Information on ACRP

- [www.TRB.org/ACRP](http://www.TRB.org/ACRP)
- Regular news and updates on:
  - Upcoming and ongoing research projects
  - New publications
  - Success stories
  - Announcements
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- **March 15** – *Air Service Strategies for Small, Medium, and Non-Hub Airports in Today’s Competitive Environment*
- **March 17** – *Identifying and Developing New Sources of Airport Revenue*
- **April 6** – *Effective Emergency Management Preparedness*

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- ACRP’s Champion program is a new initiative!
- Designed to help early- to mid-career, young professionals grow and excel within the airport industry.
- Airport industry executives sponsor promising young professionals within their organizations to become ACRP Champions.
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Additional ACRP Publications Available on this Topic

- **ACRP Report 40** – Airport Curbside and Terminal Area Roadway Operations

- **ACRP Report 110** – Evaluating Impacts of Sustainability Practices on Airport Operations and Maintenance

- **ACRP Report 148** – LED Airfield Lighting System Operation and Maintenance

- **ACRP Synthesis 49** – Helping New Maintenance Hires Adapt to the Airport Operating Environment

- **ACRP Synthesis 63** – Overview of Airport Fueling Operations

You can learn more about these publications by visiting [www.trb.org/publications](http://www.trb.org/publications)
Today’s Speakers

Moderated by Chad Makovsky, City of Phoenix Aviation Department

   • Peter Dahl, Ph.D., HGA Architects and Engineers

2) Report 92: Guidebook to Creating a Collaborative Environment Between Airport Operations and Maintenance
   • Mike Nichols, Amadeus Consulting
   • Steve Wareham, Trillion Aviation
ACRP Report 139: Airport Building O&M Optimization and Retrocommissioning: A Whole-Systems Approach

Peter K. Dahl, Ph.D., LEED AP BD+C & O+M, CEM
HGA Architects & Engineers
Peter K. Dahl, Ph.D., LEED AP BD+C & O+M, CEM
Principal Investigator

- Director of Sustainable Operations, HGA Architects & Engineers
- Ph.D. in Architectural Engineering from Penn State
- Chair, USGBC-Minnesota Chapter
- Certified Energy Manager (CEM)
ACRP Report 139 Oversight Panel

Peter Higgins, *Salt Lake City Department of Airports*, (Chair)
Isilay Civan, *HOK*
Richard Connolly, *Los Angeles World Airports*
Lorie Hinton, *Arapahoe County (CO) Public Airport Authority*
Tansu Sengezener, *Johnson Controls*
John A. Walewski, *Texas A&M University*
Kelly Slusarski, *FAA Liaison*
Richard Marchi, *ACI-North America Liaison*
Christine Gerencher, *TRB Liaison*
ACRP Report 139: Retrocommissioning

• Documents best practices for a whole-building lifecycle approach to O&M optimization and retrocommissioning
  o Improve reliability
  o Control energy costs
  o Reduce emissions

• Provides guidance for preparing a building systems optimization and retrocommissioning plan

• Published February 2015
Research Problem

Challenges for airport facilities

• Operating budget cuts
• Deferred maintenance
• Energy costs and associated emissions
• Facility reliability
• Customer experience
Research Approach

O&M best practices:

- Staff training
- Preventive & Predictive maintenance programs
- Computerized Maintenance Management Systems
- Building Information Models (BIM)
- Energy Management Program
- Energy Audits
- **Retrocommissioning:**
  - Planning
  - Investigation
  - Implementation
  - Verification & Monitoring
Retrocommissioning (RCx)

Retrocommissioning applies commissioning to an existing building.

1. Perform investigation
2. Make corrections
3. Validate performance
Logan International

Central Plant Retrocommissioning

• Cost for investigation phase: $120,000
  • Included hydraulic modeling for central plant and distribution systems throughout the airport with extensive field investigations

• Results:
  • Recommended $3.2 million in projects
  • Estimated cost avoidance $1.5 million per year
Central Plant Retrocommissioning

• **Operational recommendations:**
  – Decrease Differential Pressure Setpoints
  – Renovate Building Chilled Water Systems
  – Reset Chilled Water Supply Temperatures
  – Operate Only Electric Chillers

• **Capital project recommendations:**
  – Bypass Building Pumps
  – Upgrade & Expand Plant Metering
  – Address Steam System Losses
  – Install VFDs on Cooling Tower Fans
  – Install VFDs on Boiler Induced Draft Fans & Forced Draft Fans
  – Replace Compressors
## Summary of recommendations

- Estimated implementation cost
- Estimated annual cost avoidance
- GHG emissions avoided

<table>
<thead>
<tr>
<th>ECM No.</th>
<th>ECM Description</th>
<th>Estimated Implementation Plan</th>
<th>Estimated Implementation Cost - Engineering</th>
<th>Estimated Implementation Cost - Materials/Labor</th>
<th>Estimated Implementation Cost - Total</th>
<th>Estimated Annual Utility Reductions</th>
<th>GHG Reduction (Metric Tons CO2)</th>
<th>Total Estimated Annual Cost Avoidance</th>
<th>Simple Payback (yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bypass Building Pumps, Remove 3-Way Valves, Open Balancing Valves and Deny Valves, Piping Modifications</td>
<td>Facilities / Design - Bid - Build</td>
<td>$22,000</td>
<td>$78,000</td>
<td>$100,000</td>
<td>417,043</td>
<td>1,422,951</td>
<td>156</td>
<td>$47,126</td>
</tr>
<tr>
<td>2</td>
<td>Decrease Differential Pressure Setpoint/ Modify SCHW Pump Staging, Add Monitoring Points</td>
<td>Facilities/ Controls Contractor - Engineering Support</td>
<td>$6,000</td>
<td>$19,000</td>
<td>$25,000</td>
<td>218,713</td>
<td>746,249</td>
<td>82</td>
<td>$24,715</td>
</tr>
<tr>
<td>3</td>
<td>Renovate Building Chilled Water Systems</td>
<td>Facilities/ Term Contractors - Engineering Support</td>
<td>$41,000</td>
<td>$90,000</td>
<td>$131,000</td>
<td>454,668</td>
<td>3,137,327</td>
<td>255</td>
<td>$66,920</td>
</tr>
<tr>
<td>4</td>
<td>Reset chilled water supply temperature</td>
<td>Facilities/ Controls Contractor - Engineering Support</td>
<td>$8,000</td>
<td>$22,000</td>
<td>$30,000</td>
<td>68,000</td>
<td>3,032,016</td>
<td>174</td>
<td>$35,124</td>
</tr>
<tr>
<td>5</td>
<td>Operate Only Electric Chillers/ Upgrade Plant Metering</td>
<td>Facilities/ Design - Bid - Build</td>
<td>$65,000</td>
<td>$370,000</td>
<td>$435,000</td>
<td>3,041,091</td>
<td>110,624</td>
<td>100,447,796</td>
<td>4,744</td>
</tr>
<tr>
<td>6</td>
<td>Address Steam System Losses</td>
<td>Facilities/ Vendors</td>
<td>$0</td>
<td>$120,000</td>
<td>$120,000</td>
<td>16,618</td>
<td>16,618,000</td>
<td>882</td>
<td>$171,856</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td></td>
<td></td>
<td><strong>$142,000</strong></td>
<td><strong>$699,000</strong></td>
<td><strong>$841,000</strong></td>
<td><strong>1,882,667</strong></td>
<td><strong>131,828</strong></td>
<td><strong>125,404,340</strong></td>
<td><strong>6,294</strong></td>
</tr>
</tbody>
</table>
Colorado Springs

“Leveraging a Utility Conservation Program”

• ASHRAE Level 1 Energy Audit by third party
  • 11 low-cost recommendations
  • 10 recommendations requiring capital budgeting
• Implemented:
  • $60,081 in lighting upgrades with payback less than 2 years
  • Improvements to tenant kitchen equipment
  • Revisions to building pressurization and economizer operation
  • Revisions to control point dead bands; pneumatic and DDC
  • Supply air temperature reset based on outside air temp
  • Static pressure reset to control VAV supply fans
Minneapolis-Saint Paul
Minneapolis-Saint Paul

<table>
<thead>
<tr>
<th>Level</th>
<th>Focus</th>
<th>System Architecture Tier</th>
<th>Primary Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise Operations</td>
<td>Enterprise</td>
<td>Enterprise</td>
<td>Enhanced operational and management</td>
</tr>
<tr>
<td>Systems Integration</td>
<td>Terminal / Facility</td>
<td>Network</td>
<td>effectiveness</td>
</tr>
<tr>
<td>BAS &amp; Controls</td>
<td>Systems &amp; Equipment</td>
<td>Field</td>
<td>Dataflow</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operational efficiency</td>
</tr>
</tbody>
</table>

- **Building Systems**
  - HVAC
  - Lighting
  - Fire Alarm
  - Metering
  - Conveyance

- **Systems Integration**
  - Connectivity
  - Integration
  - Optimization

- **System Architecture Tier**
  - Enterprise
  - Network
  - System
  - Field
Minneapolis-Saint Paul
Minneapolis-Saint Paul
Minneapolis-Saint Paul

Critical Success Factors

• Obtain executive level support for the program
• Integrate first time and ongoing component procurement into appropriate budgets
• Delegate responsibility for updating controls systems to a single individual to ensure consistency and uniform development
Summary from Case Studies

1. Get the right people at the table
2. Engage a third party
3. Commit to implementation
Optimization through RCx

• **Define objectives:**
  • Energy reductions (evaluate utility rebate programs)
  • Resolve chronic equipment failures
  • Improve occupant comfort

• **Scope the project:**
  • Project boundaries
  • Building systems
  • Functional testing & trending performance

• **Budgeting/procurement:**
  • Target for annual savings (energy, maintenance, etc.)
  • Identify budget for quick fixes
  • Estimate labor to perform assessment & investigation
Planning for RCx

Identify Project Scope

Potential Considerations:
- Building Footprint
- Control System
- AHU/Pressure Zones
- Chronic repair issues
- Area Use
  - Secure Passengers
  - General Public
  - Baggage Handling

Feasibility/Limits

Potential Considerations:
- System configuration
- Number of AHUs
- Number of VAVs
- Space uses
- Building vintage

Finalize Scope of Work

Revise Scope as Necessary to Meet Budget/Time Constraints

Request for Proposals and Budgeting
RCx Process

Investigation
• Collect operational data, test systems, complete technical analysis and provide recommendations

Implementation
• Execute approved changes, provide training as appropriate

Verification & Monitoring
• BAS trending, measurement & verification, recommissioning, ongoing commissioning
Report 139: Optimizing O&M

Tools for Implementation

- Process map with detailed descriptions
- Sample retrocommissioning scopes of work
- Sample retrocommissioning plans
- Sample optimization reports
- Master list of recommendations
  - Ranking tool for prioritization
**Airport Facility Optimization Ranking Tool**

**Introduction:** Retrocommissioning efforts often uncover many energy and cost saving opportunities, but many times budget or resource constraints hinder implementation efforts. The SIMPLE list provides a Master List of best practices for optimizing facilities and reducing lifecycle costs. The ADVANCED tool seeks to help teams pursuing retrocommissioning to prioritize opportunities based on 5 criteria:

- **Implementation Costs** This measure includes all costs associated with the effort including capital costs, design / consulting fees, etc.
- **Potential Cost Savings** This measure includes all cost savings which could be in the form of lower utility bills, avoided maintenance, lower insurance premiums, lower liabilities, etc.
- **Estimated Difficulty** This measure evaluates how much effort is required and whether or not the project team would likely need to seek help from outside architects, engineers, consultants, etc.
- **Visibility** This measure evaluates likelihood that the airport's stakeholders (passengers, local community members, etc.) will notice the implementation of the effort.
- **GHG Savings** This measures the relative impact on greenhouse gas emission reduction.

Each retrocommissioning opportunity is scored qualitatively on each of the 5 criteria based on the descriptions in the following table. The user assigns a weighting factor to each of the criteria based on the project team's priorities. Note that the sum of all 5 criteria's weighting factors must equal 100% (the GHG Savings weighting will calculate automatically to ensure this). A "weighted score" is calculated for each retrocommissioning opportunity which helps to prioritize efforts for the project team (higher weighted scores imply higher priority opportunities).

<table>
<thead>
<tr>
<th>Weighting</th>
<th>Implementation Costs</th>
<th>Potential Cost Savings</th>
<th>Estimated Difficulty</th>
<th>Visibility</th>
<th>GHG Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>easy, no cost</td>
<td>major savings</td>
<td>easy</td>
<td>highly visible</td>
<td>major savings</td>
</tr>
<tr>
<td>4</td>
<td>internal effort, or low cost</td>
<td>significant savings</td>
<td>internal coordination</td>
<td>more visible</td>
<td>significant savings</td>
</tr>
<tr>
<td>3</td>
<td>consultant, or other moderate cost</td>
<td>some savings</td>
<td>external coordination</td>
<td>visible to staff</td>
<td>some savings</td>
</tr>
<tr>
<td>2</td>
<td>capital cost</td>
<td>minimal savings</td>
<td>leadtime &amp; planning required</td>
<td>less visible</td>
<td>minimal savings</td>
</tr>
<tr>
<td>1</td>
<td>major cost</td>
<td>no savings</td>
<td>very difficult</td>
<td>back of house</td>
<td>no savings</td>
</tr>
</tbody>
</table>

Adjust the weighting if necessary by overwriting the default values at the top of the "Master List" worksheet.

The summary worksheet groups each retrocommissioning opportunity by category, goal, or timeframe. On this page you can determine which opportunities are most urgent based on the weighted score.
## Airport Facility Optimization

### Master List of Recommendations

<table>
<thead>
<tr>
<th>Source</th>
<th>Reference</th>
<th>Category</th>
<th>Goal</th>
<th>Measure/Objective</th>
<th>Timeframe</th>
<th>Implementation Costs</th>
<th>Potential Cost Savings</th>
<th>Estimated Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>SAGA 239</td>
<td>Water Use</td>
<td>Reduce Water Use</td>
<td>Provide training for employees and signage for facility users instructing them on how they can help reduce water use.</td>
<td>Immediate</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Yes</td>
<td>SAGA 23</td>
<td>Operations</td>
<td>Reduce Costs</td>
<td>Develop and implement a recycling program for day to day airport operations (employees, passengers, concessions).</td>
<td>Midterm</td>
<td>4</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Yes</td>
<td>SAGA 465</td>
<td>M&amp;V</td>
<td>Improve Operation</td>
<td>Require building staff participation during commissioning and testing and balancing activities.</td>
<td>Immediate</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Yes</td>
<td>SAGA 378</td>
<td>Energy Performance</td>
<td>Reduce Energy Use</td>
<td>Use a maintenance log to track energy use processes, problems, and ideas.</td>
<td>Immediate</td>
<td>5</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Yes</td>
<td>SAGA 370</td>
<td>Energy Performance</td>
<td>Reduce Energy Use</td>
<td>Develop baseline energy consumption (e.g., perform an energy audit of buildings and facilities).</td>
<td>Midterm</td>
<td>3</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Yes</td>
<td>SAGA 376</td>
<td>Energy Performance</td>
<td>Reduce Energy Use</td>
<td>Conduct and implement recommendations from an energy audit periodically (e.g., every 4 years).</td>
<td>Long-term</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>No</td>
<td>EERE 86-10</td>
<td>IT</td>
<td>Reduce Energy Use</td>
<td>Use network presence proxy for PC power management.</td>
<td>Midterm</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Yes</td>
<td>EERE 66-7</td>
<td>Energy Performance</td>
<td>Reduce Energy Use</td>
<td>Paint exterior walls with a cool paint color.</td>
<td>Midterm</td>
<td>4</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Yes</td>
<td>SAGA 453</td>
<td>Renewable Energy</td>
<td>Reduce Energy Use</td>
<td>Utilize wind power (wind turbines) where appropriate.</td>
<td>Long-term</td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>SAGA 445</td>
<td>Renewable Energy</td>
<td>Reduce Energy Use</td>
<td>Install solar-thermal powered water heaters.</td>
<td>Long-term</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Yes</td>
<td>SAGA 446</td>
<td>Renewable Energy</td>
<td>Reduce Energy Use</td>
<td>Install Trombe walls for passive solar heating.</td>
<td>Long-term</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Yes</td>
<td>EERE 794</td>
<td>HVAC</td>
<td>Reduce Energy Use</td>
<td>Utilize dual-source heat pumps.</td>
<td>Long-term</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>
For additional information:

ACRP Report 139: Airport Building O&M Optimization and Retrocommissioning: A Whole-Systems Approach


Peter Dahl, Ph.D.
PDahl@hga.com
ACRP Report #92:
Creating a Collaborative Environment between Airport Operations and Maintenance Departments

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Mike Nichols, Amadeus Consulting
Steve Wareham, A.A.E.
• Vice President, Trillion Aviation
• Co-Investigator
• Former Director, MSP Operations
• Board Member, Airport Foundation, MSP

Mike Nichols, Amadeus Consulting
• Co-Investigator
• Director of Client Experience
• Contracts Administrative Officer
ACRP Report 92 Oversight Panel

- Chair, Mr. John P. Kirwan, Business Coordinator, Metropolitan Washington Airports Authority
- TRB Staff Representative, Ms. Marci A. Greenberger, AAE, Senior Program Officer, Transportation Research Board
- Mr. Travis A. Crilly, Operations Specialist, Lexington Bluegrass Airport
- Mr. Michael J. Kaminski, Facilities Maintenance Supervisor, Tucson Airport Authority
- Mr. Chad R. Makovsky, Deputy Aviation Director - Operations, City of Phoenix
- Ms. Jennifer Mims, Senior Manager, Maintenance, Port of Seattle
- Dr. Maureen Pettitt, Director of Institutional Research, Planning and Effectiveness, Skagit Valley College
- Ms. Mindy Price, Principal Consultant, Direct Effect Solutions
- TRB Liaison Representative, Mr. Richard A. Cunard, Senior Program Officer – Traffic and Operations Engineer, Transportation Research Board
- Liaison Representative, Dr. Michel Hovan, Manager, Airports, Engineering & Safety Standards Branch, Federal Aviation Administration
ACRP Report #92: Guidebook to Creating a Collaborative Environment Between Airport Operations and Maintenance

• Provides tools and strategies that can be used to increase and improve collaboration between operations and maintenance staffs at airports
• Tools include exercises, case studies, and other resources
• Provides methods to identify warning signs of collaboration issues between operations and maintenance staffs
• Identifies root causes
• Includes a Toolbox Mapping Worksheet strategy to simplify implementation
• Published October 2013
Introduction to the Research Problem

Why does there seem to be less collaboration between Operations and Maintenance in comparison to other departments and divisions within airport organizations?

• Operations and maintenance departments at airports must rely on each other to ensure a safe, secure, and efficient operation of an airport
• They don’t always share a clear understanding of each other’s responsibilities, which can sometimes lead to counterproductive working relationships
• Operations and maintenance may often report to different people, leading to competing priorities for day-to-day responsibilities
Defining Collaboration

According to the Merriam-Webster dictionary, the definition of the word “collaborate” is “to work jointly with others or together especially in an intellectual endeavor” or “to cooperate with an [...] instrumentality with which one is not immediately connected.” Essentially, collaboration is nothing more than “Individuals working together towards a common goal.”
Research Process

The Research Team collected inputs from more than 70 airport teams:

- Extensive Literature Review
- Case Studies
- Focus Groups
- One-on-One Interviews (phone or in-person)
- Online Surveys
- Participation from Small, Medium, Large and Non Hub airports
Assessing an Airport’s Current State

The Guidebook includes instructions on how to administer a Collaboration Survey:

• The most comprehensive and measureable approach to assessing the current state
• Involve large groups of team members at all levels
• Time efficient
• Enables filtering and analyzing survey results
• Recommended survey questions included
• Found in Appendix D: Creating a Survey Tool
Assessing an Airport’s Current State – Administering a Survey

A Subset of Survey Questions

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>N/A</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>I understand the process for a work order system, from entering the field through repair/replacement and close-out.</td>
<td>3.9% (7)</td>
<td>3.9% (7)</td>
<td>0.3% (23)</td>
<td>31.2% (57)</td>
<td>61.3% (104)</td>
<td>2.4% (4)</td>
<td>215</td>
</tr>
<tr>
<td>I use checklists for routine work such as inspections, terminal tours, etc.</td>
<td>1.4% (3)</td>
<td>0.7% (2)</td>
<td>14.9% (29)</td>
<td>57.2% (109)</td>
<td>22.0% (44)</td>
<td>0.5% (1)</td>
<td>215</td>
</tr>
<tr>
<td>I consider the physical work environment efficient for completing my work and collaborating with others</td>
<td>0.5% (1)</td>
<td>0.5% (1)</td>
<td>4.4% (9)</td>
<td>32.8% (65)</td>
<td>22.0% (44)</td>
<td>3.3% (7)</td>
<td>215</td>
</tr>
<tr>
<td>I clearly understand the &quot;Vision&quot; of my organization</td>
<td>1.6% (4)</td>
<td>0.4% (1)</td>
<td>12.1% (23)</td>
<td>47.0% (86)</td>
<td>20.2% (39)</td>
<td>0.5% (1)</td>
<td>215</td>
</tr>
<tr>
<td>This &quot;Vision&quot; helps my organization work together</td>
<td>2.1% (5)</td>
<td>12.1% (26)</td>
<td>24.7% (53)</td>
<td>39.1% (74)</td>
<td>23.9% (45)</td>
<td>0.0% (3)</td>
<td>215</td>
</tr>
<tr>
<td>The nature of my department enables collaboration</td>
<td>1.0% (4)</td>
<td>0.5% (1)</td>
<td>0.5% (1)</td>
<td>39.3% (73)</td>
<td>19.6% (38)</td>
<td>0.8% (2)</td>
<td>215</td>
</tr>
<tr>
<td>My organization is more reactive than proactive</td>
<td>3.7% (10)</td>
<td>3.7% (10)</td>
<td>25.5% (49)</td>
<td>31.2% (60)</td>
<td>14.6% (28)</td>
<td>0.5% (1)</td>
<td>215</td>
</tr>
<tr>
<td>We use planners to schedule our daily work</td>
<td>0.3% (2)</td>
<td>3.7% (7)</td>
<td>10.3% (20)</td>
<td>31.8% (60)</td>
<td>9.0% (18)</td>
<td>5.8% (11)</td>
<td>215</td>
</tr>
<tr>
<td>I am allowed a certain amount of flexibility in the way I complete my work</td>
<td>0.5% (1)</td>
<td>1.5% (4)</td>
<td>0.5% (1)</td>
<td>83.4% (158)</td>
<td>34.5% (65)</td>
<td>0.5% (2)</td>
<td>215</td>
</tr>
</tbody>
</table>
Interpreting the Results

Strategies are provided for analysis and comparison of survey results:

• Compare mean survey scores with those of the broader airport population
• Identify areas of significant variance
• Look for potential disconnects between organizational levels
• Analyze across each of the demographics areas represented
• Review of the open ended responses
• Guidance for conducting a Focus Group is provided as an alternative or addition to online surveys
Using the Collaboration Toolbox

26 Strategies to improving collaboration are provided within the Collaboration Toolbox:

<table>
<thead>
<tr>
<th>Identified Warning Signs</th>
<th>Possible Causes</th>
<th>Strategies for Fostering Collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>#12: Not comfortable delegating tasks</td>
<td>17, 18, 19, 20, 22, 26, 34, 35, 36, 38, 39</td>
<td>6 and 17 - Building Trust and Building Respect</td>
</tr>
</tbody>
</table>

Use the Current State Assessment to identify Warning Signs and Possible Causes, then apply the referenced strategies from the Collaboration Toolbox.
Identify Warning Signs

Our research identified 48 Warning Signs (outlined in Chapter 3) that can indicate collaboration issues:

• Abnormally high levels of disciplinary action in one or both divisions
• Conflict within employee ranks
• Confusion as to who is responsible for what activity
• Decisions made without input from stakeholders
• Lack of comfort with delegating tasks
• Unwillingness to accept constructive criticism
• High absenteeism
• High turnover in supervisory personnel
Identify Possible Causes

The Warning Signs can each be mapped to one or more Possible Causes. Chapter 4 describes the process of mapping these relationships as a scenario:

The Maintenance Supervisor has noticed that some of the Maintenance group are exhibiting “if you want it done right, do it yourself” attitudes, which has resulted in animosity between certain team members, process slowdowns, and excessive workloads for certain members.

Referring to the Collaboration Toolbox, the Maintenance Supervisor narrows this issue down to “Employees not comfortable delegating tasks” and finds the following entry:

*Employees are not comfortable delegating tasks. Certain employees exhibit a “if you want it done right do it yourself” attitude.* This unwillingness to delegate tasks results in process slowdowns and uncompleted tasks, and contributes to silos of skills and knowledge in the organization. *Possible Cause Numbers: 17, 18, 19, 20, 22, 26, 34, 35, 36, 38, and 39.*
Identify and Implement Strategies for Fostering Collaboration

Chapter 5 Strategies represent both tactical and strategic approaches to removing barriers to collaboration. Examples of Strategies include:

- Aligning Priorities
- Building Trust
- Conflict Resolution
- Embracing Change
- Improving Communication
- Mentoring Programs
- Addressing Generational Differences
Assess Results and Repeat the Process

• Complete a follow-on assessment
• Gain insight to the impacts of the strategies selected
• Determine improvements that have been realized in interdepartmental collaboration.
• Identify the next level of priorities to address
• If the initial effort was ineffective, determine additional possible causes and appropriate strategies to implement
For additional information:

ACRP Report 92: Guidebook to Creating a Collaborative Environment Between Airport Operations and Maintenance


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