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# Development of UAV-based solution against wildfires

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# The Mati incident



Date	July 2018
Place	Attica, GR
<b>Humans dead</b>	<b>100</b>
Cost	approx 40M€
Burned area	13 km <sup>2</sup>

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# The challenge that led to a tragedy



- Large area, including residential areas and holidays resorts.
- Very strong winds (up to 8 B).
- Non-existing spatial (urban) planning.



*Extremely challenging incident for the firefighters and the civil protection agencies.*

# The heroes' drama



- Lack of ground troops coordination (no real-time communication).
- Low ground visibility (smoke, fire, debris).



*Need for real-time situation awareness, optimal resources deployment and keep firefighters out of harm's way.*

# The civilians' drama



- Lack of civilians coordination.
- No way of live tracking / information exchange between the rescuers and the people.



*Real-time situation awareness and image feeding could help provide accurate instructions to civilians and keep them from harm's way!*

# The disaster's aftermath



- 100 people dead.
- Damage assessment and area mapping using ground and aerial vehicles.



*It costs on time, fuel, personnel and resources in general.*



# UAVs: a modern and different approach



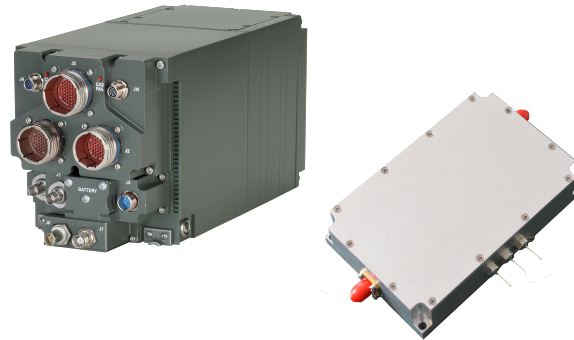
- Capability to withstand adverse weather conditions.
- Guarantee safety for firefighters and rescue personnel.
- Large flight time (flight endurance).
- Adequate payload capacity (RF links, EOP sensors, flares, supplies).
- Short deployment times.
- Low-cost.

*The ideal (?) solution, matching the above requirements is based on UAVs.*

# UAV dilemma: multicopters or fixed-wing

Trades		
Payload capacity	Low (~1 kg)	High (10-50 kg)
Flight endurance	Very low (< 40 min)	High ( > 10 hrs)
Stability	Weak (in strong winds)	Excellent (up to 8 B)
Speed	Medium (up to 50 km/h)	High (up to 250 km/h)
Ease of deployment	High	Low
Portability	High	Low
Manoeuvrability	Very High	Medium

# Payload



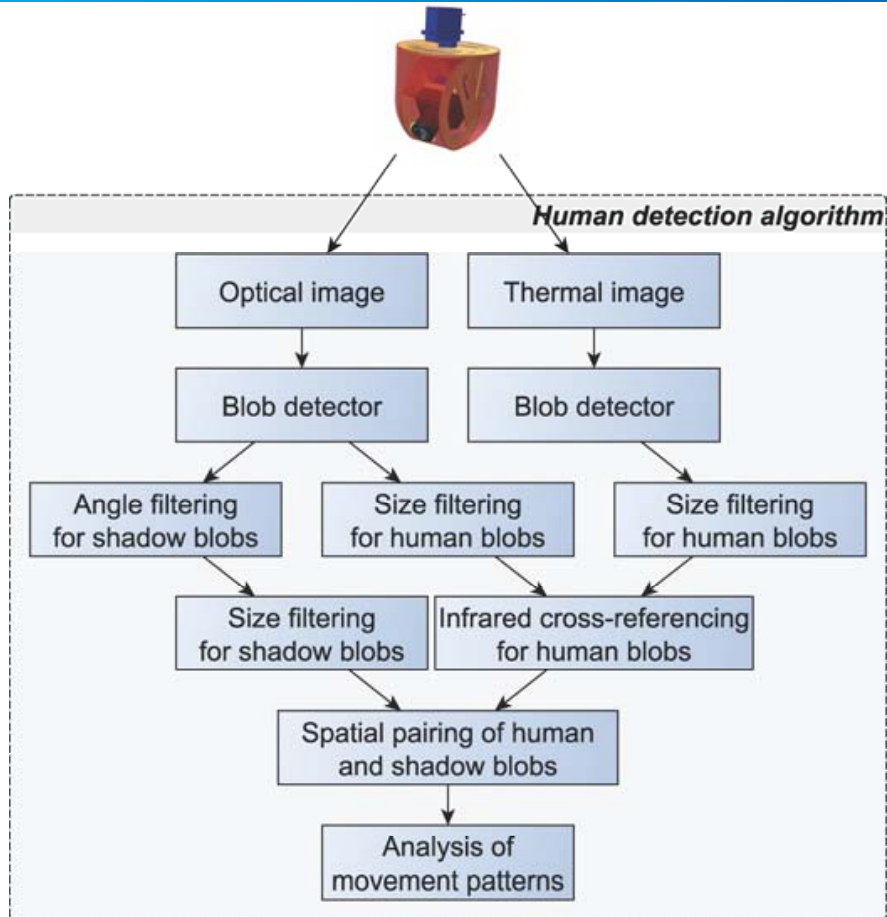
- Telecommunication systems
- EOP
- Onboard computers
- Telemetry systems
- Laser range finder (LRF) systems

# Payload



- Even lifesaving equipment for maritime rescue missions (humans trapped in a coast line).

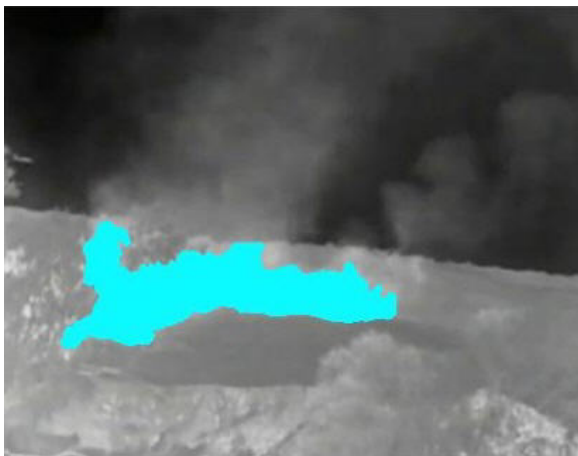
# Payload



- EOP and human detection algorithms.

# Payload

- EOP and fire detection algorithms.



# The prototypes: The RX-1



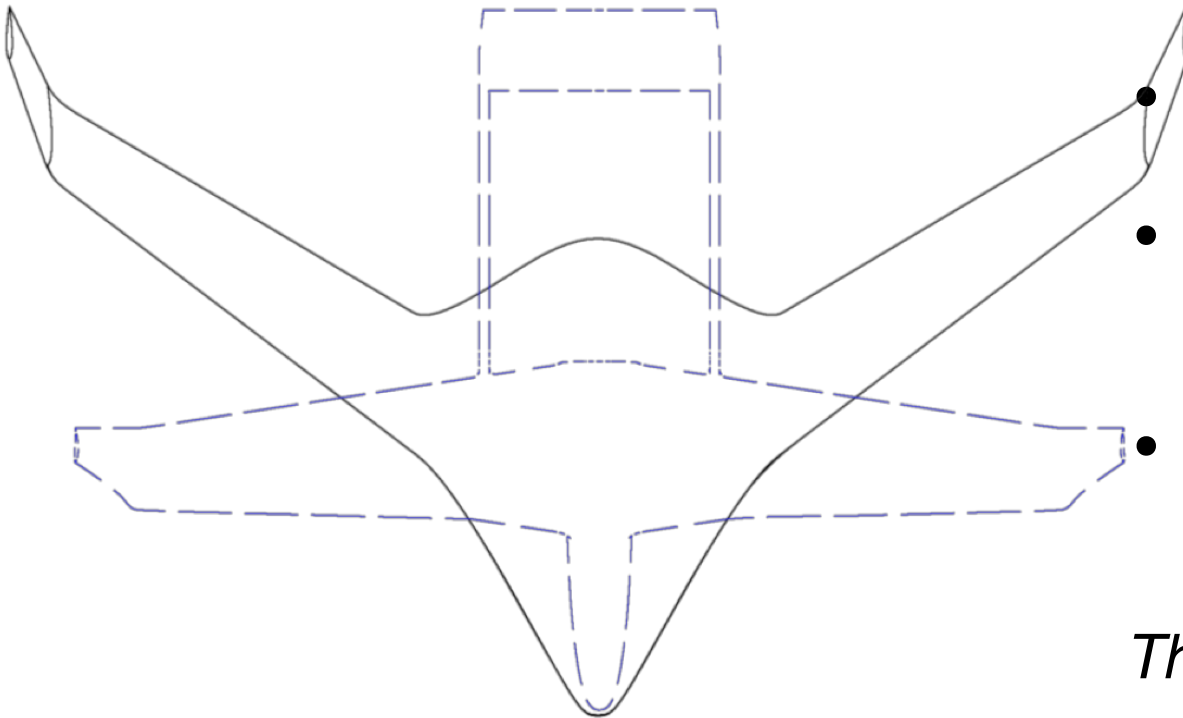
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# Conventional and innovative designs

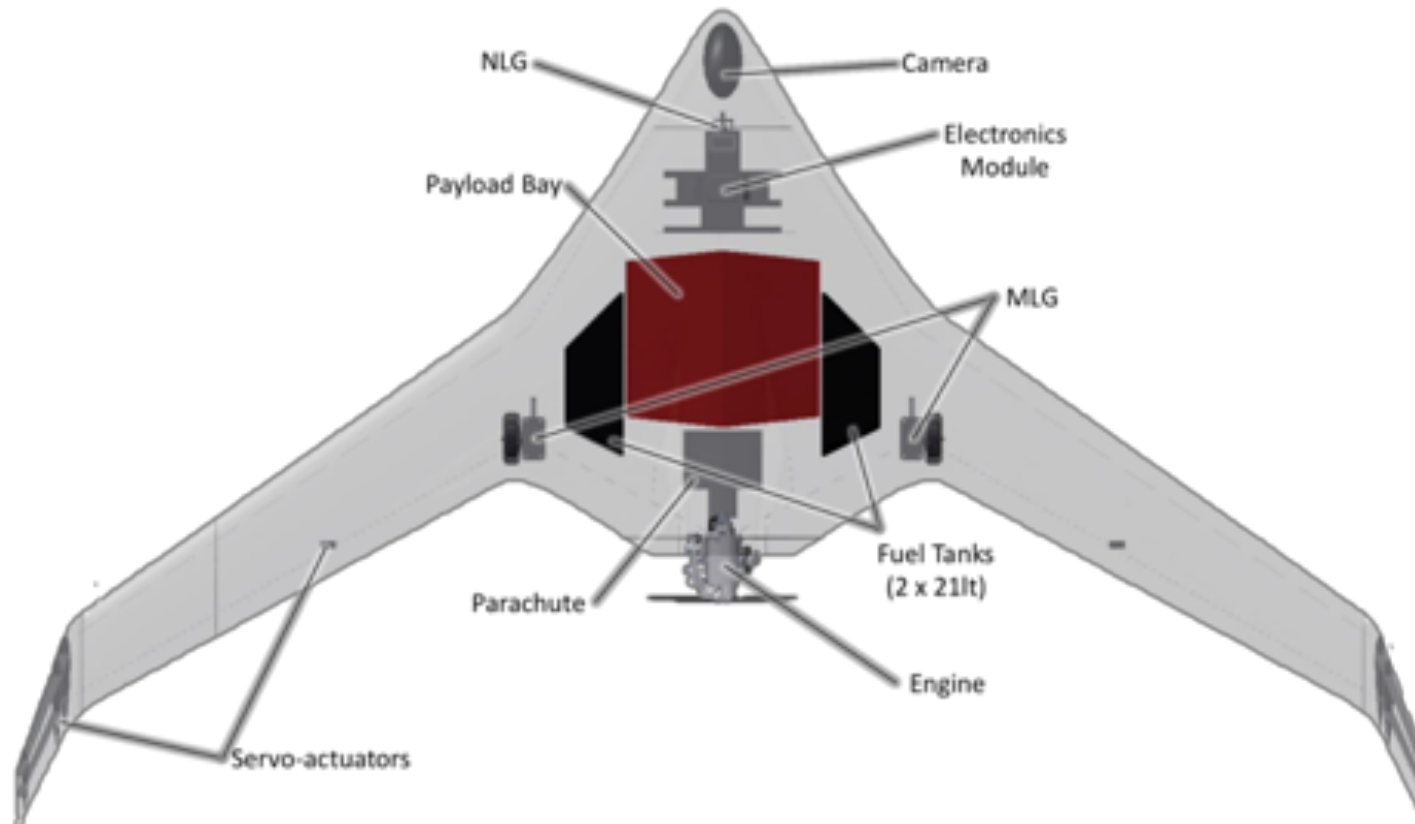
- Large available internal volume.
- Enhanced aerodynamic efficiency.
- Improved performance specifications.
- Reduced noise and pollutants emissions.

*The Blended Wing Body innovative configuration.*

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# Payload and BWB



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# The prototypes: The RX-3



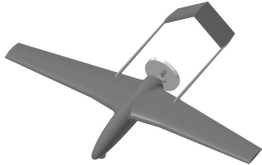



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# The prototypes: The RX-3



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# Some in-house configurations & prototypes

RX-X	RX-1	RX-2	RX-3	RX-4
<b>Mission</b>	Surveillance	Combat	Support/Rapid response	Surveillance (VTOL)
<b>Weight</b>	185 kg	800 kg	200 kg	4 kg
<b>Span</b>	6.4 m	9 m	7.2 m	2 m
<b>Payload</b>	35 kg (radios & EOP)	20 kg (radios) + 45 kg (missiles)	20 kg (radios) + 45 kg (droppable)	500 gr (avionics) + 500 gr (EOP)
<b>Flight speed</b>	140 kph	Mach 0.6	180 kph	55 kph
<b>Image</b>				

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# A typical wildfire incident and a rescue scenario

The incident conditions:

- Wildfires
- Smoke
- Strong winds
- Trapped civilians
- Blocked GSM network
- Unpredictable ambient conditions.

*UAVs can provide integrated rescue solutions.*

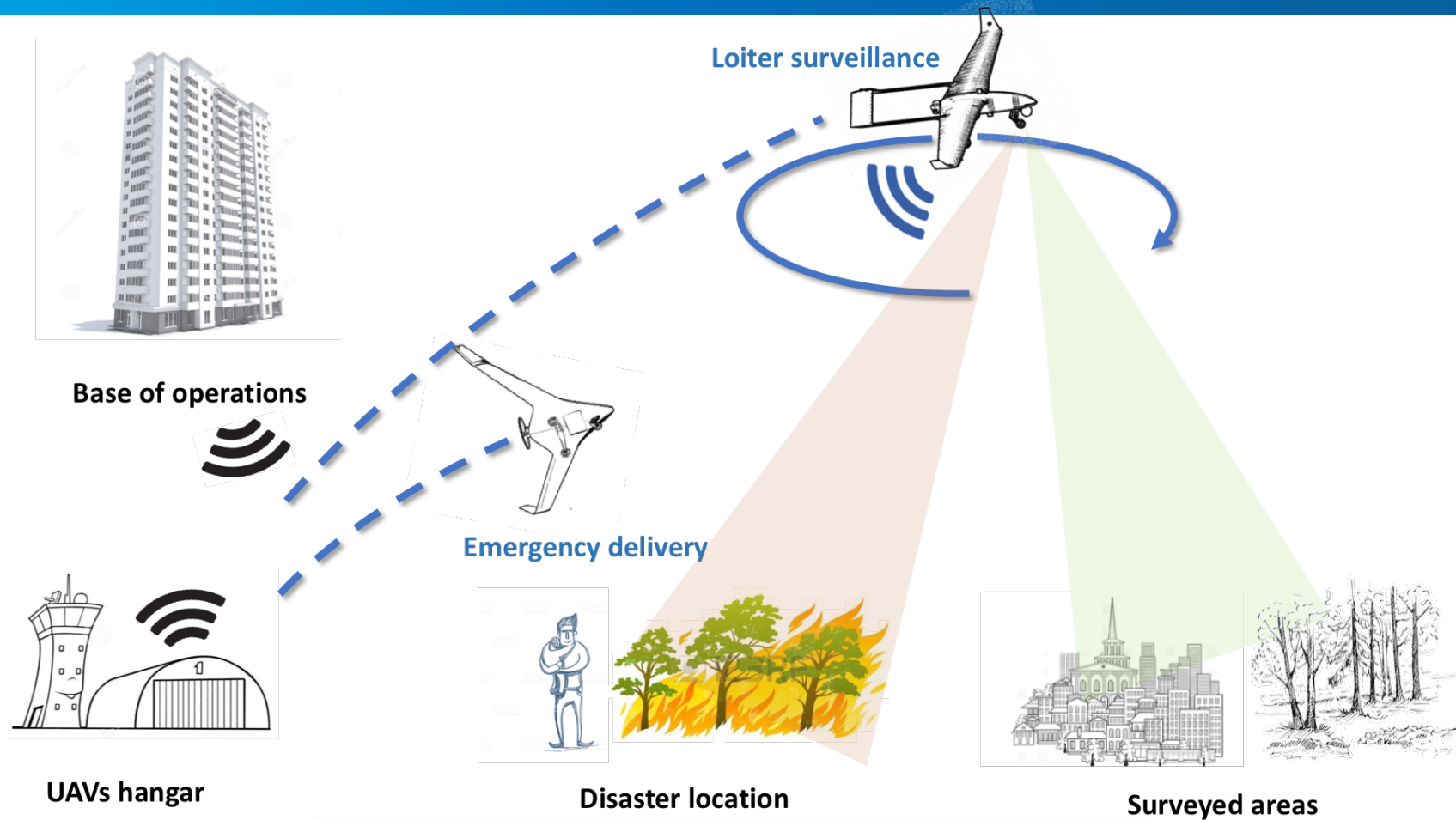
# UAVs to the rescue!

Fixed wing UAVs can:

- provide real-time images and videos through the entire operation that may last days,
- keep firefighters and civilians out of danger zones,
- serve as aerial communication (R/F) relay systems,
- support the Incident Commander (IC),
- provide any life saving supplies and
- operate *simultaneously* with other manned aerial and ground units.

*At a very low cost in lives and resources...*

# UAVs to the rescue!



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*Thank you for your attention :-)*

Kyros