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
**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 Gittell (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
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
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 (Bonnefoy)  
   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:
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 (Bonnefoy)
   Air Traffic Flow Management under Uncertainty (Hanowsky)
   Market-Based Mechanisms for Capacity Allocation at Airports (Schorr)
   Auctions for Airport Landing Slots (Harsha)

1530 Looking Ahead: Discussion (All)
   Airline Industry Consortium – Update

1600 ADJOURN