Good, Bad & Ugly of Legacy Helo Upgrades

October 23, 2024

Designed for Precision

▷ WHO WE ARE

„We are a One-Stop-Shop for Airborne Special Mission Aircraft Integration Solutions“

- Years of experience
- 4000m² operating area
- In-house flight operation
- Fully EASA certified
- Own fleet of test aircraft

▷ WHAT WE DO

„We turn Legacy Military Aircraft
into Special Mission Platforms“

We design, integrate and certify state-of-the-art special mission equipment and systems into new & existing airframes.

Whatever sensor, communication system
or special configuration you need for your mission -
We make it Airborne!

▷ THE GOOD

- Statistically old aircraft do NOT crash more often than new ones
- Old birds may require different pilot skillset to fly, but still fly safely
- Overhaul can add up to 50% to aircraft lifespan (SLEP)
- Original, demanding airframe roles can be tuned down in new missions:
  - Littoral surveillance missions
    - Clandestine activities (immigration, narcotics, etc.)
    - Pollution detection
      - Airborne (sulphur, methane, etc.)
      - Surface (oil, waste, etc.)
  - Search & Rescue missions
  - Survey aircraft (pipeline, powerline, archeology, etc.)
  - Demonstration/Testbed aircraft for avionics/sensors
  - Pilot or sensor operator training aircraft
  - 3rd Party Targeting configurations

▷ THE GOOD…

Helo	Code	~Age	Built	Initially
Kiowa	OH58	40+	2,200	Scout
Gazelle	SA342	45+	1,775	Attack
HIP	Mi17	40+	12,000+	MultiRole
Lynx	Various	40+	450+	MultiRole
NH90	TTH/NH	25+	471+	MultiRole
Hirundo	A109	40+	470+	Utility
SeaKing	SH3	50+	1300	ASW
MBB	BK105/117	40+	440+	MultiRole

▷ THE BAD….

- Most military organizations support ‘new’ vs ‘old’… (except finance…)
- In some countries aircraft ‘upgrades’ are simply not a tradition or cannot be managed
- Present cost of new sensors may very well exceed the value of the old aircraft.
- Helicopter upgrades can be expensive in an all-out upgrade approach

  - Airframe - Engines - Avionics - Mission Payload: Sensors & Armament

- Other BAD issues:
  - Upgrades may not be attractive to the OEM vs sale of new helo:
    - limited choice of new sensors (installation/integration/training/support)
    - small quantity of aircraft
    - outside of main business model
  - Consequently, OEM price for old aircraft upgrades are rarely affordable
  - Upgrades via third parties (= integrators) are regularly discouraged by OEMs
  - OEMs rarely provide hard/software data/support for upgrades via third parties
  - ‘Only OEMs can make helicopter upgrades’ : discouraging and WRONG
  - EASA/FAA certification of third party helo upgrades are impossible/nightmare: WRONG

▷ THE UGLY....

- Aircraft are the most expensive, most complicated means of transportation in the world
- Common helicopter planned life is 20-30 years
- Most ugly issues: weight – space – power – endurance – competing sensor location
- Cannibalizing a few to support many…

  - Airframe - Engines - Avionics **- Mission Payload (**Armaments / Sensors)

- Reasons for being taken 'out of service':
  - # Flying hours/Pressurization cycles
  - Age/fatigue/health/vibration of the airframe
  - Unable to meet new ops requirement (speed, weight, maneuverability, endurance, etc.)
  - Parts-obsolescence and/or issues with 'lifetime support' (after sales…)
  - Engine issues
  - Maintenance cost/flying hour
  - Maintenance down-time/flying hour
  - Short TBO
  - Unable to meet new safety/EASA/FAA standards
  - Aircraft commonality decision/budget
  - Aircraft manufacturers' competitive factors

▷ THE UGLY...

▷ THE GOOD....

- Sensors covering large areas perform best at higher altitude
- Sensors do not distinguish between old or new aircraft
- Newer sensors have an operational life expectancy that 'matches' the airframe life-left
- 3rd party integrators can offer
  - ✓ warranty/lifetime support of sensors and integration
  - ✓ basic sensor fit with provisos for future upgrades
  - ✓ full training packages (classroom, hands-on, simulator, inflight, virtual inflight trainer)
  - ✓ largest choice of sensors (agnostic) - ITAR/non-ITAR
  - ✓ provide sensor-swap ability between same/different airborne platforms
  - ✓ very customized solutions:
    - ❖ sensor integration
    - ❖ operator station: access/location/control
    - ❖ sensor pod configurations

▷ THE GOOD....

CONCEPT of OPERATION

CONOPS

▷ THE GOOD: FLEXIBLE WORKSTATION

„Optimized Interaction between mission crew and state-of-the-art technology“

- Lightweight Carbon Fibre construction
- Fully customizable / NVG-compatible
- Quick install/remove (2 people/15mins)
- Full HD Touchscreen Monitors
- Data/Voice/Video Recorders
- Integrated Mission-Management-Unit
- Integration of Tactical Radios
- Bracket for Hand controller unit and SLR Camera

▷ THE GOOD: INNOVATION BEYOND TRADITION

Space-Saving Design

- No dedicated operator seat
- Console moves to operator
- Quick Mission Swap
- All CFRP material

▷ THE GOOD: NEAR-UNLIMITED CUSTOMIZATION

- Handheld/kneepad tablet w/WiFi & std HCU
- Laptop w/WiFi & std HCU
- Operator Console w/WiFi & std HCU
- Operator Console w/Ethernet cable & std HCU
- Operator Ground Control station w/Uplink

▷ THE GOOD: INNOVATION BEYOND TRADITION

„Camera Lift Solution for every airborne platform"

- Carbon fibre construction: lighter, strong and non-corrosive
- For pressurized and non-pressurized aircraft cabins
- Automated or hand-controlled operation
- Back-up battery for protected operation
- Total safety for sensor storage, birdstrikes, covert operations

The lifts accommodate gimbals up to 26" diameter and offer an electromechanical retraction system in a self-supporting CFRP structure.

Lift can be used for EOIR and rotating Ku-band radars

For small aircraft the operator stows and lower the sensor easily by hand.

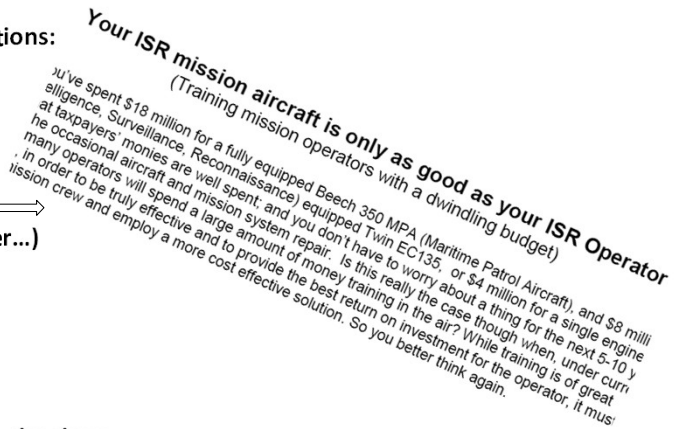
Internal Solutions

External Solutions

Mechanical Solutions

▷THE GOOD: CUSTOMIZED SOLUTIONS

- **Choice of Sensors (agnostic)**
- **Recommendation for Customized Solutions:**
  - ❑ **installation**
  - ❑ **integration**
  - ❑ **training**
    - ➢ **factory**
    - ➢ **simulator (see article)** ⟹
    - ➢ **in-flight (virtual inflight trainer…)**
    - ➢ **life-time**
  - ❑ **long-term support**
- **Future-proof: provisions for…**
- **Mid-life Upgrades: 'new' vs. 'proven' technology**



▷ GOOD, BAD AND UGLY: IT´S ALL ABOUT SENSORS

Sensor	Existing	Replacement	Wiring	Comments
EOIR	Likely/Limited	HD/Hyper Spectral	Ethernet	Main Sensor; D/R/I
RADAR	Likely/Limited	ESA/MTI/CCD/ISAR	Ethernet	Main Sensor; D/R
AIS	Unlikely	New Sensor	Ethernet	ID check
Recorder	Likely/Analog	HD/Multi-Channel	Video	Playback/ Analyze; Archive
Uplink	None	HD/	Video/Data	Satellite / Streaming
RF downlink	Likely/Analog	HD/Multi-Channel	Video	LoS / Streaming
Moving Map	Unlikely	Digital/ARS	Video	Localization; History
Console	Basic/Metal	CFRP	Various	Light; non-Corrosive
MMU	Likely/Limited	Multi-Sensor	Ethernet	Intuitive
DF System	Unlikely/Limited	Wide frequency band	Ethernet	Localization
GSM detect	None	New Sensor	Ethernet	Localize; ID
SatCom detect	None	New Sensor	Ethernet	Localize; ID
Hyperspectral	Unlikely	New Sensor	Video	Detect; Analyze
ELINT / RWR	Unlikely	New Sensor	Ethernet	Detect; Localize; Analyze; ID
SMALL TARGET	None	New Sensor	Ethernet	Detect; SAR; Pollution
AI	None	Analysis Software	Ethernet	History; Trends; Predict; Tactics

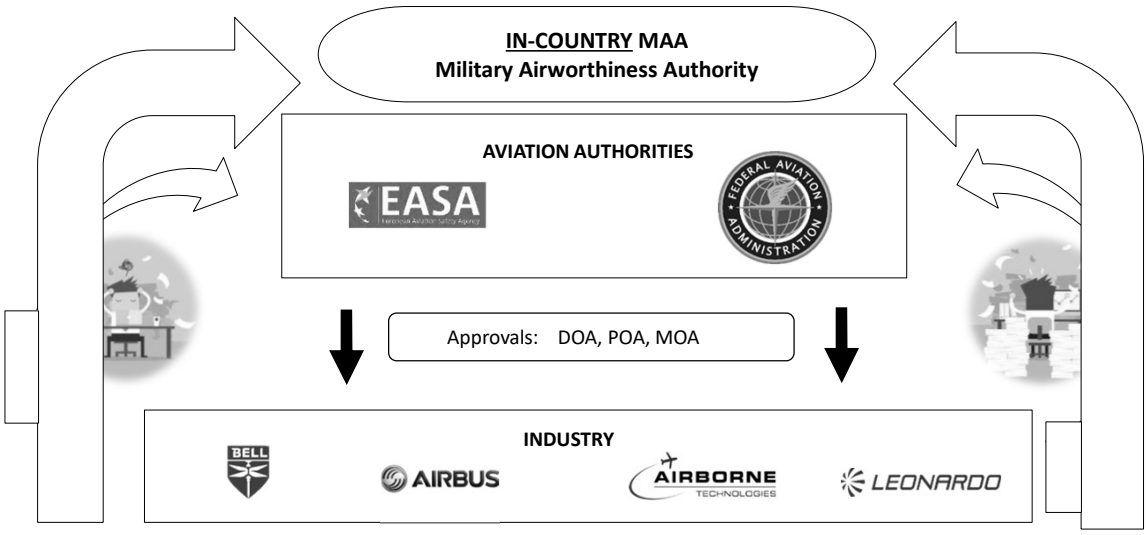
▷ THE BAD

~~EASA certified sensor integration~~

can only come
from the aircraft manufacturer

▷ THE GOOD

▷ THE GOOD

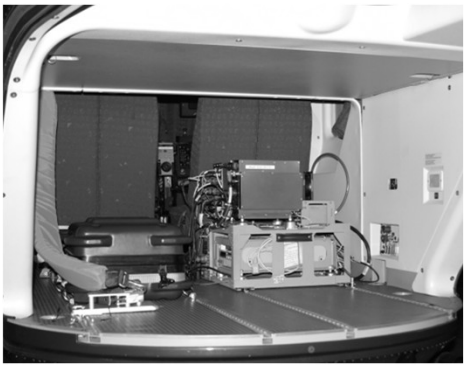


▷ THE GOOD: EASA CERTIFICATIONS

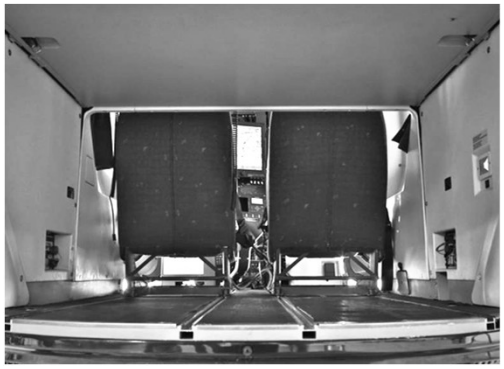
EASA Part 21 J approved Design Organisation	Design and certification of modification to helicopters and fixed wing aircraft (STC´s and Minor Changes)
EASA Part 21 G approved Production Organisation	Production of products, parts and assemblies (EASA Form 1, CofC)
EASA Part 145 approved Maintenance Organisation	Maintain, repair, modify and upgrade components already in service

CS-27 Small Rotorcraft | **CS-29** Large Rotorcraft | **CS-23** Small Aeroplanes | **CS-25** Large Aeroplanes | **UAS-** Drones

▷ THE GOOD: SWAP REDUCTION



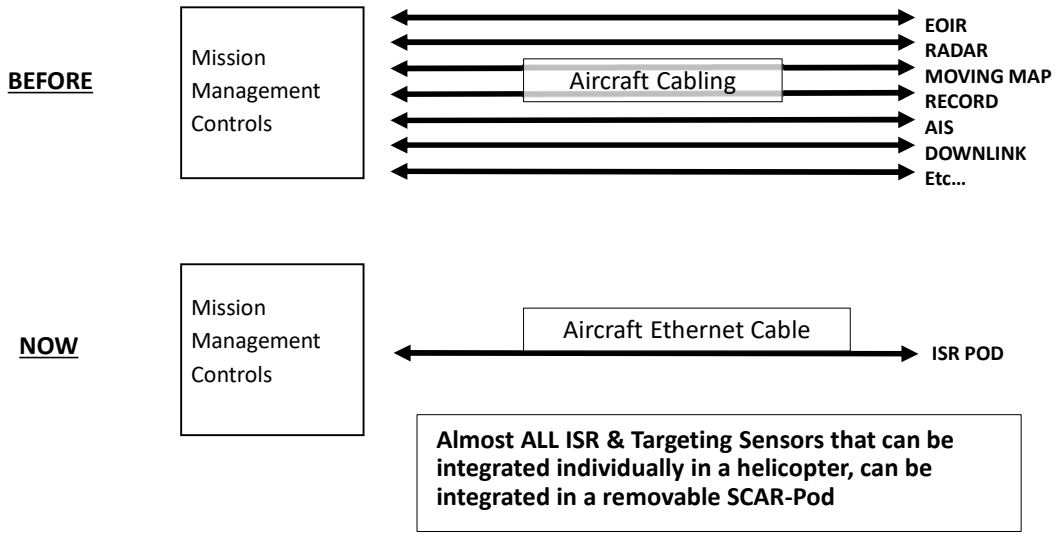
before



after

For many helicopter upgrades, the reduced weight results in a significant increase in endurance

▷ THE GOOD: POD SOLUTIONS

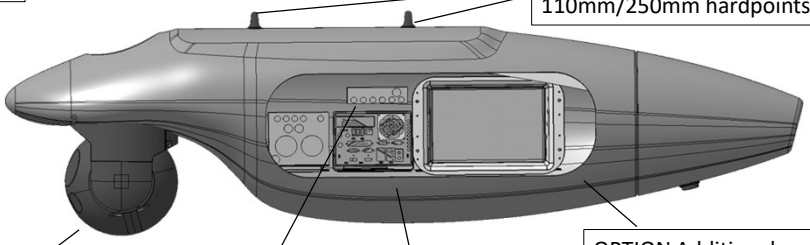


▷ THE GOOD: POD SOLUTIONS

Proposed now

Growth

Ready for immediate use with NATO hardpoints (14'' suspension lugs) or 110mm/250mm hardpoints



EOIR 10-20"

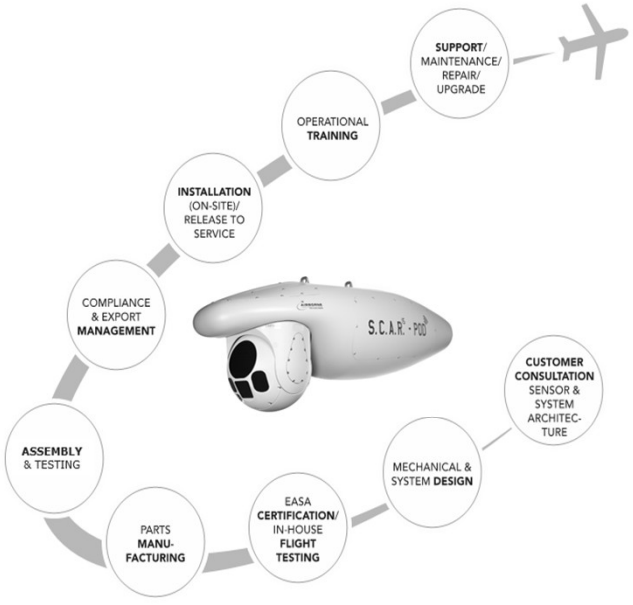
Integrated MovingMap/ARS

LINX MMU

OPTION Additional equipment:

SIGINT/COMINT, SatCom Uplink, LoS Video Downlink, AIS, Small Target Detect, Small Target Detect; GSM Detect/ SatPhone Detect; Dual Re etc.

▷ THE GOOD: POD SOLUTIONS



- Typical installation time: <15 minutes
- No/Minor airframe modifications:
  - standard NATO 14" mount, or
  - 110/250mm mount,
  - or both
- No aircraft down-time (swap pod)
- No sensor down-time (swap a/c)
- Wireless or wired operation
- Aircraft or Internal Battery operation
- Ship pod to theatre: aircraft of opportunity
- Pod Swapping:
  - Between RW
  - Between FXW & RW

▷ THE GOOD: SCAR-POD ADVANTAGES

SCAR-POD HARDWARE COST SAVINGS

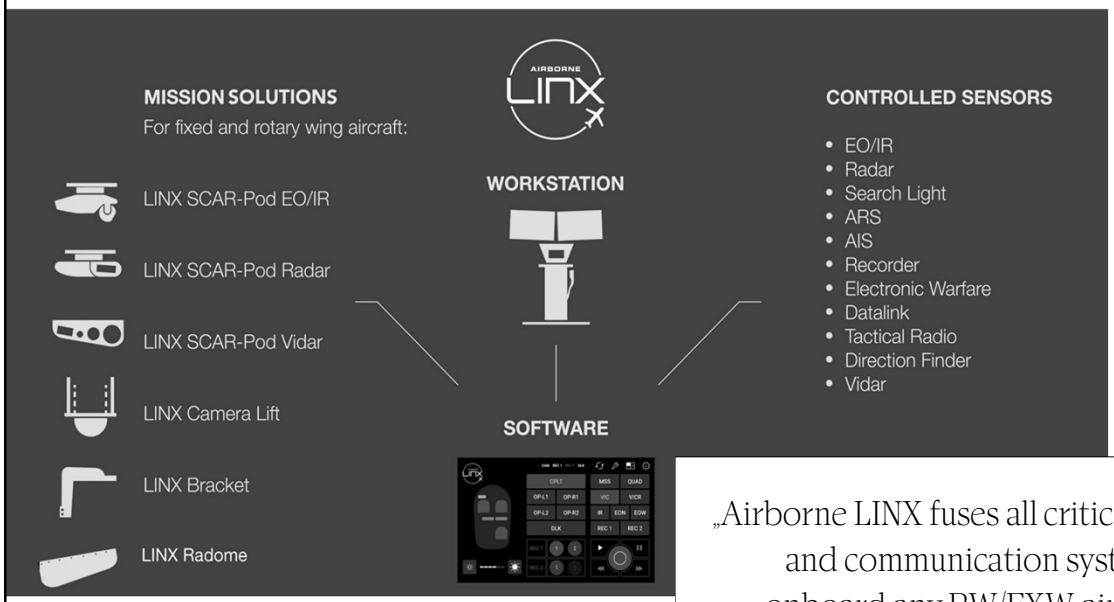
Example:
4 ISR A/C need only 3 ISR SCAR-pods
6 ISR A/C need only 4 ISR SCAR-pods
10 ISR A/C need only 7 ISR SCAR-pods…

SCAR-POD INSTALLATION COST SAVINGS

Install Type	Traditional ISR Sensor Installation & Test	SCAR-pod ISR Installation & Test
Install Time Aircraft Hangar Time per A/C	75 days	~10 days

Savings compared to fixed installation:
- hardware saving: >30%
- installation saving: >80%

▷ THE GOOD: CUSTOMIZED AIRBORNE LINX MMU



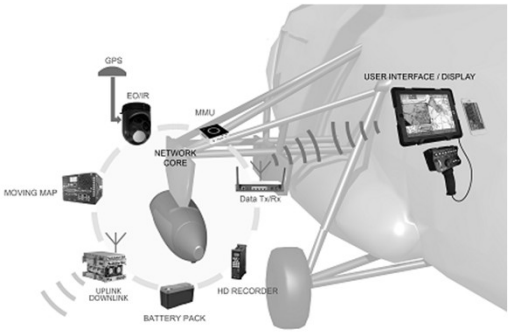
„Airborne LINX fuses all critical sensors and communication systems onboard any RW/FXW aircraft“

▷ UPGRADE CANDIDATE: HIP MI-17

Upgradeable with 10“-20“ EO/IR SCAR-Pod,
using existing 110/250mm mounting provisions.
Controllable via tablet, laptop or full-up operator console.

Recommended Sensors

- 10-15““ EOIR SCARpod
- Moving Map/ARS
- Carbon fibre operator workstation
- Mission Management Unit



▷ UPGRADE CANDIDATE: HIRUNDO AW109

Upgraded with state-of-the-art technology including an external camera lift for unobstructed 360° view during SAR missions.

Recommended Sensors

- 15“ EOIR
- External LIFT
- Search Light
- MovingMap/ARS
- Carbon fibre operator workstation
- Mission Management Unit

▷ UPGRADE CANDIDATE: GAZELLE SA342

Upgradeable with 10“-15“ EO/IR SCAR-Pod using existing 14“ NATO mounting provisions.
Controllable via tablet, laptop or full console.

Recommended Sensors

- 10“ EO/IR SCARpod
- Moving Map/ARS
- Tablet and/or Laptop
- Mission Management Unit

▷ UPGRADE CANDIDATE: TWIN OTTER

Upgrade for maritime patrol or surveillance missions with a mix of podded and fixed sensor installation.

Recommended Sensors

- EO/IR SCAR-Pod or Nose mounted
- VIDAR/SAR nose installation
- Carbon fibre operator workstation
- Mission Management Unit

▷ UPGRADE CANDIDATE: BELL 412

Upgradeable with 10“-15“ EO/IR SCAR-Pod using existing 14“ NATO mounting provisions.
Controllable via tablet or laptop.

Recommended Sensors

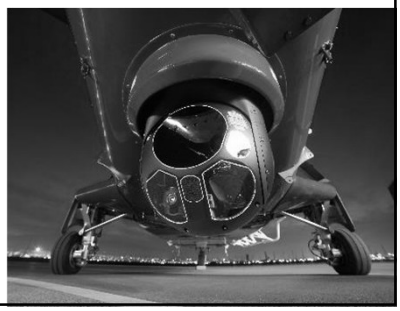
- 10“ EO/IR SCARpod
- Moving Map/ARS
- Tablet and/or Laptop
- Mission Management Unit

▷ AW109 – BORDER GUARD BULGARIA

AW109 upgraded with state-of-the-art technology for the Bulgarian Border Guard.

Equipment & Sensors

- Star Safire 380HD EO/IR Camera
- Carbon fibre operator Workstation
- ECS LOS downlink



▷ CN-235 & AW139 – SPAIN SASEMAR

Upgrade of CASA CN-235MPA and Leonardo AW139 with a maritime surveillance package.

Equipment & Sensors

- SatCom System
- L3Harris Wescam MX-10 Camera with Overwatch* software
- ABT Mission Management Unit
- ABT CFRP Workstation for 2 sensor operators

▷ EC135 – SLOVENIA AIRBORNE POLICE

Airborne LINX upgrade with state-of-the-art technology for two EC135 in 2016 and 2022

Equipment & Sensors

- MX-15 EOIR Camera
- AVALEX Operator Screens
- Carbon Fibre Operator Desk
- SHOTOVER Augmented Reality System, ION recorder
- RF VideoDownlink

▷ FROM PAX TRANSPORT TO FLYING LABORATORY

8 Sensors on 3 external mounts for

- Powerline thermographic inspection
- Track & Pipeline monitoring
- Forest Fire/Growth assesment
- Agricultural/Farming assesment
- Urban growth & Archeological survey

Equipment & Sensors

- Trakka SWE-400 Quad Camera
- HD TV Camera
- HR Thermal Imager and ultraviolet detection camera
- RIEGL VUX-1UAV Laser Scanner
- High resolution camera
- Hyspex Hyperspectral Camera
- Operator Workstation

▷ THANK YOU!