



## Beneficiaries

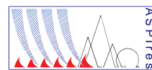
- University of Applied Sciences, Fulda, Germany - Coordinator
- Military Academy „General Mihailo Apostolski“, Skopje, FYR of Macedonia
- Comicon Ltd. Bulgaria
- InterConsult Bulgaria Ltd
- National Cluster for Intelligent Transport and Energy Systems (NCITES), Sofia, Bulgaria

### End users of ASPIres

- Ministry of environment and physical planning
- Ministry of Agriculture
- Forestry and Water Economy
- Crisis Management Center, Skopje
- National park Mavrovo (testbed)
- National park Pelister
- Directorate General Fire Safety and Civil Protection, Ministry of Interior, Bulgaria
- Bundesministerium des Innern, Germany

**Project financed under the Civil Protection Programme Call: 2016**

Agreement No.: ECHO/SUB/2016/742906/PREV03



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Coordinator:

**Hochschule Fulda**

University of Applied Sciences



## Project: Advanced Systems for Prevention & Early Detection of Forest Fires ASPIRES

ECHO/SUB/2016/742906/PREV03

European Commission

Directorate-General for European Civil Protection and Humanitarian  
Aid Operations (ECHO)

ECHO A - Emergency Management

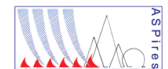
Unit A4- Civil Protection Policy



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**2016 Call for Prevention and Preparedness Projects in the field of  
Civil Protection and Marine Pollution**

## Summary

**ASPIres** is one of the EU projects developing cloud-based early forest fire prevention, detection and monitoring systems and concepts. Forest fires still present one of the main risks for human, property, climate and environment and its prevention and detection at early phase remains one of the biggest challenge for researchers and institutions in Crisis Management Information Systems (CMISs) worldwide. Existing forest fire monitoring systems have the disadvantage of relatively low percentage of detection (between 23.5% - 30%). The ASPIres project is creating a novel information and communication cloud platform integrating exiting systems and preparing the area for new virtualized services and models for fire danger forecast and prediction, alerting, fire management, reporting and analysis.

ASPIres platform integrates sensor networks, mobile, drone technologies, cloud computing, big data analysis and artificial intelligence while collecting data at existing CMISs. The mobile and drone solutions allow covering large areas and raising the percentage of forest fire detection in places of importance. Proposed technological solutions monitor areas with high Fire Weather Index (FWI), affected by forest fires, hot spots, varying FWI and estimates the probability of forest fires. ASPIres platform is interoperable and open for integration with existing European CMISs at regional, national and international level. ASPIres platform offers opportunity to develop and customise different methodologies and scenarios for initial stage warning, localization and organization of the fire fighting teams and tactics to suppress the disaster. The vitality of the platform is proven via experiments in National park Mavrovo, FYR of Macedonia, in Park Pirin in Bulgaria, laboratory tests at University of Applied Sciences in Fulda, Germany. All experiments are supported by the listed end-users.

- Improved coordination and cooperation of services and end-users included in the prevention, preparedness and rescue process.
- Easy customization of the services depending on local law and legislation.
- Data sharing to data centers and CMISs allowing secondary data analysis. Validation of developed software and hardware solutions in different parts of the network.

### ASPIres Long Term Impact

- Protection of people and properties from forest fires improved and negatives impacts of climate changes reduction.
- Assessment of forest fires is improved. Manpower and technical equipment and management that answer to crisis situations are more appropriate and faster
- Functions of CM are improved.
- Capacities for detection of forest fires and monitoring of forest areas of particular importance which are rich with endemic specimens of flora and fauna in real time are developed and damages caused by forest fires in forest areas of particular importance are significantly reduced.
- Received serial data from measurements are in use for improving experiences in detection and monitoring of forest fires and opened for added values.

All products will be ready for integration at European level and with heterogeneous systems.

- Data is collected in the cloud through regional centers or directly.
- Data acquisition at existing CMISs is virtualized in the cloud.
- Data virtualization allows further development and the implementation of different methodologies for initial stage warning, localization and organization of the fire fighting teams and tactics to suppress the disaster.
- Cloud solution allows continuous definition of new services for crisis management intended for different end-users.



## ASPIres Short Term Impact

- Sharing and exchange of data for forest fires between the different levels of prevention, preparedness and rescue agencies, services and institutions through cloud and locally.
- Integration of existing CMISs and appropriate data sharing.
- Reduction of the cost of real-time forest fire detection and monitoring in national parks.
- Automatic processing of information for forest fires system alerts.
- Opening possibility for enhanced forest monitoring and preventive measures taking into account forest categorization, degree of risk, endemic species of trees, FWI, etc.
- Integration of fixed and mobile solutions including the use of the drone.
- Experimenting the drone solution and field gateway to ensure network deployment.
- Experimenting the delay-tolerant network solutions and gossip protocols for hop-by-hop spreading of urgent sensor data, fire alarms, instructions, etc.
- Identification of main actors, systems and their possible level of integration to the ASPIres platform.
- Forest fire behaviour simulation, prediction algorithms testing, end-to-end testing, verification and validation of the platform.
- Implementation of the developed solutions with the existing tower infrastructure.
- Reduction of false alarms, increase of the detection time, integration of the data from preliminary analysis of the preparedness of the area.
- Increased possibilities of management in command various types of barriers, tourniquets, locks and locking mechanisms in the protected or surrounding areas.

## ASPIres Medium Term Impact

- Possibilities for object tracking in the forest.
- Implementation of safety standards for communication, access, sharing and dissemination of the data.



## ASPIres Objectives

Development of advanced concepts of systems for early forest fire detection integrating sensor networks, mobile, drone technologies and cloud computing.

Use of data collection to improve the percentage of forest fire prevention and detection in areas of importance by monitoring the FWI, hot spots, affected places and predicting the forest fire behaviour.

Specification of communication interfaces, protocols and data flows to share information between authorities and end-users improving the coordination at regional, national and international level.

Development of new information and communication technology solutions and services that allow platform interoperability and integration using recent big data, context-aware and artificial intelligence algorithms.

Improve sustainability in collecting disaster data for CMIS by sharing the best practices in cross-sector and cross-boundary risk management.

Concept simulation in extreme environment, development of the scenarios for system testing, verification, validation.

## Expected Results

Development, experimental implementation and testing of ASPIres integrated advanced platform for early forest fire detection and monitoring that integrates sensor networks, mobile, drone technologies and cloud computing for data collection at CMISs.



