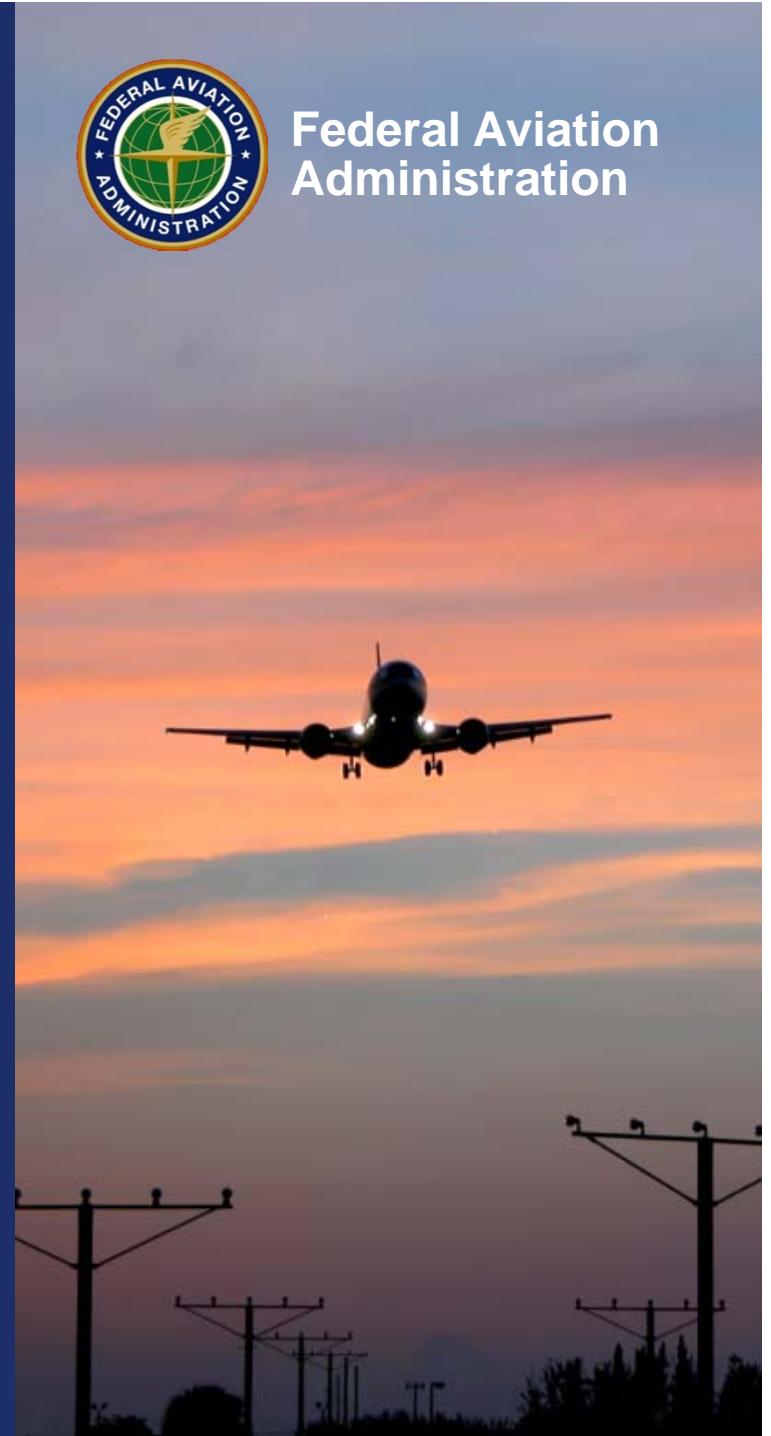


Some Lessons Learned About Flight Deck Automated Systems

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Federal Aviation Administration
2 June 2015



Federal Aviation Administration



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

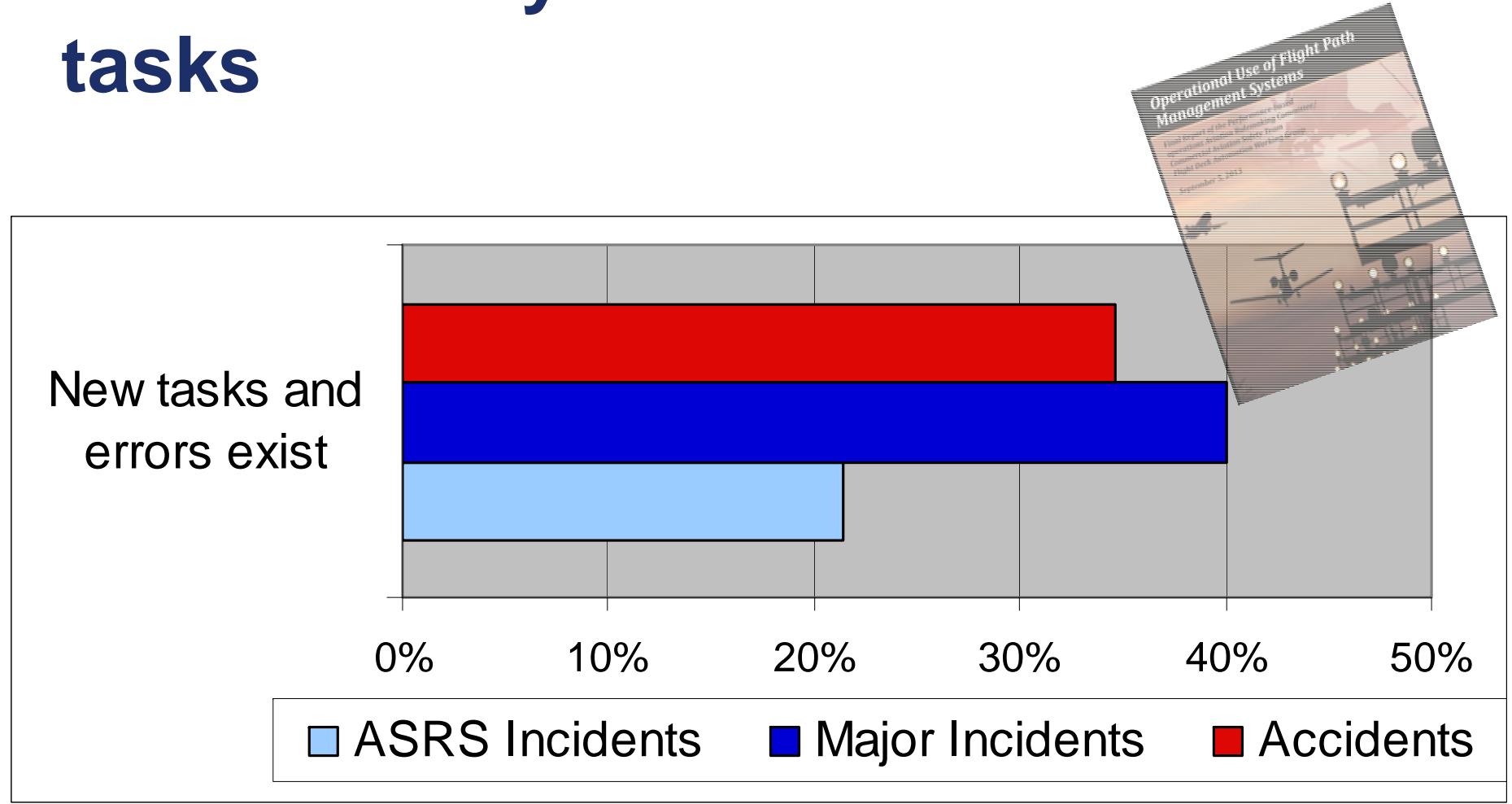
- **Combinations of automated system features**
- **Not a simple linear hierarchy**

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

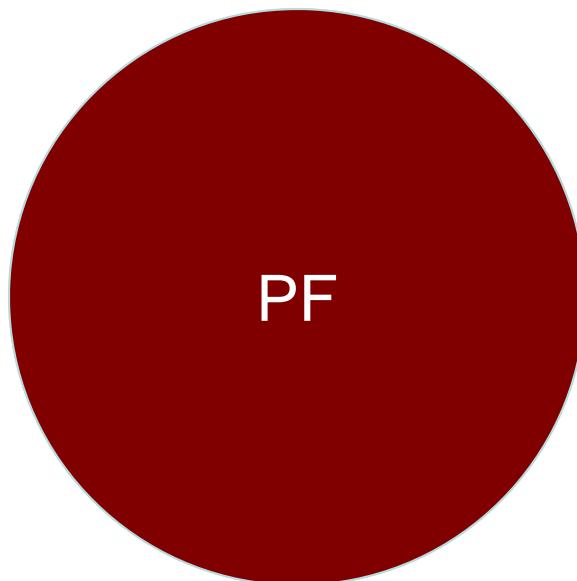
Corollary to Lesson 6: Adding automated systems can add new tasks



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

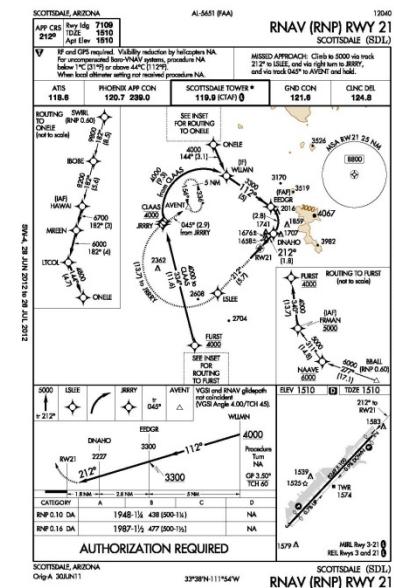
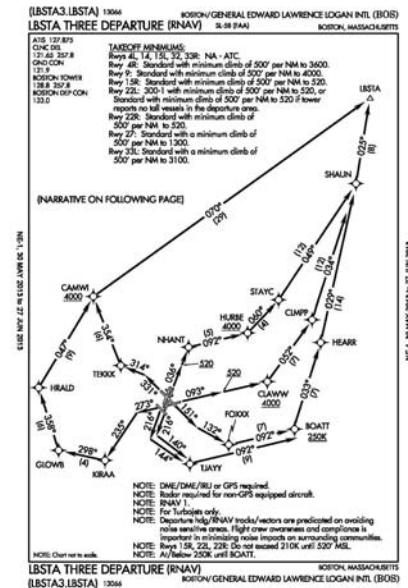
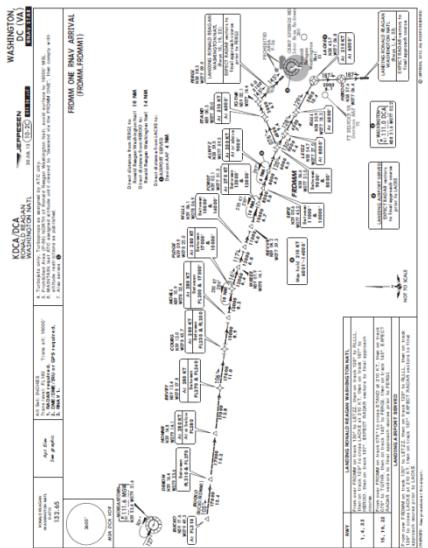
- CRM / NTS
- Intent / Challenge
- Aircraft Systems
- Flight Path
- a/c + ATC
- Modes
- Rules of thumb
- Manual
- Recovery
- Malfunction

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

- 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, 2015
RSS

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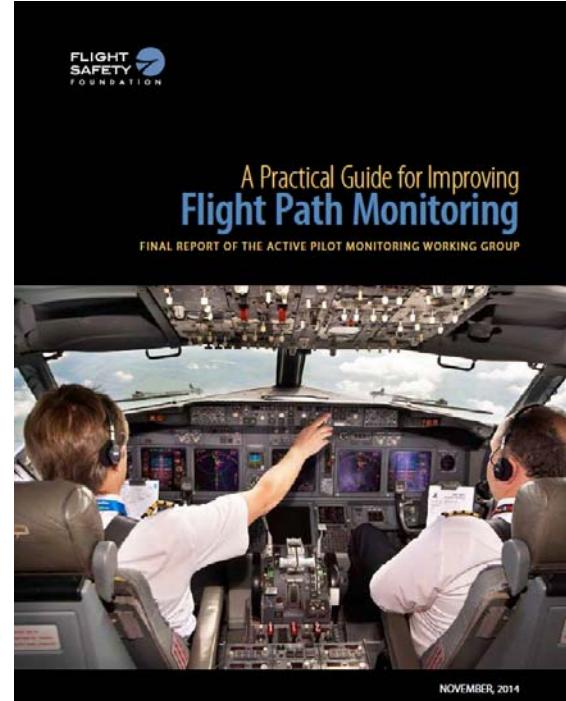


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	<p>AD No.: 2014-0266-E</p> <p>Date: 09 December 2014</p> <p>Note: This Emergency Airworthiness Directive (AD) is issued by EASA, acting in accordance with Regulation (EC) No 216/2008 on behalf of the European Community, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation.</p>

This AD is issued in accordance with EU 748/2012, Part 21.A.3B. In accordance with EC 2042/2003 Annex I, Part M.A.301, the continuing airworthiness of an aircraft shall be ensured by accomplishing any applicable ADs. Consequently, no person may operate an aircraft to which an AD applies, except in accordance with the requirements of that AD, unless otherwise specified by the Agency [EC 2042/2003 Annex I, Part M.A.301] or agreed with the Authority of the State of Registry [EC 216/2008, Article 14(1) exemption].



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

Thank you!