AN INTRODUCTION TO INTELLIGENT TRANSPORTATION SYSTEMS

1.212

SPRING 2003

Professor Joseph M. Sussman

Mon/Wed 2:30 -4:00

BLOCK 1

(Lectures 1, 2)

INTRODUCTION TO ITS

Basic Concepts

Continued

SPEAKER: Joseph M. Sussman MIT

February 7, 2005

INSTITUTIONAL ISSUES

- Privacy/enforcement
- Anti-trust
- Who is in Charge?
 - Public/Private Partnership
- International Cooperation
- Tort Liability
- Procurement
- Marketplace

INSTITUTIONAL ISSUES

- Interagency Coordination and Cooperation
 - Metropolitan Area Traffic Management
 - Federal and State Departments and Agencies
- Adaptation of Existing Posers and Organizational Forms
- Collaborative vs. Adversarial Approaches
- Public/Private Partnership Agreements

INTELLIGENT TRANSPORTATION SYSTEMS (ITS)



ATMS - - Advanced Transportation Management System (Operator)

ATIS - - Advanced Traveler Information System (Customer)

DISCUSSION: What specific actions can ATMS take to improve network performance?



TRANSPORTATION AND CHANGE

Our transportation system provides fundamental and basic services to society, and has done so for thousands of years.

- However, as we begin the 21st century, the field is subject to many changes.
- These transitions occur on the dimensions of technology, systems and institutions and characterize the field in its broadest sense.

TRANSITIONS

- What are these transitions?
- What do they mean for the education of the "New Transportation Professional"?

CLIOS

<u>Complex</u> <u>Large-scale</u> <u>Integrated</u> <u>Open</u> <u>Systems</u>

COMPLEXITY

Complexity as in CLIOS

(Sussman, "The New Transportation Faculty: The Evolution to Engineering Systems", *Transportation Quarterly*, Summer 1999):

A system is *complex* when it is composed of a group of related units (subsystems), for which the degree and nature of the relationships is imperfectly known. Its overall behavior is difficult to predict, even when subsystem behavior is readily predictable. Further, the time-scales of various subsystems may be very different (as we can see in transportation -- landuse changes, for example, vs. operating decisions).

NESTED COMPLEXITY



SUMMARY OF TRANSITIONS

<u>From</u>	<u>To</u>
1. CAPITAL Planning	M ANAGEMENT AND O PERATIONS FOCUS
2. Long Timeframes	REAL-TIME CONTROL
3. URBAN SCALE Planning and Operations	→ REGIONAL SCALE PLANNING AND OPERATIONS
4. EMPHASIS ON M OBILITY	EMPHASIS ON ACCESSIBILITY (THE TRANSPORTATION / LAND-USE CONNECTION)
5. "O NE SIZE FITS ALL" SERVICE	CUSTOMER ORIENTATION QUALITY PRICING FOR SERVICE

From	<u>To</u>
6. ALLOCATE CAPACITY BY QUEUING	ALLOCATE CAPACITY BY PRICING
7. AGGREGATE Methods for —— Demand Prediction	DISAGGREGATE METHODS FOR DEMAND PREDICTION
8. Episodic Data for Investment Planning	DYNAMICDATA FOR INVESTMENT PLANNING (AND OPERATIONS)
9. PUBLICFINANCING FOR INFRASTRUCTURE AND OPERATIONS	PRIVATE AND PUBLIO' PRIVATE PARTNERSHIPS FOR FINANCING OF INFRASTRUCTURE AND OPERATIONS USING HYBRID RETURN
10. INFRASTRUCTURE Construction and MaintenanceProviders	ON INVESTMENT MEASURES NEWHIGH TECHNOLOGY PLAYERS

<u>From</u>	<u>To</u>
11. STATIC ORGANIZATIONS AND INSTITUTIONAL	DYNAMIC ORGANIZATIONS AND INSTITUTIONAL
12. PROFESSIONAL EMPHASIS ON	RELATIONSHIPS PROFESSIONAL EMPHASIS ON TRANSPORTATION
DESIGN OF PHYSICAL Infrastructure	AS A COMPLEX, LARGE-SCALE, INTEGRATED, O PEN SYSTEM (CLIOS)
13. ECONOMIC Development	Sustainable Development
14. Computers Are "Just a Tool"	UBIQUITOUS COMPUTING
15. <u>From</u> <u>To</u> Supply-Side Supply/D Perspective → Equilib Framev	EMAND RIUM WORK AND ON TO SYSTEMS THAT NEVER REACH EQUILIBRIUM

From	<u>To</u>
16. Independent Conventional Infrastructure Projects	LINKED ADVANCED INFRASTRUCTURE PROJECTS REQUIRING A SYSTEM ARCHITECTURE
17. VEHICLES AND INFRASTRUCTURE AS INDEPENDENT	VEHICLES AND INFRASTRUCTURE AS ELECTRONICALLY LINKED
18. REDUCING CONSEQUENCES OF CRASHES	CRASH AVOIDANCE
19. <u>From</u> Modal Perspective →	TOAND ON TOINTERMODALSUPPLYCHAINPERSPECTIVEMANAGEMENT
20. NARROW TRANSPORTATION SPECIALISTS	THE NEW TRANSPORTATION PROFESSIONAL

NESTED COMPLEXITY



THE T-SHAPED TRANSPORTATION PROFESSIONAL

