



When you need to be sure

WORLD'S LEADING INSPECTION, VERIFICATION, TESTING AND CERTIFICATION COMPANY



N°1
WORLD LEADER

85,000
EMPLOYEES

1,650
OFFICES AND
LABORATORIES



13
GLOBAL
INDUSTRIES

**GLOBAL
SERVICE
LOCAL
EXPERTISE**



COMPLIANCE



BUSINESS CONTINUITY



SAFETY



TRUST



EFFICIENCY



FURTHER EXCELLENCE



QUALITY



COMPETITIVE ADVANTAGE



RISK MANAGEMENT

SOLUTIONS

FOR MANAGING AVIATION RISK

WHEN YOU NEED TO BE SURE



- The emerging RPAS industry has been compared to the initial chaos of the automobile boom of the 1920's ([Hobbs and Herwitz 2006](#)).
- Fortunately, lessons learned from 110 years of aviation have been recognised as crucial to operational success by other safety critical industries
- It is now time for the application of this type of safety culture to progress into the commercial RPAS world, a new generation of **Airmanship**, for a new generation of aviation – the Drone Age.





LAO TWIN OTTER ACCIDENT

- Pilots experience on twin engine aircraft deemed to be insufficient
- Poor Co Pilot support
- Company audited by SGS prior to accident and clients advised not to charter the Twin Otter aircraft – **Risk mitigation works.**

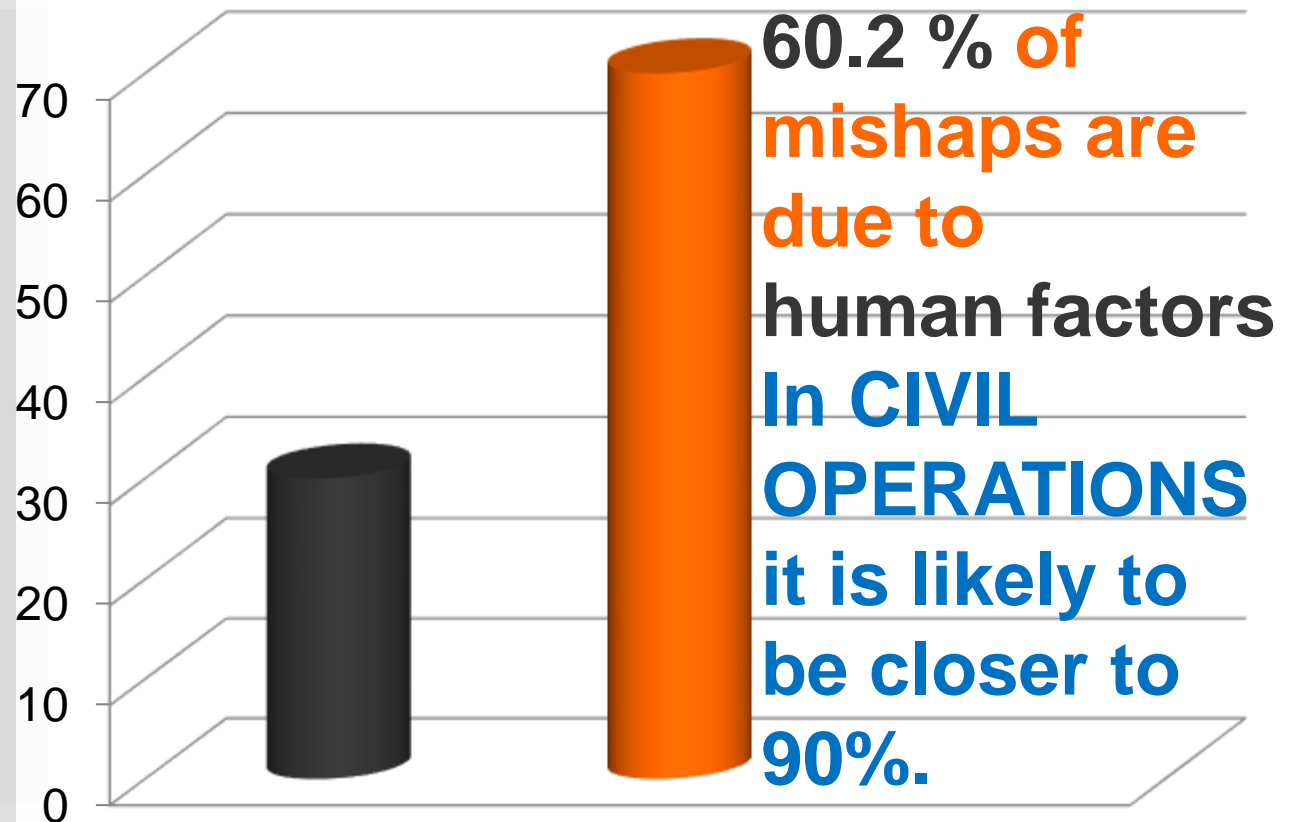
AVIATION SAFETY, DOES IT APPLY TO DRONES AND WHY ?



CONTRIBUTING FACTORS IN DRONE MISHAPS

(TVARYANAS, THOMPSON, & CONSTABLE, 2006).

Percentage



HUMAN FACTORS & ORGANISATIONAL CHALLENGES FOR **DRONE OPERATORS**



ARTIFICIAL PERSPECTIVE & SYNTHETIC VISION

- UAV flight presents human factors challenges different from and in some ways greater than those of manned aircraft ([Gawron 2008](#)).
- RPAS mishap rates are up to 300 times greater than that of general aviation conventionally piloted aircraft fleets ([Carrigan, Long, Cummings, & Duffner, 2008](#)).



LEVELS OF AUTOMATION



REMOTE TEAMS



HUMAN MACHINE INTERFACE

BALANCING THE INCREASE IN SAFETY WITH THE DIFFERENT AND EMERGING RISKS



- Lack of shared fate
- Complacency
- Boredom
- Distraction
- Resignation
- Curiosity
- Disposability
- Accessibility
- Accountability
- **COMMERCIAL PRESSURE**
- **PERCEPTION OF LOW RISK**



THE COSTS;

- EQUIPMENT DAMAGE
- COLLISION
- PLANT SHUTDOWN
- SUPPLY INTERRUPTION
- LOST DATA
- INJURY OR DEATH
- LOSS OF RPA
- CORPORATE IMAGE
- LIABILITY
- INCREASED COSTS
- ENVIRONMENTAL DAMAGE
- LEGISLATIVE NON-COMPLIANCE
- **CONSEQUENTIAL LOSSES**

- Safety culture *'the type of relationship that an organisation has with safety'*.
- High Risk Operations; nuclear and power organisations, industrial installations, off shore installations, mines sites, rail organisations, wind farms, aviation and aerospace organisations and medical organisations (Helmerich & Merritt, 2001).
- SAFETY CULTURE



LITHIUM BATTERY FIRE IN AIRCRAFT CARGO HOLD BOEING 737 - 153 PASSENGERS, 6 CREW



Images courtesy CASA

NEW GENERATION OF RISK MANAGEMENT FOR A NEW GENERATION



- **ALARP** - As Low As Reasonably Practical
- **SFAIRP** – So Far As Is Reasonably Practical
 - **ALARP** utilises target levels of safety (TLS) as decision making benchmark
 - Input based process
 - If risk assessment is inaccurate (probability, High C low L) controls may not be implemented
 - **SFAIRP** utilizes reasonable controls available to be put in place
 - Focuses on precautions, controls mitigation earlier in the process
 - Output based process
 - **SFAIRP is more robust in post event forensic analysis of due diligence**

INTERACTIVE

COMPREHENSIVE

INTUITIVE

PRACTICAL

PORTABLE

Logistics & Tools	Transport of batteries	4	5	H	Education	Follow IATA DG Table A23	RPA Controller	2	3	M
Logistics & Tools	Transport of RPA	2	5	H	Education	Methodical packing instructions	RPA Controller	1	3	M
Logistics & Tools	Emergency response plan	1	4	M	Education	Keep copy in Job pack	RPA Controller	1	2	L
Environment	Bad weather - CHAS	3	5	H	Education	Wear appropriate clothing	Field staff, RPA Crew	1	1	L
Environment	Bad weather - Equipment	2	3	M	Education	Correct packaging	RPA Controller	1	1	L
Environment	Proximity to airfield	3	5	H	Education	JAR Safety Assessment CAGA Approval	Chief Controller, RPA Controller	2	3	M
Environment	Dark or dawn	1	2	L	Education	Have tailfins to First aircraft light	RPA Controller	1	1	L
Environment	Sunglasses	3	4	H	Education	Wear Good sunglasses & hat	RPA Controller	1	2	L
Environment	Permissions - Bad items, VEC, fog, and airfields	1	3	M	Education	Obtain Aviation Weather	RPA Controller	1	2	L
Environment	Turbulence / gusty conditions	1	4	M	Education	Escorted-gust limits	Chief Controller, RPA Controller	1	2	L
Environment	Stakes / tower life	1	5	H	Education	Wear long pants, gaiters/high boots	Field staff, RPA Crew	1	1	L
Environment	Miscommunication database	2	4	H	Education	Repeaters	Field staff, RPA Crew	1	2	L
Environment	Public interference	2	4	H	Education	Use a safety officer to assist	Chief Controller, RPA Controller	1	1	L
Environment	Unseen terrain (creeks, canyons, mountains)	1	5	H	Education	Avoidance, lookout, crew communication, ground markers	Field staff, RPA Crew	1	1	L
Environment	Sites with machinery	3	5	H	Education	Site specific inductions, Use of PPE, Spotter in UAS case	Site responsible persons, UAS Crew	1	1	L
Flight Operations	Propeller strike on person	3	4	H	Education	Correct placement of hands during launch	RPA Controller	1	1	L
Flight Operations	Engine failure - rotary wing	2	5	H	Education	Pre-flight training, banners, signs	RPA Controller, Maintenance Controller	1	3	M
Flight Operations	Collision with persons or landing	1	3	M	Education	Pre-flight training, banners, signs	RPA Controller	1	1	L
Flight Operations	Aircraft loss of link	2	4	H	Education	Flight tracking	RPA Controller	1	2	L
Flight Operations	Collision with terrain	1	5	H	Education	Use correct charts & Elevations	RPA Controller	1	1	L
Flight Operations	Other aircraft sited	2	5	H	Education	Carry risks, maintain visual	RPA Controller	1	1	L
Flight Operations	Control w/ I completed malfunction	1	4	M	Education	Software updates & equipment protection	Chief Controller, RPA Controller	1	2	L
Flight Operations	Battery malfunction	1	3	M	Education	Follow correct charging procedures	Chief Controller, RPA Controller	1	1	L

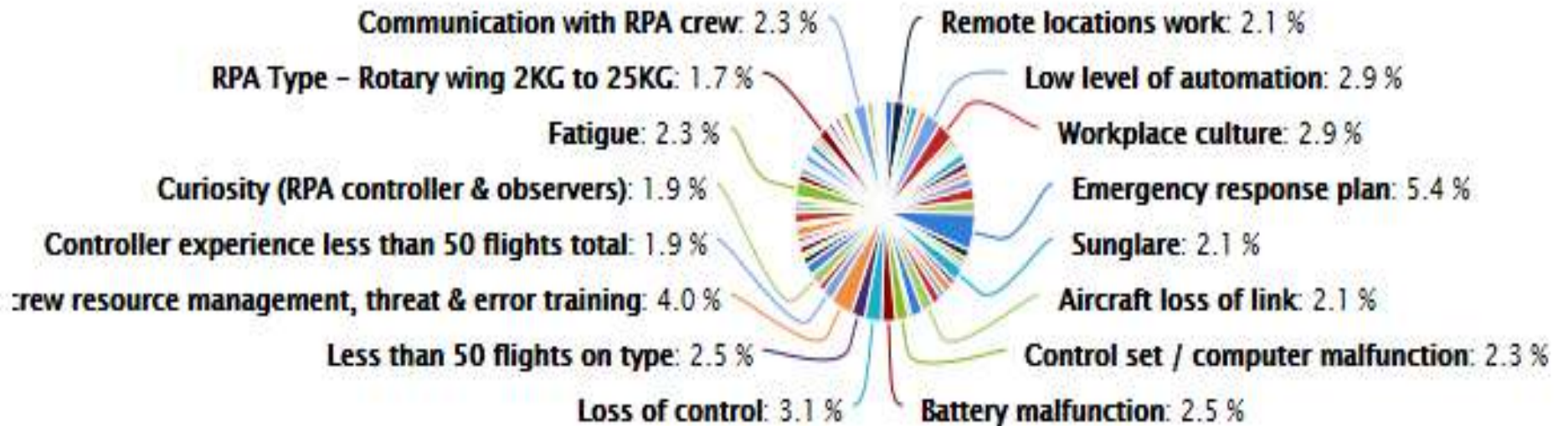


CONOPS: RPAS, AIRSPACE, ENVIRONMENT, PILOT COMPETENCE, HUMAN AND ORGANISATIONAL FACTORS. (JARUS SORA, EASA 3.6 2016)

TREND MONITORING

IMPROVED EFFICIENCY

GREATER SAFETY



SERIOUS AVIATION INCIDENTS AND ACCIDENTS ARE RELATIVELY RARE, BUT ARE HIGH CONSEQUENCE EVENTS



HELIDECK INSPECTIONS AGAINST CAP437 AND INTERNATIONAL STANDARDS

FRICTION TESTING OF HELIDECK SURFACE

REVIEW OF EMERGENCY RESPONSE, FIREFIGHTING AND RESCUE EQUIPMENT

INSPECTION OF MAINTENANCE AND REFUELLING PROCEDURES

COMMUNICATION PROCEDURES AND ENVIRONMENTAL DATA

**COMPETENCE AND TRAINING OF HELIDECK CREWS
INTEGRATION OF RPAS CREW**



AIRLINE RISK CALCULATOR (ARC)



**SYSTEMATIC
APPROACH TO
AVIATION RISK
ASSESSMENT**

**PROFILES AND
RISK RATINGS
FOR GLOBAL
COMMERCIAL
AIRLINES**

**OBJECTIVE
SAFETY
ASSESSMENT**



**DEMONSTRATE
DUTY OF CARE**

**EXPERT
AVIATION
ANALYSIS**

**SELECT
COMPETITIVE
AIRLINES
WITHOUT
COMPROMISING
SAFETY**



- SUNDANCE Resources said today **there were no survivors** of the crashed plane in West Africa that was carrying its **entire board**.
- The entire Sundance board died when the twin turboprop CASA C212 went down on a flight from Cameroon to Yangadou in the Republic of Congo.
- **The aircraft operator was audited by HART Aviation just prior to the accident.**
- **We advised our clients to never put their on flights with this operator, or their aircraft.**



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