

Some Lessons Learned About Flight Deck Automated Systems

Kathy Abbott, PhD, FRAeS

Federal Aviation Administration

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Federal Aviation
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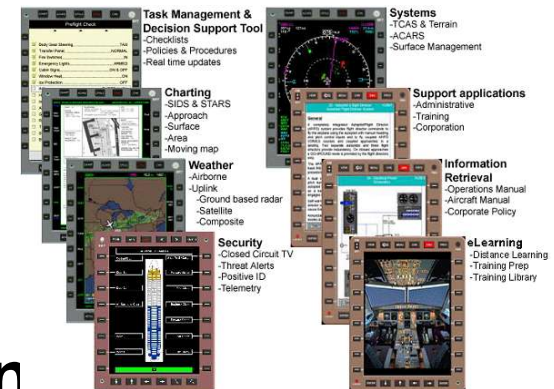


Lesson 1: Automated systems have contributed significantly to improvements in safety, operational efficiency and precise flight path management. However, vulnerabilities exist.

- **Pilots sometimes rely too much on automated systems and may be reluctant to intervene.**
- **Autoflight mode confusion errors**
- **FMS programming and usage errors**

Lesson 2: Automated systems, not “automation”

- **Many systems, not a single system**
- **Not all the same type of automated system – from Billings 1997**
 - Control
 - Information
 - Management
- **Greatest growth is in automation of information-related tasks**



Lesson 3: Lack of practice can result in degradation of basic knowledge and skills

- **Degradation of motor *and cognitive* skills and knowledge for manual flight operations**

Lesson 4: “Levels of automation” is a useful concept for communicating ideas about automated systems but can be hard to operationalize

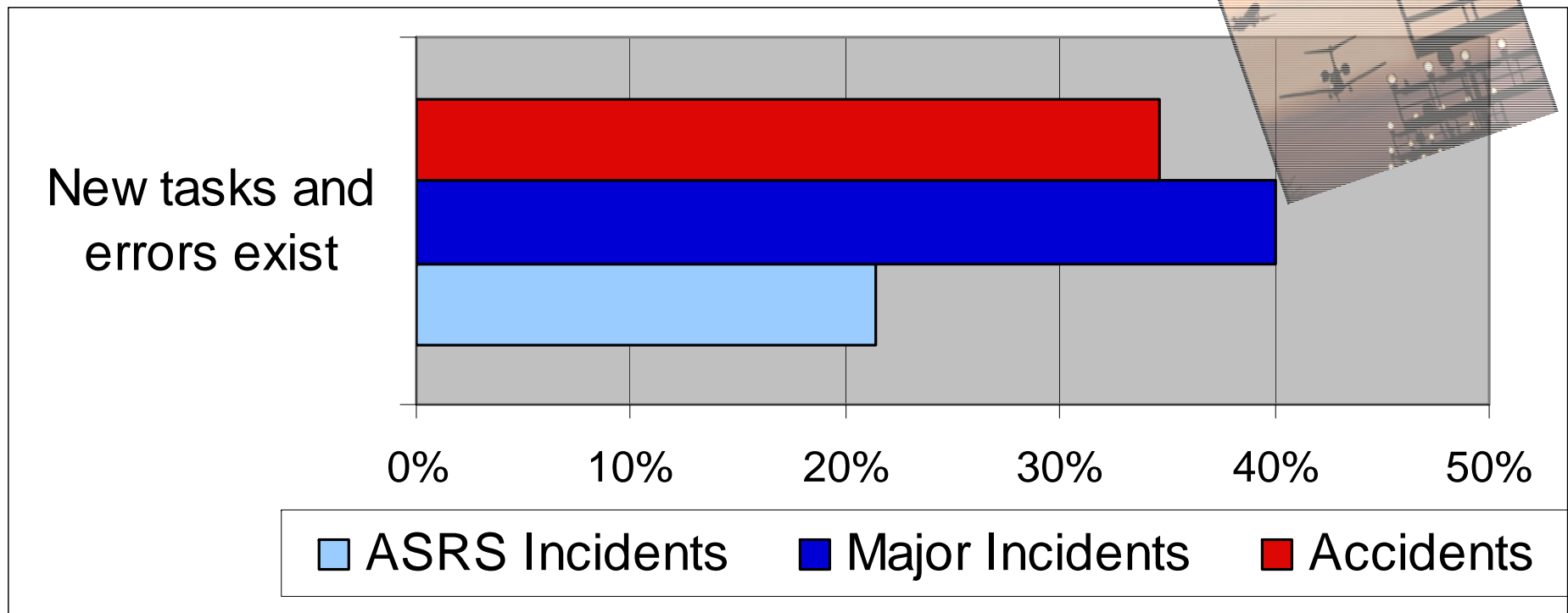
- **Combinations of automated system features**
- **Not a simple linear hierarchy**

Lesson 5: Operational policy for flight path management, not automation policy

- **Focus on managing the flight path of the airplane, not the automated systems**
- **Identify opportunities for manual flight operations**
- **Automated systems are tools for the pilot to use**

Lesson 6: Use of automated systems can reduce workload during normal operations but may add complexity and workload during demanding situations

Corollary to Lesson 6: Adding automated systems can add new tasks



Flight Path Monitoring

- **Monitor aircraft systems and flight path**
- **Note that both Pilot Flying and Pilot Monitoring have to monitor!**
- **Monitoring requires intervention skills**

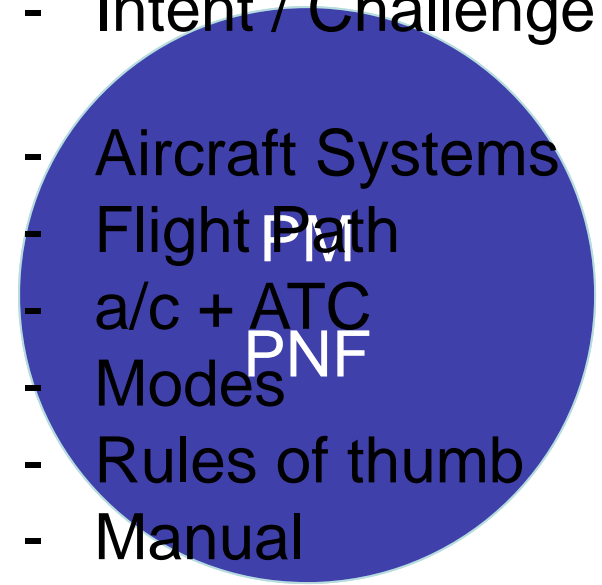
Both pilots monitor and manage flight path



Technical

Non Technical

- CRM / NTS
- Intent / Challenge
- Aircraft Systems
- Flight Path
- a/c + ATC
- Modes
- Rules of thumb
- Manual
- Recovery
- Malfunction

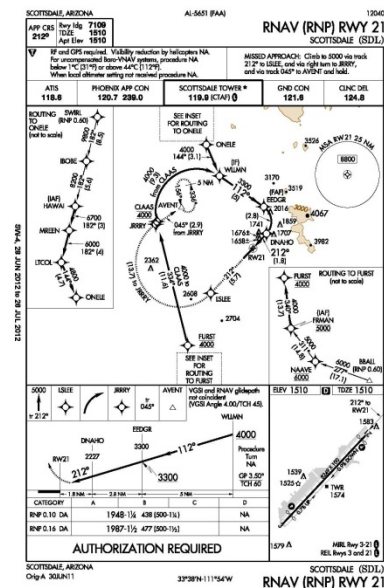
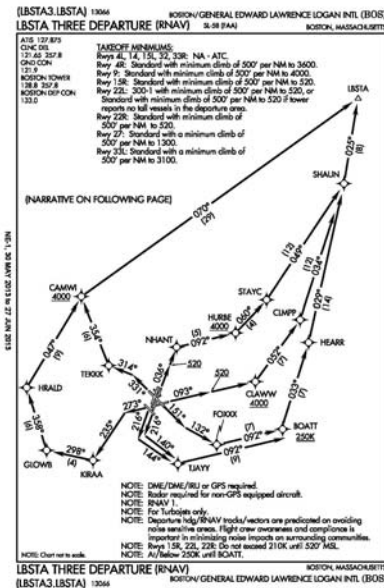
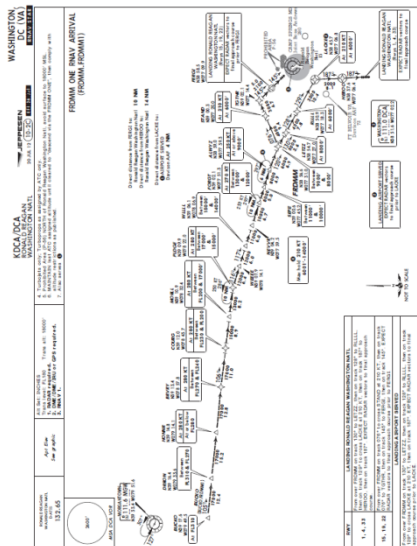


Flight Path Monitoring - Intervention

- **Assumes that a flight path issue has been detected and requires actions**
- **Implications for pilot training**
- **Implications for operational policies**

Lesson 7: Sometimes the issue is complexity, not automation

- Vulnerabilities are sometimes related to complexity. Examples:
 - Large amounts of information
 - “Change fatigue”



Lesson 8: Be cautious referring to automated systems as another crewmember

- **Potential for false expectations about system behavior**

Lesson 9: Pilots and controllers mitigate risk on a regular and ongoing basis

Safety Snapshot: Split-second Decision Saved the Day (and more) in Perth


by John Croft in Things With Wings

Mar 16, 2016
RSS

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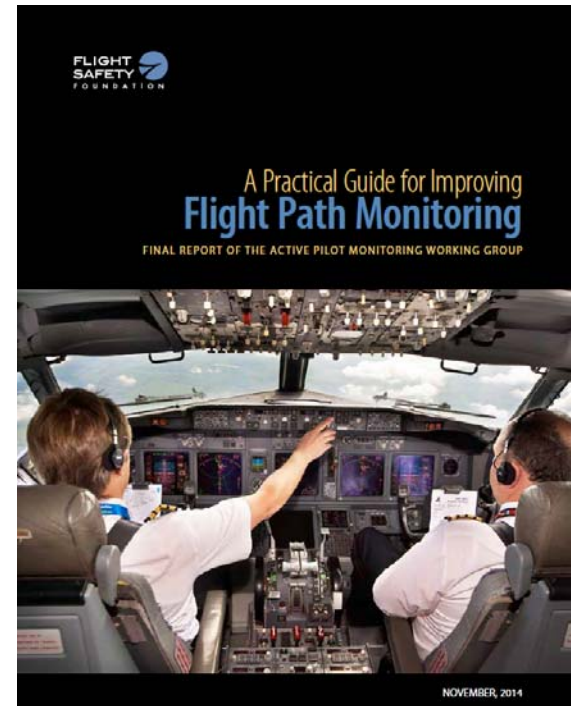
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<http://flightsafety.org/files/flightpath/EPMG.pdf>

Thank you!