Air Traffic System Performance Measures

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Forces of Change

- User's need to control their own operations
- Increased emphasis on Free Flight
- Recognized need for collaborative decision making between FAA and users
- Need to take full advantage of a myriad of new technologies
- Laws and Presidential Orders requiring increased government accountability (e.g., GPRA)

Limits of the Current System

- Delay is standard measure of air traffic system performance
- Delay alone is not an adequate measure of user desires
  - Delay does not reflect user's ability to select routes, speeds, departure times, arrival priorities, etc.
  - Delay understates the benefits of many critical programs

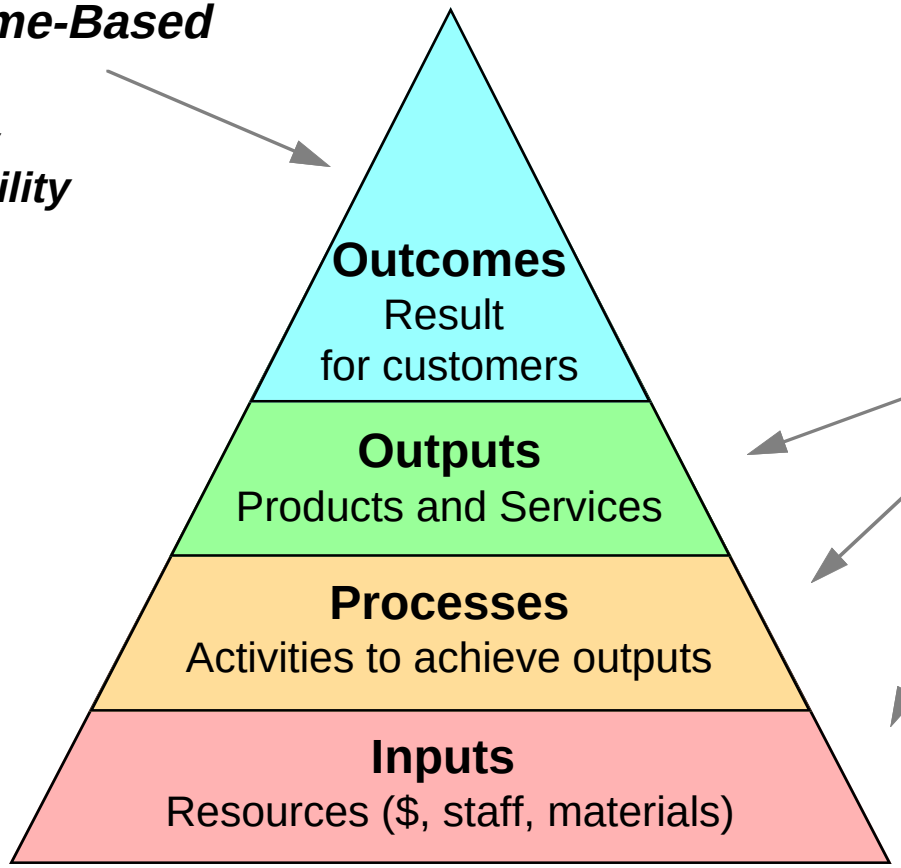
Current FAA/ATS Measurement Approach

- Work began in late 1995
- Measures developed in collaboration with industry
- Initial measurement framework has been adopted by the FAA Administrator, FAA Management Board, and industry groups
- Work in now in progress to institutionalize key measures

Focus of Measurement Approaches

ASC Outcome-Based Framework

- ***Flexibility***
- ***Predictability***
- ***Access***
- ***Delay***



Previous FAA Measurement Efforts

Background and Context

- **Goal is to establish system performance metrics that correspond with *customer-driven outcomes***
  - **Enable achievement of strategic objectives**
  - **Focus on value of service provided to user ...**

    although we are not assigning a monetary value as yet to what a particular service is worth to a user
  - **Extend beyond traditional measures of capacity and delay**
- **Context**
  - **Short-term operational assessment is different ...**

    though closely related
  - **Longer-term analysis should roll-up of short-term analysis**
  - **Impact on high-level decisions**
    - **Track long-term patterns of operational performance**
    - **Evolve the system to meet operational needs**

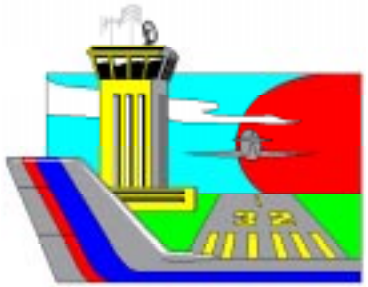
Predictability

The extent to which the system allows users to know when they will arrive based on when they depart

- **Important to all categories of users**
- **Addresses variation in system performance due to weather**
- **Gives credit to programs that improve information flow**
- **Begins to link FAA actions to user's "schedule pads"**

Aspects of Predictability

Variability in Ground Movement Times



What allowances does the user have to make for variability in taxi-out times?

(Variability in "out-to-off" times at major airports)

+

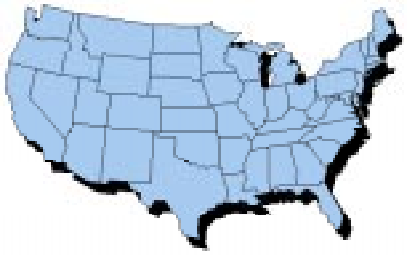
Variability In En Route Times

How accurately is the user able to predict en route time?

(Variability in difference between actual and estimated arrival times)

=

Total System Variability



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Flexibility

The extent to which users are able to use the system the way they want to

- **Absence of constraint**
- **Fundamentally different from measuring efficiency**
  - **Difficult concept to measure**
  - **Requires knowledge of user preferences**
  - **Where data does not exist, some assumptions must be made**

Aspects of Flexibility

Scheduling

How restrictive are the FAA-preferred routes?

- Difference between ATC-preferred route and great circle weighted by use

Flight Planning

How well does the flight plan system deal with user preferences?

- Flight plan approved vs. ATC-preferred route

Operating

To what extent does the system allow users to operate the way they want?

- Lateral deviation
- Vertical deviation
- Extent of restrictions

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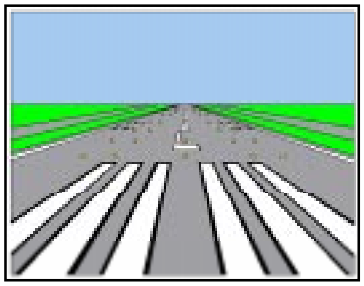
Access

The extent to which users are able to access airports, airspace, and services

- **Relevant to all users, but focuses on many of the issues important to general aviation users**
- **Many of these things have never been measured at all**
- **Many access measures rely on qualitative data**

Aspects of Access

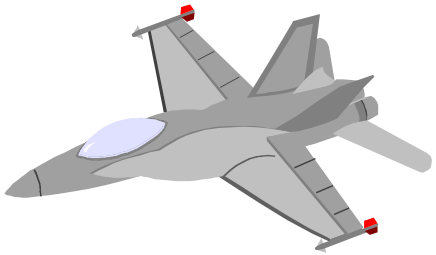
Airports



Ability of users to access airports in a variety of wx conditions

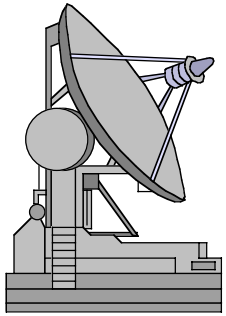
- **Airports with IFR approaches**
- **Airports with precision approaches**

Airspace



Civilian utilization of Special Use Airspace

Services



Ability to access ATC services

- **Radar and comm coverage**
- **Availability and quality of VFR services**
- **Availability and quality of FSS**
- **Operations provided with VFR tower services**

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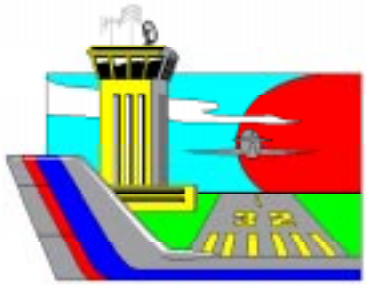
Delay

- Discussion of delay has focused largely on these areas:
  - What data should be used?
  - What is optimum taxi time?
  - Who takes credit (blame) for a given delay?
- Focus is on delay measures leading to system improvement
  - Not on settling arguments about impact on specific flights

Aspects of Delay

Ground Movement Times



Monthly average Taxi-in and taxi-out times at the top 25 airports

En Route Times

Difference between ETA and ATA at top 25 airports

Note: ***Delay measures are very similar to predictability measures except that predictability measures focus on variability and delay measures focus on averages***

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Recent Insights

- Actual ATM System performance is driven by several things
  - Weather (chaotic variable)
  - Demand (adaptive component)
  - FAA management of the system
- Shifts in the data tend to be transient
  - Seasonal variations and weather anomalies dominate
  - When benefits are achieved, users adjust their demands

Status and Next Steps

- Mature measures are being included in Air Traffic Services Business Performance Plan
- Some measures will be used in capital investment process
- Work continues in the following areas
  - Evaluation and development of models to support the measurement framework
  - Collaboration with users to refine flexibility and delay measures
  - Development of supporting lower level measures that link outcomes to organizational actions

Note: This briefing is a minor update and adaptation of earlier briefings by the Office of System Capacity (FAA) and CAASD/MITRE.

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