

TRANSPORTATION RESEARCH BOARD

Lend a Helping Hand - Sharing Airport Data for Risk Management

August 9, 2021

@NASEMTRB
#TRBWebinar

Learning Objectives

1. Identify types of operations and safety data to collect and share for risk-based decision-making
2. Identify resources available to airports for operations and safety data collection



American Association of Airport Executives (AAAE)

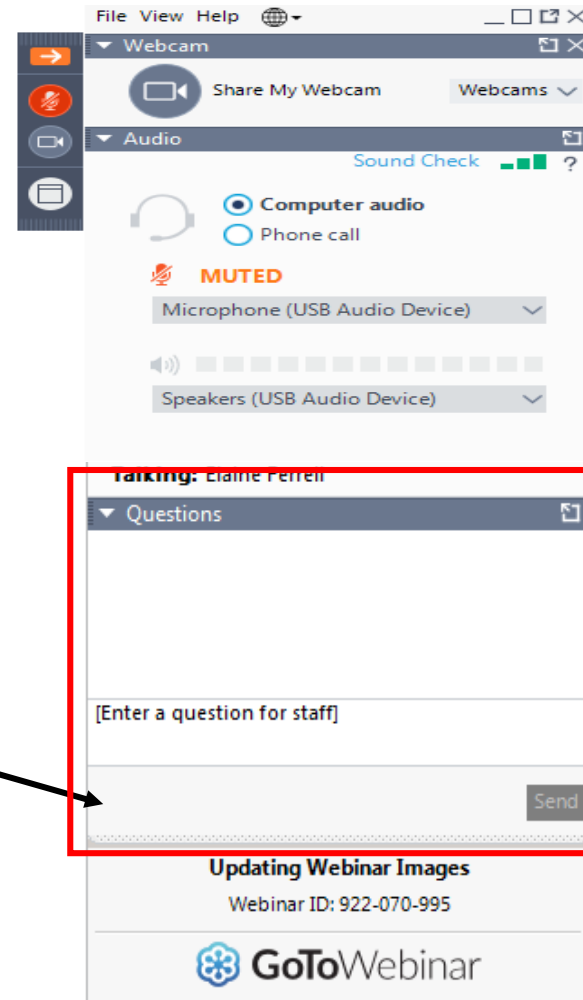
1.0 Continuing Education Units (CEUs) are available to Accredited Airport Executives (A.A.E.)

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Questions and Answers

- Please type your questions into your webinar control panel
- We will read your questions out loud, and answer as many as time allows



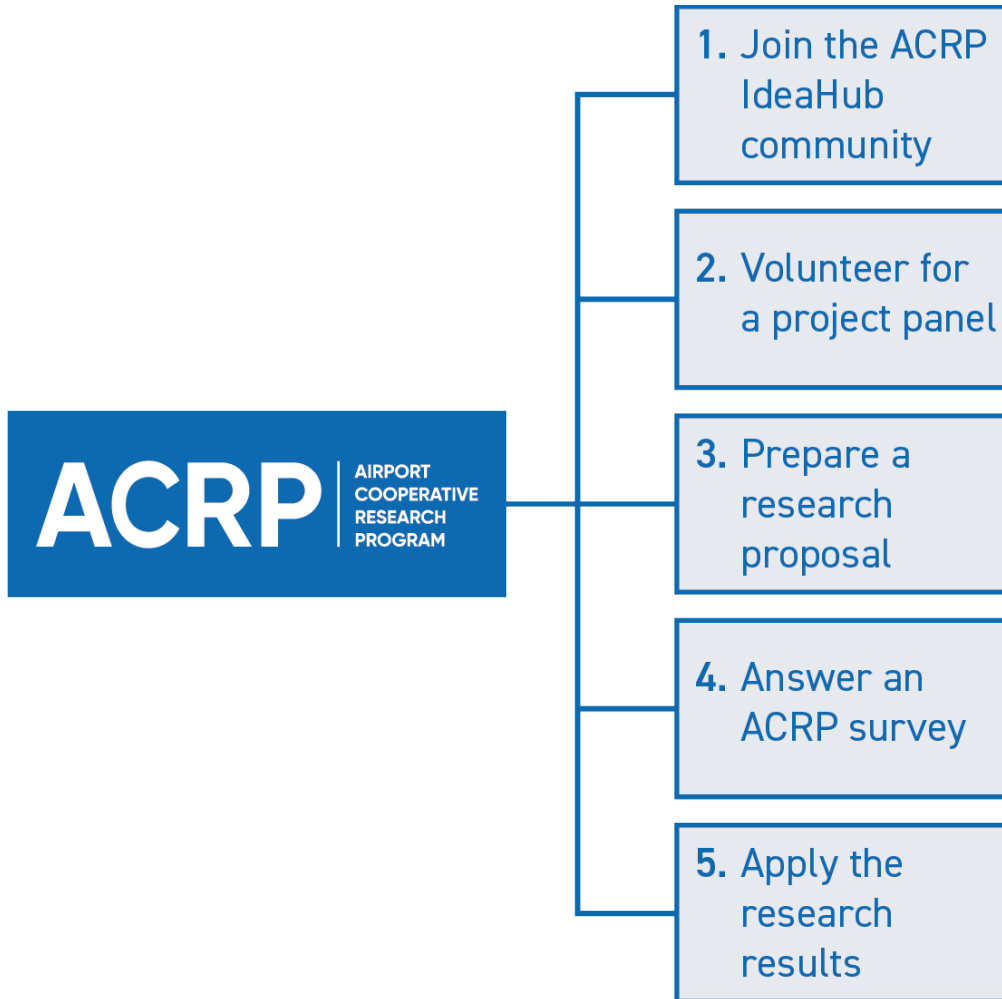
David Bannard

Kaplan Kirsch & Rockwell LLP

- More than 25 years of experience in representing airports on regulatory compliance, airport financings, use and lease agreements and rate-setting ordinances, airline and other tenant bankruptcies, defense of Part 16 actions, and the negotiation of concessions agreements.
- Experienced bond attorney, serving as bond counsel to airports and other issuers, counsel to borrowers and underwriters and disclosure counsel, as well as issuer's counsel, in many transactions.
- Dave served as chair of the ACRP legal projects for several years.



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Today's Speakers

Jennifer Salerno, Booz Allen Hamilton,

Dave Fleet, Faith Group, and

Ken Neubauer, Futron Aviation Corp.

Presenting

ACRP Report 222: Collecting and Sharing of
Operations and Safety Data

Collecting and Sharing of Operations and Safety Data

Jennifer Salerno, Booz Allen Hamilton

Dave Fleet, Faith Group

Ken Neubauer, Futron Aviation

Jennifer Salerno, CMAP

Principal Investigator

- 24 years of environmental experience, including over 10 years for aviation
- Senior Lead Technical Specialist, Booz Allen Hamilton
- Has been a Principal Investigator (PI) for multiple ACRP projects
- Served two 3-year terms as Chair of AV030, Environmental Impacts of Aviation (1994-2020)
- Change Management Advanced Practitioner (CMAP)



Dave Fleet

- ➔ 18 years in Airport Management
- ➔ 15 years in Airport Consulting – focused on Safety and Risk Management
- ➔ Has been a Principal Investigator for several ACRP and PARAS projects
 - Served as a SME on several more
- ➔ Facilitated and documented over 60 Safety Risk Management panels
- ➔ Nationally Recognized Facilitator



Ken Neubauer

- Technical Director for Aerospace Safety at Futron Aviation Corporation
- 20 Years of Aviation Safety Focus
- Safety Management Consultant to airports, automotive, and commercial aviation
- Career Navy pilot; Director of Naval School of Aviation Safety; Director of Aviation Safety Programs, Naval Safety Center
- Multiple ACRP safety projects as Principal Investigator



ACRP Report 222 Oversight Panel

David Bannard, Kaplan Kirsch & Rockwell, Panel Chairman

Geoffrey David Clark, MicroStrategy Japan

Catherine Coslick, MITRE Corporation

Keith Ellis, United Airlines

Mark Richter, Ricondo and Associates

Elizabeth Smart, St. Louis Lambert International Airport

Phillip Davenport, FAA Liaison

Susan Gardner, FAA Liaison

Ashley Sng, ACI-NA Liaison

Christine Gerencher, TRB Liaison

Marci Greenberger, ACRP Senior Program Officer

Guidebook Overview

Airports collect operations & safety data daily

→ Real-time and historic data is helpful to analyze risks and hazards

→ ACRP Report 222 (Guidebook) identifies:

- Data sources and data points for successful airport operations and safety data collection and sharing
- Available and relevant information sources, challenges, and best practices in data collection and information sharing



Research Problem

Airports require access to data to:

- Make informed, risk-based decisions
- Address emerging risk to make smarter decisions to address or reduce risk
- Monitor and understand trends
- Benchmark against the industry
- Identify and mitigate risks and hazards



Research Approach

Literature review and interviews

- Extensive literature review (reports, studies, etc.)
- Collected information on risk-based decision-making data collection and sharing
- Interviewed airport operational and safety managers

Result

- Recommendations and best practices for the collection, analysis, and sharing of operations and safety data to help address potential issues and enhance risk-based decision making

ACRP Report 222 (Guidebook)

Helps airports to better understand:

- Types of data available and sources
- Benchmarking methodology
- Categories of risk faced in operations
- Availability of information to assess and mitigate risks
- Data collection and sharing – challenges and issues

Serves as a resource providing:

- Illustrative examples
- How airports might adopt these practices to improve performance levels
- How to collect and share standardized formats of data

ACRP Report 222 (Guidebook) Overview

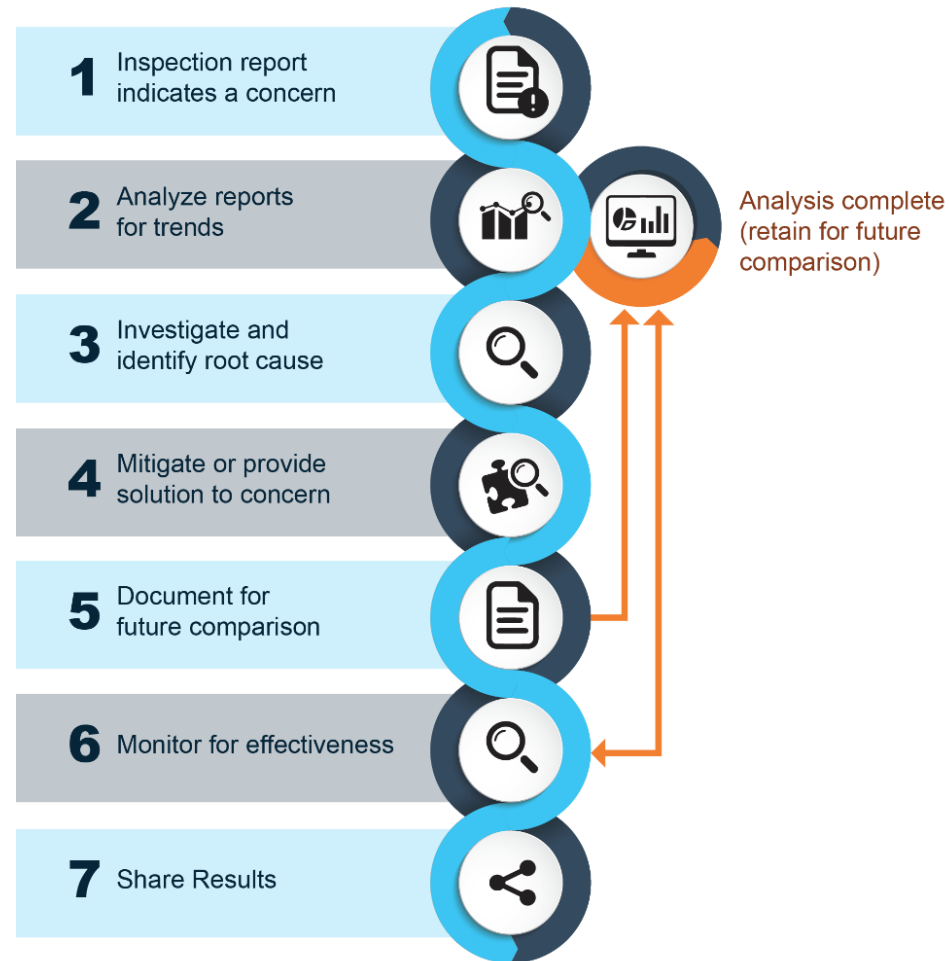
Research revealed (Chapter 2)

→ There are a wide variety of stakeholders with DATA that could be useful if shared

- FAA ATO
- FAA ARP
- FAA Tech Ops
- Airlines
- Cargo Carriers
- FBOs
- Ground Service Providers
- MRO
- Corporate Aviation
- General Aviation
- TSA
- CBP
- Airport Depts
 - PD/ARFF
 - MX/Ops
 - Commercial Dev.
- Security Companies
- Landside Operators
- Terminal Concessions
- Convention and Visitors Bureaus
- Chambers of Commerce

ACRP Report 222 (Guidebook) Overview

Data Sources (Chapter 3)



ACRP Report 222 (Guidebook) Overview

Data Sources

→ Internal (Airport Operator) – Inspections / Regulatory Compliance

Table 3-1. Internal data sources covered in this Guidebook.

Section #	Data Source
3.1.1	Part 139 Self-Inspection Reports
3.1.2	ARFF and Aircraft Fueling Equipment and Facility Inspection Reports
3.1.3	ARFF Runs (Non-Aircraft-Related) Reports
3.1.4	Airport Training Records
3.1.5	FOD Program Reports
3.1.6	Baggage Handling Area Inspection Reports
3.1.7	Ramp Inspection Reports
3.1.8	Terminal and Landside Inspection Reports
3.1.9	Safety and Incident Reporting

ACRP Report 222 (Guidebook) Overview

Data Sources / Uses

→ Internal Inspections – Example: Airfield Lighting

Table 3-2: Data Items from Airport Inspection Areas

Data Items	Description
Paved and Unpaved Areas	Number of pavement discrepancies noted along with type and location of discrepancy.
Safety Areas	Number of safety area discrepancies noted along with type and location of discrepancy.
Markings and Signs	Number of marking and sign discrepancies noted along with type and location of discrepancy.
Lighting	Number of lighting discrepancies noted along with type and location of discrepancy and catalogue by area of the airport where the discrepancy occurs.
NAVAIDs	Number of NAVAID discrepancies noted along with type and location of discrepancy.
Wildlife	Wildlife activity noted along with changes to environment impacting wildlife activity (wetlands expansion, trash accumulation, changes outside the airport property, etc.).
Fueling	Number of fuel spills and number of fire code violations noted.
Obstructions	Number of obstructions along with type and location of obstruction.
Hazmat	Number of storage tanks and leaks along with type and location of discrepancy.
Snow and Ice	Number of lights and signs damaged, FOD left on pavement following snow removal activities, (equipment parts, ice chunks, etc.) along with number and type, time required to clear, means and methods used, and amount of snow/ice accumulation.
Public Protection	Number of security discrepancies noted along with type and location of discrepancy.
Aircraft Rescue and Fire Fighting	Number of fire hazard discrepancies noted along with type and location of discrepancy.
Construction	FOD collected/reported (type and amount) and number of violations by construction workers.
Wind Indicators	Number of wind indicators and type and condition of wind indicators.

ACRP Report 222 (Guidebook) Overview

Given that Part 139 airports collect and manage the results from self-inspections, there are significant similarities in data collected and how data is managed airport to airport. While there are no technical requirements for data management, some large airports have sophisticated software and others use spreadsheets to track data. Despite differences in the methods of documentation, airports can and should share Part 139 inspection data given the possible benefits. The following is a brief example using airfield lighting.

Part 139 airports inspect lighting nightly. If lights are out in the movement area, this is documented and fixed as soon as possible. If more than two lights are out in a row, the lights must be corrected immediately. This requirement is even more stringent in Instrument Flight Rules (IFR) conditions. To this end, if an airport begins to note light failures in one specific area of the airfield, either on one taxiway or perhaps one side of a runway edge, and the frequency of outages is increasing, the airport operator must assume and investigate this situation as more than just normal bulb failure.

Upon investigation, the airport operator discovers that the lighting systems are working normally. There are no excessive ground faults, the regulators are operating normally, and the power supply is smooth and efficient. The operator determines that this taxiway (example) was recently transitioned to a new light fixture with light emitting diode (LED) bulbs in order to save energy as part of a construction project. Upon review, the operator discovers that the LED lights used meet the specifications in the project. The airport operator meets with the engineers and contractors to determine the root cause of this issue. ...

ACRP Report 222 (Guidebook) Overview

Example: Airfield Lighting

→ For this example to work effectively across several airports, airports would need the following information:

- Type of light (taxiway, runway, threshold, other)
- Location (as exact as practicable)
- Lighting system (e.g., which regulator, homerun, circuit)
- Light product, including part number

ACRP Report 222 (Guidebook) Overview

Table 3-3. Data sharing examples.

Part 139 Item	Sub-System (Location)	Issue	Issue Source	Frequency (per Month)	Time Between Discovery and Correction (Average)	Shared Data	Benefit
Lighting	Runway Edge	Burning too frequently	Part 139 nightly inspection results	6: approach end of Runway 5L	24 hours	<ul style="list-style-type: none"> Results of root cause analysis and possible fix (acquire new LED bulbs) are shared Share: circumstance and bulb manufacturer 	Cost savings, ensures improved safety through more reliable airfield lighting
Pavement Markings	Runway Edge Markings	Cracking and peeling shortly after repainting	Part 139 daily inspection results	12 x 10-ft sections	1 week	<ul style="list-style-type: none"> Results of root cause analysis shows poor paint quality (acquire new paint and inform FAA of specification variations) Share: circumstance and paint manufacturer 	Cost savings, improved safety through improved longevity of markings
Airfield Signage	Runway Hold Position Signage	Face panel fading within 1st year of deployment	Part 139 nightly inspection results	2 signs	1 to 2 days	<ul style="list-style-type: none"> Results of root cause analysis show poor quality signage panels; thus, fading prematurely Share: circumstance and signage panel manufacturer 	Cost savings, improved safety through improved longevity of signage
Snow Removal Operation	Plow Blades Damaging In-Pavement Lights	Parts of polyurethane blades are breaking off in-pavement light lenses	Part 139 inspections post-snow removal events	5 lights	2 days (time for analysis, change to procedures)	<ul style="list-style-type: none"> Results of root cause analysis revealed poly blades angled at 45 degrees are more likely to damage light fixtures. Rotating blades on edge (90 degrees to pavement) rarely damages lenses Share: circumstance and blade manufacturer 	Cost savings, improved lighting performance during snow removal; does not result in degradation of snow removal
Wildlife Hazard Management Program (WHMP)	Migratory Birds	Large flocks of migratory birds are overflying the airport	Continuous monitoring of WHMP	3 times per day on average over 2-week period	As soon as possible	<ul style="list-style-type: none"> Root cause analysis shows geese flight patterns changed due to above average rainfall filling low-lying areas near the airport 	Understanding hazards (flocks of large birds) enables a proactive approach to WHMP
Construction Activities	Haul Routes Crossing Active Movement Areas	Escorts are losing contact with all pieces of equipment going to/from work areas	Continuous monitoring of construction	18	1 week (time for analysis, change to procedures)	<ul style="list-style-type: none"> Airport policy allows two pieces of equipment to be escorted across movement areas. Second piece has been losing contact with escort and appears alone on the airfield. Root cause analysis determines that single pieces of equipment escorts are more appropriate. 	Additional costs for escorts; however, improved safety as escort policy was changed to 100% control and single vehicles

ACRP Report 222 (Guidebook) Overview

Example: Data Sharing from ARFF Response Vehicle Inspections

ARFF response vehicles are produced by several different manufacturers around the world. The information regarding their reliability, strengths, and weaknesses can and should be used by airports to determine which vehicles best suit their operations (i.e., climate might play a factor) and where to invest their money. In order to provide this information from one airport to another, the results of ARFF response vehicle inspections could be made available to a national data base where ARFF personnel and equipment maintenance staff could access the information to help them make decisions.

The results of inspections and testing could identify issues with water pumps, engines, fit and finish of the vehicles, and normal operational capabilities. Information sharing among ARFF personnel could help them make decisions regarding their fleet going forward. Information sharing also results in more open communications between airport ARFF personnel.

For example, an ARFF inspection may result in identifying a water pump issue. ARFF units must be able to dispense their allotment of water or chemical in a specific amount of time. The pumps used to accomplish this are critical to the ability of the unit. If pumps begin to slow or fail, the unit is out of service until repaired. Information shared about the type of pump, issue encountered, and the correction required helps other airports with the acquisition of new equipment or a maintenance need for existing equipment

ACRP Report 222 (Guidebook) Overview

Example: ARFF Response Vehicle Inspection

→ For this example to work effectively across several airports, airports would need the following information:

- Type and brand of vehicle
- Model year of the unit
- Specific issue identified (i.e., water pump not holding pressure, etc.)
- Correction requirements (i.e., new pump, different pump, etc.)
- Time of correction
- Date the issue is detected or recorded and date of correction

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Data Sources / Uses – More Examples

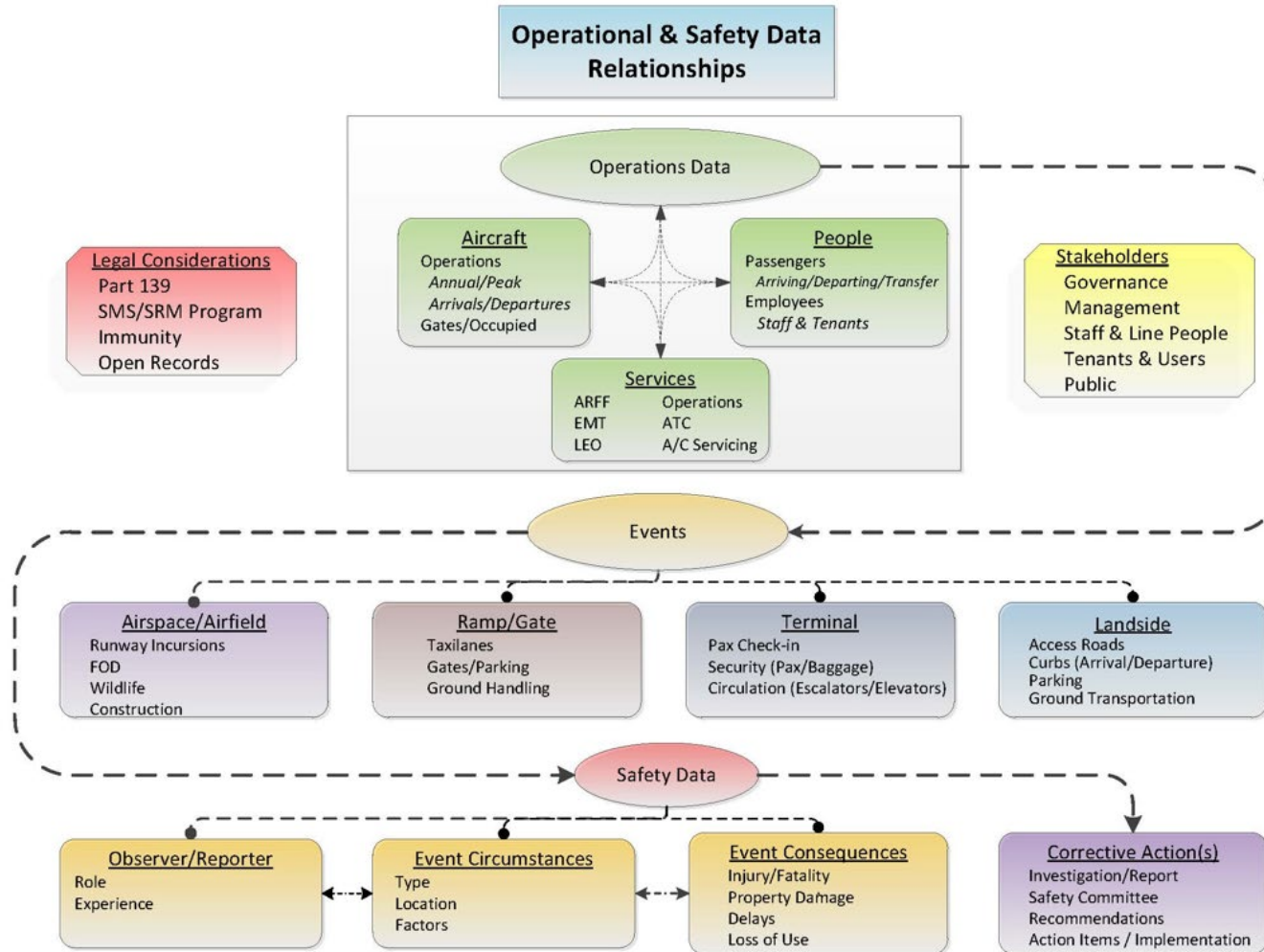
- Non-airfield ARFF Runs
- Training
- FOD Programs
- Baggage Handling
- Ramp Inspections
- GSE
- Property Damage
- Safety Reports/Hazards
- Terminal and Landside Ops
- Parking
- Shuttles/taxi/shared ride
- Terminal Equipment and Function
- Incidents and Accidents

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Table 3-15. National data sources.

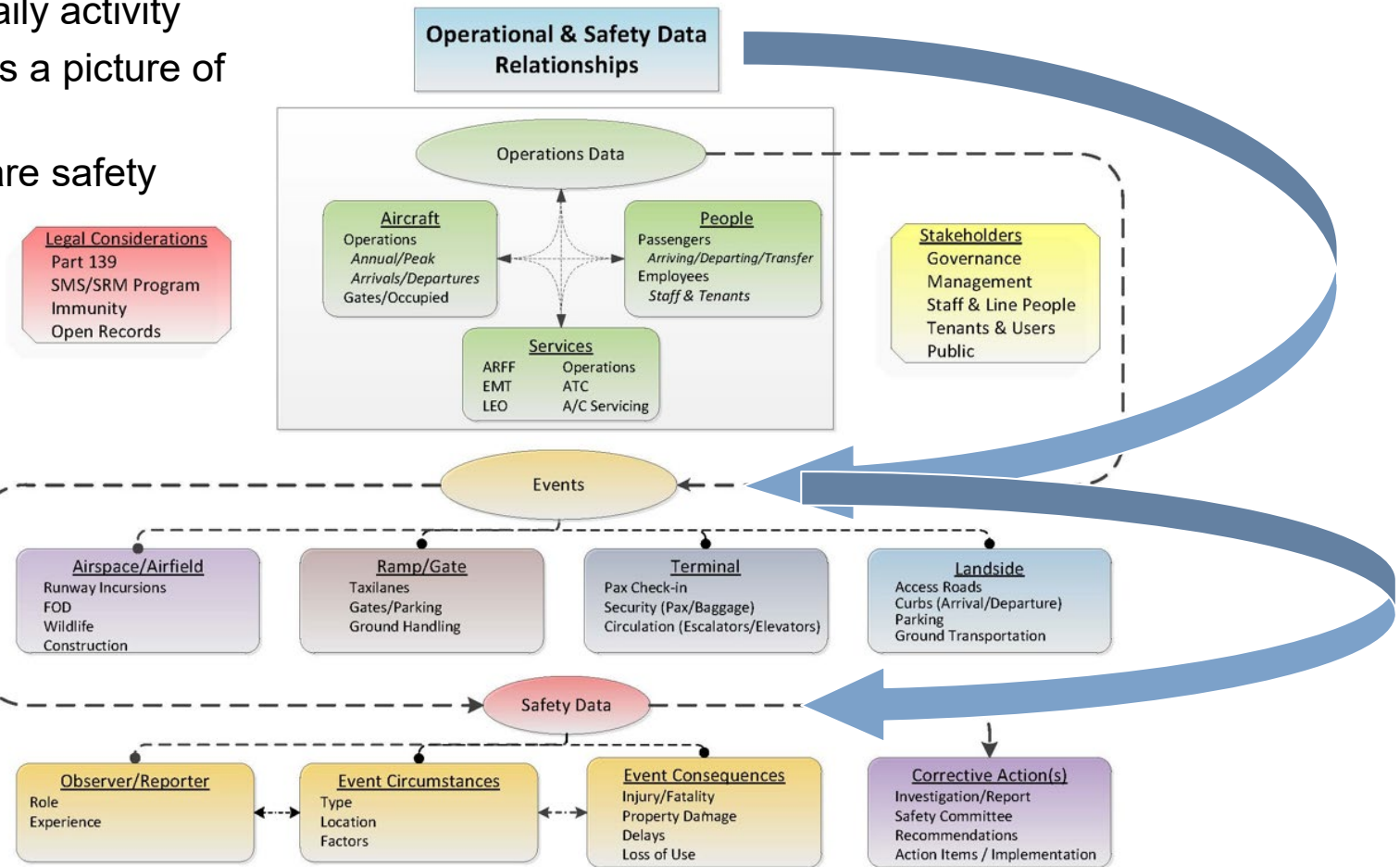
Section #	Data Source
3.2.1	Airport Data (FAA Form 5010)
3.2.2	Operations Network (OPSNET)
3.2.3	Passenger Enplanements and Cargo (BTS T-100)
3.2.4	Airport Financial Data (via CATS)
3.2.5	Airport Weather
3.2.6	Aviation Safety Reporting System (ASRS)
3.2.7	NTSB Accident Reports
3.2.8	FAA Aviation Incident Data System (AIDS)

ACRP Report 222 (Guidebook) Overview



A View Into Safety Data

- Ops data on daily activity
- Ops data paints a picture of airport events
- Some events are safety incidents



- Looking for those links between Ops data and Safety data

Data Collection and Analysis

Collection and Analysis

- Apply a systematic and consistent approach
 - Leads to discovery of lessons learned and trends
 - Trends and lessons learned can be shared
 - Internally with stakeholders
 - Externally with airports and industry organizations
- Two levels of analysis prior to sharing (minimum)
 - Initial level to determine system performance (internal)
 - Root cause analysis to lead to corrections/mitigations (sharable externally)

Safety Data Collection Sources

Safety Specific Sources

- Inspection reports (Part 139, safety audits, OSHA)
- Investigation reports (inspection results, accidents, incursions)
- Safety incident reports
- Safety hazard reports

Safety Related Sources

- Training records
- FOD reports
- Financial reports
- Other organizations on the airport (collection and sharing)

The real value of safety record data rests in the rigor an airport operator puts into the investigation of the reason a report was submitted. ~ Section 3.1.9.1

Analyzing Data with a Safety Eye

Table 3-3. Data Sharing Examples

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Define "Improved Safety"



Cost savings, ensures improved safety through more reliable airfield lighting

Cost savings, improved safety through improved longevity of markings

Cost savings, improved safety through improved longevity of signage

Analyzing Data with a Safety Eye

Financial Data – A Link to Safety

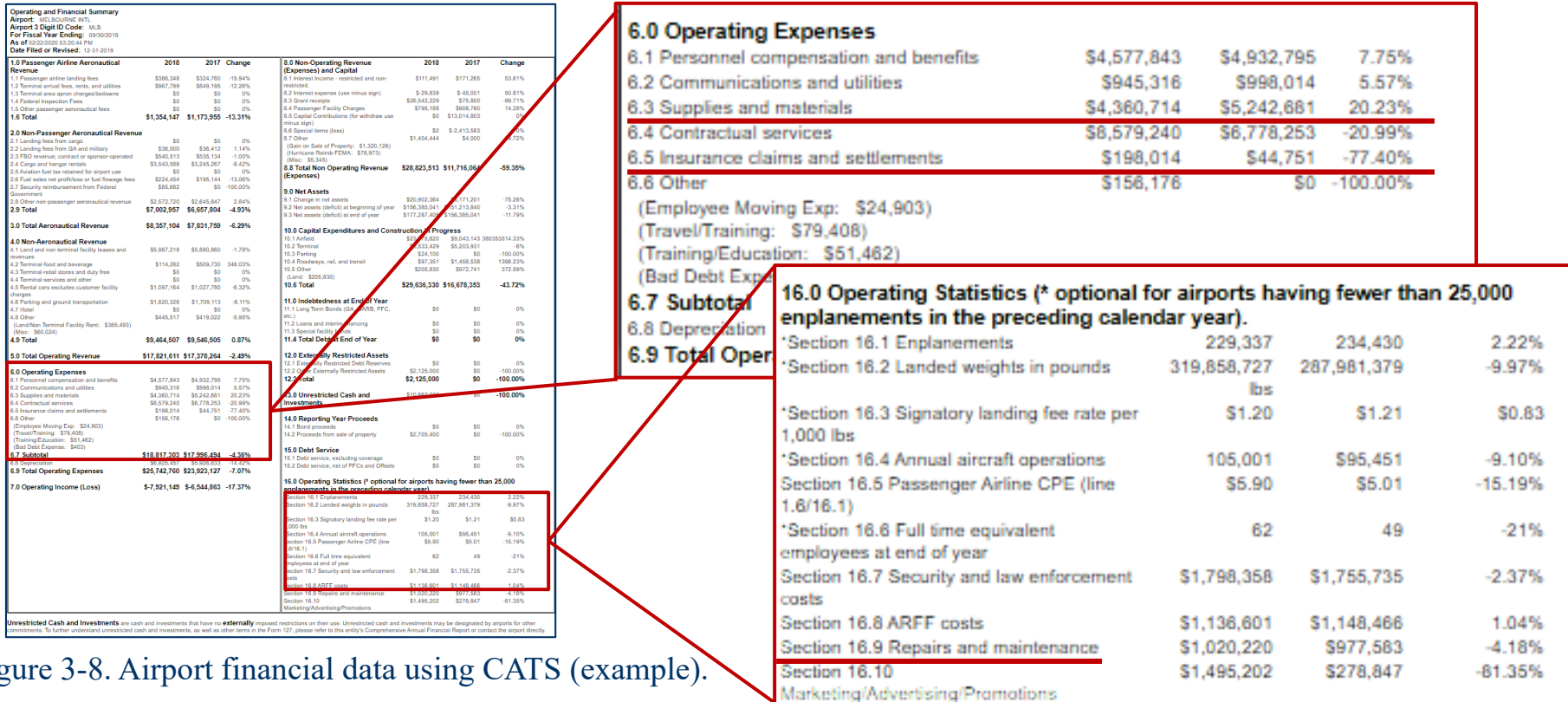


Figure 3-8. Airport financial data using CATS (example).

Data for Assessing Risk

Table 3-14. Data sharing example.

Incident Type	Location	Date/Time	Frequency	Root Causes	Cost of Claim	Mitigation	Status
Passenger Injury	Terminal A escalator	July 25/1930	4 to date	<ul style="list-style-type: none">Slippery surface due to rainImproper use with large luggage	\$7,000.00	TBD	Open

Additional data captured to assess risk

- Hazards impacting the incident
- Frequency of similar incidents (running total per month)
- Root causes of the hazards (recorded post-investigation)
- Costs of repairs, medical treatment

Safety Data Sharing

*When an airport shares and compares safety statistics with airports of **similar size and complexity**, operational deficiencies and hazards may be discovered through the process of asking **why there are differences in the data**. No airport is the same, and small airports in particular may not have the **operational exposure** to reveal existing hazards having yet to result in a bad outcome. Thus, comparing data with other like airports, and then analyzing the reasons for the differences may provide a **proactive means to correct deficiencies** before they result in an accident.*

~ Section 3.1.9.3

National Data Sources = Sharing

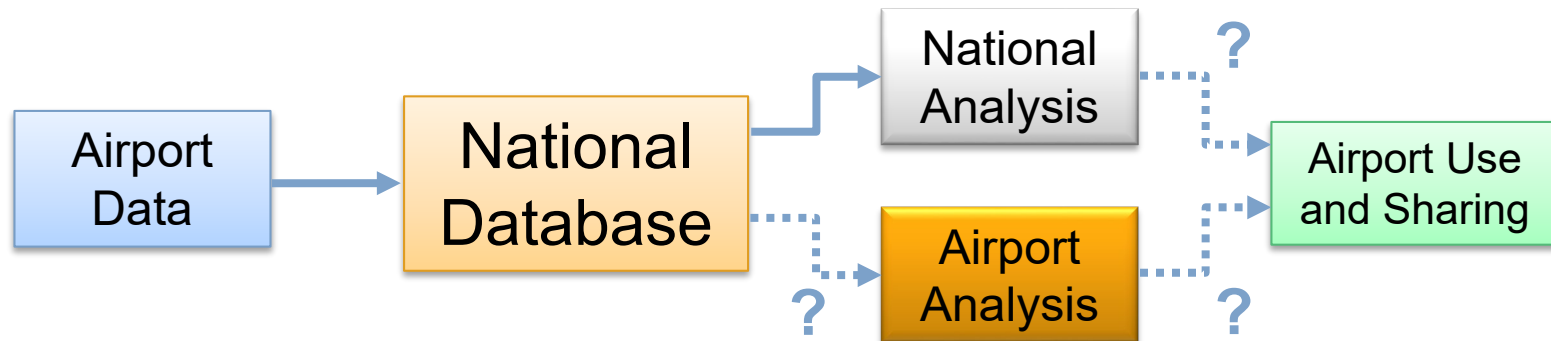


Table 3-15. National Data Sources.

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3.2.2	Airport operations (OPSNET)
3.2.3	Passenger enplanements and cargo (BTS T-100)
3.2.4	Airport financial data (CATS)
3.2.5	Airport weather
3.2.6	Aviation Safety Reporting System (ASRS)
3.2.7	NTSB Accident Reports
3.2.8	FAA Aviation Incident Data System (AIDS)

Safety Data Sharing

Aviation Safety Reporting System (ASRS)

Table 3-25. ASRS data.

Data	Description
Date and Report Number	Period of Research (or Report Number if known)
Place	Location (LOCID) and/or State
Environment	
Lighting	Dawn/Daylight/Night, etc.
Weather	Conditions (Rain/Snow/Fog, etc.)
Person	
Reporter Organization	Air Carrier/FBO/Personal, etc. (Note: Airport not a choice)
Reporter Function	ATC/Flight Crew/Ground Personnel, etc.
Aircraft	
Operation (FAR)	Regulatory Authority (FAR Part 91/121/135 etc.)
Flight Phase	Takeoff/Landing/Taxiing/Parked, etc.)
Flight Plan	VFR/IFR, etc.
In-Flight	Characteristics of observed clouds
Make/Model	Aircraft Type (B737-800/Challenger 650, etc.)
Mission	Passenger/Cargo/Training, etc.
Event Assessment	Classification and Description
Event Type	Anomaly (Ground incursion/excursion, etc.) Also, Critical vs Less Severe
Detector	Automation vs Person (also ATC, ATIS equipment, etc.)
Primary Problem	Procedure, staffing, airport, etc.
Contributing Factors	Company policy, human factors, environment (non-weather), etc.
Human Factors	Distraction, fatigue, situational awareness, etc.
Result	ATC/Flight crew (also Issued Advisory/Provided Assistance, etc.)
Text (Narrative/Synopsis)	Keywords with Boolean functions ("AND", "OR") and Wildcards ("%")



Data Sharing Challenges

Safety Data Sharing Challenges

- ➔ Lack of a requirement (SMS)
- ➔ Lack of an airport venue or platform
- ➔ No common taxonomy
- ➔ Sunshine Laws

Starting Point – Common Taxonomy

- ➔ Chapter 4 in the Guidebook
- ➔ Uses ASRS as a model

Table 4-3. Human factors related to event.

Field Name	Code	Format	Remarks
Human Factors (HF)			Multiple Entries allowed
Confusion	HFC	Checkbox (Y/N)	
Distraction	HFD	Checkbox (Y/N)	
Fatigue	HFF	Checkbox (Y/N)	
Physiological Conditions	HFP	Checkbox (Y/N)	
Situational Awareness	HFS	Checkbox (Y/N)	
Time Pressure / Workload	HFT	Checkbox (Y/N)	
Training/Quals	HFQ	Checkbox (Y/N)	
Equipment Failure	HFE	Checkbox (Y/N)	
Other	HFX	Alpha	
Communications Failure Between (CO)			
Party 1 & ATC	CO1	Checkbox (Y/N)	
Party 2 & ATC	CO2	Checkbox (Y/N)	
Party 1 & Party 2	CO3	Checkbox (Y/N)	
Other	COX	Alpha	

Path Forward (Chapter 5)

Individually or Collectively

→ Individual airports

- Require resources – perhaps as simple as a spreadsheet
- Analyze and investigate for actionable knowledge

→ Groups of airports

- Like size, complexity, Ops tempo, location
- Dashboards, mobile devices
- Sharing methods may be impacted by Sunshine Laws

Integrate into Existing Processes

→ ASRS, ASIAs

→ May provide path to privilege with third party partner

FOR ADDITIONAL INFORMATION



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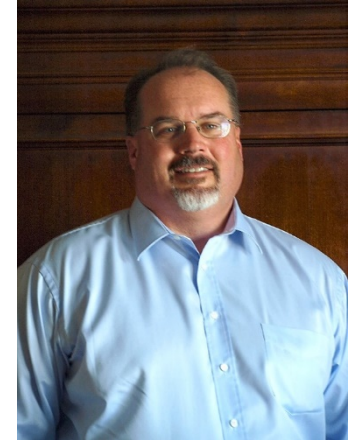
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Today's Panelists



Moderated by:
David Bannard,
*Kaplan Kirsch &
Rockwell LLP*



Dave Fleet,
Faith Group



Jennifer Salerno,
*Booz Allen
Hamilton*

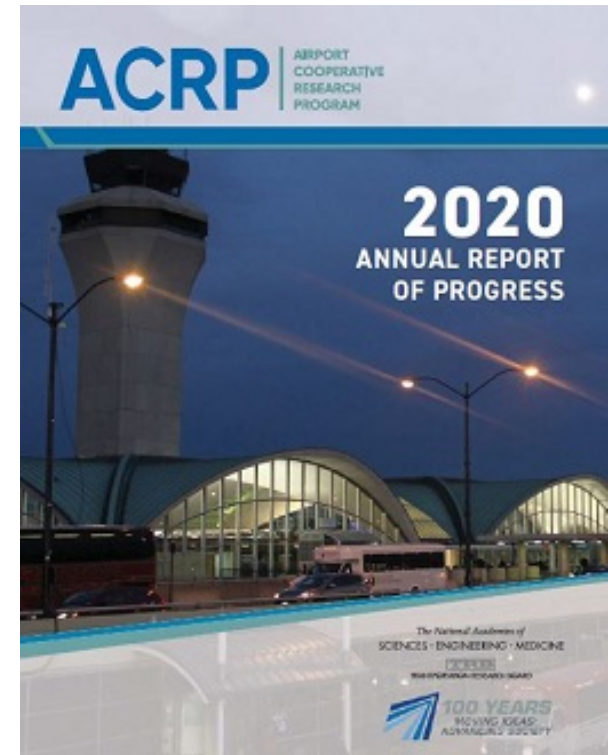


Ken Neubauer,
*Futron Aviation
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Other ACRP Research on Today's Topic

Report 131: [*A Guidebook for Safety Risk Management for Airports*](#)

Synthesis 26: [*Current Airport Inspection Practices Regarding FOD*](#)

Synthesis 58: [*Safety Reporting Systems at Airports*](#)

Synthesis 59: [*Integrating Airport Geographic Information System \(GIS\) Data with Public Agency GIS*](#)

Synthesis 105: [*Airport Surface Weather Observation Options for General Aviation Airports*](#)

Synthesis 71: [*Airport Safety Risk Management Panel Activities and Outcomes*](#)

Web-Only Document 50: [*Research Roadmap on Safety Issues*](#)

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