



OPERATION OF MALE UAV IN THE GERMAN AIRFORCE

+ Mishap Investigation under Combat Environment
and Corona



Presentation

1. Introduction + Definitions

2. System description Heron 1

3. Sensors

4. Deployments

5. Future

6. Mishap Investigation

Introduction + Definitions



LTC Helge „Bruno“ Behrens FSO & Safety Manager

80th Flying TRW ENJJPT, Sheppard AFB, Class 9801
09/96 – 10/97 T-37, T38, AT 38 (250h)



20FS Holloman AFB
02/98 – 09/97 Phantom F-4F



JG 71 "Richthofen" Luftwaffe
02/98–09/07

Phantom F-4F (1000h) + 8h in the backseat
99- 07 - Wing Deputy Flight Safety Officer



3rd GAF Training Squadron

10/07 –06/12
Grob 120A (1000h +)
10/09- 06/12 - Flight Safety Officer and CFI



9th Reconnaissance Wing Beale AFB, CA

08-11 -12/11
RQ-4 B Global Hawk (8h + 160h Sim)



Tactical Air Force Wing 51 "Immelmann"

06/12- present
06/12 – 05/12 Euro Hawk (50h Sim only)
11/12 – 06/21 C525 CJ1+ (900h+)
10/14 – 06/21 Heron 1 (700h +) all during 10 Combat Tours RS AFG
04/13 – Present - Flight Safety Officer



Total h: Real + Sim + UAV: ~ 4000h



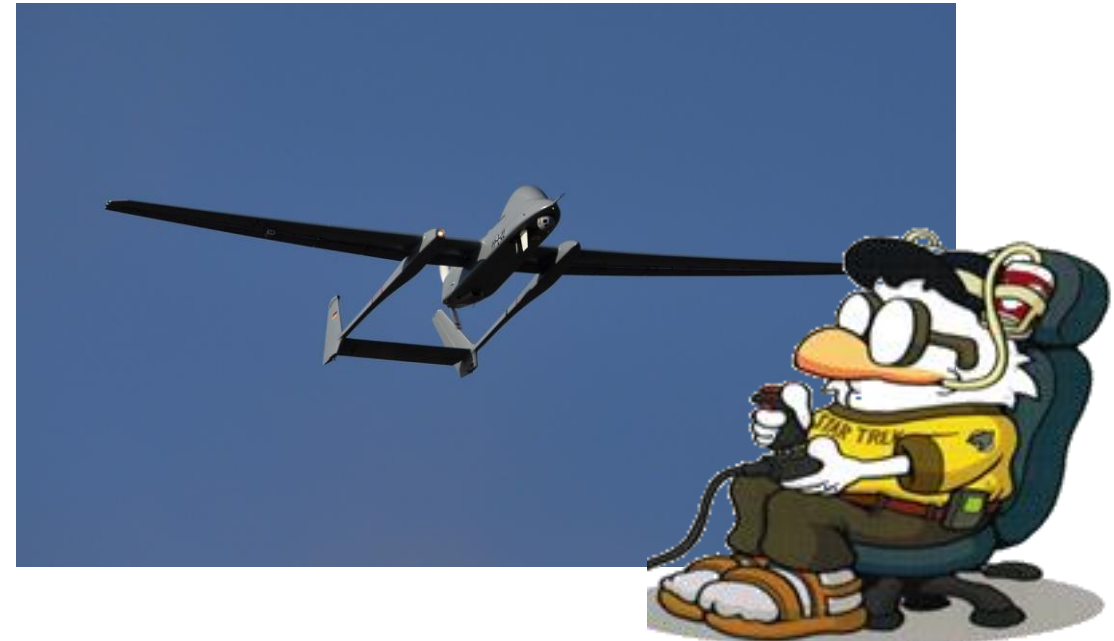
Introduction + Definitions



from this



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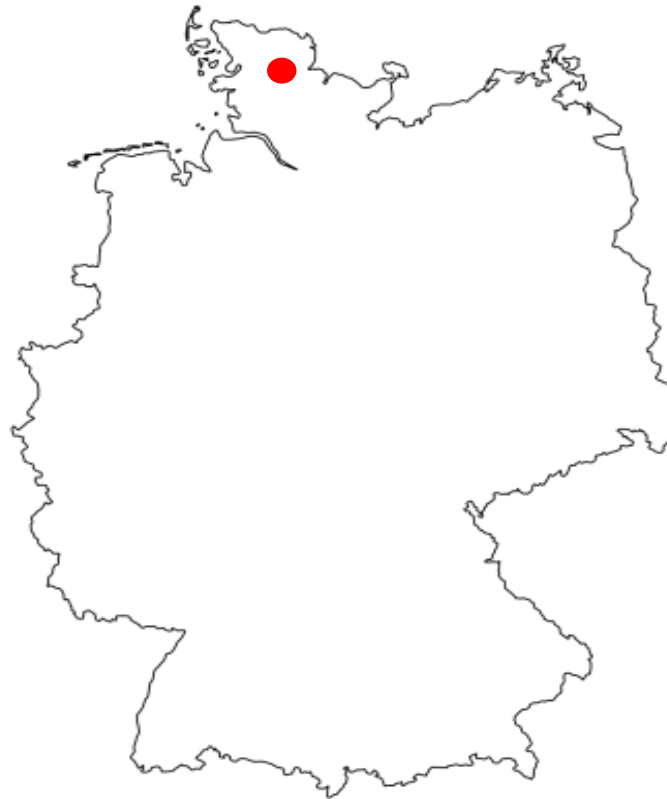


Introduction + Definitions



Tactical Air Wing 51 "I" Jagel

1st & 4th Squadron



2nd Squadron



DEU Heron 1– RPA Pilot (AVO)



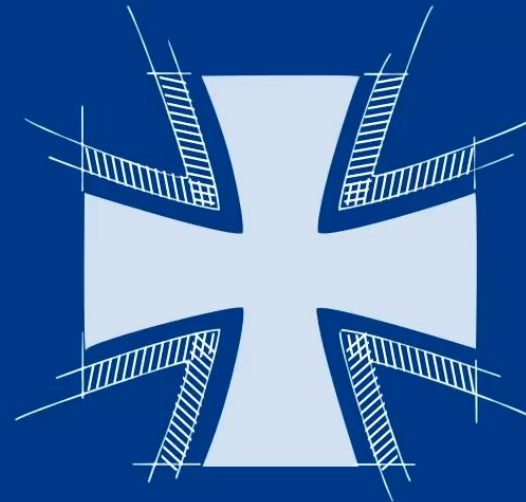
Prerequisites:

Active Military Pilot License
+ Instrument Rating



Drones vs UAVs vs RPAs





1. System description



Performance data

MTOW: 1150 kg
Payload: max. 250 kg

Powerplant: Rotax 914
115 PS / 5500 rpm
1211,3 ccm

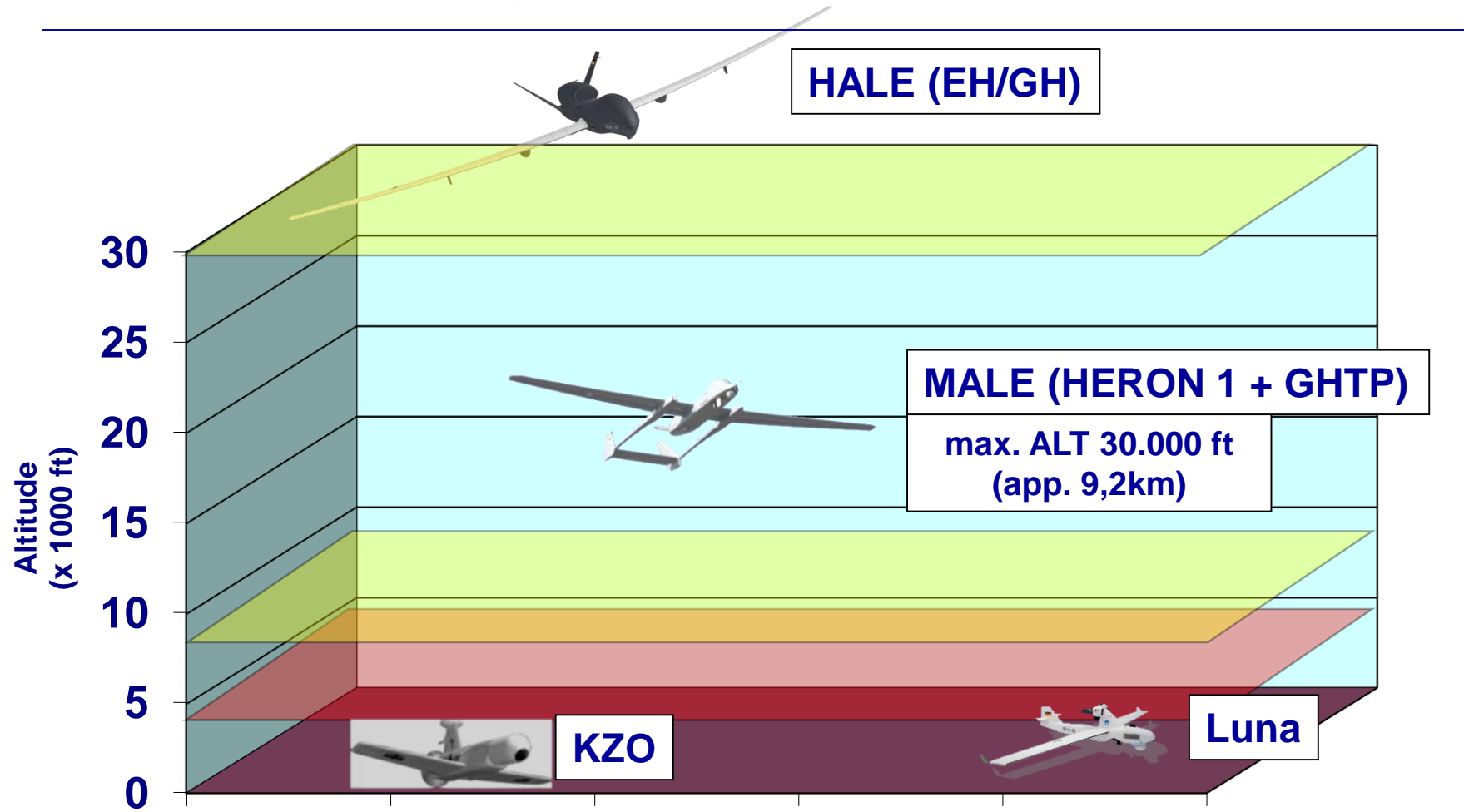


Duration : operational 16 - 27 h
Altitude : max 30.000 ft
Speed : 60 – 115 KTS
Cruise : 70 – 80 KTS
Loiter : 65 KTS

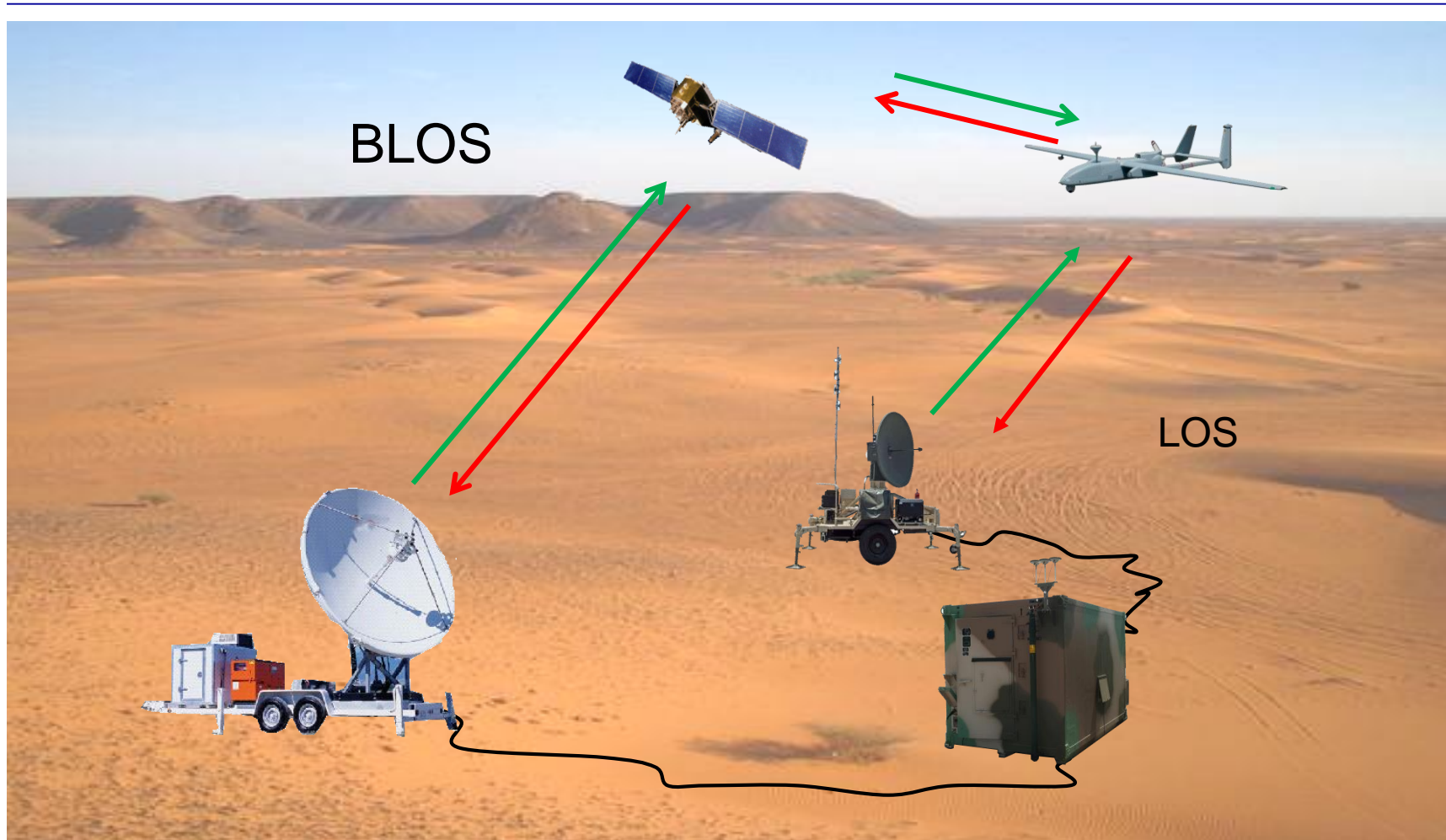


1. System description

UAS Classes



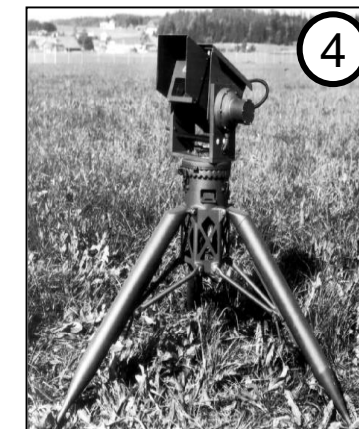
2. System components



2. System components

Ground components

1. Advanced Ground Control Station
AGCS
2. Ground Data Terminal
GDT
3. Ground Satellite Terminal
GST
4. Range Auto Positioning System
RAPS



2. System components



AGCS

Cockpit

PO /
TacOP
WSOp

AVO / PILOT



3. Sensors



PANO image incl. MOSP annotations



3. Sensors IR



3. Sensors EO



3. Sensors

Remote Video Terminal (RVT) / ROVER



4. System Deployment



HERON 1 Deployments



4. System Deployment

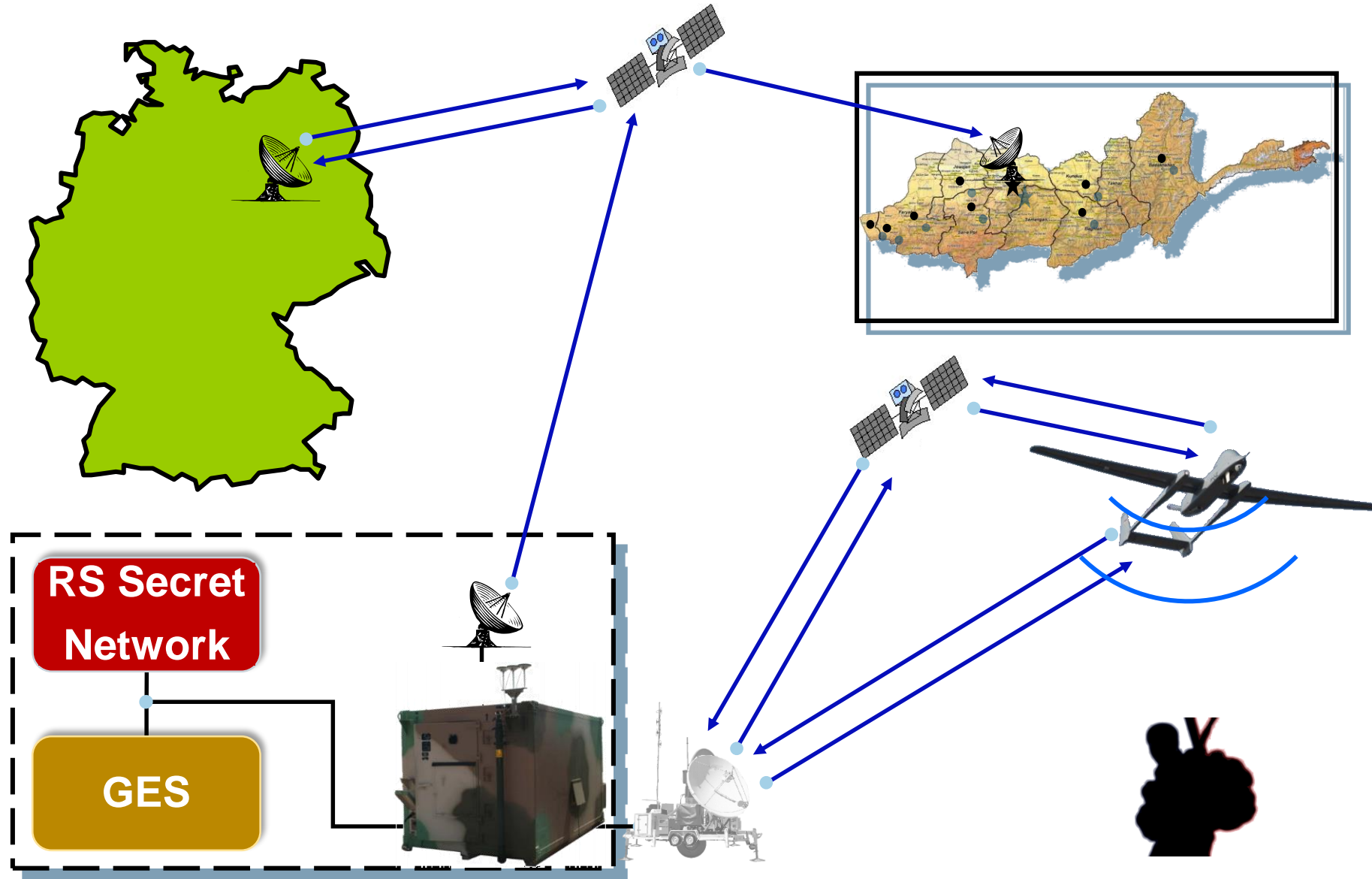
Heron 1 (Mazar e Sharif) ISAF&RSM



- 15.03.10 – 26.04.2021
- LOA = 480h / Month; 2/3 HERON 1
- over 50.000 FH,



4. System Deployment





Mission Types Heron 1 SQN

Primary

Mission Escort

- Escort Base Defence Forces
- Overwatch INFIL / EXFIL Rotary Forces
- Support Expeditionary Advisory Package (EAP)

ISR

- Support for assessment of the situation in the AOR
- Reconnaissance und Monitoring activities ANDSF (Green Reporting)
- Reconnaissance und Surveillance armed groups
- Support Battle Damage Assessment

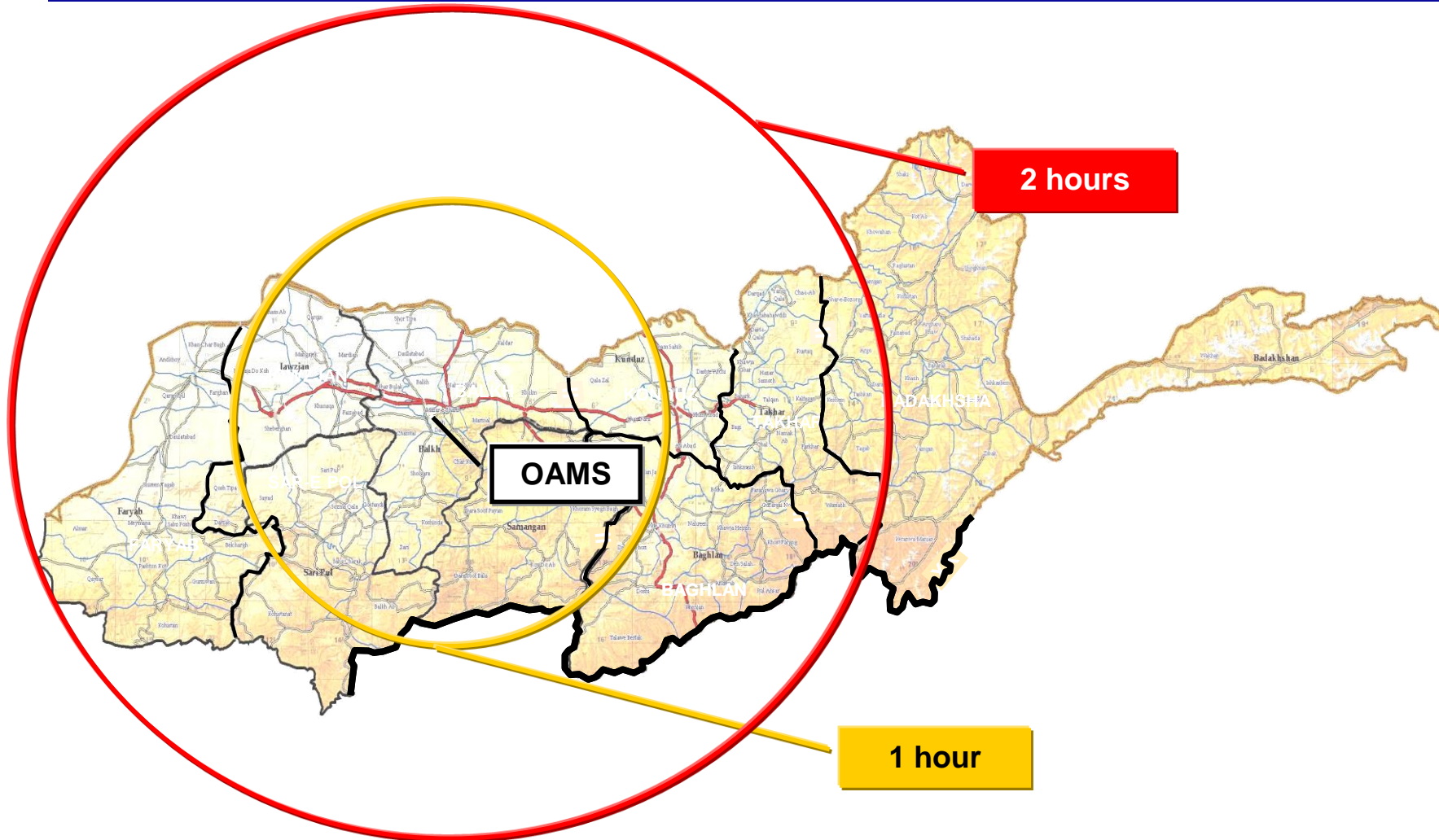
Secondary

- Humanitarian assistance and damage assessment in case of natural disaster

4. System Deployment



Transit Times AFGHANISTAN



4. System Deployment



- FOC Februar 2017:
- LOA = 420h / Monat; 4 x HERON 1
- Reach Back Jagel
- Over 21.000 FH,

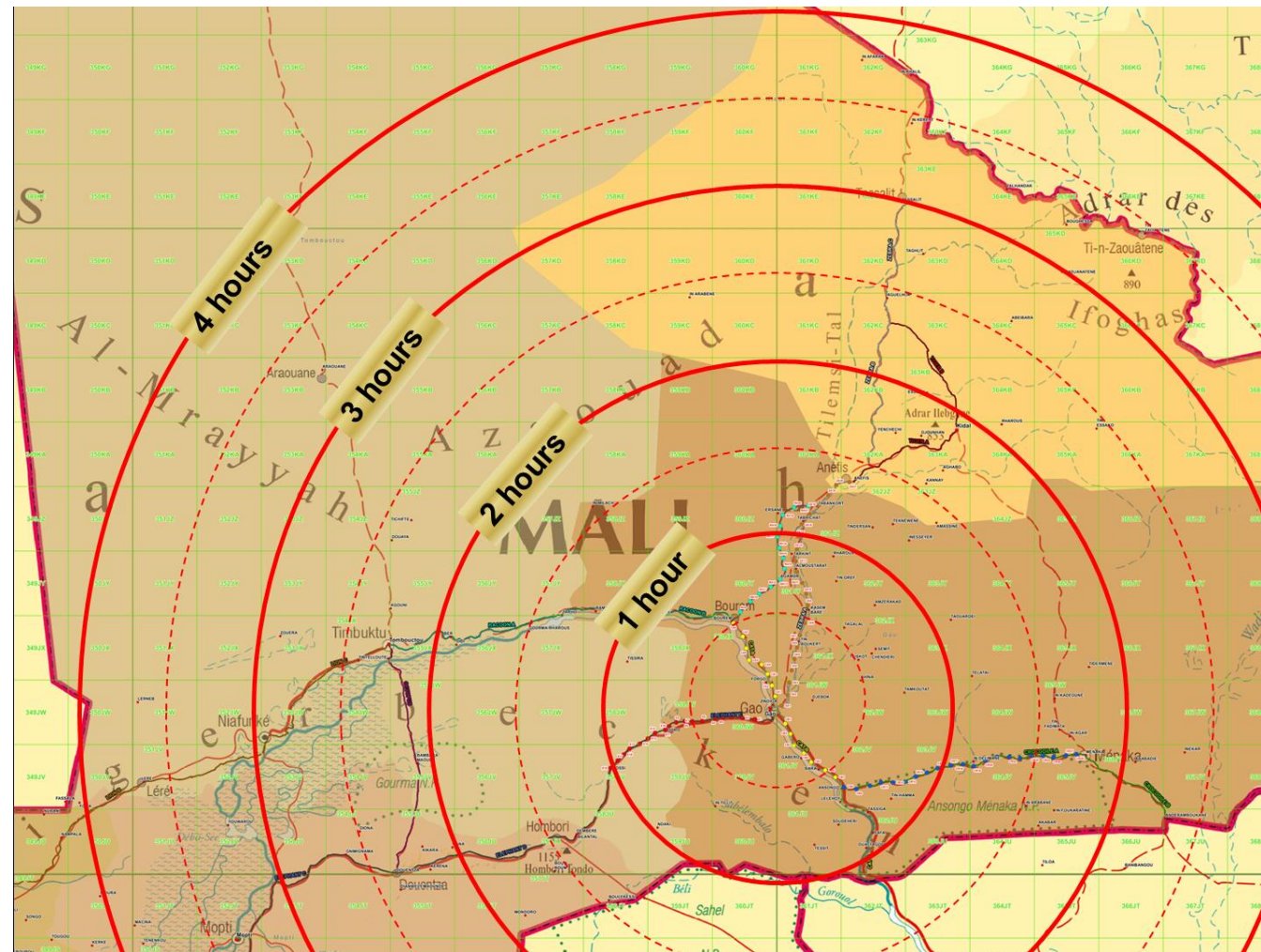
MINUSMA
Gao, Mali



4. System Deployment



Transit Times MALI



4. System Deployment



Mission Types Heron SQN

Primary

Mission Escort

- Escort UN Supply Convoys
- Support of UN and DEU Forces in the Area of Responsibility
- Overwatch INFIL / EXFIL RotaryWing-Operations

ISR

- Support for assessment of the situation in the AOR
- Monitoring peace treaty between Armed Groups
- Reconnaissance und Surveillance Terrorist Armed Groups (TAGs)

4. System Deployment

MTX AND OPERATION

Airbus DS Airborne Solutions GmbH

is a subsidiary of Airbus Defence and Space. Based in Bremen, the company is responsible for services with unmanned aerial systems and has been operating the Heron 1 system successfully since 2010 for the German Forces in Afghanistan.

UAV + System is leased by Bundeswehr

1 Orbit in Afghanistan

1 Orbit in Mali



4. System Deployment



CREW CONCEPT

FLIGHT DUTY TIME

MAX 14H

4H + BREAK + 4H + BREAK

FOR 24/7/365

8 AVO / 6 WSOP

Outlook



■ MISHAP INVESTIGATION UNDER COMBAT ENVIRONMENT





- Total of 5 Heron losses within 12 Years of Operation with over 75000 h
- 1st loss on initial flight in March 2010
Pilot Error
- 2nd loss due to engine failure (unknown reasons) December 2010
- 3rd loss due to Pilot programming error. Wrong Return Home (RH) routing. November 2013
- 4th loss due to engine failure (unknown reasons) November 2020
- 5th loss due to engine failure (unknown reasons) March 2021



- After 20h of Operational Flight
- RTB with max Performance due to MTX Engine Time Limit from the east to MES
 - Approx. 40km east of MES Engine abruptly stopped
 - Prior that Engine Detonation was internally recorded but was not confirmed by the Pilot
 - Pilot recognized RPM out of Limits
 - RPM Adjustment acc. not according to CL
 - Controlling link was still SATCOM
 - WSOp scanned ELS (emergency Landing site with Camera)
 - Pilot prepared Aircraft for Emergency Landing
 - Link was switched to LOS
 - Aircraft landed itself after initiation of Emergency Landing Mode (Pilot was controlling the UAV almost to the end)
 - Controlling links still working
- No major damage to Aircraft.
- Only Camerapod was destroyed
- Aircraft was completely destroyed after extraction of classified Components (not the Engine)



- One hour after Take off
 - Approx. 45km east of MES Engine abruptly stopped
 - No signs of Engine Problems
 - Controlling link was still SATCOM
 - WSOp scanned ELS (emergency Landing site with Camera)
 - Pilot prepared Aircraft for Emergency Landing
 - Link was switched to LOS
 - Aircraft landed itself after initiation of Emergency Landing Mode (Pilot was controlling the UAV almost to the end)
 - Controlling links **not** working
 - No major damage to Aircraft.
 - Only Camerapod was destroyed
 - Aircraft was completely destroyed after extraction of classified Components (not the Engine)



- Consist of:
 - Head of Board
 - Investigation Officer
 - Flight Surgeon
 - Flight Psychologist
 - Technical Investigation Officer
 - Representative of User

- Pre – Reports are written
- All Members Meeting (usually a week)
 - Witness Hearing
 - Reason finding (not Guild)



- Incident and Accident investigation is usually done by General Flight safety
 - Corona
 - Quarantaine
 - Flight Safety officer was in MES
 - Deviation from Emergency Response Plan
- „Normal“ Investigation Process
 - (1) Organization and preliminary examination
 - (2) Data collection (only FDR)
 - (3) Data analysis and deliberations
 - (Simulator in Germany)
 - (4) Completing the technical report



no trained Flight Safety personal at the downed UAV

no time - “friendly” people - Danger of IED

Data Analysis only possible in Israel

No Data of mechanical failure



Questions ?

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Tusen Takk!