



## *New Emergency Management in a Resilience Era Facing Health, Climate and Energy Challenges*

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# PL case study: experiences of using drones and manned aviation in crisis operations on the basis of Forest2021 State Fire Service



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## Centrum Badań Kosmicznych PAN – CBK PAN



CBK PAN is an interdisciplinary research institute, founded in 1977 as a part of Polish Academy of Sciences. It is the only R&D institution in Poland fully devoted to space research, as well as the leading institution for UAV, satellite and geoinformatic support for civil protection authorities, with a dedicated division for these purposes (Crisis Information Centre – CIK).

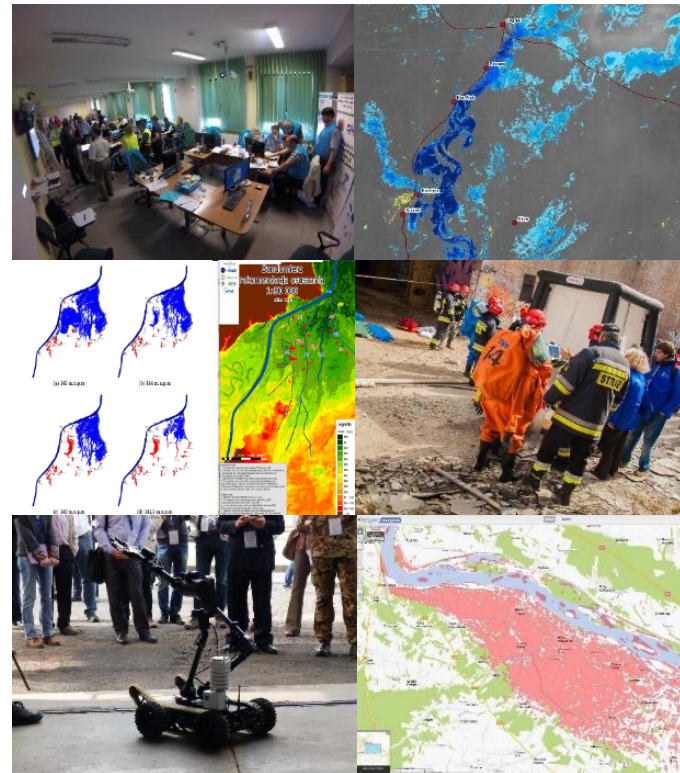
- *Involved in crisis management activities since 2005*
- *Cooperates with civil protection authorities, specializing in optimisation of information flow between technology providers and security end-users for crisis management and rescue activities*
- *Provides operational support for Polish crisis management structures and conducts R&D activities based on its insight into user needs in this field*
- *Raises awareness of added-value offered by practical use of geospatial information (both satellite- and drone-based) in crisis management operations and planning*
- *Provides geoinformatics support, trainings and expert advice for State Fire Service and other crisis management institutions*
- *Acts as an intermediary between practitioner organisations and (applied) research organisations, solution providers, public administration and policy-makers*
- *Supports User-driven and service-oriented approach, best practices evaluation, optimisation and tailoring to end-user needs*
- *Provides risk assessment capabilities*

# Crisis Information Centre CBK PAN

THE RIGHT **INFORMATION** FOR THE RIGHT **PEOPLE** AT THE RIGHT **TIME**

The mission of the Crisis Information Centre (**CIK**) is to increase the efficiency of activities in the area of crisis management and rescue operations through:

- effective use of existing technical possibilities in the domain of geospatial information as well as satellite and aerial remote sensing,
- development of new methods and tools in this area, in particular development of applications of satellite techniques and *EO downstream applications and services*,
- increasing awareness and competencies in the use of satellite techniques and geoinformation by organising trainings, exercises, demonstrations and tests of new technical solutions.



# Crisis Information Centre CBK PAN

THE RIGHT **INFORMATION** FOR THE RIGHT **PEOPLE** AT THE RIGHT **TIME**

Integration of data from different sources



Expert support in operational use of geoinformation



Demonstration and assessment of pre-operational solutions



Development of best practices for use of innovative solutions

## Forest2021 State Forest Exercise – general context and aviation component

- The first and largest field exercises after the Covid-19 pandemic called „Forest2021”: duration 3 days, participation of 470 firemen and 150 vehicles (August 2021, northern part of Poland).
- Exercise scenario: long-term forest fire, covering large area and difficult to extinguish due to unfavourable environmental conditions, threat not only to critical infrastructure (electric power station and grids), but to several groups of tourists and forest workers, resulting in the need for search and rescue activities and providing on-site medical assistance in addition to „ordinary” fire-fighting.

### Aviation component challenges

- ✓ Enable the simultaneous use of UAVs and manned aircraft in rescue and crisis management operations
- ✓ Optimise use of UAVs for continuous monitoring of situation on the ground



## Aviation component of Forest2021 exercise

### CoE Driver+ approach

- Use Forest2021 exercise of the Polish State Fire Service to conduct and evaluate a separate aviation component
  - „The trial mode” – personnel efficiency not evaluated
- Creation of a specific model for air traffic organisation
- Support for development of „Air Operations Coordinator” function in State Fire Service
- Creation of a specific model for „strategic UAV” monitoring
- Gathering lessons for „Search and Help” functionality (future IT system under PansaUTM system)



### Specific concepts

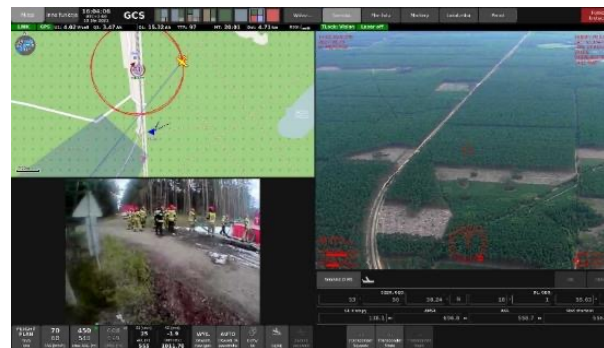
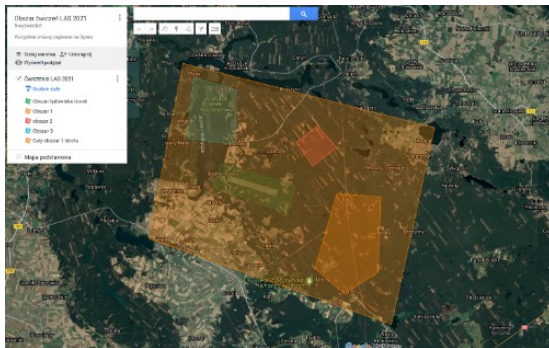
- Layered organisation of airspace: high-level UAVs, manned aviation, low-level UAVs
- „Air Operations Coordinator” team supported by PANSAs (ATC controllers)
- UAV plane orbiting above 300m (AGL)



## Aviation component of Forest2021 exercise

### Key events

- Establishment of R (restricted) airspace volume (real life, before the exercise)
- Activation of „Air Operations Coordinator“
- Establishment and management of R airspace volume („played“ during the exercise)
- Continuous coordination of human-operated aircraft and UAVs
- Strategic monitoring provided by high-level UAV and helicopters
- Tactical use of UAVs





## Lessons learnt

### Airspace management

- Critical – enabling for combined (human-operated and UAVs) operations
- Introduction of restrictions easily implemented for UAVs (PansaUTM)
- More complicated but feasible for human-operated aviation
- High value of dedicated IT solutions

### Flight separation

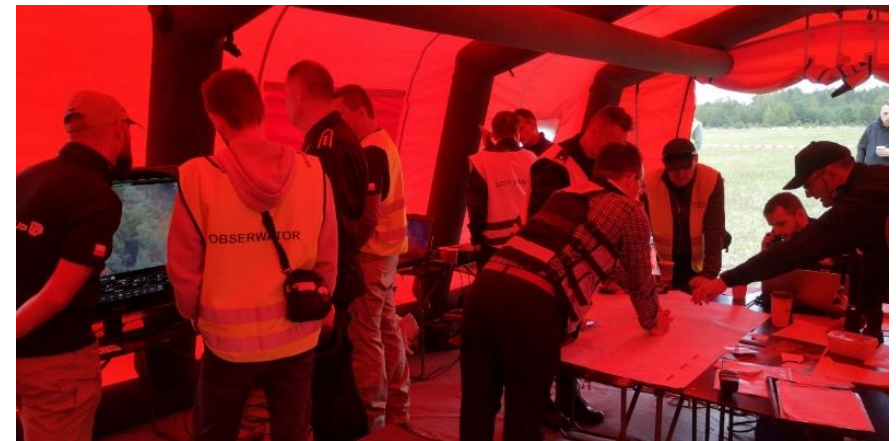
- Altitude separation
  - Procedural
  - Effective, flexible, no safety concerns experienced
- Horizontal separation
  - Procedural
  - Feasible, no safety concerns experienced
  - Very high value of IT solutions



## Lessons learnt

### „Air Operations Coordinator”

- 3 person team recommended
  - Clear need for support by ATM peronnel
  - Need for well established liason within HQ
- Need for specific procedures and training
- Confirmed as key user of „Search and Help” IT system
- Gathered multiple observations related to ATM processes



## Lessons learnt

### Human-operated aircraft

- Observation – effective synergy with UAVs
  - Video transmission from helicopters supports integrated situation monitoring
- Firefighting flights – safe conduct feasible

### Strategic UAVs

- Flights above human-operated aircraft
- Rapid situation assessment
- Continuous situation monitoring
- Data provided to multiple points (HQ and local field commander)

### Tactical UAVs

- Safe flights feasible
- Effective communication with „Air Operations Coordinator” critical
  - Very high value of IT solutions



## Conclusions and recommendations

### CoE and Trial approach

- Effective implementation of UAVs may significantly benefit from „Trial” activities
- Driver+ trials approach is a flexible instrument for:
  - assessment of new solutions **functionality**
  - assessment of **organisational approaches** to use new solutions
  - definition of **functional requirements** for IT support systems
- Experience from using **UAVs and support solutions** in crisis management should be shared among European stakeholders
  - issues related to air traffic management are of particular importance and solutions should be developed in a coordinated manner
  - this may significantly benefit from Knowledge Network mechanisms



## Conclusions and recommendations

### Getting most benefits from UAVs

- Dedicated approach for air traffic management is critical
  - high potential for U-Space / DTM systems (including deployable solutions)
- Effective information flow to users must be ensured
  - making information available to right recipients
  - optimised form of information



# References

- Crisis Information Centre CBK PAN: <http://www.informacjakryzysowa.pl/en>
- Trial Guidance Methodology: <https://www.driver-project.eu/trial-guidance-methodology>
- DRIVER+ Centres of Expertise Network: <https://www.driver-project.eu/centres-of-expertise-coe>
- PANSA UTM: <https://www.pansa.pl/en/u-space>
- <https://www.gov.pl/web/kgpsp/cwiczenia-centralnego-odwodu-operacyjnego-las-2021>



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