



*Technology Work Session for the South African Army; Hosted by the CSIR*

# Autonomous and Remotely Controlled Systems



## Man-portable UAV evaluations

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# Outline of presentation

- Explain evaluation process followed
- Individual outcome for each system
- Comparison of systems
- Summary
- Conclusions and recommendations

# Evaluation process

- Requirements (Mandatory and Desired)
- Market research
- Identified the systems for evaluation
- Invited respective suppliers
- Conducted evaluations
- Analysed results
- Compared results

# Identified systems

T-HAWK - CSIR



Germany: ALADIN - EMT



E-swifteye – Cyberflight (UK)



RAVEN – AeroVironment (USA)



RSA: KIWIT – ATE



Maveric – Cyberflight (UK)



PUMA – AeroVironment (USA)



Israel: Casper – Sonic



STRIX (Italy)



Desert Hawk III (USA)



# Evaluation scenarios

## **Tactical Reconnaissance (Day & Night)**

- Planning, assemble, launch, recover
- Fly 10km, 60 minutes, silent, video, aircraft control

## **Small Team Reconnaissance (Day & Night)**

- Back-packable, 2 men team on foot
- Undetectable (silent), launch, recover

## **Convoy Protection (Day)**

- Mobile base station at back of bakkie
- 5km road @ 20 - 30km/h
- Detect vehicles & people ahead

## **Command & Control (C2) (Day)**

- Planning, launch, camera control, recovery
- Detection of own & enemy forces around buildings

# CSIR T-Hawk outcome summary



- **Pros:**
  - Good image quality
  - Quick and easy assembled, hand launch
  - Reliable & stable flight
  - Good image quality
  - Local (Adaptability)
  - Cost (R0.6m)
- **Cons:**
  - Not back-packable
  - 45 minutes endurance
  - Airframe fragile



# ATE KIWIT outcome summary



- **Pros:**

- Reliable and stable flight
- Quick & easily deployed, hand launch
- High resolution photos
- Local (Adaptability)
- Cost (R0.63m)

- **Cons:**

- Large GCS (Smaller one added recently)
- Landing with manual remote control
- Not back packable
- Only day camera without PTZ
- 36 minutes, 4km

# Cyberflight E-swifteye outcome summary



- **Pros:**
  - Quick & easily deployed, hand launch
  - PTZ camera control
  - Good night image
  - Rugged



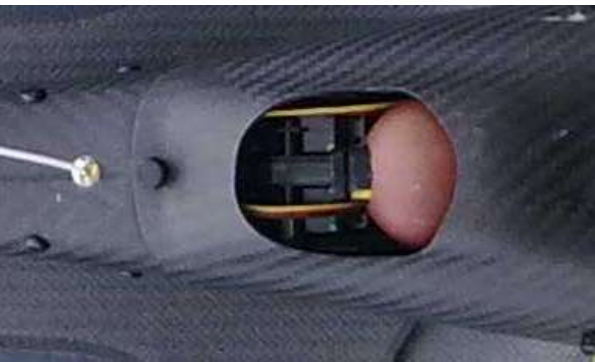
- **Cons:**
  - Not back-packable
  - Noisy
  - 40 minutes endurance
  - Day image not good quality
  - Take-off difficulty at high altitudes



# Cyberflight Maveric outcome summary



- **Pros:**
  - Small, light & rugged
  - Back packable
  - Quick & easily assembled
  - Looks like bird in the sky
- **Cons:**
  - Image not as stable as others
  - 20 minutes, 6km
  - Fixed zoom
  - Landing not precise



# Cyberflight evaluation picture



# Alpi-aviation STRIX outcome summary



- **Pros:**
  - Good PTZ payload
  - 1.5 hrs flight endurance
  - Stable flight
  - Easy to operate
  - Small parts (for its size)
- **Cons:**
  - Big (3m wing) & heavy (8kg)
  - Catapult big, bulky, noisy
  - Take-off difficulty at high altitudes

# Alpi-aviation STRIX photos from evaluations

STRIX assembled



STRIX disassembled








Catapult Launcher



PTZ camera



# Comparison of UAV systems

Major Requirements	T-Hawk 	ESWIFT-EYE 	MAVERIC 	KIWIT 	STRIX 
Take off, fly & land autonomously following map waypoints	√	√	√	X	√
Endurance (60 min)	45	40	30	36	90
Distance (10km)	10	10	6	4	10
Size (wingspan < 2.7m)	2.5	1.25	0.75	2.4	3
Weight (5kg)	3	2.2	1.15	3.8	8
Small parts (<0.5m to be back packable)	1	0.4	√	1.2	√
Hand launched (Or bungee, not catapult)	√	√	√	√	X
Day camera (pan-tilt-zoom) with acceptable image	√	√	No zoom	No P-T	√
Night camera detect fires, people & vehicles	√	√	X	X	X
Land within 75m radius from launching point	√	X	X	X	√
Complete 5 flights without maintenance (Ruggedness)	X	X	√	√	X
Low noise (Inaudible during night at 300m above ground)	√	X	√	√	X
Price for 2 aircraft, day & night camera, GCS, spares, packaging, chargers, manual (R2m)	R0.6m	R1.52m	R1.71m	R0.63m	R2.8m

# Scenario summary

UAV	Tactical Recce	Small Team Recce	C2	Convoy protection	PRICE	Notes
T-HAWK	✓	X	✓	✓	R0.60m	Not back-packable, endurance
KIWIT	X	X	✓	✓	R0.63m	Not back-packable, range and endurance
ESWIFT-EYE	X	X	✓	✓	R1.52m	Not back-packable, range, endurance, noisy
MAVERIC	X	✓	✓	✓	R1.71m	Range, endurance, no zoom
STRIX	X	X	✓	✓	R2.84m	Bid & Heavy, Not usable at high altitudes

✓ Compliance    ✓ Limited compliance    X Non-compliance

# Conclusions & Recommendations

- No system met all requirements, however many are field operational
- It is better to have 80% of required functionality than nothing at all
- There are many similar systems to choose from
- Local systems meet SANDF requirements on par with international
- Field evaluations are vital to show the quality of data they can deliver
- UAV systems are highly recommended for SANDF operations
- Consider everything from local market to state of the art US market for UAV technology solutions
- Tailor the requirements if 100% required functionality still not found
- Evaluate advanced systems before making procurement decisions
- Buy quantities for current needs; UAV technology improves rapidly
- Make sure what you buy, is what you want, is what you get

# Thank You

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