Implementation of Safety Management System (SMS) at Airports outside the US

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Overview of Presentation

- Global Aviation Changes, Evolution and History of non-US Airport SMS
- ICAO Airport SMS Requirements
- SMS Table
- Current Airport Progress Outside US and Learned Lessons
- Critical Challenges
- Conclusion
- References
Changes in Global Aviation

- Airline Deregulation
- Airport Privatization
- Explosive Air Traffic Growth
- Complexity of Global Airspace
- Sophisticated Aircraft

- Past: Safety Systems were Reactive & Generic

- Future: Safety Systems must be Proactive & Customized
Evolution of Aviation Safety Thinking

- **Machine Period** (Technical Factors)
  - 1950s
- **Human Period** (Human Factors)
  - 1970s
- **Organizational Period** (Organizational Factors)
  - 1990s
- **Today**
  - 2000s
History of Airport SMS outside the US

- **Push for SMS**
  - In 1987, British Airports Authority (BAA) privatized
    - It initiated a global change in how airports operate
  - In 1992, Rigas Doganis declared “Airports are Businesses” (as opposed to being just public utilities), however, safety needs to remain as a driving force
    - ICAO concurred that safety management is prerequisite for sustainable aviation business
  - With worldwide push for privatization/corporatization in the 90s, *it was clear that the safety discipline and safety oversight of these profit-oriented airports were even more imperative*
ICAO’s Universal Safety Oversight Audit Program

- ICAO adopted universal safety oversight audit program, recognizing need to improve aviation safety and security in an integrated manner
- The integrated concept includes the CAAs, airlines, ATS and airports

| CAA | • National Aviation Laws and Regulations  
      • CAA structure, personnel, and procedures  
      • Information collection and distribution |
|-----|--------------------------------------------------------------------------------|
| Airlines | • Flight crew qualification/certification  
          • Air operators training and procedures  
          • Airworthiness of aircraft  
          • Avionics certification |
| Air Traffic Services | • Controller/engineer qualification and certification  
                         • Training and procedures  
                         • Navigation aid maintenance and inspection  
                         • ATC capacity and automation planning |
| Airports | • Airport operator qualification and certification  
           • Airport operator training and procedures  
           • Passenger terminal safety and security  
           • Terminal gate and movement area control  
           • Instrument arrival/departure procedures |
International Civil Aviation Organization (ICAO) Requirements for Airport SMS

- **2000**
  - ICAO Air Navigation Commission considered proposal to amend Annex 14, Volume I to introduce new requirement for licensing/certification of aerodromes as a first step

- **2001**
  - ICAO began process of defining and recommending **safety management system** for airports

- Originally required by November 2003, was extended to November 2005

- Subsequently ICAO issued standards and recommended practices for member States to implement SMS in their airports’ operations
  - Sections 1.4.1-1.4.4 and 1.5.1-1.5.4 specifically require
    - SMS implementation and
    - regulatory framework to certify the SMS
ICAO Requirements for Airport SMS, continued

- Further guidance provided in
  1. Manual on Certification of Aerodromes (*Doc 9774*)
  2. Safety Management Manual (SMM) (*Doc 9859*), *Chapter 18*
ICAO SMS for Airports

- SMS is generally referred to as a explicit systemic and proactive approach to managing safety, including
  - the necessary organizational structures,
  - accountabilities,
  - policies and procedures
The SMS Table (Side View)
The SMS Table (Top View)

Safety Policy
- Procedures
- Organization

The SMS Table
- System & Task Analysis
- Change Management
- Employee Reports
- Operational Data

Safety Assurance
- Corrective Action
- Internal Audits

Safety Promotion
- Culture
- Training
- Communication

Risk Mitigation
- Risk Assessment
- Hazard Identification And Tracking

Safety Risk Management
Overview of SMS for non-US Airports

Conducted interviews with non US Airports, CAAs and ICAO to survey their SMS implementation experiences

2007 MITRE TRB report to provide airport execs SMS fundamentals
Sample Interview Questions

• Questions asked of the ICAO SAM/CAR region:
  – What is the status of SMS airports' legislation implementation by States in your region? What levels of airports are affected?
  – What lessons have airports in your region learned that could help US airports implement SMS?

• Questions CAAs were asked:
  – What is the status of SMS legislation implementation in your country?
  – What data is your CAA tracking on a national basis from airports regarding hazards, for example?
  – Describe the Confidential Reporting System in place in your country?

• Questions airports were asked:
  – How was SMS implemented at your airport? Was a phased approach used? What milestones were developed and actually worked?
  – Is your airport’s safety reporting system data available to your CAA?
  – What results (if any) can your airport show, now that SMS is implemented?
  – What lessons has your airport learned that could help other airports implement SMS?
  – What benefits have been observed at your airport due to SMS so far?
Current Airport Progress
Outside US

- SMS has been adopted by a few Airports
  - SMS implementation worldwide is relatively new
- Wide variation in the way that SMS principles have been applied
  - Central issues include:
    - Variations of SMS components – Tailored to circumstances
    - Implementation Styles – No standard approach
    - Scalability
    - Scope
    - Number of steps
    - CAA Implementation Methods
    - Legislative Experience – Limited information available
    - Non-punitive Reporting Systems – No cookie cutter structures
    - Accountable Executive – Responsibilities may need clarification in certain models of airport management
    - Process Analysis – Depth of experience varies
    - Data Collection – Types, methods and analysis varies
Variations of SMS components – Tailored to circumstances

- Airports are like snowflakes, each airport is unique, has its own challenges and its SMS will need customization.

Example:

- Though the United Kingdom Civil Aviation Authority defines components of an airport’s SMS, they believe that *airports are to decide which components need to be developed themselves.*
  - However, they stress:
    - that the simpler and clearer the SMS the better
    - SMS should complement existing systems and procedures.
Implementation Styles – Three different approaches depending on emphasis

Evolutionary style
• SMS principles implemented over several years.
• Safety culture gradually becomes ingrained in employees’ attitudes and actions.

“Fast Track” adoption
• Implements SMS at a relatively rapid pace.
• Although this approach may bring the airport into compliance with SMS regulations, it may not result in a sufficiently fundamental change in safety practices and attitudes.
  – An aggressive employee training program will be required to achieve this transition.

Phased methodology
• Uses dates and milestones to implement the various aspects of SMS;
• Allows time to address any issues that arise before advancing to the next stage.
Scalability – yes!

• SMS can be scaled to different sized operations without becoming a bureaucratic exercise
  – Viewpoint by Australia’s CASA in “Getting Started”
    • For small organizations, SMS is seen as a positive, fewer people involved and therefore less difficult to communicate
  – From the small airport operator perspective however, they worry about not adding more burden than they can handle.
    • “I am already working 24 hours a day and you want me to work 48?”
Scope – evolving with experience

• IATA recommends IMS – not SMS – in order to be more encompassing than only focusing on safety.

• Australia’s CASA interview revealed they started with airside, but are now moving into the terminal building, parking lot and other physical structures at the airport.

• The bottom line is that SMS is most effective when applied to the entire organization.
Some CAAs’ 
SMS Implementation Methods

• Permitted airports to institute safety management processes by themselves, using some or all of the following methods:
  – Gathering best practices and lessons learned from more experienced organizations
  – Enlisting independent consultants or other airport operators to verify proposed safety programs
  – Compelling airports to initiate SMS self-education programs
  – Seeking software vendors to supply airport-specific data collection systems
A number of States have airport regulations, certification and licensing

- Some States made SMS mandatory for all certified airports; for example:
  - Peru, before 2003
  - Cuba and Argentina (2004)
  - Singapore, Brazil, Ecuador, Barbados, Costa Rica, El Salvador, Mexico (2005)
  - Denmark (2006)
  - Australia (by Dec 2007)

- Some States made SMS mandatory for some airports
  - Canadian Group 1 (by Dec 2007)

- UKCAA implementing SMS at airports for last 10 years but it is *not a requirement*.

- NZCAA is currently evaluating mandating SMS for certificated operators across the whole civil aviation system.
• Different cultures approach non-punitive reporting systems with great caution or uncertainty.
  – Identified three types of reporting approaches:
    • Internal airport reporting
    • CAA-reporting
    • NTSB-type reporting systems
  – Some cut out airport operator entirely in order to ensure whistleblower protection

• Voluntary/confidential incident reporting programs are a cornerstone of SMS.
• Airport operators will need to review their thinking on the safety culture messages they are conveying to airport employees.
Accountable Executive – Hard to pin down

- Responsibilities may need clarification in certain models/sizes of airport management/airports
  - Privatized airport
  - Local council run airport
  - Government run airport
Airports’ Safety Processes – Thoroughness of Evaluation Varies

- As part of gap analysis, airports must identify their safety processes.
  - 2005 Berlin University of Technology study, ~1,600 airport safety-relevant (flight-operational) processes identified and verified with Munich and other German airports.

- A re-evaluation of existing processes will not only help determine where SMS needs to be incorporated, but also how airport operations may be made more efficient.
  - By-product of this may reveal some areas of duplication which, if eliminated, could help reduce some costs.

Reference: Schorcht, Hendrik. briefing: “SMS at aerodromes in Germany: Results of a research project”, Berlin University of Technology, Institute of Aeronautics and Astronautics, Section Flight Guidance and Control Air Transportation, Budapest, 06,12,2005.
Airports’ SMS Data Collection

- UKCAA is tracking
- NZCAA will continue to track
- CPH is collecting
- Perth is tracking
- Singapore is tracking

- airport ground incidents data
- accident and incidents, and will track airports’ hazard mitigations in future
- airside security, bird control, foreign object damage (FOD), runway inspections and safety occurrences data
- airside hazards and airside operations incidents
- birdstrikes and runway safety hazards
Korean Experience: Attitude Challenges

- Biggest challenges in SMS implementation were:
  1) low interest levels
  2) reluctant and passive attitudes towards new changes

- Insiders exhibited negative attitudes towards increase in amount of tasks resulting from new changes

- Associated parties also worried about possible disadvantages arising from the safety inspection

SMS Success?

• In non-US airports’ interviews, no one would go on the record and say whether they had yet achieved success with SMS.
  – They *would say* certain specific areas were improved.
  – They *would not say* that less accidents were occurring now that they had a reporting system, for example…
Lessons Learned - from Interviewed Airports’ Perspective

• Do not wait until legislation is in place – start the process **now**.
• Some or much of **what you have** in place today can be used in an SMS framework.
• **Documentation** is the key SMS component to ensure and demonstrate an airport’s due diligence to requirements.
• Tackle SMS in **stages**, rather than trying to do everything at once.
• If not already done, establish and maintain a **good working relationship with your partners** and members of the airport community, including the regulator.
SMS Critical Challenges

Based on the interviews with airport authorities outside the US, the following aspects of SMS implementation were deemed both difficult to accomplish but also critical to success.

- Cultural change.
- Determining legal liability/accountability.
- Identifying a trained and qualified Safety Manager.
- Instituting data collection methodologies.
- Developing a workable non-punitive hazard-reporting system.
- Integrating airport SMS with other domains, particularly air traffic control and airlines.

These merit substantial research and planning.
Conclusion

- Aviation community around the world recognizes that safety is paramount to sustain global aviation growth
- No universal solution for improving airport safety, but SMS offers a customizable method that has been shown to work in other industries, including airlines
- Airport SMS should include the entire operation but avoid over-complexity, focus on processes, recognize the data-driven nature of SMS and be prepared for a phased approach
- Airport SMS implementation requires regulatory framework, management commitment and communications, cultural building and organization structure
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– Australia Civil Aviation Safety Regulations 1998 (CASR), regulation 139.250

– Australia Manual of Standards (MOS) – Part 139 Aerodromes, Chapter 10, Section 10.1.4


– Australia/New Zealand Standard – AS/NZS 4581:1999 – Management System Integration


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  • Getting Started
  • What’s in it for you?
  • Is it Working?
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