ENHANCING THE USER EXPERIENCE: TECHNOLOGIES FOR CONNECTIVITY AND RELIABILITY

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Organization of Presentation

• Background
• Enabling Technologies and Applications
• User Information Systems and Trends
  – Information Personalization
  – Information Socialization
  – CTA User Survey
• Technologies for User Convenience
• Innovation through Design
• Technology for Sustainable Mobility
• How Can Agencies Accelerate the Pace of Innovation?
The Last Horsecar in NYC--

Broadway and Bleecker,
July 1917
Chicago was busy inventing the traffic jam --

Dearborn and Randolph, Chicago
Shape of things to come?
New Metro in Dubai
Meanwhile, on the ground: Chicago buses in traffic
Transit vehicle operations in traffic are subject to

Source of

- Unreliability
- Unpredictability
- Delay
- Bus Bunching
- User frustration
What it means to users

Travel behavior studies have shown that

1 minute of wait time (out of vehicle)  
has the equivalent disutility of 3~5 minutes of in-vehicle travel time

1 minute of standard deviation (measure of variability, or unreliability)  
is about 30 to 70% more costly than 1 minute of travel time

How people use their time affects how costly they perceive it to be  
(re: Disney and queue management)

People evaluate their travel options from door to door,  
not just between boarding and alighting
ENABLING DATA TECHNOLOGIES AND APPLICATIONS

SENSING of vehicles
LOCATION people
COMMUNICATION

DATA

SYSTEM INTELLIGENCE
REAL-TIME OPERATOR DECISIONS:
HEADWAY CONTROL (e.g. Holding Policies)
SCHEDULING ROUTING DRIVER ASSIGNMENT
REAL-TIME INFORMATION TO USERS

DATA WAREHOUSING

ANALYTICS:
KNOWLEDGE MANAGEMENT

PERFORMANCE MONITORING
SERVICE DESIGN

SERVICE PLANNING
MARKETING
FLEET MAINTENANCE
Transit-related Operational Measures:

*Bus Priority At Signals*

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![Diagram showing transit-related operational measures](image)

**Figure 1.** Trajectories of a vehicle platoon and a bus between successive signalized intersections.  
1a—Bus stops at far side of intersections.  
1b—Alternating near-side and far-side bus stops.
Integrated Corridor Management (ICM) refers to the

- **Coordination** of individual network operations between adjacent facilities to create an **interconnected system** capable of **cross-network travel management**, along major corridors in metropolitan areas.

- Aggressive and targeted application of intelligent transport system (ITS) technologies to influence not only
  - operational performance of highway facilities, but also
  - the demand for travel in the corridor.

- Combined application of judiciously matched operational strategies (supply-side) with travel demand management (TDM) approaches to bring about improvement in travel time, delay, fuel consumption and emissions, and *increase the reliability and predictability of travel*. 
TYPES OF TRANSIT-RELATED ITS INFORMATION

**Operations Oriented**
- Fleet Management
  - Communications Systems
  - Geographic Information Systems
  - Automatic Vehicle Location Systems
  - Automatic Passenger Counters
  - Transportation Management Centers
  - Data Management for Decision Making
  - Maintenance Information Systems
  - Remote Vehicle Diagnostics
  - Transit Operations Software
- Electronic Fare Payment
  - Closed System
  - Open System
  - Magnetic Swipe/ Credit Cards
  - Smart Cards / Chip Cards
- Traveler Information
  - Pre-trip Transit Information Systems
  - In-terminal/Wayside Transit Info Systems
  - In-vehicle Transit Info Systems
  - Multi-modal Traveler Info Systems
- Transit Safety and Security
  - On-vehicle Surveillance
  - Station/Facility Surveillance
  - Incident Response
- Transportation Demand Management
  - Dynamic Ridesharing
  - Dynamic Routing and Scheduling
  - Automated Service Coordination
  - Transportation Management Centers
- Intelligent Vehicle Initiative
  - Collision Avoidance
  - Guidance / Steering Assistance
  - Obstacle Detection
  - Coupling/ De-coupling

**Customer/Demand Oriented**
- Communications Based Train Control
- BRT / Guided Busways

**Emerging Technologies**
- Hybrid/ Combi-card
- Contact
- Contactless
- Personal Information Systems
- HOV Facility Monitoring
Traveler Information Services

Multi-modal Traveler Information Systems

Pre-trip Transit Information Systems

In-terminal/Wayside Transit Information Systems

In-vehicle Transit Information Systems

Personal Information Systems
Critical features of an ATIS transit service based on survey of early deployments (Lappin, 2000)

- Real-time info on Web, by phone, at bus stops, and on monitors at malls and office parks near major transit centers.
- Detailed maps of routes, with stops, and transfer locations
- Point-to-point trip itineraries: transit and multimodal
- Recommended trip times and routes for fastest travel
- Secure online bus pass purchases

However, research suggests that transit riders are not interested in paying for better system information.
Desirable Attributes of ATIS

- Timeliness and accuracy of information
- Extent of coverage: trains and buses
- Clarity in presentation (regardless of media)
- Ease of access: prefer low engagement
- Degree of personalization: my route and alternatives
- The right information at the right time
Customer identified benefits of transit ATIS

- Reduced stress
- Improved satisfaction with the decision to take transit (post-rationalization)
- Greater control over time and travel decisions

Impact of transit ATIS on customer behavior

- Wait with increased peace of mind
- Choose a different bus or route
- Make a phone call to notify someone that they’ve been delayed
- Data suggests that ATIS may help to retain transient transit customers
TWO KEY TRENDS IN INFORMATION

• INFORMATION PERSONALIZATION:
  – CUSTOMIZED INFORMATION SPECIFICALLY FOR USER LOCATION AND PREFERENCES ("where is my bus?")

• INFORMATION SOCIALIZATION:
  – GROWING ROLE OF SOCIAL MEDIA, AND LOCATION-BASED APPS (e.g. Google Latitude)
    “Where are my friends”?
  – PEER-TO-PEER WILL ACCELERATE TREND, AND POSSIBILITIES (M2M; “THE INTERNET OF THINGS”)
Example: Sense Networks Inc.

Citysense

Tracking cell phone signals for social networking

Example: Google Inc.

Google Latitude

Share your location with friends
KEY DEVELOPMENT
Handset Capabilities, Wireless Internet

Precise Location Enables Wide Variety of LBS Apps

GAMING
Interactive Gaming
GeoCaching
Location aware games for individuals/groups

PERSONAL SECURITY
Roadside Assistance
Weather Warning
Child Finders
GeoFencing

ENTERPRISE
Fleet Management
Asset Monitoring
Personnel
Productivity

m-commerce

POINTS OF INTEREST
City Guides
Mobile Yellow Pages
Navigation
Traffic reroute

PEER-TO-PEER
Buddy Groups
Dating
Geo-marked photo sharing
Mobile Blogging

m-commerce

e-logistics
m-logistics
## BY THE NUMBERS:
SURVEY OF WHAT CTA TRAIN USERS DO WHILE RIDING

<table>
<thead>
<tr>
<th>Action</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used cell phone</td>
<td>67%</td>
</tr>
<tr>
<td>Used audio/video electronics</td>
<td>43.8%</td>
</tr>
<tr>
<td>Text/e-mail for personal use</td>
<td>47%</td>
</tr>
<tr>
<td>Text/e-mail for business</td>
<td>21%</td>
</tr>
<tr>
<td>Surf web</td>
<td>20%</td>
</tr>
<tr>
<td>Make voice calls for personal use</td>
<td>20%</td>
</tr>
<tr>
<td>Make calls for business</td>
<td>5%</td>
</tr>
<tr>
<td>Read news</td>
<td>26%</td>
</tr>
<tr>
<td>Surf web</td>
<td>27%</td>
</tr>
<tr>
<td>Get directions on phone</td>
<td>10%</td>
</tr>
</tbody>
</table>
BUS TRACKER: REAL-TIME PREDICTIVE BUS ARRIVAL TIME AT SPECIFIC STOPS

CTA Bus Tracker
Your official source for up-to-the-minute arrival info.

Looking for the text-only/mobile version? Find it here.
CTA BUS TRACKER

DESKTOP WIDGET

Finalist for
CHICAGO INNOVATION AWARD
2010

70%
CTA users who have cell phones

VIA TEXT MESSAGE

MESSAGE FROM:
41411
5:07 PM
14624) Pulaski & Fullerton
53 to 31st DUE & 11 MIN

Reply Service Bulletins
R)refresh
TECHNOLOGIES FOR USER CONVENIENCE
ELECTRONIC FARE PAYMENT SYSTEMS

SMART CARD PAYMENT SYSTEMS
In France and Europe for many years; US adoption in past 5 years

CELL PHONE PAYMENT SYSTEMS
Less prevalent than smart cards; Not limited to transit– general purpose payment device

MTC

ZOOMPASS, Vancouver, BC
INNOVATION THROUGH DESIGN
What do IKEA, Apple and Starbucks have in common?

*They all expanded the definition of ‘product’ and redefined their industries in a way that placed the overall user experience at the center of the brand and its design.*
What does this have to do with transit?

Think about it

the user interface
information
personalization
socialization
point to point perspective
the stop experience
service delivery and business model
AT NORTHWESTERN –
ONE OF THREE STRATEGIC AREAS OF OUR TRANSPORTATION CENTER (NUTC)

REINVENTING THE USER EXPERIENCE

A joint effort with Bruce Mau Design
Corporate partners
Local and regional transit agencies

OBJECTIVE: INNOVATE THE URBAN MOBILITY PRODUCT
Touch-sensable information
Bus shelter

Heated bus shelter; Experimental ad for Kraft (Chicago)

Eco-friendly bus shelter
TECHNOLOGY FOR SUSTAINABLE MOBILITY
I-Phone App

Personalized information on handset

to assist commuters in understanding implications of different travel choices and provide advice for greener choices
MOBILE GARDEN: ART MEETS DESIGN FOR GREENING PUBLIC TRANSIT

Concept and design by artist Joe Baldwin

Replace one railcar by open garden with flowers and native species

Proposed for Chicago for May 2011
WHAT CAN TRANSIT AGENCIES DO TO ACCELERATE CHANGE?

• Facilitate engagement of private sector and application developers: make data available, readily and in standard formats
• Consider co-branding: leverage location and traffic advantage; rethink the “product” from user experience perspective
• Let users be part of redesigning the user experience
• Experiment with new service and operational concepts
• Be open to new service delivery models
• Think mobility, not just transit