ICARUS

INTEGRATED COMPONENTS FOR
ASSISTED RESCUE AND UNMANNED SEARCH OPERATIONS

AN EU-FP7 PROJECT PROVIDING UNMANNED SEARCH AND RESCUE TOOLS

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SEVENTH FRAMEWORK PROGRAMME

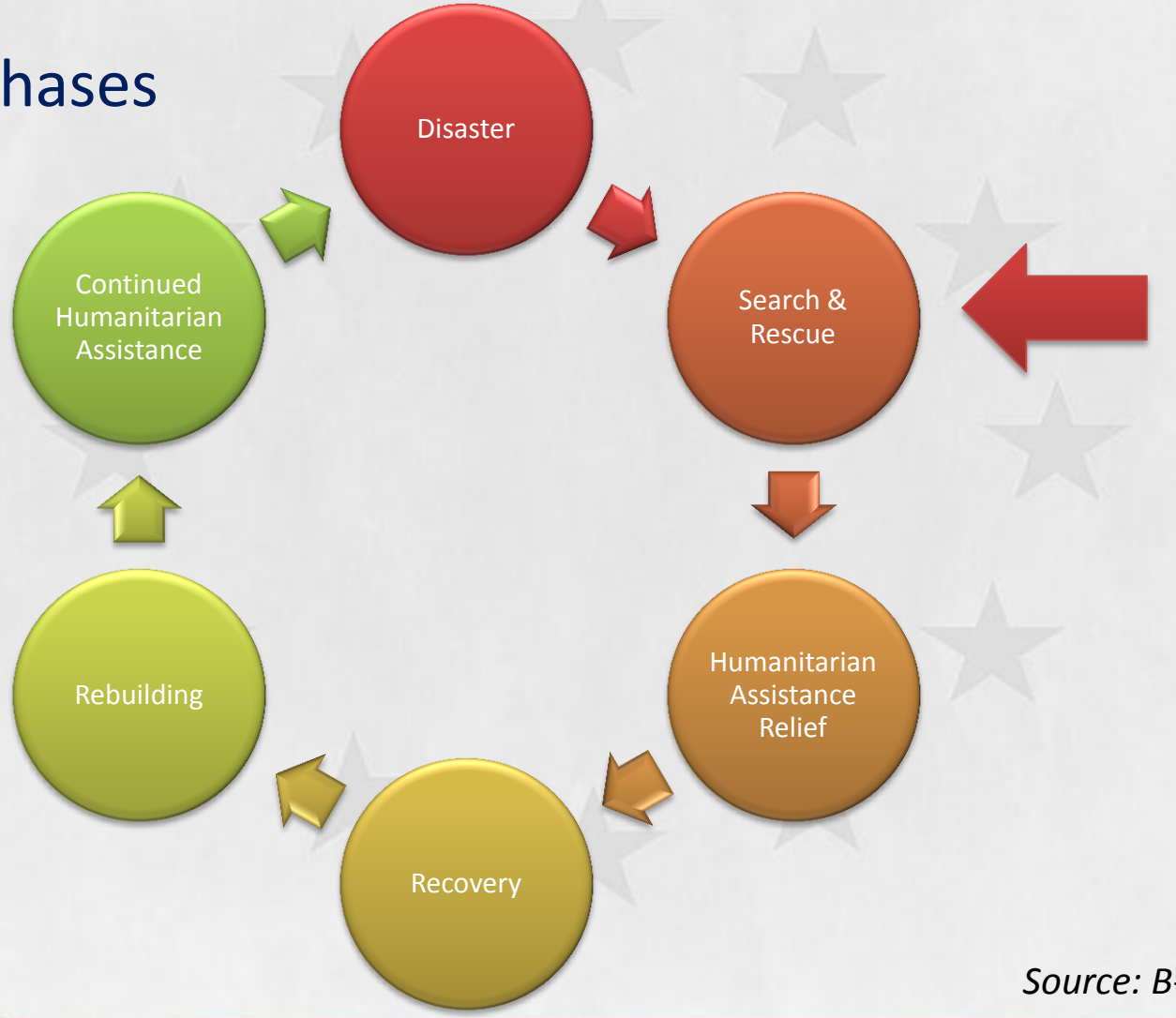
REA

- Disasters disrupt our society
- Disasters are very difficult to manage

Source: Wikimedia Commons

CURRENT SAR WORKFLOW

- Disaster Phases



Source: B-FAST

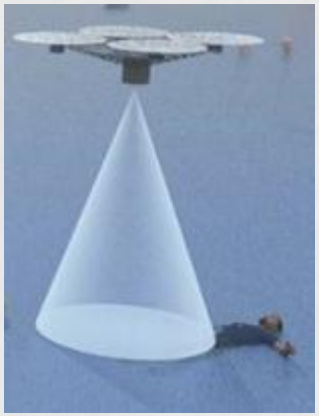
- Search & Rescue actions:
  - Labour-intensive
  - Slow

Source: B-FAST

- Integrated Components for Assisted Rescue and Unmanned Search operations
- Participants:
  - 24 partners
  - 10 countries
  - 2 end-users:
    - B-FAST
    - Portuguese Navy
  - 3 large industrials
  - NATO / NURC
- Total Budget: 17.5 M€

Source: Wikimedia Commons

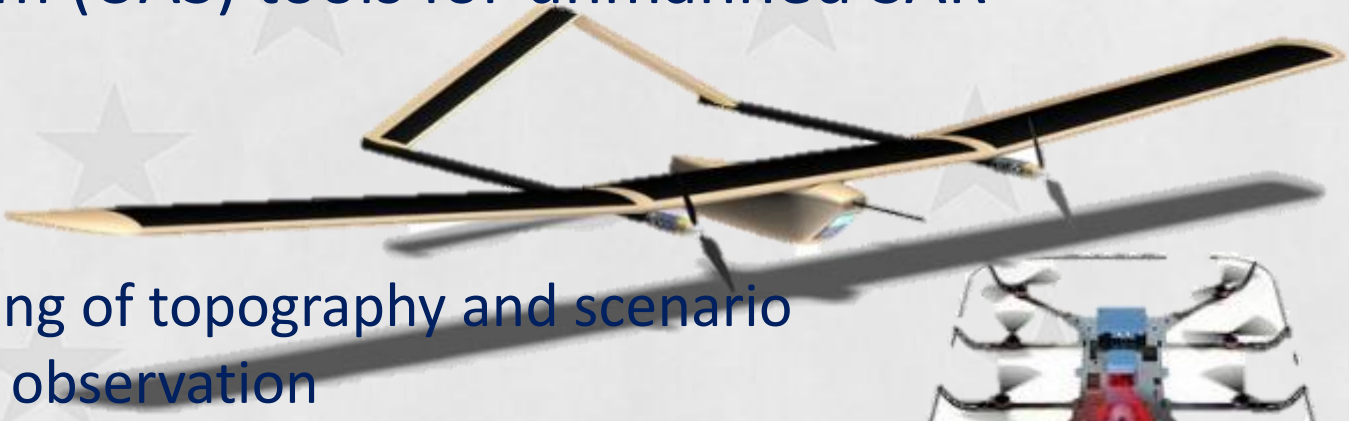
- Objective 1: Development of a light sensor capable of detecting human beings



Source: RMA

  - WP210
  - Based on QCD technology
  - Minimal levels of weight (500 g), dimensions (12x12x6 cm) and total power consumption (5 W) are being targeted
  - Image and video processing algorithms for detecting human survivors will be developed and combined to obtain sufficient detection performance
  - **UNINE**, TUV, IZM, ETHZ, RMA, UKL

- Objective 2: Development of cooperative Unmanned Aerial System (UAS) tools for unmanned SAR



  - WP220
  - Used for:
    - Mapping of topography and scenario
    - Target observation
    - People search outdoors and indoors
    - Kit delivery
    - Communication relay
  - **ETHZ**, CTAE, SBX, JTH

Source: ETHZ, SBX, JTH

- Objective 3: Development of cooperative Unmanned Ground Vehicle (UGV) tools for unmanned SAR

  - WP230
  - Development of a large UGV which can be used as a mobile base
  - Development of a small UGV which is able to enter in collapsed buildings to search for human victims

  - **UKL**, META, AV, RMA, SPACE, BFAST

Source: META, AV

- Objective 4: Development of cooperative Unmanned Surface Vehicle (USV) tools for unmanned SAR

  - WP240
  - Used for:
    - Sensing and perception for target detection and tracking.
    - Mission planning and control for operations with single or multiple vehicles.
    - Capsule deployment system (life-rafts).

  - **INESC**, NURC, CAL, CINAV

Source: INESC, CAL

- Objective 5: Heterogeneous robot collaboration between Unmanned Search And Rescue devices

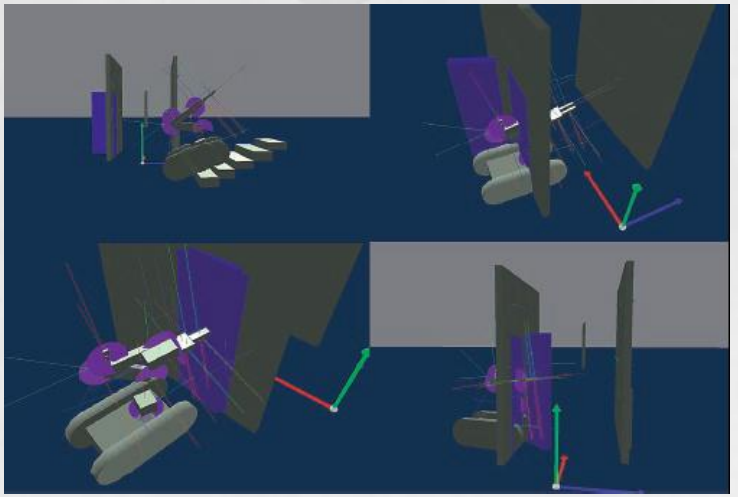
  - WP250
  - Robot Interoperability
  - Coordination between multiple UXV
  - Heterogeneous operations UAS + UGV in a SAR context
  - Heterogeneous operations UAS + USV in a SAR context

  - **CTAE**, ETHZ, INESC, IMM, RMA, SPACE

- Objective 6: Development of a self-organising cognitive wireless communication network, ensuring network interoperability
  - WP310
  - Focus:
    - Mobile and wireless ad-hoc communications in combined land-air-sea environments.
    - Self-coordination and optimisation of spectrum resources by using cross-layer cognitive radio techniques
    - Self-managed network able to adapt to varying and extreme conditions by using power-efficient, failure-resilient protocols.
    - Flexible security scheme.
    - Harmonised management and control overlay, able to encompass several data-link technologies (WLAN, GSM).
  - **ISYS**, RMA, QUOBIS

- Objective 7: Integration of Unmanned Search And Rescue tools in the C4I systems of the Human Search And Rescue forces
  - WP320
  - 3 objectives:
    - Collection of data/information from the robots, operators, human teams deployed, …
    - Collation and merging of data from different sources, including allowing for differing reliability of sources and integration with GIS information;
    - Monitoring and control interfaces that can provide high level command capabilities to appropriate users
  - **SPACE**, ATOS, CTAE, ISYS, INESC, IMM, E-GIS, UKL

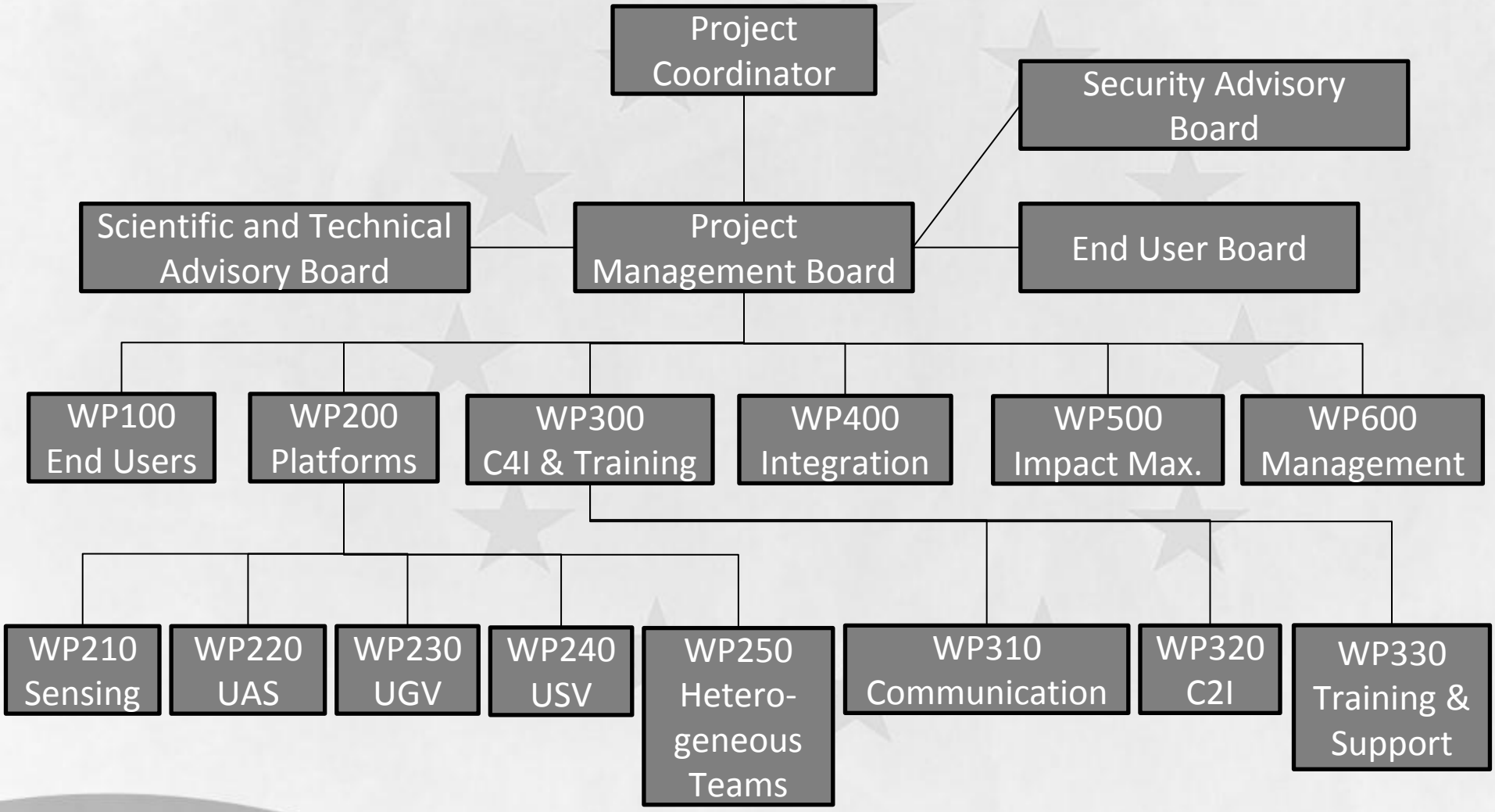
- Objective 8: Development of a training and support system of the developed Unmanned Search And Rescue for the Human Search And Rescue teams
  - WP330
  - Development of PC-type trainers-simulators for training operators of SAR robots
  - Development of an e-learning methodology
    ➔ training tool with virtual robots
    ➔ use of semantic information in a human-machine-interface
  - **IMM**, ISYS, INESC, ESRI



Source: IMM

- Objective 9: Communication and dissemination of results
  - WP510
  - Ensure that the outcomes, results and benefits of the project are made visible to the actors involved in search and rescue operations and to the final beneficiaries
  - Increase overall visibility of the EC's research and development activities among the search and rescue community.
  - Support user engagement activities
  - Production of printed and multimedia material;
  - Networking activities among the end-users and beneficiaries
  - Development and implementation of a campaign in media
  - Development of a project website;
  - Shooting of video material to promote the results of ICARUS
  - **STP**, ATOS, JTH, QUOBIS, RMA

ICARUS - STRUCTURE



CONCLUSIONS

- Disasters pose a huge problem for our society
- The current disaster management tools can be improved by adding technological aids
- ICARUS proposes a comprehensive solution to this end
- We're very open to comments / advice from the end-user community

THANK YOU

ANY QUESTIONS?

OVERVIEW PRESENTATION

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SEVENTH FRAMEWORK PROGRAMME
REA


Land
Search and Rescue
Air
Water
Autonomous Systems Lab
CALZONI