



Israel Aerospace Industries – MALAT Airworthiness Certification : The Industry Side

by Michael ALLOUCHE

IAI - MALAT Airworthiness Manager

**ICAO RPAS SYMPOSIUM
Montreal 24 March 2015**



Unclassified

Presentation Topics

- Introduction
- Israel Aerospace Industries (IAI) Overview
- IAI-MALAT Airworthiness Certification Activities
 - Israel Military and Non Military Operations
 - ◆ CAAI Airworthiness Approvals
 - Worldwide Military and Civil Airworthiness Approvals
- Conclusive thoughts



Unclassified

This document contains proprietary information of Israel Aircraft Industries Ltd. and may not be reproduced, copied, disclosed or utilized in any way in whole or in part, without the prior written consent of Israel Aircraft Industries Ltd

Michael Allouche - Personal Background

- Born in 1953 (France)
- In Israel since 1992
- Aerospace Engineering Diploma, “Supaéro” (Toulouse, France, 1976)
- 16 years professional experience in France
 - Design of Military Autopilot (Mirage, Super Etendard)
 - Avionics Certification Manager at Airbus Industries Office of Airworthiness (A320, first Fly By Wire commercial aircraft !)
- 23 years professional experience at IAI
 - Galaxy (G200) FCS (Stall Protection and Q-feel) development and Certification at IAI Engineering Division
 - *UAS Airworthiness Manager at IAI Malat Division coordinating all activities leading to Malat UAS Airworthiness Approvals from Customer Certifying Authorities*
 - Eurocae WG73 Airworthiness Leader
 - Israeli Expert at NATO Airworthiness Working Group (STANAG 4671)



Unclassified

This document contains proprietary information of Israel Aircraft Industries Ltd. and may not be reproduced, copied, disclosed or utilized in any way in whole or in part, without the prior written consent of Israel Aircraft Industries Ltd

ISRAEL AEROSPACE INDUSTRIES (INCLUDING MALAT UAS DIVISION) OVERVIEW



Unclassified

This document contains proprietary information of Israel Aircraft Industries Ltd. and may not be reproduced, copied, disclosed or utilized in any way in whole or in part, without the prior written consent of Israel Aircraft Industries Ltd

IAI – Israel Aerospace Industries (1/3)

- **Employees: 15,000**
- **Sales: \$3.5B**
- **Backlog: \$10.5B**
- **Internal R&D: \$180M**
- **Reporting company**
- **Global company – over 75% export**



IAI Groups

**Systems
Missiles
& Space**

**ELTA
Systems**

**Military
Aircraft**

**Commercial
Aircraft**

**Bedek
Aviation**

Engineering



Unclassified

This document contains proprietary information of Israel Aircraft Industries Ltd. and may not be reproduced, copied, disclosed or utilized in any way in whole or in part, without the prior written consent of Israel Aircraft Industries Ltd

IAI – Israel Aerospace Industries (2/3)

- Largest Defense and Aerospace industry in Israel. Government owned.
- Active both in the defense market and in the commercial aviation market.
- Integrates cutting - edge technology with Israel's extensive operational experience.
- Largest employer of engineers in Israel (5,500 engineers)
- 25% of budget is invested in R&D
- Largest number of patent registered in Israel since 2012



Unclassified

This document contains proprietary information of Israel Aircraft Industries Ltd. and may not be reproduced, copied, disclosed or utilized in any way in whole or in part, without the prior written consent of Israel Aircraft Industries Ltd

IAI – Israel Aerospace Industries (3/3)

- Special mission and early warning aircrafts
- Strategic defense systems
- Unmanned Aircraft Systems
- Satellites and space systems
- Radars and electronic intelligence

***IAI as a World Leading
Aerospace Company in all
related fields***



Unclassified

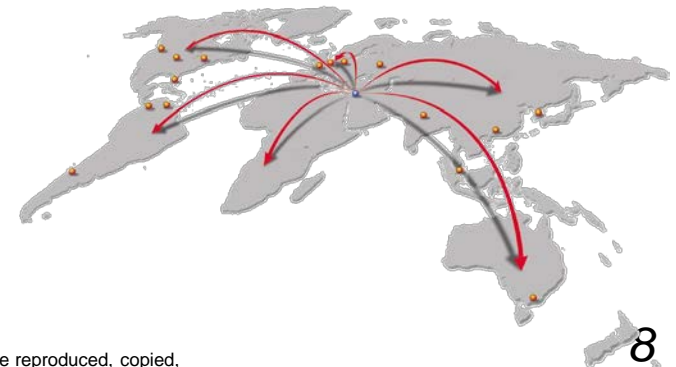


IAI - MALAT [UAS Division] Core Business

- Program management & System engineering
- Payloads & Communications System Integration



- C4I Systems Development and Integration
- ILS At all levels
- Flight and Ground testing
- "Power by the Hour" flight services



IAI- MALAT Overview

- A World Leader in UAS Solutions
- Founded in 1974
- 49 customers worldwide
- More than 1000 UAS produced and delivered
- Over 1,250,000 accumulated flight hours
- 1000 employees dedicated to UAS design, development and production



Unclassified

IAI - MALAT Customers

- *MALAT made systems are operational world-wide with 49 customers:*



– *Israel*



– *United States*



– *Switzerland*



– *France*



– *Belgium*



– *Finland*



– *Turkey*



– *Canada*



– *Australia*



– *Spain*



– *Germany*



– *India*



– *Sri Lanka*



– *South Korea*



– *Thailand*



– *Brazil*

And many others ...

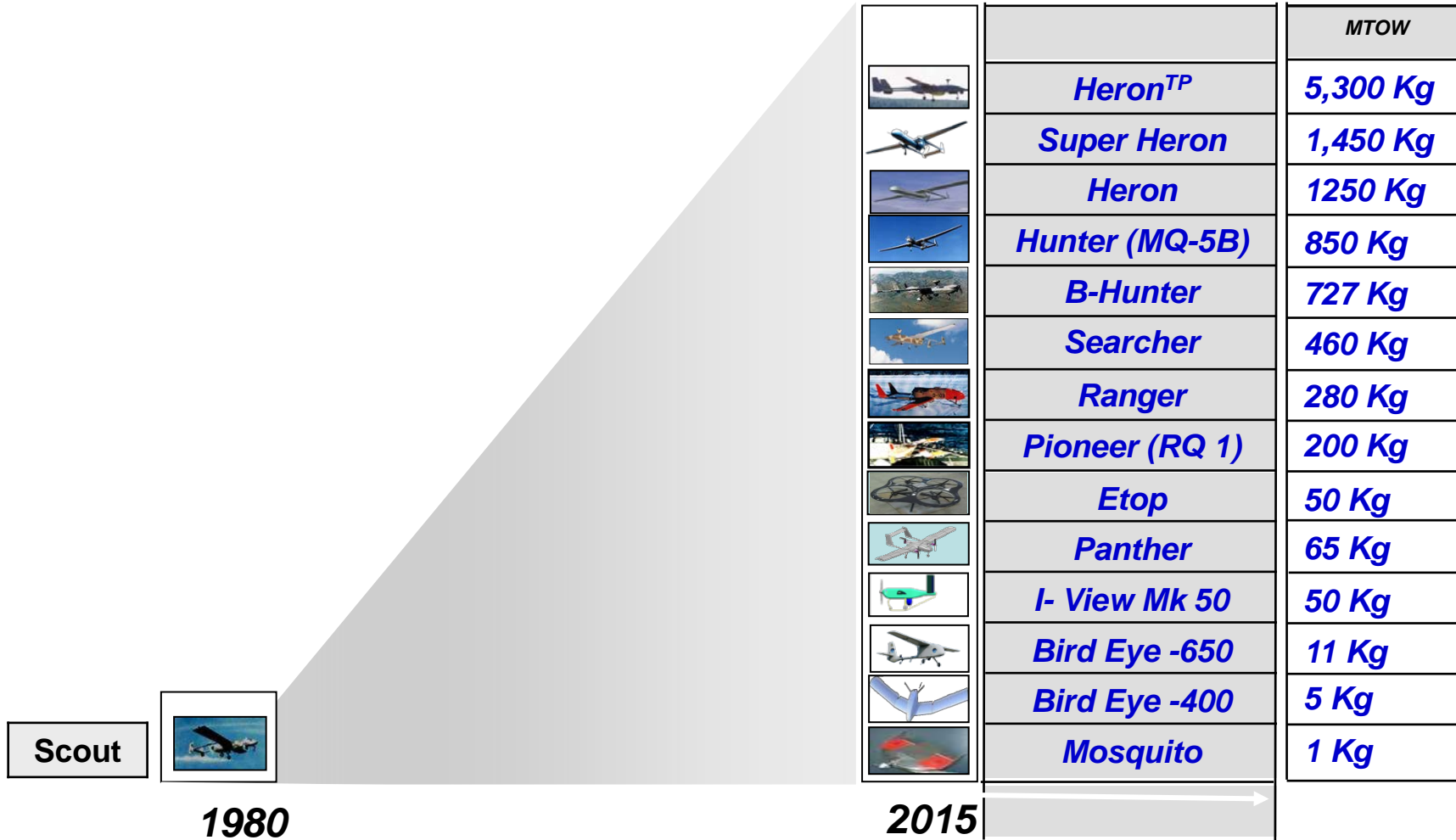
1, 2 5 0, 0 0 0

Accumulated Flight Hours

Unclassified



MALAT UAS Products Range



Unclassified

This document contains proprietary information of Israel Aircraft Industries Ltd. and may not be reproduced, copied, disclosed or utilized in any way in whole or in part, without the prior written consent of Israel Aircraft Industries Ltd

IAI Involvement in Worldwide UAS Rule-Making Activities

ICAO
- UAS Study Group / RPAS Panels

Military Bodies
- National MoD Authorities
- NATO / FINAS WG

Civil Aviation Authorities
- FAA UAS Program Office (USA)
- EASA, Eurocontrol ATM, JARUS (Europe)
- National Authorities (e.g. CASA Australia, CAA Israel)

**Industry / Authorities
Civilian WG**
- RTCA SC203/228 (USA)
- ASTM (USA)
- Eurocae WG73

R & D
European Defense Agency (EDA)
- European Commission
- European RPAS Steering Group (EC)
- Eurocontrol
- FAA & NASA
- Industry

IAI taking an active part in international UAS rule-making activities

- European Commission (UAVNET, CAPECON, USICO,) (2004-2007)
- Eurocae WG73 – Airworthiness Leader(2006 – today)
- NATO STANAG Airworthiness WG
- RTCA SC 228 Member
- INNOVATIVE FUTURE AIR TRANSPORT SYSTEM – IFATS (EC)

**IAI EXPERIENCE IN
UAS
TECHNOLOGIES
AND
CERTIFICATION**



Unclassified

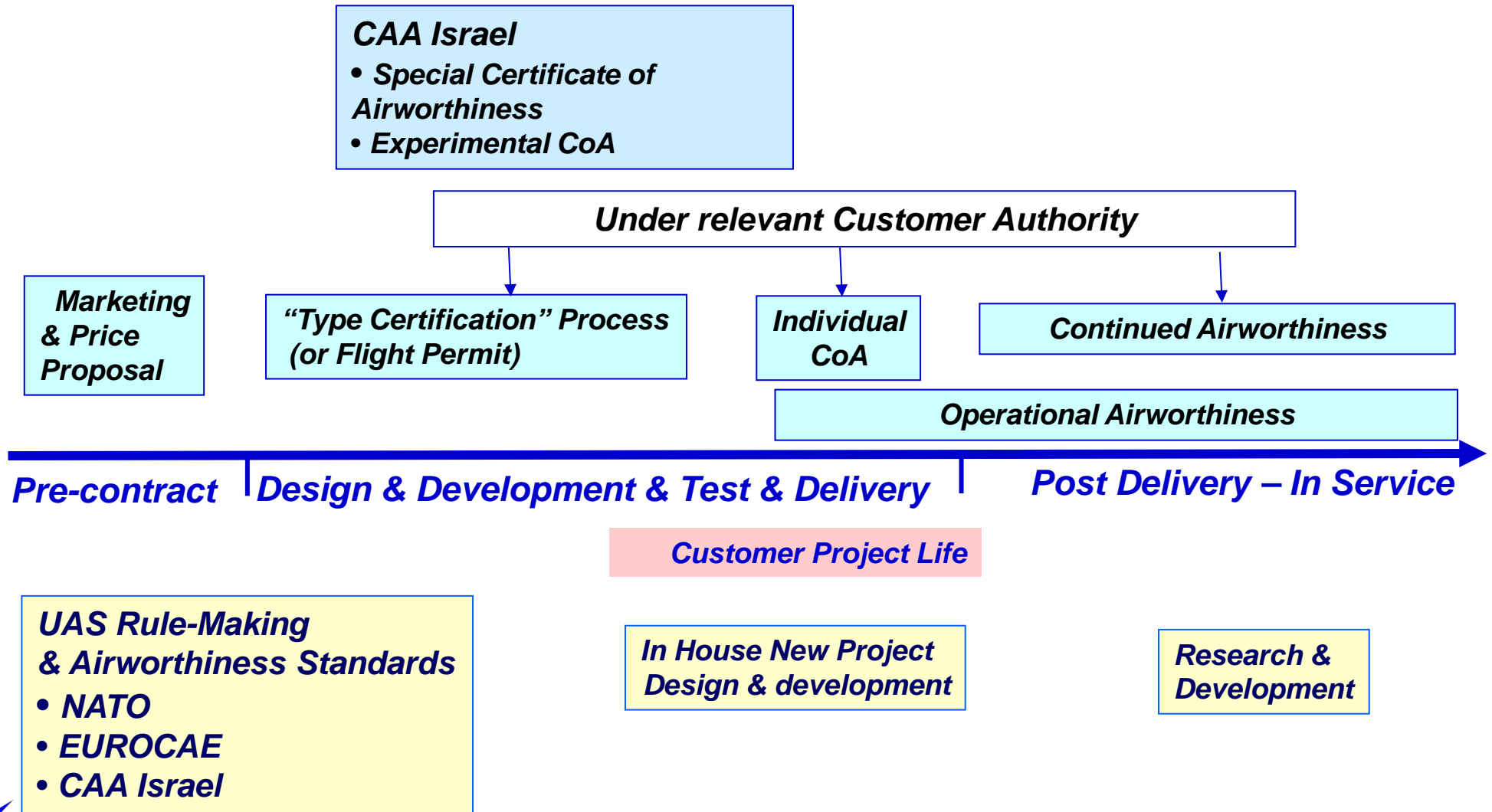
IAI – MALAT AIRWORTHINESS CERTIFICATION ACTIVITIES



Unclassified

This document contains proprietary information of Israel Aircraft Industries Ltd. and may not be reproduced, copied, disclosed or utilized in any way in whole or in part, without the prior written consent of Israel Aircraft Industries Ltd

Current Malat Certification Related Activities



Unclassified



IAI RPAS Airworthiness & Airspace Integration Experience

- IAI HERON RPAS has been granted Airworthiness Approvals and certificates by worldwide military and civilian aviation authorities :
 - [Israel](#)
 - [France, Germany, Australia, Brazil, Ecuador, USA, Canada etc...](#)
- Active participation in UAS Rule-making process ([EUROCAE WG73 Airworthiness Leader](#), RTCA SC 228 Member, [NATO Airworthiness WG](#))
- Airspace Integration Flight demonstrations (including with SATCOM) have been successfully conducted in various types of environment and airspace e.g.:



DeSIRE
Demonstration of Satellites enabling the
Insertion of RPAS in Europe



Extract from European Space Agency Conclusions

“The project has demonstrated that RPAS in BRLOS conditions relying on Satcom could timely proceed with ATC instructions/clearances in non-segregated airspace (civil controlled Class C), notably with a realistic separation exercise.”

Unclassified

Airworthiness - Flight Safety Evolution

Single channel analog FCS
Single customized engine



Dual channel digital FCS
Single customized engine
Redundant Comms

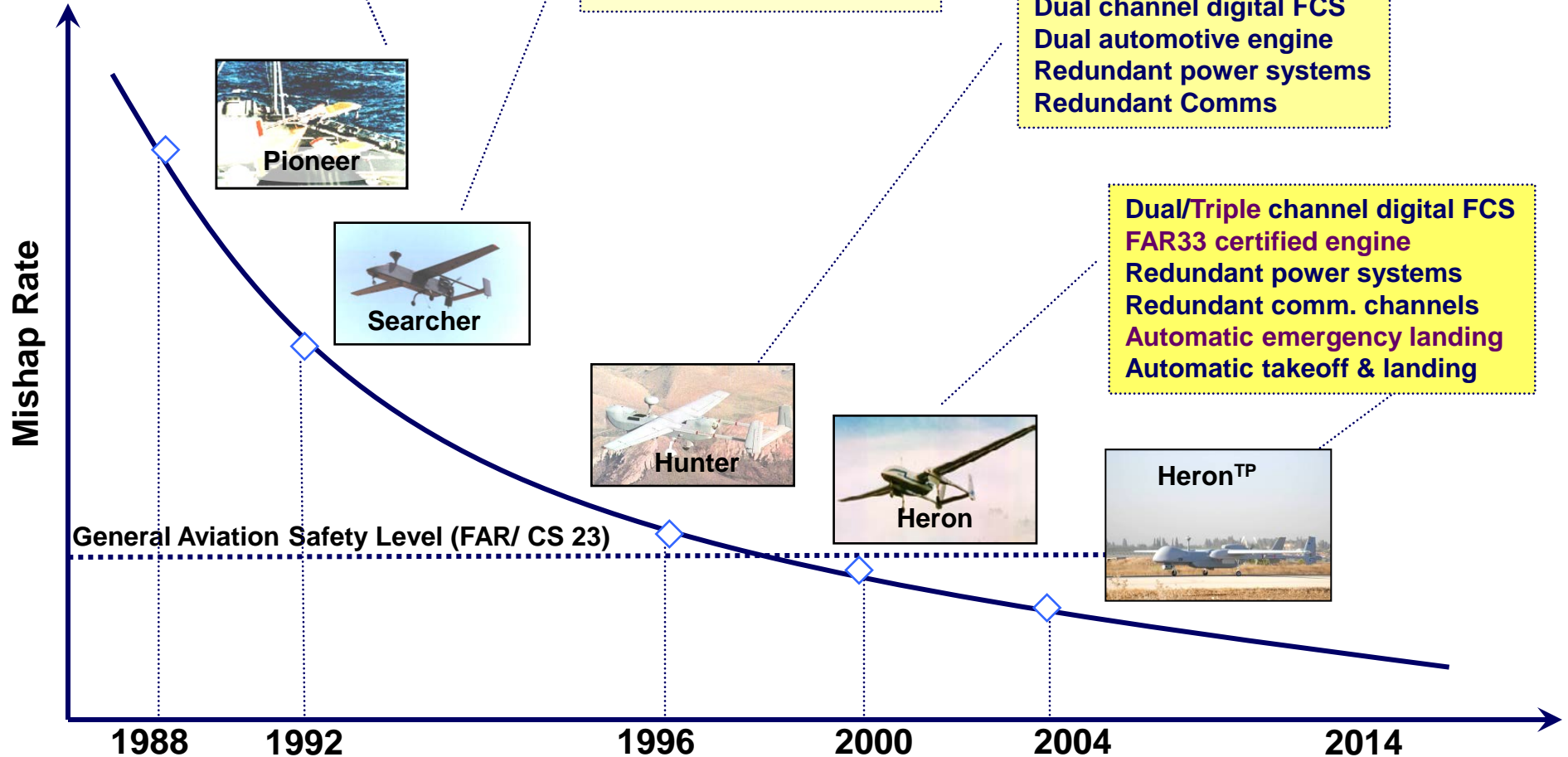


*Heron > 250,000 flight hours
High Safety & Reliability Record*

Dual channel digital FCS
Dual automotive engine
Redundant power systems
Redundant Comms

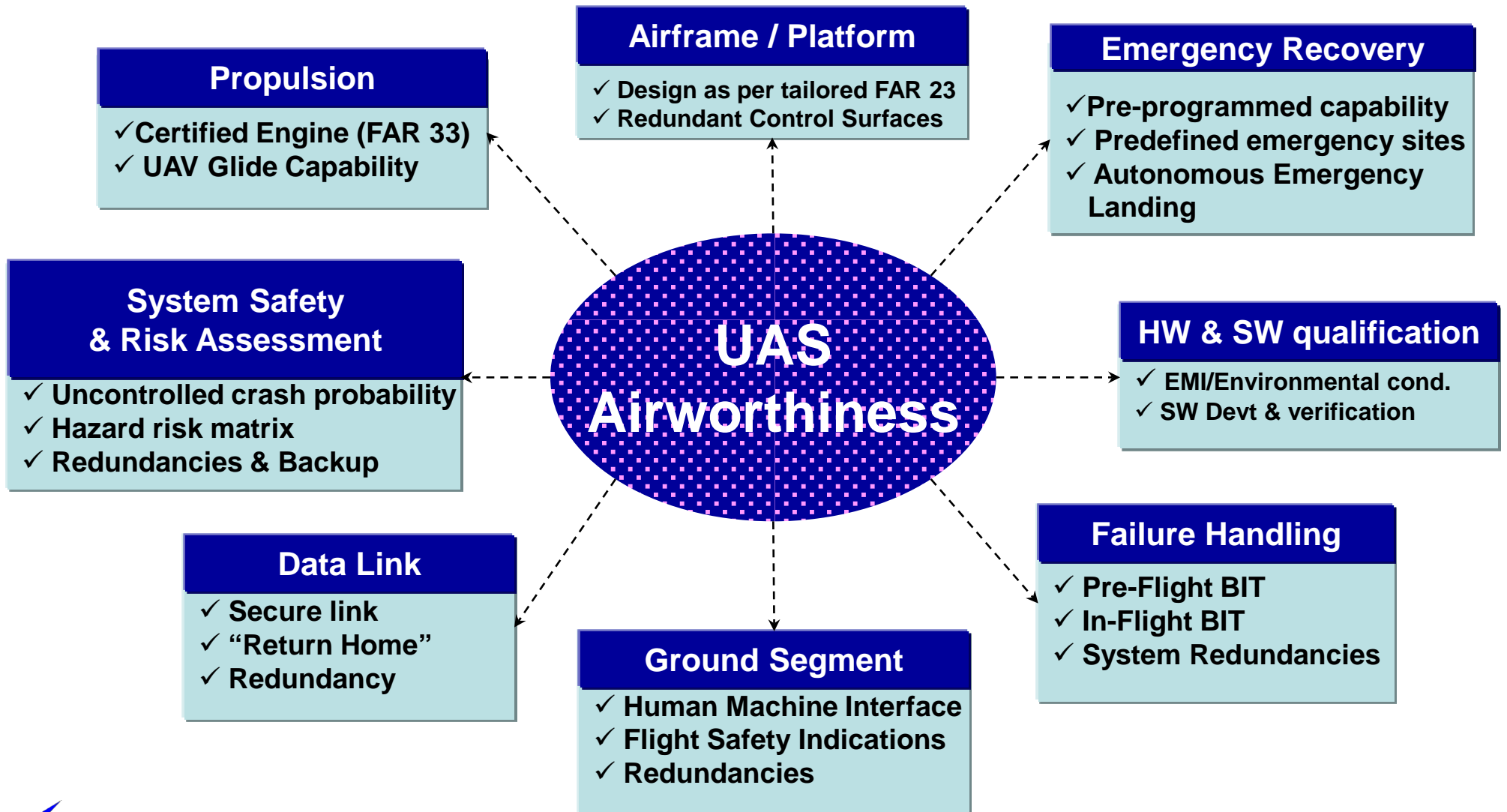


Dual/Triple channel digital FCS
FAR33 certified engine
Redundant power systems
Redundant comm. channels
Automatic emergency landing
Automatic takeoff & landing



Unclassified

HERON Airworthiness Design Features



Unclassified



Typical Airworthiness Data Package

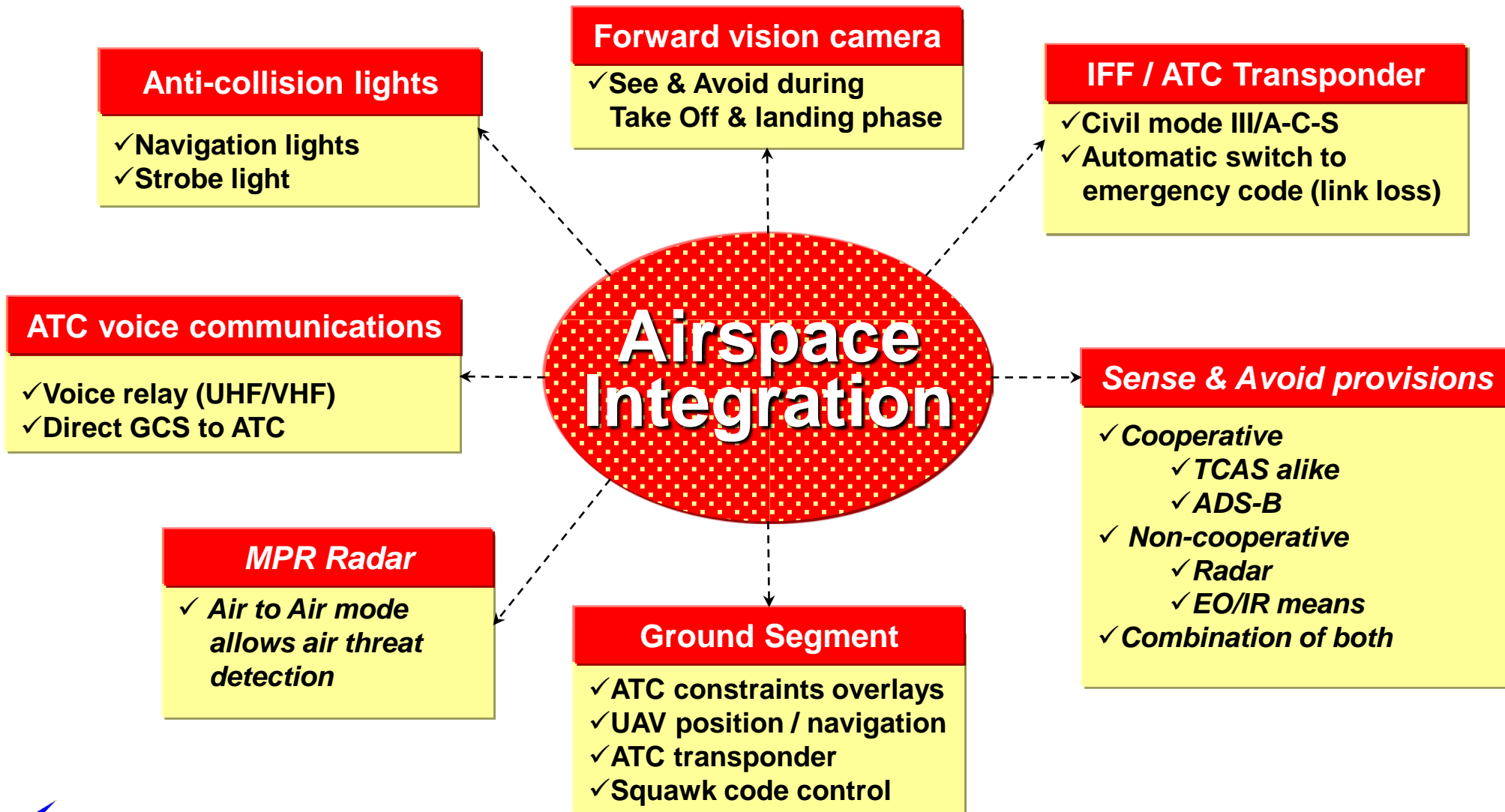
- System & Subsystem Descriptions
- System Hazard Analysis (based upon FTA, FMECA...) & Design Changes Safety Impact Assessment
- Airframe Substantiation (Loads & Stress & Flutter)
- Propulsion System Substantiation
- EMC/EMI tests
- LRU Equipment Qualification
- Software Development and Verification
- System Acceptance Test Reports (Ground and Flight)
- Manuals
 - Flight Manual, Operator Check List
 - Maintenance manuals



Unclassified

This document contains proprietary information of Israel Aircraft Industries Ltd. and may not be reproduced, copied, disclosed or utilized in any way in whole or in part, without the prior written consent of Israel Aircraft Industries Ltd

HERON Family Airspace Integration Features



Unclassified



CONCLUSIVE THOUGHTS



Unclassified

This document contains proprietary information of Israel Aircraft Industries Ltd. and may not be reproduced, copied, disclosed or utilized in any way in whole or in part, without the prior written consent of Israel Aircraft Industries Ltd

Technology has always preceded regulation !...



History of Aviation Years



Unclassified

This document contains proprietary information of Israel Aircraft Industries Ltd. and may not be reproduced, copied, disclosed or utilized in any way in whole or in part, without the prior written consent of Israel Aircraft Industries Ltd

Conclusive Thoughts

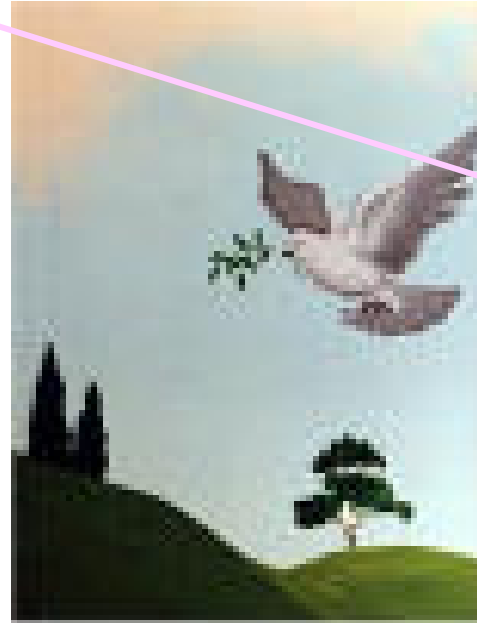
- **Worldwide UAS Rule – Making Golden Rules**
 - Pragmatic Approach while preserving safety
 - Stepwise confidence building process
 - Correct understanding of both similarities **and differences** with manned aviation
 - Risk based approach
- **IAI, as leading aerospace company:**
 - Welcomes the issuance of ICAO RPAS Guidance manual, waiting for future iterations....
 - Will continue to bring inputs from its vast UAS experience to ongoing UAS Rule-making process.



Unclassified

THANK YOU !

THE FIRST (AUTONOMOUS!) UNMANNED AIRCRAFT OF MANKIND ?



Beyond the scope of ICAO RPAS manual !?....

וַיִּשְׁלַח אֶת הַיּוֹנָה, מֵאַתּוֹ לִרְאוֹת הַקְּלוּ הַמַּיִם, מִטַּעַל פְּנֵי הָאָדָמָה

And Noah sent forth a dove from him, to see if the waters were abated from off the face of the ground“ (Bible, Genesis VIII;8)



Unclassified



mallouche@iai.co.il

