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Evolution of Risk Management in Aviation

Risk management in aviation has undergone significant transformation over the decades, evolving from rudimentary safety measures to a comprehensive and systematic approach that integrates advanced technology and data analysis.

- **The 1960s to the 1980s** brought about substantial changes in risk management practices. The introduction of flight data recorders and cockpit voice recorders provided invaluable insights into incidents and accidents. This data collection led to a more proactive approach to safety.
- **The late 1990s and early 2000s** saw the advent of Safety Management Systems (SMS). SMS provided a structured framework for managing safety risks, emphasizing a proactive culture of safety rather than merely complying with regulations.

The key components of SMS (the 4 pillars) remain:

- **Safety Policy:** Establishing a clear commitment to safety at all levels of the organization.
- **Risk Management:** Identifying hazards, assessing risks, and implementing control measures.
- **Safety Assurance:** Continuous monitoring of safety performance and effectiveness of safety interventions.
- **Safety Promotion:** Encouraging a culture of safety through training, communication, and engagement.

The implementation of SMS across the industry has enabled airlines and operators to adopt a more systematic and data-driven approach to Safety and now **Active Risk management**.

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Part 1 - Risk Management Cycle

1. **Identify Risks:** List potential hazards or risks that could impact safety or operations.
2. **Assess Risks:** Evaluate the likelihood and impact of each identified risk.
3. **Control Risks:** Develop strategies to mitigate or eliminate risks.
4. **Implement Controls:** Put the identified control measures into action.
5. **Monitor and Review:** Continuously track the effectiveness of controls and review risk assessments.
6. **Communicate and Consult:** Engage stakeholders in the risk management process, sharing information and feedback.



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Part 2 - Essential Tools for Successful Risk Management

- **Situational Awareness**

Having a high level of situational awareness means you are constantly alert and highly attuned to your surroundings. This is crucial because little things can be big things. The sooner you notice a small anomaly in your aircraft or your surroundings, the more time you have to determine if there is a problem. This gives you time to take corrective action before the situation becomes catastrophic and **anticipate potential outcomes to come**.

- **Problem Recognition**

Once you become aware of an abnormal situation, it is key to develop your problem recognition skills. Too often we may be tempted to dismiss a seemingly small and insignificant anomaly. As pilots, that snap judgment could easily prove fatal. Train yourself to ask, **"What is the worst problem that this anomaly could indicate and what are the potential outcomes?"** Then investigate and if a problem does exist, recognize it. This mindset can help you in mitigating risk.

- **Good Judgment**

The final key component to bring with you on your risk management journey is good judgment. You have noticed the anomaly and you have recognized the problem. The final step is to make a judgment call on what to do next. If this problem occurs in the air, it is critical that you use good judgment to decide what your best, safest course of action is. Do you turn around? Do you maintain course? Do you divert to a different airport? **Practice thinking of different scenarios that could occur mid-flight and go over what your response would be.**

- **Use Risk Management Modelling**

eg. T-DODAR, FORDEC, Effective Threat and Error Management Countermeasures etc

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Part 3 – Managing Aviation Safety: Airlines vs Humanitarian Aviation

Aviation safety is a critical concern across all sectors of the Industry, but it takes on unique dimensions in commercial airlines and humanitarian aviation. While both aim to ensure safe operations, **their approaches differ significantly** due to their operational contexts, objectives, and regulatory environments.

Commercial Airlines are primarily focused on **profit and efficiency**, serving millions of passengers daily. Their operations are heavily regulated by bodies such as the Federal Aviation Administration (FAA), ICAO and the European Union Aviation Safety Agency (EASA). These regulations ensure rigorous safety standards, routine maintenance, and extensive pilot training, **prioritizing passenger safety and operational reliability**.

In contrast, Humanitarian Aviation is dedicated to delivering aid in crisis situations, often operating in remote or conflict-affected areas. **Humanitarian flights often prioritize access and responsiveness over profit**, and they may face rapidly changing conditions, making safety management more complex and adaptive.

Contrasting Risk Management Approaches

Risk management in Commercial Airlines relies on comprehensive protocols, utilizing data analytics and predictive modelling to anticipate potential safety issues. **Airlines conduct routine risk assessments and implement technology-driven safety measures.**

In Humanitarian Aviation, most risk assessments are more focused and localised and based on immediate needs, **almost on a daily basis**. Humanitarian pilots and crews often make quick decisions in unpredictable environments, **balancing the urgency of aid delivery with safety considerations.**

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Part 4 - Cost of Safety and Security

Aviation remains one of the safest means of transportation, due in large part to the strict safety and security measures in place, and which continue to evolve. However, maintaining this high level of safety comes at a **significant cost**. The implications of not being adequately prepared for safety and security challenges can be catastrophic, not only in terms of human lives but also financially and reputationally for airlines, charter operators and humanitarian aid agencies, operators and the industry as a whole.

The Financial Burden of Safety and Security and Investing in safety and security measures is not optional:

It is a necessity and is linked to effective Risk Management!

Factors to consider:

- **Employee Training:** Employees must be well-trained to respond effectively to emergencies and security breaches. On-going training programs add to operational costs but are vital for maintaining readiness.
- **Regulatory Compliance:** Often demands investment in infrastructure upgrades and operational changes, which can strain budgets and **are often not fully thought through by the regulator, for that environment or country.**
- **Different AOC's = different regulatory interpretation.**

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Part 4 - Cost of Safety and Security (cont.)

Further Factors to consider:

- **Reputational Damage:** An incident resulting from inadequate safety measures can lead to a significant loss of public trust. AOC Operators and airports that experience security breaches may find their reputations irreparably harmed, leading to decreased passenger numbers and long-term financial impact.
- **Legal Liabilities:** In the event of an accident or security incident, the financial ramifications can escalate quickly. Lawsuits from affected parties, regulatory fines, and settlements can amount to millions, placing a heavy burden on companies and **ultimately the Insurance Market**, for those that fail to prioritize safety and security.
- **Operational Disruptions:** Safety and security incidents often lead to operational delays, cancellations. These disruptions can have a cascading effect on schedules and revenues, affecting not just the operator but also associated businesses in the travel such as the various clientele utilising these air travel services.

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Part 4 - Cost of Safety and Security (cont.)

Key Safety vs Commercial Impact Example

- **Compliance with ADS-B regulations** (e.g., SACAA mandates for ADS-B by June 2025)

Key points to consider regarding implementation and cost implications:

- **Transponders:** Aircraft must be equipped with ADS-B Out transponders, which can range from a few thousand to tens of thousands of dollars, depending on the aircraft type and existing avionics suite installed in the aircraft.
- **Avionics Upgrades:** Older aircraft (**typical of the Humanitarian Sector**) may require significant upgrades to their existing avionics systems to comply with ADS-B requirements. **EFIS vs Analogue? STC available?**
- **NB: Supply chain and logistics challenge.** Equipment and components supply and timeline, STC approval and related timelines from OEM's for this equipment?
- **Operational Costs:** While ADS-B can reduce operational costs by improving flight safety and efficiency, the initial investment can be substantial.
- Significant benefits: **Enhanced Safety, Cost Savings Over Time ONCE installed.**
- **How to implement in a Large Commercial Humanitarian operator (eg. 40 aircraft),** with all aircraft on long term contracts and NO staggered implementation possible, given the timeline?

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Part 5 – Security case study on Khartoum and Lessons Learned from the Unforeseen

- ***This case study covers two key and related elements: the destruction of the King Air B350i ZS-SYX (Serial No. FL-833) at Khartoum International Airport (HSSK), operating for the ICRC, as RED 908 and the lessons learned from the unpredictable/unforeseen, from this event.***

• Background

- From April 16 to April 20, 2023, Khartoum experienced a significant escalation in armed conflict. Initial tensions between opposing factions culminated in intense fighting, characterized by flak cannon fire and aerial bombardments affecting both civilian and military targets throughout the city, including Khartoum International Airport.

• Timeline of Events

- **April 16, 2023:** Fighting erupted in Khartoum as skirmishes intensified between rival factions. Residents reported increased military activity, including the use of heavy artillery and gunfire in various neighbourhoods
- **April 17-18, 2023:** The conflict escalated, with continuous bombardments reported around the city. Khartoum International Airport became a critical zone of conflict, with flights suspended and airport operations severely affected. The airport's infrastructure remained at risk due to the ongoing military engagements

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Part 5 – Case study on Khartoum and Lessons Learned from the Unforeseen

- **April 19, 2023:** The situation remained dire, with continued aerial bombardment and ground assaults reported in proximity to the airport. Air-Tec's King Air B350 was parked on the main apron, designated as non-operational during the conflict. At approximately 07H55am, a mortar shell struck the main apron, hitting the King Air B350 and adjacent ATR directly. The explosion resulted in a total loss of the aircraft, which was destroyed beyond repair.
- **April 21, 2023:** Satellite imagery from the 21st of April clearly shows that there was a burnt-out airframe where earlier images, from the days prior had shown the aircraft being parked and still intact.



Part 5 – Case study on Khartoum and Lessons Learned from the Unforeseen

Impact Assessment

Damage to Aircraft: The King Air B350 suffered catastrophic damage from the mortar attack. The aircraft was deemed a total loss, resulting in significant financial implications for Air-Tec, including potential claims for insurance and the costs associated with replacement.

Operational Disruption: The fighting had severely disrupted airport operations, resulting in the suspension of flights and affecting logistics for humanitarian aid and commercial operations in the region. The ongoing conflict posed serious risks to personnel and assets at the airport.

Safety of Personnel: Ground staff and crew at the airport were evacuated following the attack, ensuring their safety amid the escalating violence. Some were trapped at the airport. The psychological impact of the conflict on personnel was a major concern.



Part 5 – Case study on Khartoum and Lessons Learned from the Unforeseen



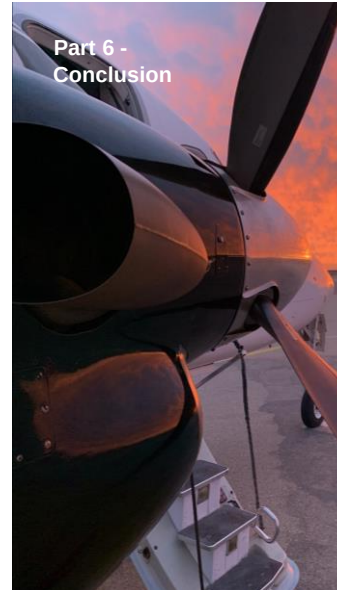
Recommendations from us an Operator experiencing such an event:

- **Flow of information** and keeping secure communication channels open, ensuring employees are kept up to date on what to expect and what is happening.
- **Coordination with Authorities** and clients on the ground and in the country.
- **Emergency Rations / Supplies** – Extra water to be kept as well as meal rations (MRE/RATPACKS) for 2-3 days.
- **Safety Assessment / Monitoring** – Risk Assessment to be ongoing to assess surroundings and to update the ERP.
- **Pre-Planned Evacuation Routes** -Combined with the ERP and the Risk Assessment
- **Secure and available transportation for employees** – upon evacuation
- **Scenario based tabletop / actual event exercises**
- **Border crossing protocols** – documentation etc.
- **Psychological support for the employees** – Post event
- **Review and update of ERP Plans and crew guidance protocols**

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Part 6 - Conclusion



• FINAL THOUGHT.....

- *It is estimated that this single event and conflict, which continues 18 months later, has cost the insurance market between \$330 - 350 million and this is still not fully reconciled due to continued inaccessibility of Khartoum Airport.*

An example of unforeseen Risk and the Indirect

“Cost of Safety and Security”

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