

# Airport Capacity Through Simulation (ACATS) Transition

**Dr. John N. Barrer**

**703-983-7757 • [jbarrer@mitre.org](mailto:jbarrer@mitre.org)**

**MITRE Sponsored Research**

The logo for the MITRE Technology Program, featuring a stylized graphic of stacked blocks in yellow, orange, and blue to the left of the text.

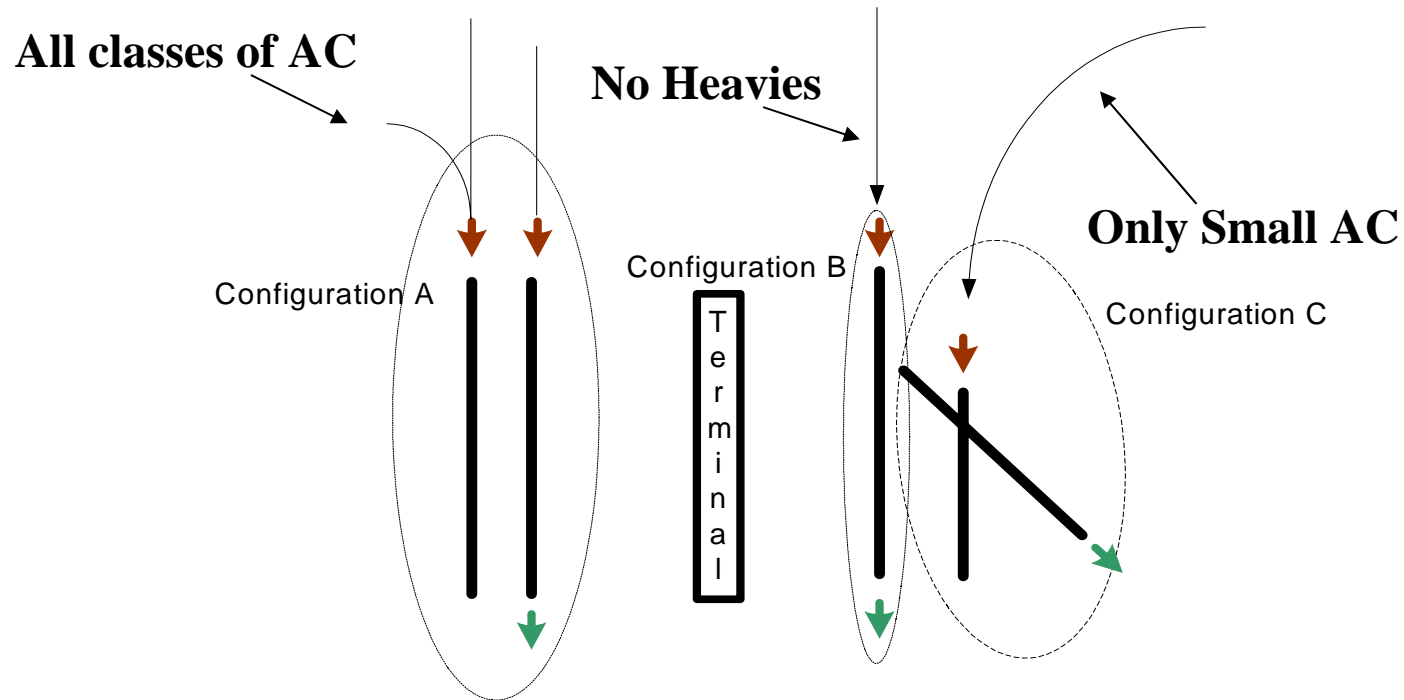
**MITRE  
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# Problem

- **Can we develop a fast, flexible analysis tool that can estimate the runway capacity of *any* airport, operating under *any* user-selected set of separation rules and aircraft demand patterns?**
- **The definition of airport capacity (*average maximum sustainable throughput*) for a system of runways requires that we employ optimization heuristics to process the aircraft efficiently. Will this be possible within a simulation?**

# Background

## Airport Operations Have Become More Complex



Existing analysis tools fail to handle:

- Complex airports
- New separation rules
- Limited-use runways

Current tools are:

- Flexible or fast, but not both

# Objective

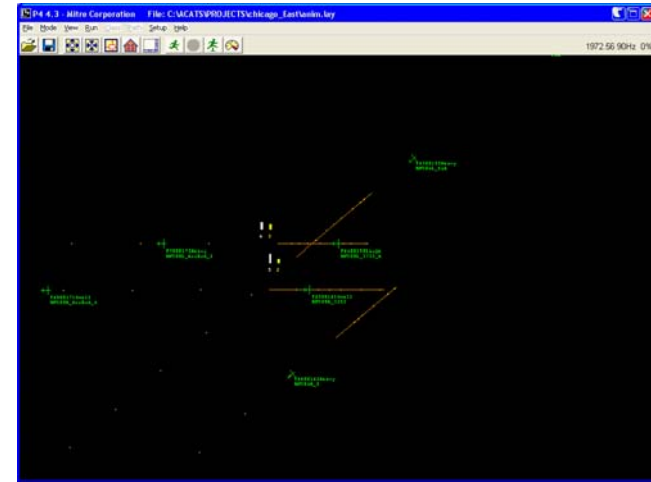
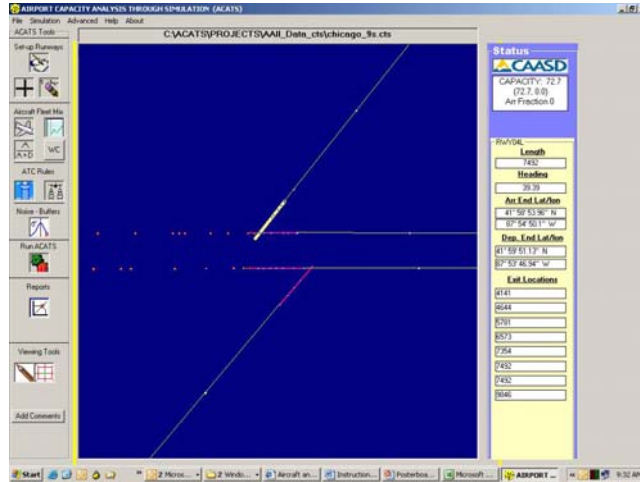
- **Create an airport capacity analysis tool that is fast and flexible enough to handle**
  - **Any complex runway layout and demand characteristic**
  - **Multiple aircraft types (e.g., A380)**
  - **Operational constraints due to airspace, runway length, aircraft performance**
  - **Both existing and future ATC rules**

# Activities

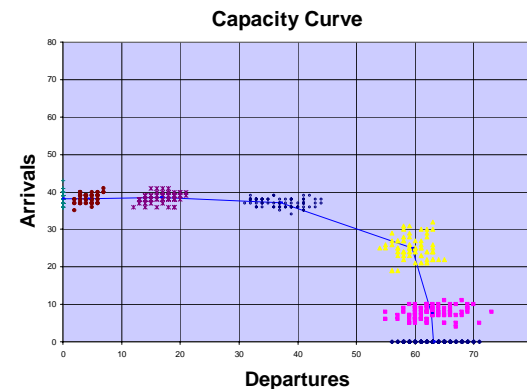
- **The Airport Capacity Analysis Through Simulation (ACATS) model was developed during the last two years**
- **Final testing and validation is underway**
  - Model is being applied to real problems
  - Collaboration with universities
- **Continuing to “scale up” prototype to meet all performance goals**
- **Refining heuristics for better performance**
- **Documenting and publishing papers**

# Highlight

## The ACATS Graphics



- **Graphical**
  - **User interface**
  - **Animation of operations**
  - **Reporting capabilities**
- **Provides increased modeling capability and improved insight into runway capacity**



# Demonstration

## ACATS Analysis of a Complex Airport

**AIRPORT CAPACITY ANALYSIS THROUGH SIMULATION (ACATS)**

File Simulation Advanced Help About

C:\ACATS\PROJECTS\AAII\_Data\_cts\chicago\_9s.cts

**ACATS Tools**

Set-up Runways

Aircraft Fleet Mix

ATC Rules

Noise - Buffers

Run ACATS

Reports

Viewing Tools

Add Comments

**Status**

**CAASD**

CAPACITY: 72.7  
(72.7, 0.0)  
Arr Fraction 0

RWY04L

Length
7492

Heading
39.39

Arr End Lat/lon
41° 58' 53.96" N
87° 54' 50.1" W

Dep. End Lat/lon
41° 59' 51.13" N
87° 53' 46.94" W

Exit Locations
4141
4644
5781
6573
7354
7492
7492
9846

Start | 2 Micros... | 2 Windo... | Aircraft an... | Instruction... | Posterboa... | Microsoft ... | AIRPORT ... | 9:32 AM

# Impacts of ACATS Model

- **ACATS has increased insight into the causes of and solutions to congestion at airports having complex runway systems**
- **Improved and more efficient analysis capabilities for our sponsors**
- **An intuitive learning tool for explaining the analysis of airport runway capacity**

# Future Plans

- Establish ACATS as industry standard for capacity analysis
  - Academic involvement
- Complete validation and documentation of ACATS
- Integrate ACATS with CAASD work program

