Topics

• ACRP 01-22 Research Background
• Research Findings and Conclusions
• Project Risk Management Recommendations for Airport Environments
• Practical Application of Available Tools
Research Objective

Development of a Guidebook to assist airports in proactively assessing and managing risks associated with capital and maintenance projects to ensure project scope, schedule and budget are met.

Guidebook will contain the following attributes:

– Scalability by project type and complexity
– Organization of material to allow flexibility to reader
– Immediate applicability of information
– Ability to tailor contents to current environment
Definitions

- Capital Project
- Maintenance Project
- Risk Management
- Project Risk
- Project Risk Management
Processes with Risk Management

- Strategic Business Plan
- SWOT Analysis
- Enterprise Risk Management
- Project Risk Management
- Process Improvements
- Succession Planning
- Continuity of Operations
- Risk Modeling
Differences and Similarities in Airports

Differences:

– Geographic location
– Governance structure
– HUB size

Similarities:

– Safe and secure operations
– Runways, terminals, parking
– Revenue and expenses
– Running a business
Trends in Airport Business

- Decreased AIP funding
- Consolidations of airlines
- Economic impacts
- Aging workforce
- Increased expectations of passengers
- Rapid changing technology
- Healthcare and retirement benefits
- Budget constraints
- Changing regulations
- Regionalization of airports
Research Approach
Research Approach

Existing Resources:
  – Literature Review
  – Methodologies Review

Data Collection:
  – Survey
Research Findings
Research Findings- Existing Resources

Literature Review

• Drafted definitions and objectives for project risk management

Methodologies

• Determined project risk management framework can be applied
Research Findings- Data Collection

Survey

• Validated definitions for project risk management, capital and maintenance projects
• Assessed maturity of risk programs
• Identified potential focus group participants
Survey Results- Hub Size

Please indicate your airport type. If you have multiple airports, please select your most predominant type of airport.

This indicates the number of responses by airport type, not the number of unique airports by size.
Survey Results - Governance

Please indicate your airport's governance structure:

- 25 Municipal
- 16 County
- 57 Authority / Quasi-government
- 2 State
- 0 Private
- 15 Other (Please specify)
Survey Results - Geo Region

Please indicate your airport's FAA region:
- New England: 1
- Eastern: 16
- Southern: 37
- Great Lakes: 18
- Central: 5
- Southwest: 14
- NW Mountain: 12
- Western Pacific: 12
- Alaska: 0
Survey Results - Risk Role

Please indicate whether you have an overall person/role who is responsible for managing risk for your organization:

- 62 We DO have an overall risk management person...
- 40 We DO NOT have an overall risk management person...
Do you have risk management processes established or embedded within your CAPITAL projects planning and/or execution processes?

Survey Results - Risk Processes in Capital v Maintenance

Do you have risk management processes established or embedded within your MAINTENANCE planning and/or execution processes?

41.46% Yes
58.54% No

52.7% Yes
46.3% No
## Project Risk Management Definition

<table>
<thead>
<tr>
<th>Type of Risk Management</th>
<th>Description</th>
<th>Sample Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generic</td>
<td>any uncertainty that, if it occurs, would affect one or more objectives.</td>
<td></td>
</tr>
<tr>
<td><strong>Project Risk Management</strong></td>
<td>any uncertainty that, if it occurs, would affect one or more <em>project objectives</em>.</td>
<td>Time, cost, performance, quality, scope, client satisfaction</td>
</tr>
<tr>
<td>Business Risk Management</td>
<td>Any uncertainty that if it occurs, would affect one or more <em>business objectives</em></td>
<td>Profitability, Market share, competitiveness Internal Rate of Return, reputation, repeat work, share price</td>
</tr>
<tr>
<td>Safety Risk Management</td>
<td>Any uncertainty that if it occurs, would affect one or more <em>safety objectives</em></td>
<td>Low accident rate, minimal lost days, reduced insurance premiums, regulatory compliance</td>
</tr>
<tr>
<td>Technical Risk Management</td>
<td>Any uncertainty that if it occurs, would affect one or more <em>technical objectives</em></td>
<td>Performance, functionality, reliability, maintainability</td>
</tr>
<tr>
<td>Security Risk Management</td>
<td>Any uncertainty that if it occurs, would affect one or more <em>security objectives</em></td>
<td>Information security, physical security, asses security, personnel security</td>
</tr>
</tbody>
</table>
Project Risk Management Framework
Research Approach

Data Collection:
– Focus Groups
– Interviews
Research Findings- Data Collection

Focus Groups

• Clarified survey findings
• Identified similar project types, tools and existing processes

Interviews

• Identified case studies
• Validated audience
• Identified scenarios and lessons learned
## Project Types

<table>
<thead>
<tr>
<th>Airside/ Airfield</th>
<th>Landside</th>
<th>Terminal- secure and non-secure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projects occurring on the airfield, apron, taxiways, runways, tug roads, hangars and landscaping</td>
<td>Projects occurring outside the security perimeter fence.</td>
<td>Projects occurring in secure and non-secure areas of the terminal</td>
</tr>
<tr>
<td>New runway/taxiway</td>
<td>Reconfigure roadway entrance to airport</td>
<td>Signage - way finding</td>
</tr>
<tr>
<td>Pavement rehabilitation</td>
<td>Pavement repairs</td>
<td>Terminal modernization</td>
</tr>
<tr>
<td>Glycol collection system repairs</td>
<td>Drainage repairs</td>
<td>Facility painting, carpeting</td>
</tr>
<tr>
<td>Connector taxiways</td>
<td>Golf course</td>
<td>Small concessionaires</td>
</tr>
<tr>
<td>Storm water detention</td>
<td>Storm water detention</td>
<td>New concessionaires build or remodel</td>
</tr>
<tr>
<td>NAVAID repair/replacement</td>
<td>Building repairs/remodels not associated with terminal</td>
<td>Escalators</td>
</tr>
<tr>
<td>Ramp Expansion</td>
<td>New road construction</td>
<td>Elevators</td>
</tr>
<tr>
<td>New/replacement and marking</td>
<td>Landscaping</td>
<td>Restrooms - maintain, remodel, build</td>
</tr>
<tr>
<td>Full parallel taxiway and additional aircraft parking</td>
<td>Paving- roads, parking, public thru -fares, parking lots</td>
<td>Tenant improvement requests</td>
</tr>
<tr>
<td>Apron expansion/repairs</td>
<td>Parking garage maintenance and repair, paving, gate maintenance</td>
<td>Facility security projects - bollards</td>
</tr>
<tr>
<td>Taxiway demolition and rebuild, Pavement reconstruction</td>
<td>Signage - road, DOT compliant</td>
<td>Terminal redesign - secure area</td>
</tr>
<tr>
<td>Airfield lighting repairs</td>
<td>Striping</td>
<td>Terminal renovation</td>
</tr>
<tr>
<td>Spot pavement repairs</td>
<td>Non-airfield roads</td>
<td>Baggage handling replacement</td>
</tr>
<tr>
<td>Vehicle gate maintenance</td>
<td>Airport owned roadway system outside of airfield Parking lot maintenance</td>
<td>Maintaining jet bridges</td>
</tr>
<tr>
<td>Terminal hangar, Hangar rehab, Hangar door repairs</td>
<td>Parking facility rehab and improvements</td>
<td>Substation panel - replacement</td>
</tr>
<tr>
<td>Paving - Taxiways</td>
<td>Mowing</td>
<td>Chiller</td>
</tr>
<tr>
<td>Drains</td>
<td>Patching roads</td>
<td>Generators</td>
</tr>
<tr>
<td>Aprons</td>
<td>Replacing signage</td>
<td>Changing filters, faucets, toilets</td>
</tr>
<tr>
<td>Runways</td>
<td>Landscaping</td>
<td>Gas and water leaks</td>
</tr>
<tr>
<td>Patching roads, Rubber removal</td>
<td>Striping</td>
<td>Roof, window, door repairs</td>
</tr>
<tr>
<td>Replacing signage</td>
<td></td>
<td>Mechanical systems</td>
</tr>
<tr>
<td>Landscaping</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Striping</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Interview Findings

<table>
<thead>
<tr>
<th>Airport</th>
<th>Project Risk Focus Areas</th>
<th>Project Management Techniques Used</th>
<th>Project Risk Management Techniques Used</th>
<th>Risk Identification</th>
<th>Risk Assessment</th>
<th>Risk Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port Authority of New York New Jersey</td>
<td>Schedule Budget</td>
<td>CPM Schedule Periodic status meetings Contingency budgeting</td>
<td>Brainstorming Expert Interviews</td>
<td>Qualitative (Risk matrix) Quantitative (Monte Carlo simulation) to establish risk-based contingencies</td>
<td>Risk Register Risk Management Plans</td>
<td></td>
</tr>
<tr>
<td>Columbus Regional Airport Authority</td>
<td>Schedule Budget</td>
<td>Project charter Project plans Periodic status meetings Capital Project Committee</td>
<td>Brainstorming Consultant contributions</td>
<td>Consultant contributions</td>
<td>Consultant contributions</td>
<td></td>
</tr>
<tr>
<td>San Diego Regional Airport Authority</td>
<td>Schedule Budget</td>
<td>Project plans Periodic status meetings Contingency budgeting</td>
<td>Consultant contributions Risk workshop with subject matter experts</td>
<td>Consultant contributions Quantitative Analysis (Monte Carlo simulation) to forecast schedule and cost as a function of confidence level and to establish risk-based cost contingencies</td>
<td>Consultant contributions Risk Register Risk Management Plan</td>
<td></td>
</tr>
<tr>
<td>Seattle- Tacoma Port Authority</td>
<td>Schedule Budget</td>
<td>Periodic status meetings</td>
<td>Brainstorming Consultant contributions</td>
<td>Contractor solutions</td>
<td>Contractor solutions</td>
<td></td>
</tr>
<tr>
<td>St Petersburg Clearwater International Airport</td>
<td>Schedule Budget</td>
<td>Contractor solutions Regulatory requirements</td>
<td>Contractor solutions Regulatory requirements</td>
<td>Contractor solutions Regulatory requirements</td>
<td>Contractor solutions Regulatory requirements</td>
<td></td>
</tr>
<tr>
<td>Orlando International Authority</td>
<td>Schedule Budget</td>
<td>Contractor solutions Regulatory requirements</td>
<td>Contractor solutions Regulatory requirements</td>
<td>Contractor solutions Regulatory requirements</td>
<td>Contractor solutions Regulatory requirements</td>
<td></td>
</tr>
<tr>
<td>Albert Whitted Regional Airport</td>
<td>City mandated processes</td>
<td>Contractor solutions City processes</td>
<td>Contractor solutions</td>
<td>Contractor solutions</td>
<td>Contractor solutions</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions
Conclusions

Project Risk Management Practices

• Increasing use of risk management in organizations

• Inconsistent or immature in most airports

• Basic risk framework applies to airport projects

• Consistent practices benefit airports

• Practices are scalable determined by *project type*
Conclusions

Project Risk Management Tools

- *Complexity* of the project can determine scalability of tool use

- Regardless of formality of project management practices, tools apply

- Although staff performing project work may be different, tools may be the same

- Need a flexible, simple, clear, and easy to navigate set of tools for any type or complexity of airport project
Recommendations
Conclusions to Recommendations

Project Risk Management Practices

- Increasing use of risk management in organizations
- Inconsistent or immature in most airports
- Basic risk framework applies to airport projects
- Consistent practices benefit airports
- Practices are scalable determined by *project type*

**RECOMMENDATION:**

Develop guidebook with narrative section by project risk management phases which include scenarios illustrating application of the project risk management phase and related tools in an airport project example.
Conclusions to Recommendations

Project Risk Management Tools

- *Complexity* of the project can determine scalability of tool use
- Regardless of formality of project management practices, tools apply
- Although staff performing project work may be different, tools may be the same
- Need a flexible, simple, clear, and easy to navigate set of tools for any type or complexity of airport project

**RECOMMENDATION:**

Develop a set of simple and complex tools related to each project risk management phase to allow audience to select tool relative to complexity of the project
Benefits of Project Risk Management Practices
Project Risk Management Practice Benefits

• Review project scope, schedule, budget for feasibility- revise before issues occur
• Lower cost
• Project priority and resource management
• Establish realistic contingencies
• Increase communication about progress, efforts, outcomes
• Better estimating for future projects
Practical Application of Tools
# Tool Set

<table>
<thead>
<tr>
<th>Step</th>
<th>High Risk</th>
<th>Low Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Large, Critical, or Complex Projects)</td>
<td>(Simple or Small-Scale Project)</td>
</tr>
<tr>
<td>Planning</td>
<td>Tool: Risk Management Plan</td>
<td></td>
</tr>
<tr>
<td>Identification</td>
<td>Tool: Risk Register</td>
<td>Tool: Risk Checklist</td>
</tr>
<tr>
<td>Analysis</td>
<td>Tool: Updated Risk Register</td>
<td>Tool: Probability and Impact Matrix Worksheet</td>
</tr>
<tr>
<td></td>
<td>(based on quantitative and/or qualitative analysis)</td>
<td></td>
</tr>
<tr>
<td>Response Planning</td>
<td>Tool: Updated Risk Register</td>
<td>Brainstorming Session</td>
</tr>
<tr>
<td>Monitor &amp; Control</td>
<td>Tool: Risk Register</td>
<td>Periodic status meetings as required, including discussion of progress, issues, etc.</td>
</tr>
</tbody>
</table>
Probability and Impact Matrix

Step 1: Determine Risk Score for Documented Project Risks

- Probability Scale:
  - 1: Very Low
  - 2: Low
  - 3: Medium
  - 4: High
  - 5: Very High

- Impact Scale:
  - 1: Negligible
  - 2: Low
  - 3: Medium
  - 4: High
  - 5: Catastrophic

Step 2: Plot Probability / Impact Values for All Documented Risks

- Plot each documented Risk by the value of its Probability (Y-axis) and Impact (X-axis) on the matrix.

Step 3: Assign Levels to Plotted Matrix

- Calibrate the Risk Ranking Matrix boxes by assigning Risk Level values according to the following table:

<table>
<thead>
<tr>
<th>Risk Score Range</th>
<th>Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 - 3.9</td>
<td>Low</td>
</tr>
<tr>
<td>4.0 - 5.9</td>
<td>Medium</td>
</tr>
<tr>
<td>6.0 - 9.9</td>
<td>High</td>
</tr>
</tbody>
</table>

- CAVEAT: Default Risk Score Ranges are presented in worksheet template as a starting point. Organizations should determine the Risk Score Ranges that reflect their own risk tolerances.
# Probability and Impact Matrix

## Step 1: Determine Risk Score for Documented Project Risks

<table>
<thead>
<tr>
<th>Risk Number</th>
<th>Risk Description Summary</th>
<th>Probability Value</th>
<th>Impact Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Customer slow in making decisions about design which impacts schedule</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Competing priorities for project work team will impact schedule and budget</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Unforeseen conditions found in demolition impact scope may cause redesign</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Need for permits to perform construction activities may impact schedule</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Long lead time for selected materials cause delay in start of project</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

## Step 2: Plot Probability / Impact Values For All Documented Risks

- Plot each documented Risk by the value of its Probability (Y-axis) and impact (X-axis) on the matrix.

## Step 3: Assign Risk Levels to Plotted Matrix

- Calibrate the Risk Ranking Matrix boxes by assigning Risk Level values according to the following table:

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<thead>
<tr>
<th>Risk Score Range</th>
<th>Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>Low</td>
</tr>
<tr>
<td>3-14</td>
<td>Moderate</td>
</tr>
<tr>
<td>&gt;14</td>
<td>High</td>
</tr>
</tbody>
</table>

- CAVEAT: Default Risk Score Ranges are presented in worksheet template as a starting point. Organisations should determine the Risk Score Ranges that reflect their own risk tolerances.
Questions

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