



WORKSHOP

**EMERGENCY**

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# 2030 Horizon for drones in civil protection and crisis management activities – COLLARIS foresight study



## Structure of the study

<i>Response activities:</i>	<i>Example use-case types:</i>	
	<b>Flying eyes – gathering information</b>	<b>Flying robots – other activities</b>
<b>First on scene</b>	First reconnaissance	Delivery of aid equipment (e.g. AED, floating device)
<b>Typical response</b>	Situation and damage assessment, monitoring of response activities	Support (e.g. lighting) Fire suppression
<b>Complex operations</b>	Area monitoring	Transport of humanitarian aid
<b>Threat monitoring</b>	Situation monitoring	
<b>Safety of public events</b>	CBRNE monitoring	



DCNAustria

KOIOS  
Research and Innovation Center of Excellence



NIPV  
Nederlandse Instituut  
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# First on scene. Drones before the humans

Drones reach the emergency site before arrival of a first team of responders (long distance, traffic, difficult terrain).

Flying eyes – gathering information	Flying robots – other activities
<ul style="list-style-type: none"> <li>• First reconnaissance (video transmission)</li> <li>• Transmission of emergency information from third-party overflying drones (drone-to-112)</li> </ul>	<ul style="list-style-type: none"> <li>• Delivery of aid equipment: defibrillator, floating device, survival pack, ...</li> <li>• Population warning</li> <li>• Two-way audio communication with people in distress</li> </ul>



# First on scene

## Required enablers

Air traffic management / U-space, in particular:

- Ability to conduct BVLOS flights
- Priority for “blue-light flights”
- Rapid acceptance of flight plans (<2 minutes)

## Focus on solutions that will reach technical maturity:

- Ability to conduct remotely-controlled, half-autonomous flights (GSM-based communication)
- Rapid planning of trajectories
- Continuous readiness and rapid take-off (around 2 minutes)
- Automatic hangars/docking stations (restoring readiness)
- Automatic payload exchange (multi-mission automatic capability)



# First 2 hours. Drones in support of typical response activities

Flying eyes – gathering information	Flying robots – other activities
<ul style="list-style-type: none"> <li>• Situation/damage assessment, monitoring of response activities: video transmission (optical and IR), geotagged images</li> <li>• Decision support (and evidence gathering): generation of maps and 3D models, automatic emergency delineation</li> <li>• Search and Rescue operations</li> <li>• Specialised sensors: CBRNE detection and mapping, avalanche search, cell phone detection, ...</li> </ul>	<ul style="list-style-type: none"> <li>• Support operations on site (overhead area lighting, radio retransmitting)</li> <li>• Fire suppression</li> <li>• Transport of specialised equipment</li> <li>• <i>eVTOL – rapid arrival of first responding personnel / victims transportation (auxiliary for HEMS)</i></li> </ul>



# First 2 hours/typical response



## Required enablers

Air traffic management / U-space, in particular:

- Priority for “blue-light flights” (including effective priority in VLOS)
- Rapid establishment of air traffic restrictions (DRAR, restricted zone for aviation)
- Coordination of drone flights

Arrangements for effective use of drone data in response coordination

- Operational practices (including dedicated staff position for drone/aerial operations coordination)
- Incident commanders training (ability to request proper information)
- GIS systems prepared for drone-derived data

# First 2 hours/typical response

## Focus on solutions that will reach technical maturity:



- Automatic image analysis (including fire, water, damage and person/object recognition) including use of AI analytics
- Effective data transmission (drone-to-ground) for real-time data analysis
- On-board data analysis
- Automatic mobile (vehicle-based) docking stations
- Fleet coordination (drone-to-drone safety), including autonomous flights (based on control system data exchange and/or on-board aerial situational awareness)
- Ability to monitor all drone traffic/all aerial traffic (“blue-force tracking” and “red-force tracking”)

*A mature system should have a technical reliability above 80% (if operational conditions are met, the mission should be successfully completed at least 8 times per 10 missions).*

# Complex operations.

## Long-term and/or large-scale operations

Use cases, enablers and technologies in addition to the “First 2 hours” block

Flying eyes – gathering information	Flying robots – other activities
<ul style="list-style-type: none"> <li>Monitoring of area of operations: change detection, specific analysis (e.g. monitoring of evacuated area)</li> </ul>	<ul style="list-style-type: none"> <li>Transport: logistic of rescue activities</li> <li>Transport: humanitarian aid</li> <li><i>eVTOL – evacuation of population from affected area</i></li> </ul>





# Complex operations

## Required enablers

- Coordination of drone and human-operated aviation flights (dedicated to emergency response)
- Implementation of IT systems for data access and data sharing among civil protection users

## Focus on solutions that will reach technical maturity

- Advanced data analysis (including automatic change detection: analysis of images gathered repetitively during long operation), use of AI analytics
- Tethered drones – high endurance for long-duration operations (e.g. 5 days of 16 hours continuing operations)

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## Key findings and recommendations:

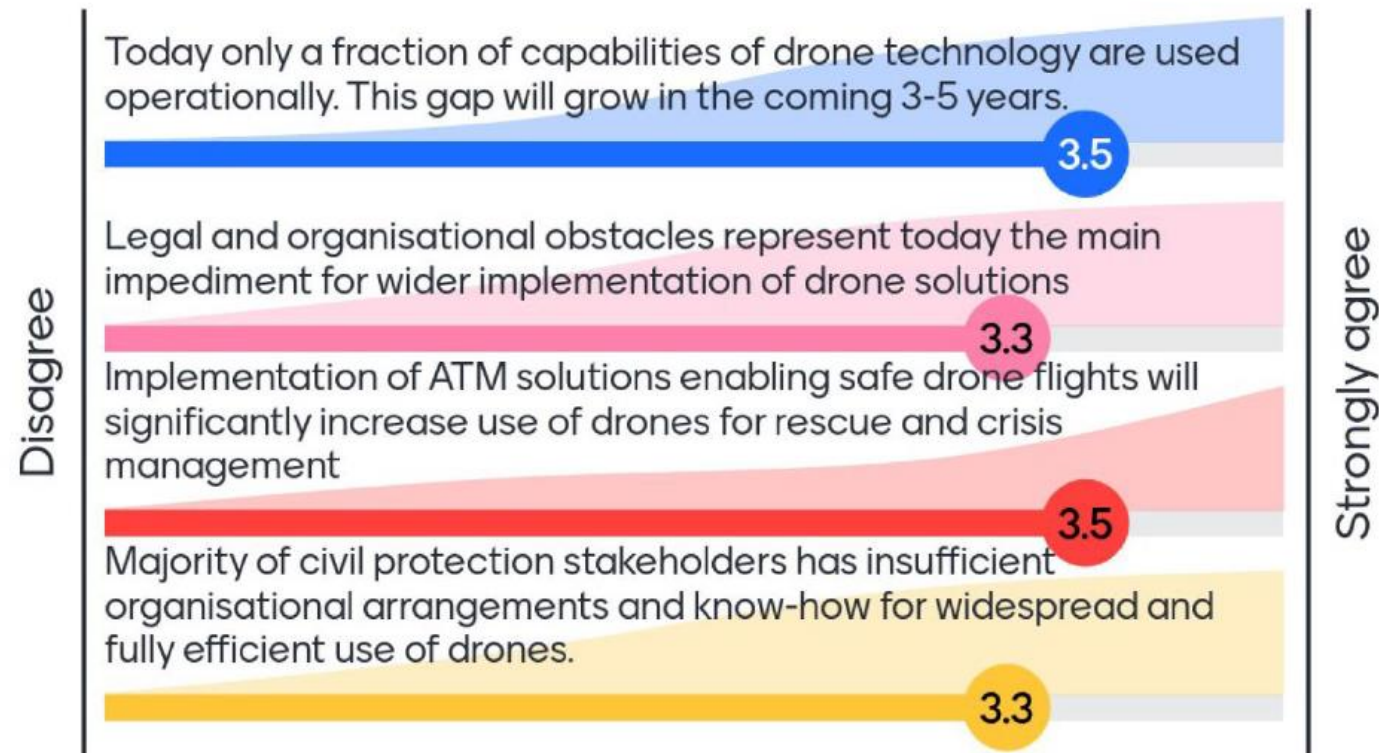
- While there is a high number of drone solutions that has already achieved technical maturity, today only a relatively small fraction of available capabilities is used operationally for rescue and crisis management.
- **Effective use of drones is limited mainly by legal and organisational obstacles and not by pace of technology development.**
- **Implementation of air traffic management solutions enabling safe drone flights** will be the most significant factor increasing use of drones for rescue and crisis management.
- **AI-based solutions for rapid data processing and analysis and efficient and safe data sharing systems** can provide common operational picture for all stakeholders involved in the crisis situation and thus improve their activities and ensure optimal use of available resources



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Key findings and recommendations:

## General challenges



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Key findings and recommendations:

## Support activities that may improve the situation





# THANK YOU!

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**OTHER CONTACT LINKS**

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The Overwatch logo, featuring a red circular icon with a white 'O' and the word 'Overwatch' in red.

The UNICORN logo, with 'UNICORN' in blue capital letters and a blue circular icon containing a white unicorn head.

The DIREKTION logo, featuring an orange network diagram above the word 'DIREKTION' in blue, with 'Disaster Resilience Knowledge Network' in smaller text below.

The Collaris2 logo, with 'Collaris2' in blue and a small drone icon above the '2', and a colorful network diagram below.

