



MIT International Center for Air Transportation

Using Key Performance Indicators to Improve Airline Operations

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The KPI Project

- **Goal to develop Key Performance Indicators (KPIs) that:**
 - ❑ are predictors of the operational and financial performance of an airline
 - ❑ increase the situational awareness of airline managers at all levels (executive dashboard)
 - ❑ aid decision making
- **Three-year project that commenced in July 2004**
 - ❑ Funded by a gift from Carmen Systems
- **Partners:**



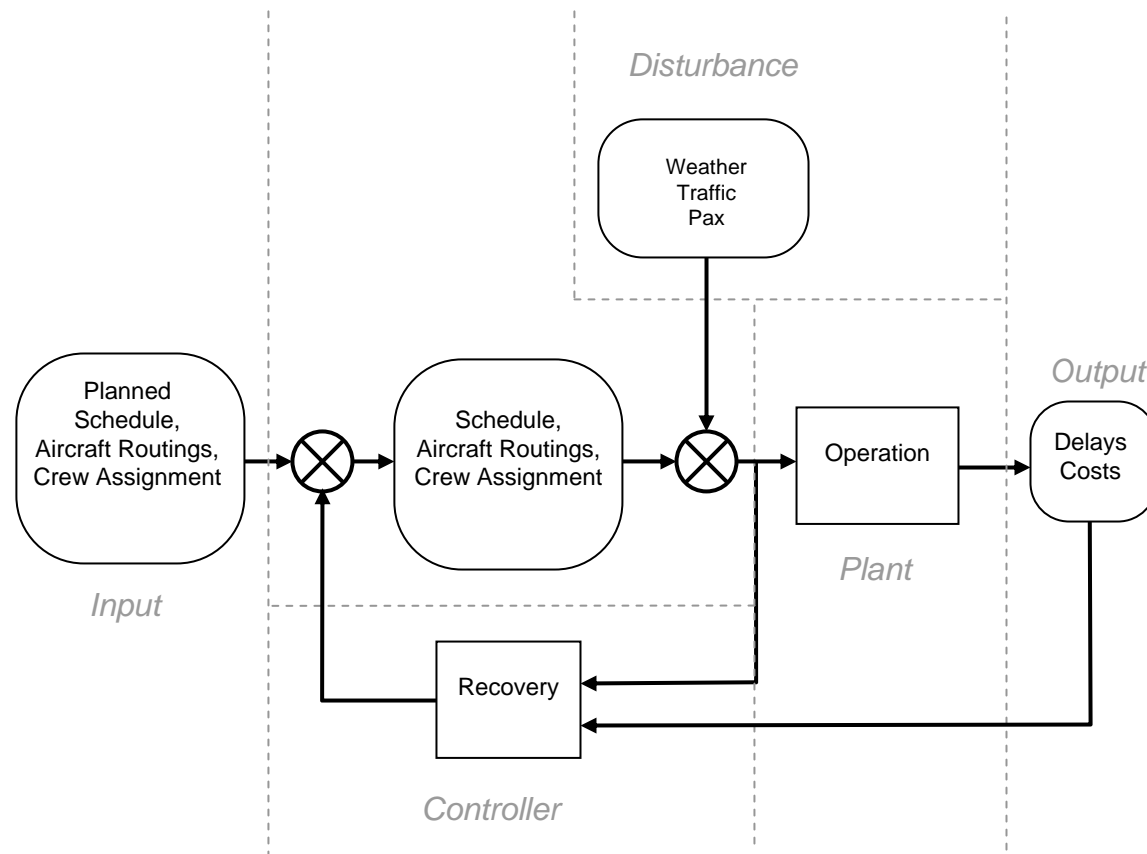


Overview

■ We believe:

- ❑ The operation of an airline can be modeled as a control system with corresponding transfer functions
- ❑ Principles of control theory can be applied to airline scheduling and recovery
- ❑ The development steps in classical control engineering can be applied
 1. System identification
 2. System modeling
 3. Controller design

Closed Loop System - Airline Analogy





System Identification: The Power of Simulation

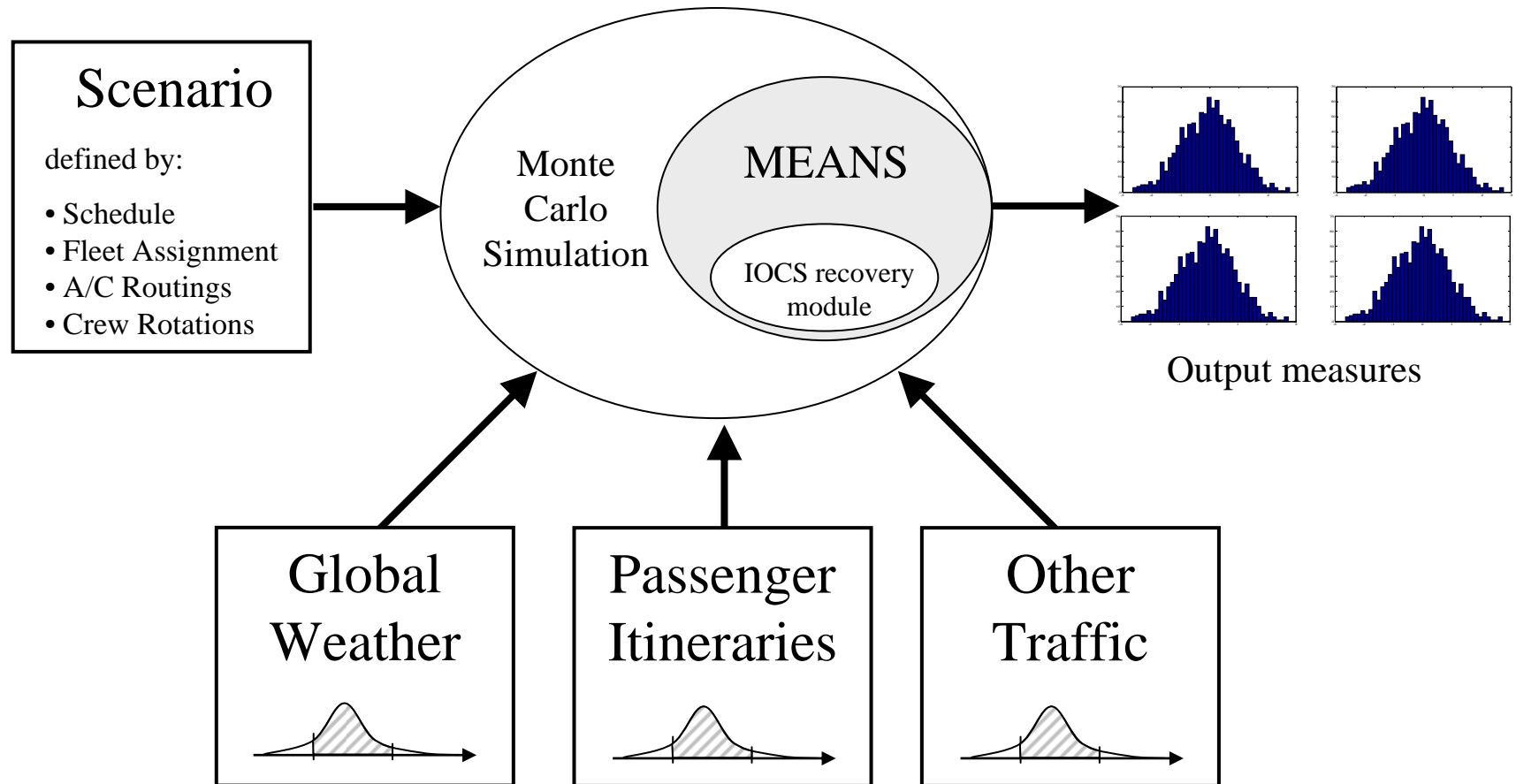
- **We can compare performance of different input scenarios...**
 - fleet composition
 - aircraft routings
 - crew pairings

- **Over the same range of environmental conditions...**
 - weather
 - traffic
 - passenger itineraries

- **Within a Monte-Carlo framework...**
 - MIT Extensible Air Network Simulation (MEANS)
 - Carmen Systems' Integrated Operations Control System (IOCS)

- **To determine correlation between KPIs and output measures.**

Simulation Environment





Focus Point: Fleet Composition

- One of the focus points in the system identification is the correlation between local and global fleet composition and operational stability

- **Global fleet composition:**
 - What is the operational advantage of a single aircraft fleet

- **Local fleet composition:**
 - What is the operational advantage of having a limited number of aircraft types at each hub

 - Example: B737 and A320 fleet, two hubs. What is the operational advantage of focusing the B737 at hub A and the A320 at hub B