Analysis of FedEx Flight 1478: Using Threat and Error Management Framework

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Abstract

Our team used the TEM framework to identify many of the organizational threats that caused the Federal Express (FedEx) Flight 1478 accident to occur on July 26, 2002. The results from the investigation showed organizational faults from FedEx as well as the Federal Aviation Administration. The results determined there was a lack of structure in pilot eyesight medical examinations and rest periods for pilots. Flight 1478 was a prime example of how fatigue can be detrimental to flight operations. Additionally, the lack of adherence to standard operating procedures (SOPs) and failure of the crew to cross check each other showed the importance and need for consistent crew resource management in the cockpit to mitigate risks and threats. The findings of FedEx Flight 1478 show that latent conditions can lead to undesired aircraft states.

Flight Information

Federal Express (FedEx) Flight 1478 departed from Memphis on July 26, 2002 towards Tallahassee expected to arrive at 5:30 a.m. The Boeing 727-232F crashed short of runway 9 totalling the aircraft. The flight crew of 3 survived the accident. The aircraft was below the glide slope, striking trees 1,500ft from the runway threshold.

Figure 1. Top view of aircraft wreckage. Source: Aviation Safety Network

NTSB Findings

The National Transportation Safety Board (NTSB) conducted the investigation of the accident. Their investigation indicated that Tallahassee had calm winds, few clouds/fog at 100ft, and suitable for landing. The NTSB further questioned the pilots on board and concluded the following:

1. Lack of authority in the flight deck
2. Pilot flying (first officer) has a color vision deficiency
3. Aircraft was low on glide slope (First Officer)
4. Lack of adherence to Standard Operating Procedures (SOPs)
5. Crew fatigue

Threat and Error Management Framework

Threats are events that occur outside of the flight crews influence. They are found within the organization and the policies they have established.

Errors are the crew's actions or inactions that lead to a deviation from their original intentions.

Threats and errors, if not managed, will lead to **undesired aircraft states (UAS)**. This results in an aircraft that has deviated from the original plan set forth by the flight crew.

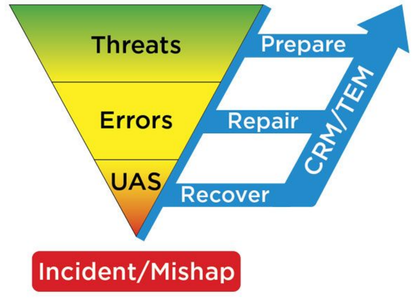

Figure 2. Threat and Error Management Framework.

Our Findings

This study was conducted to determine whether or not the pilots were completely at fault for the accident or if a culmination of several factors led to this crash. The TEM framework was used to identify organizational faults that led the pilots to perform the way they did.

Errors

- Lack of callouts and briefings
- Flight crew fatigue
- Lack of authority

Threats

- "Forgettable" fatigue management training
- Lenient medical examination
- Missed CFIT training for crew

Undesired Aircraft State (UAS)

- Unstable approach
- Aircraft was below glide slope

Conclusion

The analysis of FedEx Flight 1478 using the TEM framework identifies the latent conditions that originated from organizational factors. The framework shows us that organizational faults can lead to an undesired aircraft states. If gone unnoticed, these organizational faults can lead to pilots becoming fatigued and thusly leading to similar or worse accidents. Governing bodies, such as the FAA, can greatly impact the safety of flight in the event if any improper procedures or lack there of are present.

References

National Transportation Safety Board. (2004, June 8). *Collision With Trees on Final Approach FedEx Flight 1478*. NTSB. Retrieved from https://www.ntsb.gov/investigations/AccidentReports/Reports/AAR0402.pdf