



# Global Airline Industry Program Activities: Update

**Cynthia Barnhart**

**Industry Advisory Board Meeting**

**November 4, 2004**

*MIT Stratton Student Center – Dining Room 1+2*



**MIT**

# Background...

- MIT Global Airline Industry Program
  - Multi-disciplinary research team
  - Research activities
  - Educational initiatives
  - Conferences and workshops
- Established in September 1999 with a 3-year grant from Alfred P. Sloan Foundation
- Second round of funding secured from the Sloan Foundation
  - Supports research from 2003-2005

# Objectives

- **Develop** a **body of knowledge** for understanding development, growth and competitive advantage in the airline industry
- **Increase** the number of **Ph.D. and other graduate students** engaged in airline-related research
- **Educate** airline industry's future leaders
- **Produce** authoritative **research reports** and **educational materials**

# The Interdisciplinary Team

<i>Prof. Arnold Barnett</i>	
<i>Prof. Cynthia Barnhart</i>	<i>Economics</i>
<i>Dr. Peter Belobaba</i>	<i>Sloan School</i>
<i>Prof. J-P. Clarke</i>	<i>ICAT</i>
<i>Prof. R. John Hansman</i>	<i>CTL</i>
<i>Prof. Tom Kochan</i>	<i>ORC</i>
<i>Prof. Robert McKersie</i>	<i>Aero/ Astro</i>
<i>Prof. Amedeo Odoni</i>	<i>CEE</i>
<i>Prof. Nancy Rose</i>	<i>Brandeis</i>
<i>Prof. Jody Hoffer Gittel</i>	<i>Rutgers</i>
<i>Prof. Saul Rubinstein</i>	

# Objective

Increase the number of Ph.D. and other graduate students engaged in airline-related research

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**Cumulative number of graduate students from start of Program: 32**

## Students in 2004

Alex Lee	Shiro Yamanaka
Thomas Gorin	Diana Dorinson
Susan Martonosi	Gregory Zerbib
Helen Jiang	Ryan Tam
Georg Theis	David Czerwinski
Emmanuel Carrier	Hai Jiang
Philippe Bonnefoy	Alexandra
Raphael Schorr	Mozsdzanowska

# Objective

## Educate airline industry's future leaders

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### PhD's to Date

- Andrew von Nordenflycht, Asst Prof-Mgmt, Simon Fraser
- Thomas Gorin, Senior Analyst, Continental Airlines
- Stephane Bratu, OR Analyst, Manhattan Associates
- Manoj Lohatepanont, Research Scientist, American
- Amy Cohn, Asst Prof Ind. Eng and OR, U of Michigan
- Terence Fan, Asst Prof, Singapore Management U
- Shan Lan, American Express, Harrison, NJ
- Silke Januszewski, Asst Prof, Univ. of CA San Diego

# Objective

## Produce educational materials

- **“E-PODS” Airline Educational Game prototype**
  - Allows students to learn how to make airline management decisions regarding fleet planning, route selection and pricing in a realistic competitive environment
  - Used the prototype of this simulation game in our Airline Management subject again in 2004
  - Plan to make it available for executive training at Boeing and airlines
- **Continued restructuring of the air transportation curriculum at MIT**
  - The Airline Industry (16.71J/1.232J/15.054J)
    - 8 participants of the Program, in its 4<sup>th</sup> year in 2004
    - Textbook preparation underway
- **Continued development of case studies and learning modules**

# Objective

Develop a body of knowledge for understanding development, growth and competitive advantage in the airline industry, and produce authoritative research reports

## **Major research topics:**

- Major trends/ forces in the Industry,
- Safety/security
- Airline scheduling and operations
- Pricing and revenue management
- Labor relations
- Infrastructure/capacity issues
- Industry structure and competition

# Research Summaries

## Today's topics:

1. Research Highlights: Pricing, Revenue Management and Distribution (Belobaba)
2. Assessing Low-Fare Entry in Airline Markets (Gorin)
3. Impact of Infrastructure-Related Taxes and Fees on Domestic Fares (Karlsson/Odoni/Yamanaka)
4. Some Issues in Airline Security (Martonosi/Barnett)
5. Analysis of Profit Cycles in the Airline Industry (Jiang/Hansman)
6. What Lies Beyond Cutting Labor Costs? (Kochan/Gittell/McKersie)
7. Factors Influencing the Emergence of Secondary Airports in the US (Bonney)

# Some Additional Research Highlights I

- **Studies on how and where system capacity can be increased**
  - Investigated policy options for market-based demand management measures (congestion pricing, slot auctions, slot exchanges) at the busiest airports
  - Helped resolve the LaGuardia capacity crisis in 2000
  - Working to identify options for LaGuardia 2007, and quantify their effects
  - A PhD thesis has been completed in this general area (Fan) and a second one is in progress (Schorr).
- **Identification of Key Performance Indicators (KPIs) that:**
  - Are real-time measures of the operational and financial state of an airline
  - Increase the situational awareness of airline managers at all levels (executive dashboard)
  - Aid decision making
  - An S.M. student is working on this topic (R. Riedel), with J.-P. Clarke, C. Barnhart, Carmen Systems

# Some Additional Research Highlights II

- **Methods for estimating the safety benefits of newly-devised aviation technologies that have not yet been deployed.**
  - Examined the computer-aided passenger prescreening system (CAPPS II), “trusted traveler” programs, and other security measures that have been abolished since 9/11.
- **With respect to employees and labor relations, we have advocated a mutual gains approach and shown it to be more effective than adversarial approaches for achieving quality, efficiency, and financial performance outcomes**
  - One PhD thesis has been completed in this area (von Nordenflycht)

# The Link to Industry in 2004

- **Approximate 40 visits to companies by members of the Program**
- **Approximately 19 companies supplying data for research activities of the Program**
  - Amadeus, S.A., Scandinavian Airlines System (SAS), United Parcel Service (UPS), Athens International Airport, S.A., Lufthansa German Airlines, EasyJet, American Airlines, Massachusetts Port Authority, Eclat Consulting, Airline Industrial Relations Conference
- **Approximately 39 presentations to industry associations or groups by members of the Program**
- **Approximately 5 articles in industry trade journals**

# The Link to Government in 2004

- **Presentations or testimony given to government agencies or committees (viewed as an “objective” observer of the air transport sector)**
  - General Accounting Office (GAO) Physical Infrastructure Team
  - Federal Aviation Administration
  - NASA Aeronautics Technology Advisory Committee
  - FAA Research and Development Advisory Committee
  - Transportation Security Administration
  - National Research Council, Committee on Aeronautics Research and Technology for Vision 2050
  - National Mediation Board
- **Approximately 27 requests for assistance from government organizations**

# Workshops, Seminars, Conferences in 2004

Approximately 14 workshops, seminars, conferences, or other campus events held this past year

## **EXAMPLES:**

- “*Winds of Change – The Airline Industry in 2004*” (125 academic, industry and government attendees), April 2004 in Washington DC
- Airport Systems Planning (5-day short course for airport executives) co-taught by Prof. Odoni and de Neufville, September 27 – October 1, 2004
- Distinguished Speaker Seminar Series at MIT (5 speakers)
- “The Southwest Airlines Way: Using the Power of Relationships to Achieve High Performance,” Lufthansa Airlines Top Management Team Meeting, September 2004.

# Agenda

## OVERVIEW OF RESEARCH PROJECTS AND RESULTS

0915 Research Highlights: Pricing, Revenue Management and Distribution (Belobaba)

0935 “Assessing Low-Fare Entry in Airline Markets” (Gorin)

0955 “Impact of Infrastructure-Related Taxes and Fees on Domestic Fares”  
(Karlsson/Odoni/Yamanaka)

**1015 BREAK**

1040 “Some Issues in Airline Security” (Martonosi/Barnett)

1100 “Analysis of Profit Cycles in the Airline Industry” (Jiang/Hansman)

1120 “What Lies Beyond Cutting Labor Costs?” (Kochan/Gittell/McKersie)

Summary of research results

Collaboration with labor, management and government

**1200 LUNCH**

“Factors Influencing the Emergence of Secondary Airports in the US” (Bonnefoy)

## FUTURE RESEARCH DIRECTIONS

1315 Airline Operations & Scheduling Research (Barnhart)

1330 Airline Safety Research (Barnett)

1345 Infrastructure and Capacity Issues (Hansman)

NSF Project – Critical Infrastructure Transformation

**1400 Looking Ahead (All)**

Aviation Research Consortium – Update

Discussion

**1430 Adjourn**