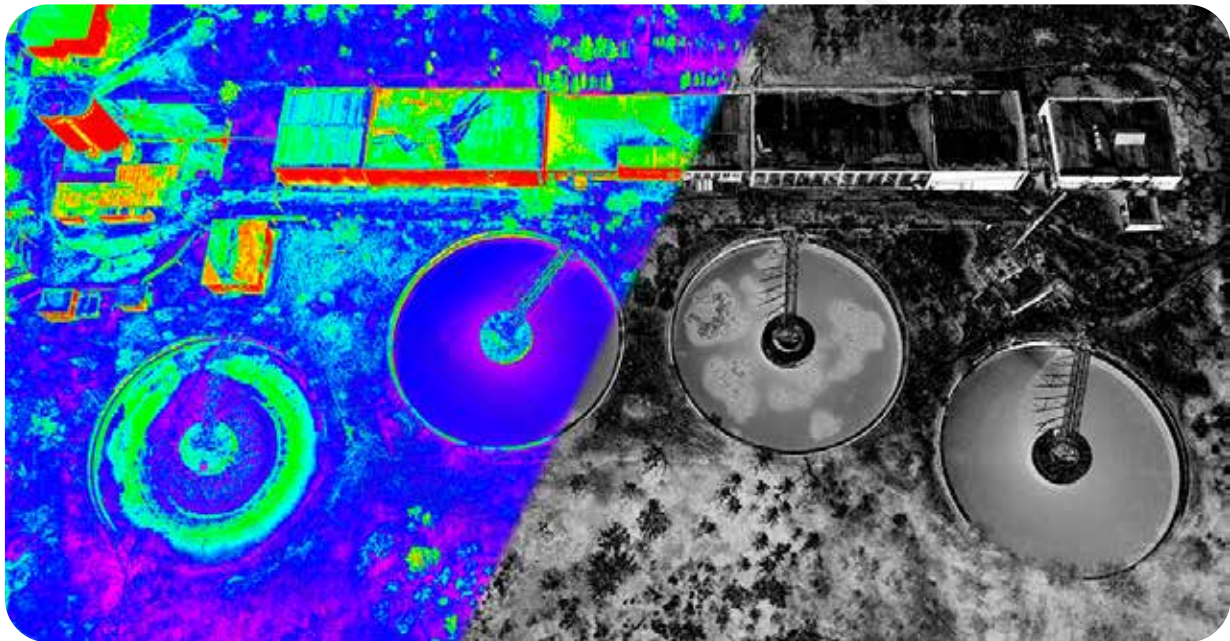
- FlytNow dashboard supports a variety of views. The cockpit view can be used by a remote inspector to have a better view of the situation. If the drone has a thermal camera then a viewer can switch between RGB (normal camera) and thermal mode.



- The solution supports a variety of payloads, this includes the DJI M2E payloads. This feature increases the overall versatility of the drones during a mission.



- In the case of DJI Mavic 2 Enterprise Dual Camera or Matrice 210 V2 Dual Camera, the thermal mode supports MSX, which produces images with better contrast separating regions of different temperatures. Along with this, a viewer can switch between different color palettes; this feature is useful in identifying hazardous materials at different states (solid, gas, and liquid).

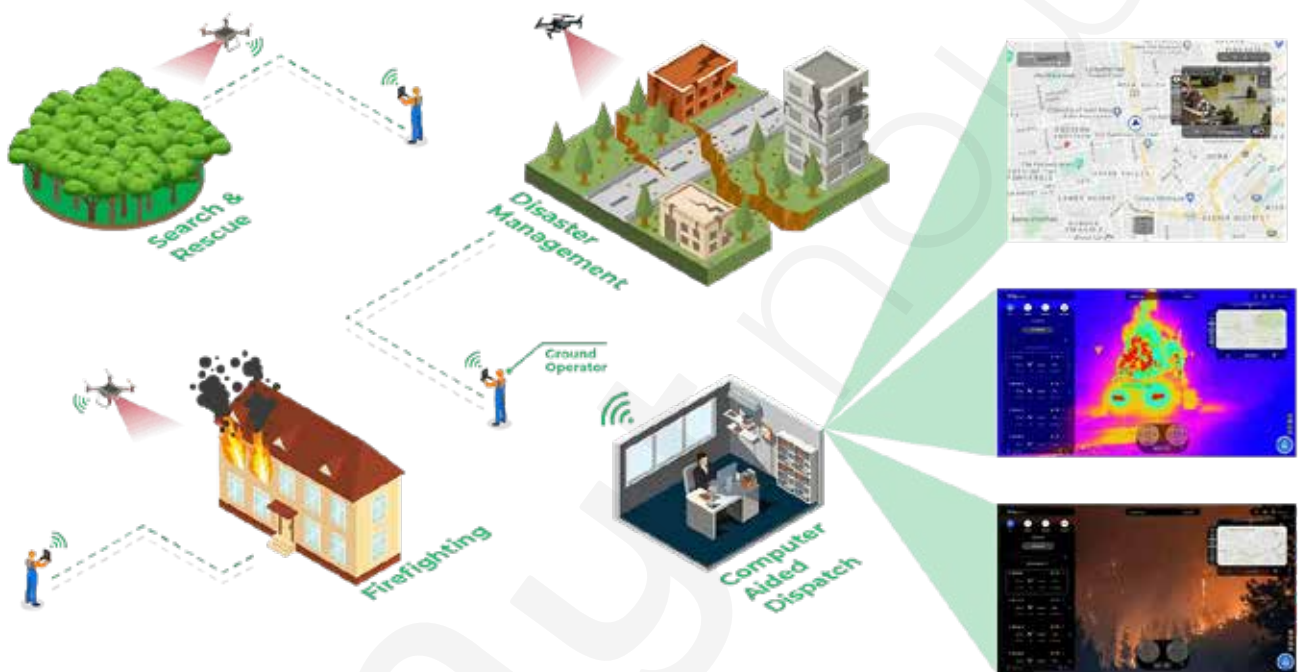


- In an incident like the ammonia leak mentioned above, a thermal camera with different color palettes (isotherms, Rainbow, Hotspot, Gray, Hot-metal, and Coldspot for the M2E Dual) would have made the job of identifying the leak much safer and easier for the technicians, because certain color palettes are better at identifying gases.
- FlytNow Business can be integrated with private cloud services such as Amazon S3. This allows for the automatic storage of all video data captured by the drones, which can be retrieved for future investigations.



# Using FlytNow Enterprise to Establish a Drone Based Response System

FlytNow Enterprise offers additional features and customization when compared to the Business version. Using this version a fully automated response system can be established that is integrated with ground-based hardware (Drone-in-a-Box) and computer-aided dispatch systems like 911.



This is possible because of some of the additional features provided by the Enterprise version:

- REST API allows integration with various public safety systems. When integrated with such a system, an incoming HAZMAT emergency request can be routed directly to the FlytNow dashboard from where an emergency operator can initiate a drone survey.
- FlytNow Enterprise works with all popular Drone-in-a-Box hardware and charging pads. In a fully integrated response system, a request from a HAZMAT technician for a drone recon can be routed to a nearby DiaB station from where a drone can launch itself and perform the task.
- The advanced-mission planner can achieve flight automation of drones. Drones can be deployed automatically from remote locations with the support of UTM service providers like Airmap.

- AI-based add-on features. A drone in a HAZMAT response can leverage features like object detection to automatically identify critical features of the situation.
- DroneLogbook integration for robust flight data management. Public safety personnel can capture flight data of every drone flight with DroneLogbook and auto-generate meaningful reports for compliance purposes.

## Summary

HAZMAT incidents are a grave danger not just to the people but the environment as well. This is why it's important to deploy the best technology available to address such situations. Drones, as cutting-edge technology, have immense potential for HAZMAT response and are quickly becoming an integral part of the standard response in many countries.

Public safety drones can make a big difference, but managing them can be a challenge as fleets of drones get incorporated for parallel missions. This is where FlytNow, as a cloud-based offering, enables fleet management and sharing of aerial data easy and quick, across multiple agencies for better coordination.

To experience FlytNow, sign up for our free trial for 28 days using this link:

<https://app.flytnow.com/>

Or

If you are interested in partnering with us, please reach out to us using the form here:

<https://flytnow.com/partner/>.

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