Project 12: Airport SMS Software Analysis

Presented by:
Steven Goetz, Southern Illinois University
Matthew Romero, Southern Illinois University
Yamini Gowda, The Ohio State University
Alyssa Manning, The Ohio State University

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The Team

• FAA
  – Lauren Vitagliano, Technical Monitor
  – Keri Lyons, Sponsor

• The Ohio State University
  – Seth Young, Project Lead
  – Shawn Pruchnicki, Management Support

• Southern Illinois University
  – Mike Robertson, Technical Lead
  – Bryan Harrison, Research Support
Purpose
• Understand the software used by airports to manage their SMS

Goal
• Provide the FAA with guidance towards recommending SMS software for airports, including minimum functionality standards

Software Analysis
• Reviewed commercially available SMS software products

Survey
• Accessed the airport community to see how they’re using SMS software
Part I
• Literature review and background

Part II
• Review of commercially available SMS software products

Part III
• Survey of airports that have some level of knowledge of SMS and have used some sort of software to manage their SMS
Part I – SMS Background

Safety Management Systems

• High-Risk Industries
  – Nuclear, maritime, petroleum, rail

• New Era in Aviation Safety
  – 1900 – 1970s = Technical Era
  – 1970s – min-1990s = Human Factors Era
  – Mid-1990s – Today = Organizational Era
SMS at Airports

- 2007  Pilot Project #1  22 Participants
- 2008  Pilot Project #2  9 Participants
- 2011  Implementation Study  14 Participants
- 2014  Robertson, Harrison, Ruiz  42 Airports w/ SMS
Identify SMS Software

- Basic Internet search for software related to Safety Management Systems
- 31 different software systems were identified
- 16 of the 31 software systems provided a demonstration or trial
  - 13 airport-specific
  - 3 for general industry
Methodology
• Identify the basic functionalities of the software
ICAO SMM

- Provided a basis from which we created the list of software functionalities
# Software Evaluation

## 37 Software Attributes Identified

<table>
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<th>Administrative</th>
<th>Policy and Objectives</th>
<th>Safety Risk Management</th>
<th>Safety Assurance</th>
<th>Safety Promotion</th>
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</thead>
<tbody>
<tr>
<td>Web-Based</td>
<td>SMS Manual Builder</td>
<td>Mandatory Hazard Reports</td>
<td>Audits</td>
<td>Communication with 3rd Parties</td>
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<td>Trend Analysis</td>
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<td>Document Upload</td>
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<td>Trend Analysis:</td>
<td>Training Modules</td>
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<td>Customizable Form</td>
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<td>Training Assessment</td>
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<td>Hazard Mitigation</td>
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<td>Integration with a</td>
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<td>Training Tracking for all Personnel</td>
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<td>Dashboard</td>
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# Administrative Capabilities

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<tr>
<th>Feature</th>
<th>Aviation Specific</th>
<th>Non-Aviation</th>
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<tbody>
<tr>
<td>Public Access</td>
<td>6</td>
<td>0</td>
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<tr>
<td>Off-Line Access</td>
<td>5</td>
<td>2</td>
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<tr>
<td>Mobile Applications</td>
<td>9</td>
<td>1</td>
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<tr>
<td>Web-Based</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Data Backup</td>
<td>10</td>
<td>2</td>
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<tr>
<td>Technical Support</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Individual Login</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Data Export</td>
<td>10</td>
<td>3</td>
</tr>
</tbody>
</table>
SMS Implementation and Policy Capabilities

- **Implementation Plan:** 1 (Aviation Specific), 0 (Non-Aviation)
- **Gap Analysis Tool:** 2 (Aviation Specific), 0 (Non-Aviation)
- **SMS Manual Builder:** 3 (Aviation Specific), 0 (Non-Aviation)
- **Software Design Based on ICAO/FAA:** 8 (Aviation Specific), 0 (Non-Aviation)
- **Document Upload:** 10 (Aviation Specific), 3 (Non-Aviation)

(0-14 range)
Risk Management Capabilities

- Hazard Report Feedback to Original Reporter
  - Aviation Specific: 8
  - Non-Aviation: 1
- Customizable Risk Matrix
  - Aviation Specific: 10
  - Non-Aviation: 0
- Risk Mitigation Planning
  - Aviation Specific: 10
  - Non-Aviation: 1
- Risk Assessment
  - Aviation Specific: 10
  - Non-Aviation: 1
- Customizable Surveys
  - Aviation Specific: 9
  - Non-Aviation: 2
- Confidential Hazard Reporting
  - Aviation Specific: 10
  - Non-Aviation: 1
- Voluntary Hazard Reporting
  - Aviation Specific: 10
  - Non-Aviation: 1
- Incident Assignment
  - Aviation Specific: 10
  - Non-Aviation: 2
- Email Notification to Safety Manager
  - Aviation Specific: 9
  - Non-Aviation: 3
- Mandatory Hazard Reports
  - Aviation Specific: 10
  - Non-Aviation: 2

Legend:
- Orange: Aviation Specific
- Pink: Non-Aviation
Airport SMS Software Evaluation

Safety Assurance Capabilities

- Trend Analysis: Mapping with GIS
  - Aviation Specific: 2
  - Non-Aviation: 1
- Hazard Mitigation Tracking
  - Aviation Specific: 10
  - Non-Aviation: 1
- Incident/Accident Investigations
  - Aviation Specific: 10
  - Non-Aviation: 2
- Audits
  - Aviation Specific: 10
  - Non-Aviation: 2
- Customizable form
  - Aviation Specific: 10
  - Non-Aviation: 3
- Trend Analysis
  - Aviation Specific: 10
  - Non-Aviation: 3
## Safety Promotion Capabilities

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<tr>
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<tr>
<td>Integration with a Learning Management System</td>
<td>2</td>
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<td>Training Modules</td>
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<td>Training Assessment Tools</td>
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<tr>
<td>Communication with 3rd Parties</td>
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<td>Dashboard</td>
<td>8</td>
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<td>9</td>
<td>2</td>
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<td>Training Tracking for all Personnel</td>
<td>8</td>
<td>3</td>
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<tr>
<td>Internal Email Communication</td>
<td>10</td>
<td>3</td>
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</tbody>
</table>

Legend: Aviation Specific, Non-Aviation
• Developed a survey to be distributed to 45 domestic civil airports
• Survey Purpose
  – Gauge the safety culture and Safety Management System implementation at airports
• **Survey Content**

SMS Software Programs

• Available SMS software products (select all that apply):
  - Aare608 SMS Safety Management System
  - Aviation SMS Software
  - Audit/Artits
  - AvSMS
  - Integrated Safety Management Systems (iSMS)
  - PRISM SMS
  - QLiLTX QPlace QPatrol
  - USML
  - QPeliq (iSMS) (Integrated Aviation Management Systems)
  - Quality SMS
  - SMS Manager
  - SMS Pro
  - WBAT
  - Software written in-house
  - Specialized SMS software not used
  - Other

• What works and what does not?

• **Capabilities and Features**

User Satisfaction

• Please provide your input on the following possible capabilities of software that may be managing an airport's safety or SMS program. This question is highly important to the research. Completion of this question is most applicable.

• Please rate how your SMS software product(s) meet the needs of your program with respect to the following characteristics.

• **What works and what does not?**
• Responding airports—Mostly small/medium hubs (NPIAS classification) or Class I (14 CFR Part 139).
• Several airports continue to develop and implement SMS programs, while other have ceased implementation for now.
• Most airports had their softwares installed on a local network server, which was accessible from multiple computers on their network.
• Out of the 6 airports paying higher upfront costs, some were paying for in-house built software, while others paid for software products installed by vendors.
• Airports paying less upfront costs instead paid monthly subscription costs.
• About 9 airports said that SMS software was limited to only certain users.
Must have  
Nice to have  
Not desired
Administrative Capabilities

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<td>Data Export</td>
<td>10</td>
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Reported Capability Necessity by Percent

- Public Access
- Off-Line Access
- Mobile Applications
- Web-Based
- Data Backup
- Technical Support
- Individual Login
- Data Export

- Must have
- Nice to have
- Not desired
### SMS Implementation and Policy Capabilities

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<td>0</td>
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### Reported Capability Necessity by Percent

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<td>Hazard Report Feedback to Original Reporter</td>
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<tr>
<td>Customizable Risk Matrix</td>
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<tr>
<td>Mandatory Hazard Reports</td>
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## Reported Capability Necessity by Percent

- **Must have**
- **Nice to have**
- **Not desired**

### Hazard Report Feedback to Original Reporter
- Must have: 80%
- Nice to have: 20%
- Not desired: 0%

### Customizable Risk Matrix
- Must have: 80%
- Nice to have: 20%
- Not desired: 0%

### Risk Mitigation Planning
- Must have: 80%
- Nice to have: 10%
- Not desired: 10%

### Risk Assessment
- Must have: 80%
- Nice to have: 10%
- Not desired: 10%

### Customizable Surveys
- Must have: 80%
- Nice to have: 10%
- Not desired: 10%

### Confidential Hazard Reporting
- Must have: 80%
- Nice to have: 10%
- Not desired: 10%

### Voluntary Hazard Reporting
- Must have: 80%
- Nice to have: 10%
- Not desired: 10%

### Incident Assignment
- Must have: 80%
- Nice to have: 10%
- Not desired: 10%

### Email Notification to Safety Manager
- Must have: 80%
- Nice to have: 10%
- Not desired: 10%

### Mandatory Hazard Reports
- Must have: 80%
- Nice to have: 20%
- Not desired: 0%
Safety Assurance Capabilities

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<td>Incident/Accident Investigations</td>
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Reported Capability Necessity by Percent

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<td>Training Tracking for all Personnel</td>
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<td>3</td>
</tr>
<tr>
<td>Internal Email Communication</td>
<td>10</td>
<td>3</td>
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</table>

### Reported Capability Necessity by Percent

- **Integration with a Learning Management System**: Must have (50%) - Nice to have (40%) - Not desired (10%)
- **Training Modules**: Must have (50%) - Nice to have (40%) - Not desired (10%)
- **Training Assessment Tools**: Must have (50%) - Nice to have (40%) - Not desired (10%)
- **Communication with 3rd Parties**: Must have (50%) - Nice to have (40%) - Not desired (10%)
- **Dashboard**: Must have (50%) - Nice to have (40%) - Not desired (10%)
- **Must Read Alerts**: Must have (50%) - Nice to have (40%) - Not desired (10%)
- **Training Tracking for all Personnel**: Must have (50%) - Nice to have (40%) - Not desired (10%)
- **Internal Email Communication**: Must have (50%) - Nice to have (40%) - Not desired (10%)
Thank you!

Questions?