



MIT Global Airline Industry Program: Activities Update

Cynthia Barnhart

**Industry Advisory Board/Airline Industry
Consortium Joint Meeting**

November 4, 2005

MIT Faculty Club, Dining Room 5



MIT

Program Background

- MIT Global Airline Industry Program
 - Multi-disciplinary team
 - Engaged in research, education and outreach
- 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-March 2006
 - Will apply in March 2006 for third round of funding (at a reduced rate) for 2006-2009

The Interdisciplinary Team 2005

Prof. Arnold Barnett

Prof. Cynthia Barnhart

Dr. Peter Belobaba

Prof. J-P. Clarke

Prof. R. John Hansman

Prof. Tom Kochan

Prof. Robert McKersie

Prof. Amedeo Odoni

Prof. Nancy Rose

Prof. Jody Hoffer Gittel (Brandeis University)

Prof. Amy Cohn (U. of Michigan)

Prof. Joakim Karlsson (Daniel Webster College)

Prof. Andrew von Nordenflycht (Simon Fraser University)

Economics

Sloan School

ICAT

CTL

ORC

Aero/ Astro

CEE

Other Universities

Graduate Students 2005

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

Philippe Bonnefoy

Hai Jiang

Emmanuel Carrier

Alexandra Mozsdzanowska

David Czerwinski

Raphael Schorr

Maital Dar

Ryan Tam

Celia Geslin

Georg Theis

Michael Hanowsky

Gregory Zerbib

Maria Ishutkina

Cumulative number of graduate students

from start of Program: 37

Program PhD Graduates

*Program Objective: Educate airline industry's
future leaders*

PhD's to Date

Andrew von Nordenflycht, Asst Prof-Mgmt, Simon Fraser

Thomas Gorin, Manager-Revenue Management, Continental Airlines

Stephane Bratu, Senior Operations Research Analyst, Sabre Airline

Manoj Lohatepanont, Asst Prof, Civil Engr, Chulalongkorn U

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, U of CA San Diego

Susan Martonosi, Assistant Prof, Mathematics, Harvey Mudd College

Alex Lee (Aeronautics/Astronautics), Consultant, LEK Consulting

Education 2005 (1/2)

Program objective: Produce educational materials

- Launched the Global Airline Industry Program's Executive Education Course
 - Part of new MIT Airline Industry Consortium
 - Attended by 28 representatives of airlines, manufacturers, and other industry and government stakeholders
 - Received overwhelmingly positive reactions from participants
- Continued development of graduate course "*The Airline Industry*"
 - All of the Program's faculty participate
 - Provides a wide-ranging introduction to the many facets of the industry
 - In its fifth year, subject attracts over 40 students per year and receives outstanding student evaluations
 - Course materials provide the basis for a major textbook to be completed by the Program faculty this Spring
 - "The Airline Industry" course can serve as a model for top-level universities

Education 2005 (2/2)

Program objective: Produce educational materials

- Continued development of the E-PODS Airline Management Game
 - Simulation game to teach students how to make airline management decisions regarding fleet planning, route selection and pricing
 - Provides a realistic competitive environment
 - Programming assistance from Boeing
 - Used in MIT's "*Airline Management*" subject for the past 4 years, will be made available to other academic institutions, and to airlines and Boeing

Education: From Program Inception

- 10 new courses/curricula developed from start of Program
- Restructuring of MIT air transportation curriculum
 - Impacts more than two hundred MIT graduate students
 - Students at other institutions will benefit from the dissemination of teaching materials
 - PhD graduates in academic positions at universities worldwide
- Organized four annual conferences in Washington, DC on current issues in the air transport industry
 - 100-125 academic, industry and government representatives attending
 - Numerous comments indicating the value of these events in providing an up-to-date and unbiased perspective on the status of the airline industry

Workshops, Seminars, Conferences in 2005

Approximately 17 workshops, seminars, conferences, or other campus events held this past year

EXAMPLES:

- Distinguished Speaker Seminar Series at MIT (7 speakers)
- “Relational Coordination as a Distinctive Organizational Capability: The Case of Southwest Airlines,” Faculty Working Group on Organizational Capabilities, MIT.
- Airport Systems Planning (3-day short course for airport executives) co-taught by Prof. Odoni and de Neufville, September 27 – 29, 2005

Major Research Topics 2005

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

- Safety/security
- Airline scheduling and operations
- Pricing and revenue management
- Labor relations
- Infrastructure/capacity issues

Research Topics on Today's Agenda (1/2)

1. Recent Airline Industry Trends -- Update (Hansman)
2. Pricing and Revenue Management Research (Belobaba)
 - Pricing and Competition in Top US Markets (Geslin)
 - Impacts of Fare Simplification (Dar)
 - Adapting Revenue Management Systems (Belobaba)
3. Infrastructure-Related Taxes and Fees in the US and EU (Karlsson/Odoni/Yamanaka)
4. Airline Labor Update (Kochan/Gittell/McKersie)
 - Layoffs and Stock Price Recovery After 9/11
 - Role of Labor and HR in Global Low Cost Competition
 - Airline Industry Council: Dialogue with Labor, Management and Government

Research Topics on Today's Agenda (2/2)

5. Secure Flights?: Models and Observations
(Martonosi/Barnett)
6. Airline Operations & Scheduling Research (Barnhart)
 - Dynamic Airline Scheduling Models and Experiments (Jiang)
 - Using Key Performance Indicators to Improve Airline Operations (Riedel)
 - How Relevant is Elapsed Time in Passenger Airline Choice? (Theis)
7. Infrastructure and Capacity Issues (Odoni)
 - Implications of Very Light Jets on the Air Transportation System (Bonney)
 - Air Traffic Flow Management under Uncertainty (Hanowsky)
 - Market-Based Mechanisms for Capacity Allocation at Airports (Schorr)
 - Auctions for Airport Landing Slots (Harsha)

Academic Papers and Books Published in Year Ending 10/2005

Program Objective: Produce authoritative research reports

- Number of academic papers/ books published in year ending 10/2005: 22
- Examples:
 - Barnett, Arnold (2004) “CAPPS II: The Foundation of Aviation Security?”, Risk Analysis 24(4), pp 909-916.
 - Bratu, Stephane and Cynthia Barnhart (2005), “Flight Operations Recovery: New Approaches Considering Passenger Recovery”, Journal of Scheduling, Vol. 9:3.
 - Gorin, T. and Belobaba, P. (2004), “Revenue Management Performance in a Low-Fare Airline Environment: Insights from the Passenger Origin-Destination Simulator”, Journal of Revenue and Pricing Management, Vol. 3, No. 3, pp 215-236.
 - Leal de Matos, P., A. Odoni and V. Rivas (2005), “The Economic Contribution and Productivity of Air Traffic Management,” Proceedings of ATM-2005 EUROCONTROL-FAA Conference, Baltimore, MD, June 2005.
 - Stamatopoulos, M. A., A. Odoni and K. G. Zografos (2004), “A Decision Support System for Airport Strategic Planning”, Transportation Research C, 12, pp. 91-118.

The Link to Industry in 2005

- Approximately 37 visits to companies by members of the Program
- Approximately 23 companies supplying data for research activities of the Program
 - Amadeus, S.A., JetBlue, United Parcel Service (UPS), Lufthansa German Airlines, Continental Airlines, America West Airlines, LAN Airlines, Eclat Consulting, Airline Industrial Relations Conference, Volpe Transportation Systems Center, U.S. Department of Transportation
- Approximately 32 presentations to industry associations or groups by members of the Program
- Approximately 6 articles in industry trade journals

The Link to Government and Media in 2005

- Developed a working relationship with the Physical Infrastructure Team of the Government Accountability Office (GAO)
 - Hosted a workshop, and provided them with on-going analysis and advice
- 9 presentations or testimony given to government agencies or committees
 - Program members viewed as “objective” observers of the air transport industry
- Approximately 19 requests for assistance from government organizations
- Approximately 11 articles or reports about the Program’s work appearing in the news media
- Program members quoted approximately 50 times this year
- Over 100 press inquiries over the past year

Awards and Honors Received this Year

- Prof. Amedeo Odoni
 - Named a Fellow of the Institute for Operations Research and The Management Sciences (INFORMS)
- Professor R. John Hansman
 - Awarded an Aviation Week and Space Technology “Laurel” (for his work on Enhanced Ground Proximity Warning)
 - Received the Air Traffic Control Association Krieske Award for Improving the Efficiency and Safety of Air Traffic Control
- Prof. Cynthia Barnhart
 - Received the 2005 Women in Operations Research and Management Science Award for the Advancement of Women in OR/MS
- Prof. Jody Hoffer Gittell
 - Named “Outstanding Young Scholar of the Year” by the Labor and Employment Relations Association for “outstanding research contributions to an industrial relations/ employment problem of national significance”

Sources of Program Funding for 2005

1. Sloan Foundation

2. Industry

- 6 members in the MIT Airline Industry Consortium
- 8 international airlines in the MIT PODS Revenue Management Research Consortium
- Annual gifts from Amadeus, S.A. and Carmen Systems
- United Parcel Service
- Draper Laboratory

3. Government

- NASA
- FAA
- Federal Mediation and Conciliation Service

Morning Agenda

0845 Introduction (Barnhart)

Update on Global Airline Industry Program Activities
Today's Agenda and Objectives

0915 Recent Airline Industry Trends -- Update (Hansman)

0940 Pricing and Revenue Management Research (Belobaba)

Pricing and Competition in Top US Markets (Geslin)
Impacts of Fare Simplification (Dar)
Adapting Revenue Management Systems (Belobaba)

1020 *BREAK*

1045 Infrastructure-Related Taxes and Fees in the US and EU (Karlsson/Odoni/Yamanaka)

1120 Airline Labor Update (Kochan/Gittell/McKersie)

Layoffs and Stock Price Recovery After 9/11
Role of Labor and HR in Global Low Cost Competition
Airline Industry Council: Dialogue with Labor, Management and
Government

Afternoon Agenda

1200 *LUNCH*

1300 Secure Flights?: Models and Observations
(Martonosi/Barnett)

1330 Airline Operations & Scheduling Research (Barnhart)

Dynamic Airline Scheduling Models and Experiments (Jiang)

Using Key Performance Indicators to Improve Airline Operations (Riedel)

How Relevant is Elapsed Time in Passenger Airline Choice? (Theis)

1420 *BREAK*

1440 Infrastructure and Capacity Issues (Odoni)

Implications of Very Light Jets on the Air Transportation System (Bonney)

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1530 Looking Ahead: Discussion (All)

Airline Industry Consortium – Update

1600 *ADJOURN*