



**Workshop**  
IoA Warsaw, July 7- 8 , 2009



# Industrial position towards GA R&TD topics

Tony HENLEY (EqIMG)



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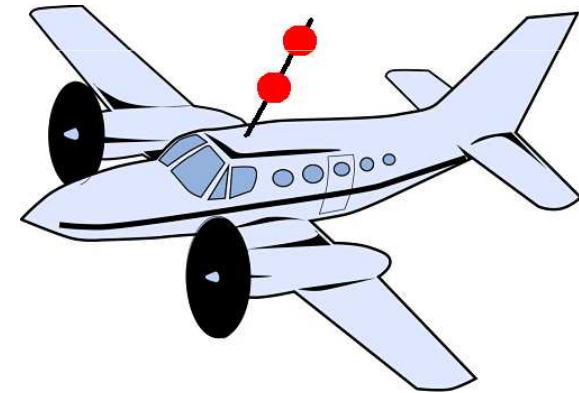
# Key Challenges

- ‘Vessel Not Under Command’
- ‘Safety, Safety, Safety’
- Single Pilot Operation, Workload and skill
- System integrity
- Cost and the Business case
- What EqIMG can contribute



# 'Vessel Not Under Command'

- Maritime term
  - UAS lost command and control link
- Aircraft must continue to fly
  - Pilot is a critical single point
  - Predictable behaviour essential
  - Aircraft not under command
- Good News
  - UAS developments but not fast enough





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# Business Jet Risks

## A UK CAA study

- The fatal accident rate 2000 to 2007, per million hours
  - large jets in airline operation- fewer than 0.2 fatal
  - airline turboprops - about 0.8,
  - **business jets 1.7.**
- The top five primary causal factors were in the 59 accidents
  - flight handling (16 accidents/27%),
  - lack of positional awareness (11/19%),
  - omission of action or inappropriate action (nine/15%),
  - poor professional judgement/airmanship (four/7%)
  - disorientation or visual illusion (two/3%).
- With poor visibility or lack of external visual reference present in
  - 21 accidents (36% )

:Flight Daily News EBACE: Business aviation not as safe as it is cracked up to be? By [David Learmount](#) 11/05/09



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# Implications

- The report mentions training
  - including limited awareness of available technology
- and fatigue
  - Including the result of additional non flying duties
- For providers of technology the message is clear
  - Necessary new systems must be as intuitive as possible
  - Must contribute to Situation awareness
  - Decision support functions are expected to be very important



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## Specific ATC Recommendation

- Business aviation should work with ANSPs to:
  - Increase controller awareness of the performance characteristics of the aircraft
  - Recognise the workload impact for single-pilot operations of changes to clearances or other instructions.
  - Minimise the number of radio transmissions and frequency changes during critical phases of flight.
- *‘SESAR’ trajectory management will help but not for many years, workload will remain a factor*



# Single Pilot Operation

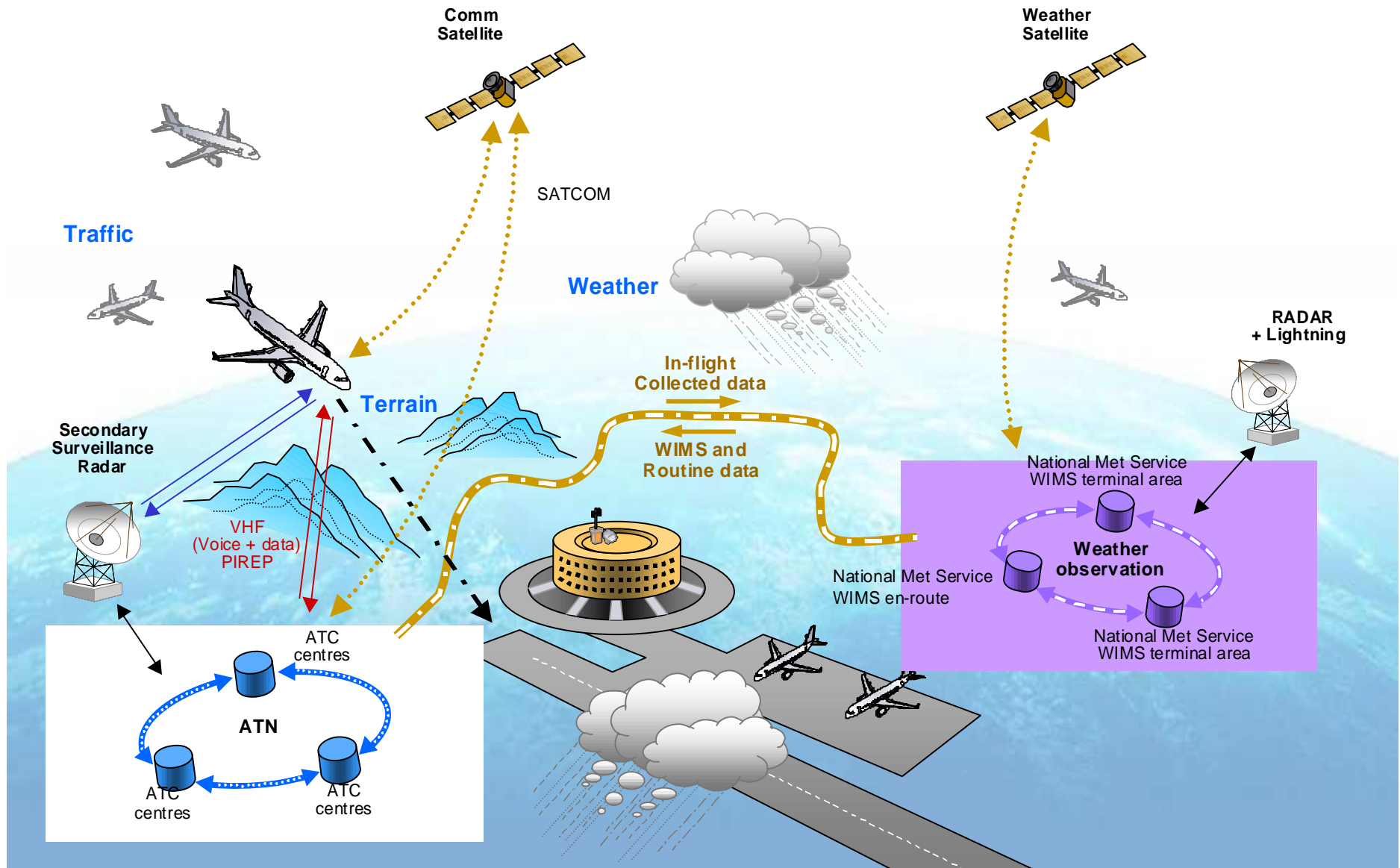
- A few other Issues - Workload
  - Collision avoidance
    - ‘See and avoid’ does not work well enough
    - TCAS?, ADS-B-IN, UAS Detect and Avoid
  - Flight Rules - routine IFR / separation support
    - Navigation precision? 3 and 4 D control
  - Management of systems failures
    - Advanced prognostics and health management



# Weather

- Severe Weather Hazards
  - Much greater for small aircraft
  - Avoidance Information - FLYSAFE
- Gust alleviation
  - Survival and passenger acceptance
  - new control and actuation methods
- Visibility
  - Precision landing aids
  - Enhanced and synthetic vision

# FLYSAFE overall concept



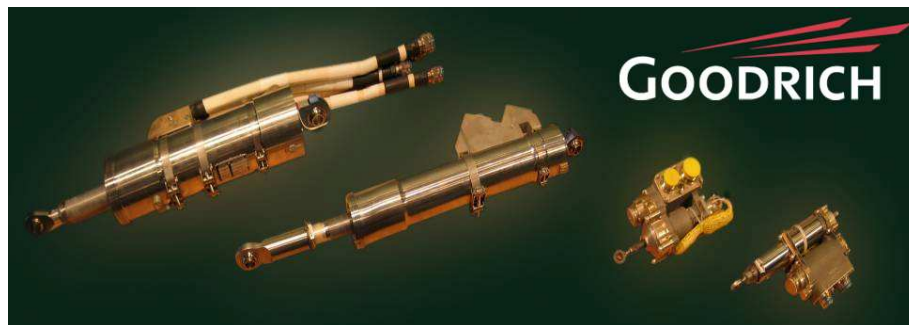


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# Gust Alleviation and advanced actuation

- Low cost Electro Mechanical Actuators for primary flight controls, landing gear and utilities
- Electrically driven Power Drive Unit for flaps
- Composite hydraulic actuators
- Jam tolerant ball/roller screws
- Distributed flap systems



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BAE SYSTEMS



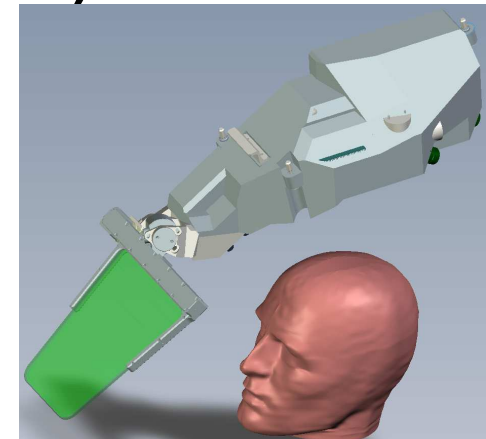
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# Visibility

## Head Up Display (HUD)

- Fixed Display projects imagery
  - in the pilot's forward field of view
- Focussed at optical infinity,
  - symbology appears to lie on the horizon
  - accurately overlays the outside world scene
- Provides increased Situational Awareness
- Now available for small aircraft

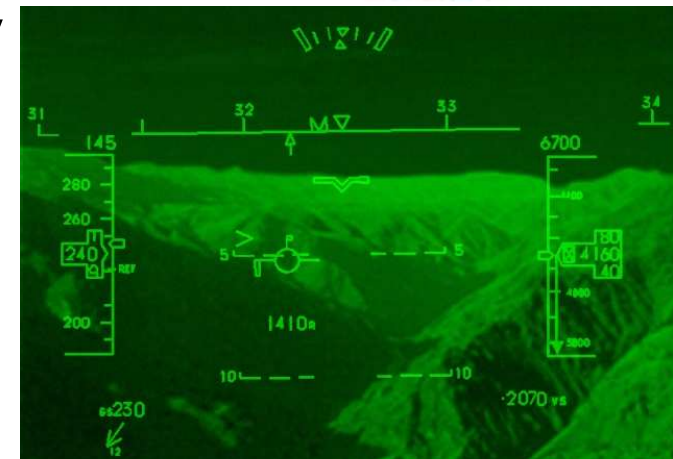


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# Head Worn Displays

- Performs the same function as HUD
  - with comparable visual performance
- Supports viewing in all directions
- enables new application areas, e.g.
  - Identification and acquisition of traffic targets in all directions (e.g. enabled by ADS-B)
  - Enhanced terrain awareness
  - Weather detection and avoidance
- Applicable to very small aircraft
- R&D in required in some areas



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# Integrity

- Key questions for the community/regulators
  - How safe do these aircraft need to be?
  - How will these aircraft be classified?
  - Acceptability of new techniques?
    - eg SBAS precision landing
- New design approaches offer the potential of lower cost, high integrity architectures
  - Beginning to be applied to UAS
  - But much work still to be done
  - Retrofit likely to be more difficult
- A known Regulatory regime is essential



# Business Case

- The initial analysis by EPATS and GA-ATS look very promising
- Implies a huge growth in small aircraft manufacturing
  - Does the capacity exist?
- Regulations, Compatibility of the ATM environment and Green issues will impact overall cost and viability
- New affordable high integrity technology needed
  - Similar to that expected for Civil Unmanned aircraft
  - But large R&D efforts (in both areas) limited by lack of interest from EU, SESAR and Platform manufactures
- Industry is very interested
  - but these issues need to be addressed urgently
- R&D support will be very important



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## EqIMG

# Equipment Industry Manufacturing Group

- **The EqIMG was formed 17 years ago as an open forum for the European equipment industry**
- **To provide a technical interface between the European equipment industry and the European Commission in order to prepare and to define suitable programmes and subjects for research in the field of aeronautical equipment.**
- **Currently 26 participants from 11 Member States representing major companies, trade organisations and AeroSME.**



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# EqIMG - How it works

- **One meeting every month the most often in Brussels**
- **EqIMG collects all research ideas from Equipment sector**
- **EqIMG co-ordinates the proposals from the equipment sector**
- **Decisions are taken on the basis of consensus**
- **EqIMG co-ordinates its activity with the other groups (airframe, engines, ATM, research centres, universities)**

# The European Aeronautics industry network for R&T IMG4

- ASD-IMG4 coordinates industry's position with regard to the EU R+TD Framework Programmes.
- ASD-IMG4 represents, through the Industry Management Groups (IMG), the European Aeronautics Industry.

IMG4 comprises representation  
from four groupings :

## Euromart IMG

Agusta-Westland  
Alenia Aerospazio  
Airbus SP  
Airbus G  
Airbus F  
Airbus UK (A)  
Dassault-Aviation  
Eurocopter  
SAAB AB  
S.A.B.C.A.  
GKN-Westland

## Engine IMG

SNECMA  
Rolls-Royce  
MTU Aero Engines  
RRD  
Turbomeca  
ITP  
AVIO  
Volvo Aero  
Techspace Aero  
Alstom  
PBS Velká Bíteš  
WSK Rzeszow

## Equipment IMG

Galileo Avionica	Qinetiql
BAE systems avionics	Cesa
Diehl Aerospace	Dräger AG
Hellenic Aerospace Ind.	Netherland
AG Liebherr-Aerospace	Sagem (A)
Barco	Selex Comms
Messier-Dowty Ltd	Nord-micro
Messier-Bugatti	Skysoft
GE Aviation	Saab Tech
Goodrich	ISQ
Thales Avionics	Jihostroj
Thales AES	Meggitt
ZF Luftfahrttechnik GmbH	

## ATM - IMG

AMS	Airbus
Thales Air Defence	Avitech
Thales Avionics	Indra
Bae Systems	Raytheon
Galiléo Avionica	
Thales Alenial Space	
Noesis (Danotec)	
Selex Communication	
Hellenic Aerospace Industry	
Dassault Aviation	
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## Workshop

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- EqIMG position towards GA R&TD topics in order to maximize added value
- Equipment Issues
- Safety - operation , reliability modular
- maintainability
- Infrastructure – support
- ATM
- Airport approach etc
- Compatibility with existing air transport systems
- All Weather
- Pilot support - decision aiding , single crew
- Terrain
- Modular design
- Certification
- ICAO /EASA rather than national Cross border
- Low cost manufacture
- Composites structures
- Composite propeller blades
- Affordable avionics
- Required levels of integrity
- Flight control
- Actuators
- Engine reliably
- Alternative fuels etc
- Link to other aircraft and UAV



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- Near autonomous FBW flight control
- Surveillance/image processing
- Autonomous See and avoid
- Autonomous control
- Intelligent crew support systems
- ATM.