

Emerging Technologies and Economic Studies

Diego Klabjan, Department of Civil and
Environmental Engineering



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Outline

- Introduction
- Selected economic studies
- Decision support systems
- Emerging technologies
 - Radio frequency identification
 - Access control





Introduction



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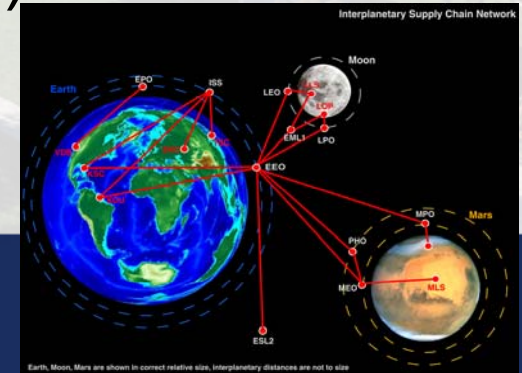
About Myself

- Graduated from Georgia Institute of Technology in 1999
 - Industrial and Systems Engineering
- Same year joined Mechanical and Industrial Engineering at the University of Illinois at Urbana-Champaign
- Last year sabbatical leave of absence at MIT
- Associate Professor in Civil and Environmental Engineering



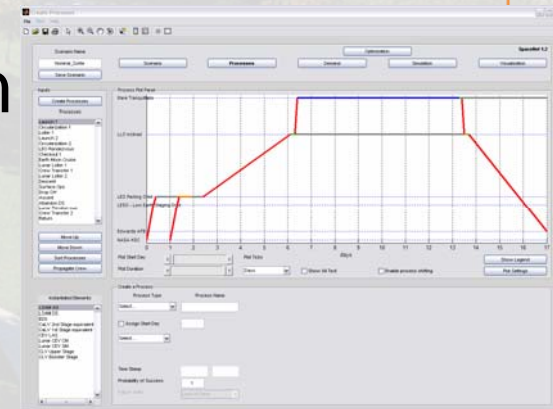
Transportation Systems

- Interest
 - Airline management (Ph.D. thesis funded by United Airlines)
 - Sabre Holdings, American Airlines
 - Aviation and Logistics (FedEx Express)
 - Interplanetary logistics (NASA)



Deliverables

- Economic studies and guidelines
 - Financial consequences of a new policy, contract, regulation
- Decision support systems
 - Data analytics and optimization
 - Facilitate decision making
 - Planning or operational





Economic Studies



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Airbus 380

- In 2007 O'Hare ready for A380
- Infrastructure
 - Runway/taxiway modifications
 - Size and passenger effect on terminals
- Benefits
 - Increased revenue
 - Decrease congestion



Airbus 380

- Additional revenue
 - Predict demand/price
 - Fees
 - Quantify additional revenue
- Will congestion really ease?
 - Implications to baggage handling
 - Gate congestion
 - Sit configuration

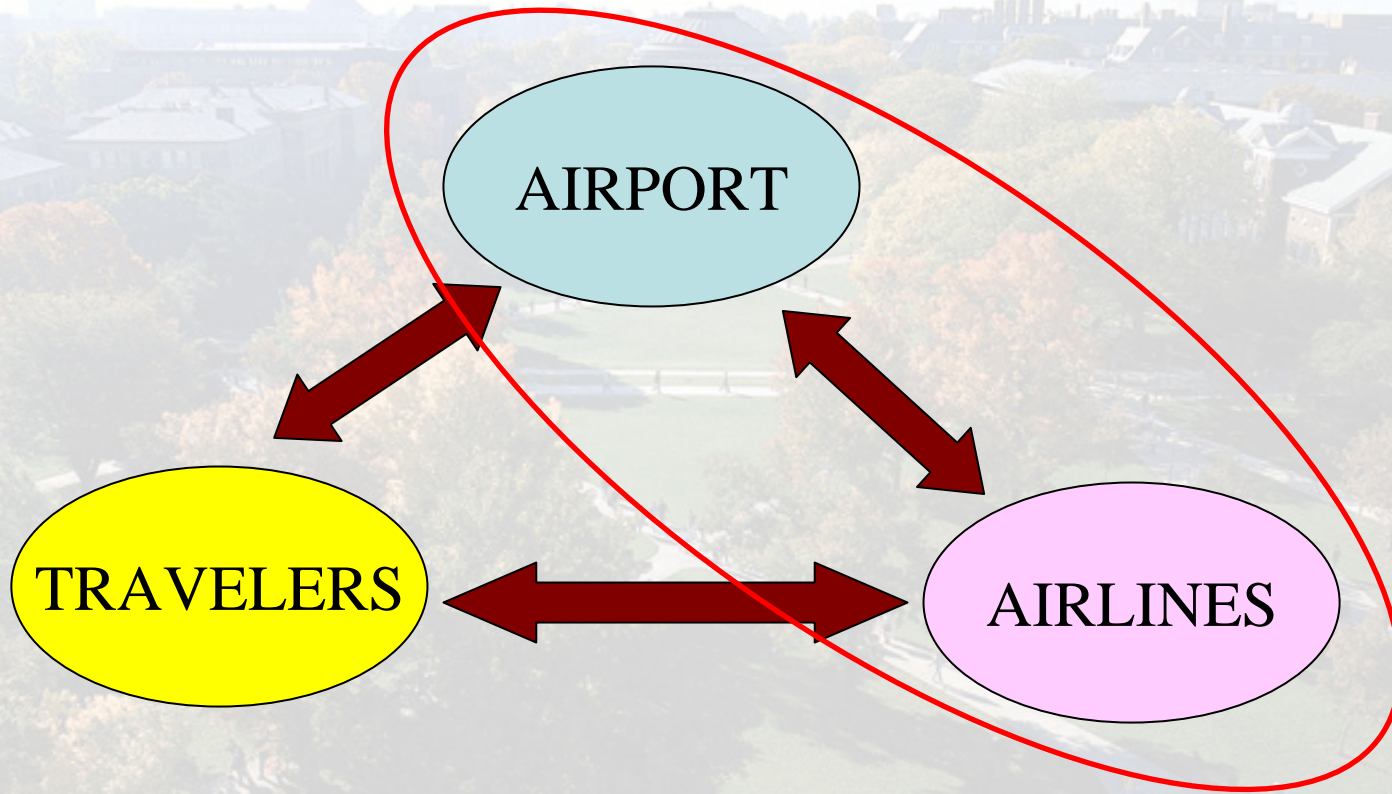


Boeing 787

- Does not require substantial changes to the infrastructure
- Study various demand scenarios
 - Effect on the airport
 - Moderate number of Dreamliners
 - Substantial usage of Dreamlinears



Customer Relationship



Fee Assessment

- Various fees
 - Terminal equipment
 - Terminal
 - Landing
 - Handling
- Mostly fixed amounts



Dynamic Pricing

- Common in several industries
 - Airline fares
 - Rental cars and hotels
 - Even retailers started using this concept
- Drivers
 - Squeeze every bit of revenue
 - As an incentive towards a goal

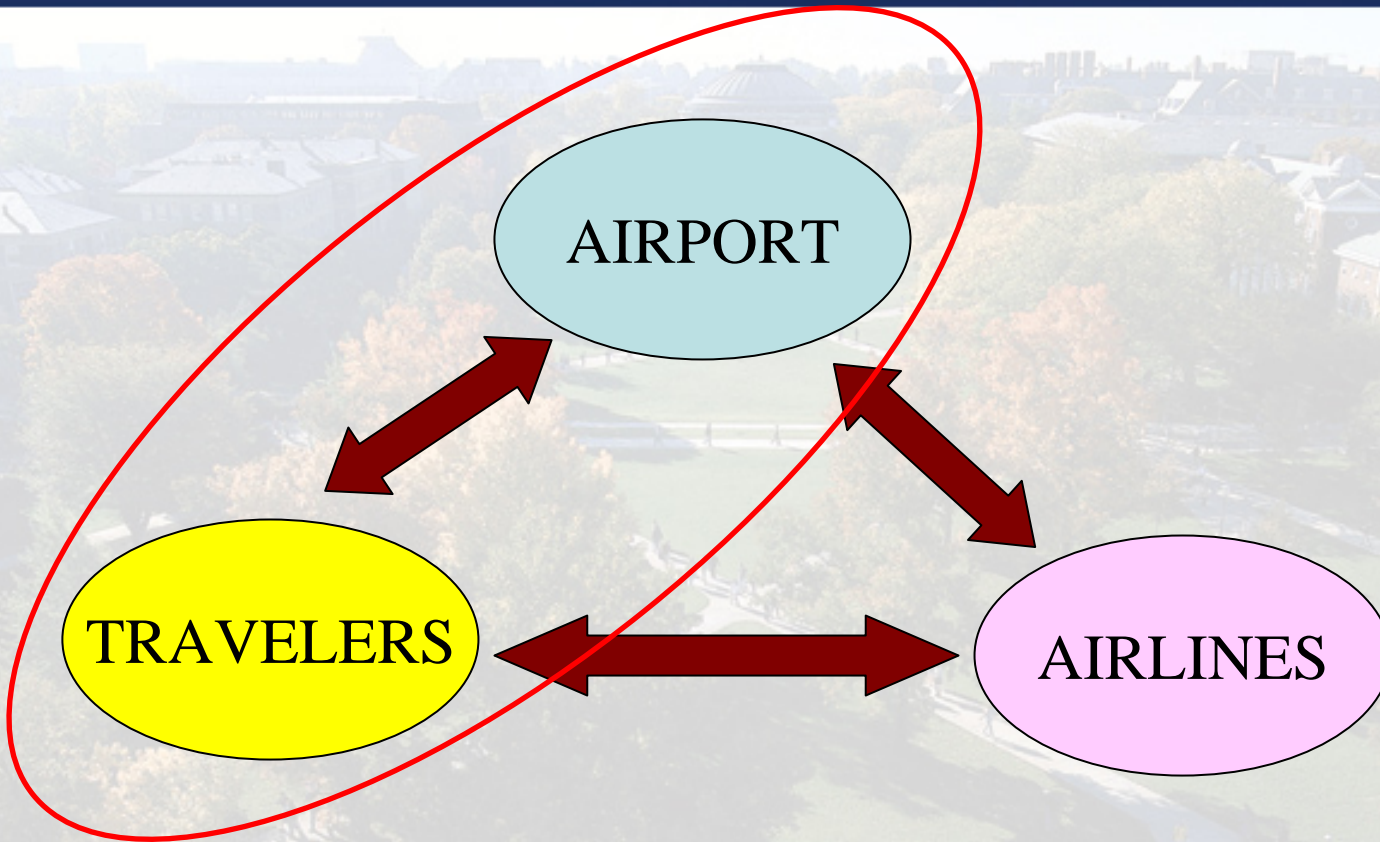


Dynamic Pricing

- Different fees at different time windows
 - Smoothen operations
 - Incentives mechanism
- Set towards targeted equipment types
- How to set the fee for a new equipment type
 - Airbus A380
 - Boeing Dreamliner



Customer Relationship



Queuing Analysis of Passengers

- Terminal areas have changed
 - Room for security processes
 - After August increased demand for drinks
 - Longer connection times
- Simulate and analyze
 - Level of service
 - Walking times



Customer Service

- Travelers spend more time at airports
- What should an airport provide?
 - Airlines provide clubs
- Improved customer experience
 - Fitness centers
 - Quiet reading rooms
 - Economics behind such services



Retail Space

- Retailers presence on the raise
 - Especially pronounced at European airports
- How to manage limited retail space
- Increase revenue for the airport
- Perform analysis
 - Evaluate revenue, cost
 - Leasing mechanism



Decision Support Systems



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What are They?

- Computer based software
 - Data analytics
 - Recommend decisions
 - Perform cost/benefit analysis of alternatives/scenarios
 - Simulation
 - Visualization



Runway Constructions

- Runway renovations, additions
 - Timing effects airport capacity
 - Tightly connected with customers
- Strategic decision making
 - Sequence the projects
 - Schedule them
 - Can it be done without reducing capacity?



Runway Constructions

- Decision support system
 - Propose several scenarios
 - Effects on the airport and airlines
 - Risk assessment
 - Evaluate robustness



Aircraft Parking

- Manage efficiently overnight aircraft parking slots
 - Highly unpredictable
 - Some aircraft parked for days with little or no notice
 - Extremely dynamic environment
 - More aircraft than parking spots and gates



Aircraft Parking

- Decision support system
 - Establish database
 - Planning tool for where and how to park
 - Execution tool for day-to-day operations
 - Execution management
 - Provide cost analysis
 - Deviations from the plan



Robust Strategic Planning

- Long term sustainability in presence of uncertain future
 - Market forces
 - Economic cycles
 - Government
 - Technology
- Strategic plan
 - Capacity
 - Number of gates
 - Cargo requirements



Robust Strategic Planning

- Portfolio of strategic plans
 - Measures of effectiveness
 - Risk measures
 - Agile and adaptable plan
 - Robust and reliable



Emerging Technologies



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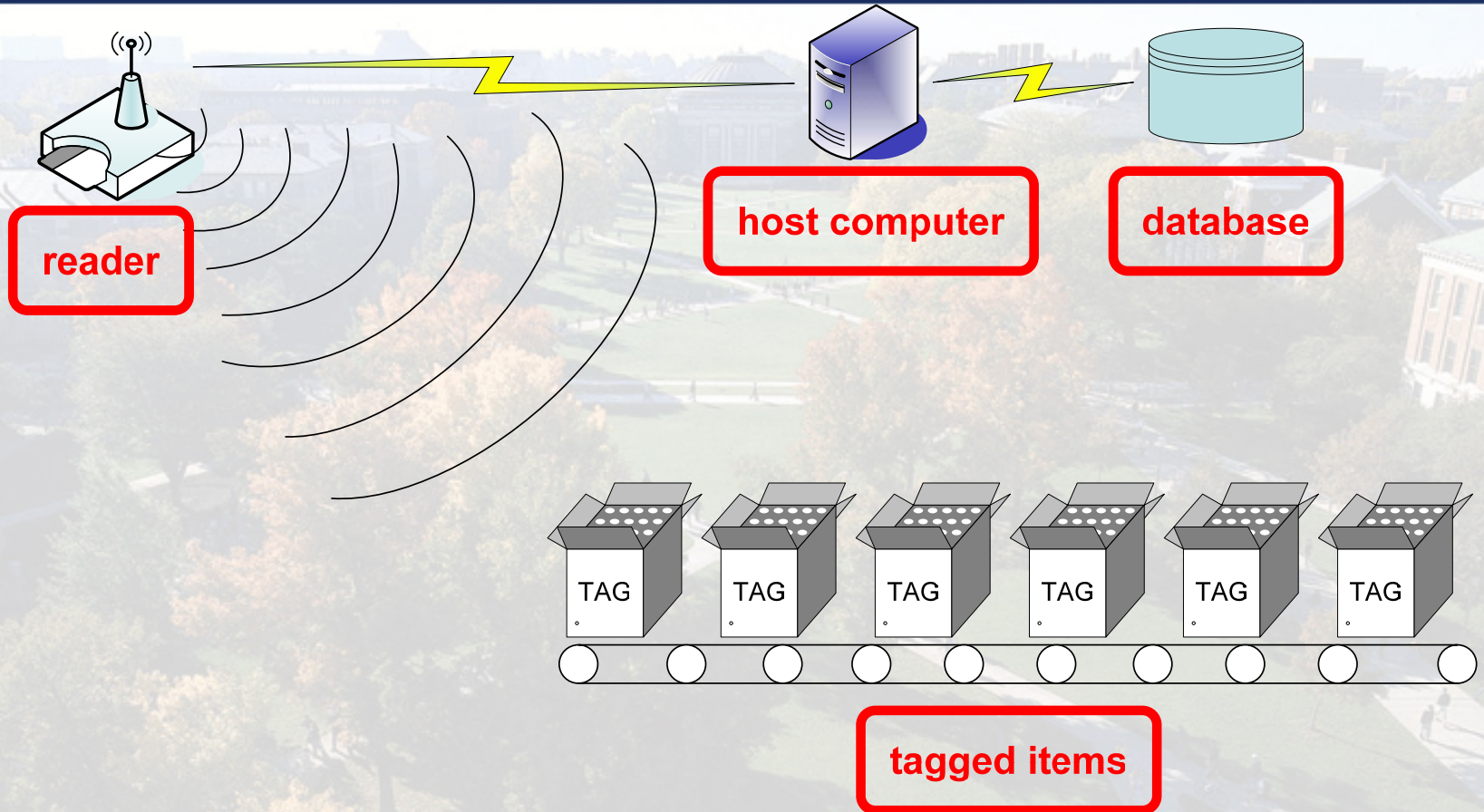
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RFID Primer

- Electronic barcode label
- Chip/tag instead of 'paper label'
- Reader reads and writes to a tag
- Communication via radio waves
- Host computer linked to a database system communicates with a reader



RFID Primer



Key Benefits

- No need for line of sight
 - Communication via air
 - Not the case for barcode scanning
- Tracking at the item level
 - Each individual bag
 - Based on Electronic Product Code (EPC)



Access Control

- Efficient control of contractors' access
 - Provide access by means of RFID enabled cards (smart cards)
 - A tracking system within the area
 - Embedded device (PDA, GPS)
 - Win-win scenario
 - Workers can be guided through the area
 - Provides tracking to the airport
 - Complete visibility



Baggage Tracking with RFID

- Already in place at some airports
- Benefits
 - Costly but prices of transponders are falling
 - Typically several different baggage handling systems in place
 - Enhanced security
 - Reduce the number of lost bags
 - Domestically 3.6 million of lost bags in 2005



Parking

- Wouldn't it be nice that upon getting the parking ticket a few empty spots are recommended?
 - RFID/sensors are enabling technologies
 - Perform the cost/benefit analysis (ROI)
 - Real time visibility of inventory



Deliverables

- What would be the cost of an implementation
 - Compare alternatives
- What are the benefits for the airport
- Implementation time



Summary

- Computers and intelligent software
 - Much more can be done than a decade ago
 - New opportunities
 - It all comes down to profit and return on investment
 - Airport as an enterprise
 - Handling uncertain future



klabjan@uiuc.edu

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Thank you



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