# ACRP Problem No. 12-10-06

## *Designing for Disrupted Aviation Operations and Valuing Solutions*

**ACRP Staff Comments:** The proposed research is very similar to that undertaken in ACRP Project 10-10, Guidebook for Airport Irregular Operations (IROPS) Contingency Planning and ACRP Project 03-18, Operational and Business Continuity Planning for Prolonged Airport Disruptions.

**TRB Aviation Group Committees Comments:** AIRFIELD AND AIRSPACE CAPACITY AND DELAY CMTE - Recommend. Similar to Problem Statement 12-03-04, The Cost of Delays Due to Unmet Flights and the Impact on Airports and Passengers, this is a good problem statement and useful research.
AVIATION ECONOMICS AND FORECASTING CMTE - As with problem statement 12-03-04, The Cost of Delays Due to Unmet Flights and the Impact on Airports and Passengers, the committee supports the aim of the problem statement, which is to identify the share of aviation system delays that are due to time specific inadequacies of an airport's staffing or equipment/facility availability, and then to develop frameworks that airports can use to include these factors in planning. It would be important to get a sense from the outset of the pervasiveness of the problem -- is it an episodic irritant for most airports, or a pervasive one at many?

**Review Panel Comments: <u>Not recommended</u> —** This is similar to ACRP 10-10, Guidebook for Airport Irregular Operations (IROPS) Contingency Planning, and there is considerable overlap with ACRP 03-18, Operational and Business Continuity Planning for Prolonged Airport Disruptions.

**AOC Disposition:** Approved and funded at $300,000. Disruption of operations should be considered when planning and designing airport facilities, instead of waiting until it becomes a problem. Airports are having a difficult time accounting for the costs and justifying expenditures.

ACRP *Problem Number*: **12-10-06**

## I. Problem Title:

Designing for Disrupted Aviation Operations and Valuing Solutions

## II. Research Problem Statement:

Disrupted operations frequently arise due to both random irregular phenomenon and planned activities resulting from either natural causes such as weather (i.e. thunderstorms, snow storms, fog, hurricanes) or due to anthropogenic actions (i.e. air traffic directives such as ground delay programs, disruptive human activities – demonstrations, management/labor actions, airport maintenance or construction activities, terrorist activities or alerts, etc.).

Current planning and investment evaluation and investment approaches do not adequately capture the costs incurred as a result of such affected operations. Current practice in these areas relies principally on either generally accepted design practices handed down over time (i.e. use of peak month average day with standard ratios of space to loading), or more formalized cost benefit analysis or investment analyses which are designed around normal operating conditions. Changing patterns of utilization, different modes of operation, changing roles and the locus of the incidence of costs (i.e. who pays), cost pressures by air carriers or other aviation users have narrowed the historical margins or buffers inherent in old design standards and lead to what is perceived as a leaner, but less resilient NAS with consequent costs. The old "rules" may no longer be a useful guide in valuing, designing, and investing in the future aviation infrastructure. What is needed is a renewed examination of current practices for dealing with disrupted operations ( i.e. the three hour tarmac rule, collaborative decision making in ATC operations, etc.) through a comprehensive examination of today's practice to discern the best current practices for the analysis and valuation of NextGen developments that incorporate airports' roles in coordination with airlines and air traffic control actions.

## III. Objectives:

Develop a comprehensive understanding and taxonomy of the current state of the art in practices and associated attributes regarding infrastructure designs and procedures that are utilized for the management of disrupted aviation operations. This review should cover the three principal actors involved in the NAS – airports, airlines, and air traffic control. Public policies regarding security, public safety, hazardous substance or environmental factors, consumer protection, etc. may also be considered as constraining and/or supporting resources.

## IV. Research Proposed:

Task 1 Conduct a literature review. Define the types and "causes" of significant disrupted aviation operations that affect airports and aviation end users (passengers and shippers) and develop a methodology to estimate the frequency and severity distribution of such disruptions as the NAS operates currently.

Task 2 Develop a taxonomy and inventory of the principle approaches and practices for coping with significant operational disruptions by the respective classes of aviation system participants including the following:

- Airports
- Airlines – scheduled and non-sched., fractional jet operators, general aviation, etc.
- Air traffic control,
- Passengers and shippers

This task likely involves surveying and/or interviewing representatives of these or other relevant participants in the NAS to gain a comprehensive understanding of each participant's response, activities, and options within the context of today's NAS and inquiring what attributes may enable more effective responses or avoidance of such disruptions in the future. The survey should collect information upon which estimates of frequency of occurrence and costs of disruption and mitigation may be developed or refined.

Task 3 Examine potential solution sets derived from Task 2 supplemented by review of JPDO and FAA's NextGen architecture and operational improvements (OIs). This task may involve convening a representative set of the above parties to interchange collaborative approaches for effective design and mitigation of resilient operations. Subgroups may focus upon selected problems (i.e. snow operations, ground delay programs, etc.)

Task 4 Develop a methodology for estimating the value of avoided operational disruptions that incorporates both the aviation system end user's responses and the NAS participants capital and operational costs.

Task 5 Document findings of each task in interim and final reports and make recommendations for further research.

## V. Estimate of the Problem Funding and Research Period:

Recommended Funding: $ 450,000

Research Period: the time periods below may have some concurrent overlap rather than being strictly sequential, but represent a rough proportional level of effort anticipated.

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|---|---|
| Task 1: | 3 months |
| Task 2: | 9 months |
| Task 3: | 3 months |
| Task 4: | 3 months |
| Task 5: | 3 months |
| Total: | 15 – 21 months |

## VI. Urgency and Payoff Potential:

Airports seeking FAA capacity project funding and/or Letters of Intent (LOI) for longer term funding commitments and stability are increasing approaching FAA with projects that may provide increased system performance by enhancing operational resilience and avoiding or minimizing the incidence of disruptions. Current approaches do not fully capture the economic and financial benefits of these avoided disruption costs to both the end users of the system and the operators of the NAS – airports, aircraft operators (i.e. airlines, general aviation), and air traffic control. Recent research indicates that passenger disruption costs for cancellations may approach the estimated costs of traditionally estimated passenger delays. The costs of disrupted airline operations is buried in the average operational costs and not well documented. Indications are that these costs may be substantially higher than typical operational costs utilized in standard benefit cost and investment analyses. Projects that may be fully justifiable and provide systemic or systematic benefits may be denied or delayed without adequate analysis. Several proposed features and attributes of proposed NextGen investments and innovations are anticipated to provide greater flexibility and resiliency to airport and NAS operations resulting in fewer disruptions and more predictable outcomes. Airports may be able to accommodate disruptions more effectively and improve the service quality to their customers and users.

Current and best practices for handling various types of aviation system disruptions shall be identified and provided to the community of airports and NAS participants. We also anticipate this will generate specific topics for further development of more effective design and operational approaches to avoid and reduce the impacts of operational disruptions making airport managers jobs less stressful.

## VII. Related Research:

**ACRP Project** 11-02, Task 06 **Interagency - Aviation Industry Collaboration on Planning for Pandemic Outbreaks**

ACRP Project 11-02, Task 12 **Ramp Incident Data from Selected Large and Medium Hub Airports**

ACRP Project 5-01 **An Airport Guide for Regional Emergency Planning for CBRNE Events**

ACRP Project 4-04 **Exercising Command-Level Decision Making for Critical Incidents at Airports**

ACRP Project 4-02 **Lightning-Warning Systems for Use by Airports**

**FAA/ATO Command Center studies and playbook operations**

**Airline operational centers and dispatch offices playbooks**

**JPDO NextGen Architecture Operational Improvement roadmaps**

**TRB 2011 Workshop Event 116 Airport Irregular Operations**

**TRB 2011 Workshop Event 136 Travel Time Reliability – World View and Lessons**

## VIII. Person(s) Developing the Problem:

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## IX. Process Used to Develop Problem Statement:

Discussed this problem with various airport management and planning staff, airport consultants, and within the FAA.

## X. Date and Submitted By:

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