
Pervasive real-time mobility data: Implications for transportation strategy

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**InMotion'09: 1st Workshop on Pervasive Technologies
for Improved Mobility and Transportation**

Nara, Japan
May 11, 2009

The Context

deployment of advanced communications and mobility technologies



generation of data with potential applications to the transportation sector

Range of Applications:

*Real-time
(Operational)*



Strategic

Examples of transportation decisions

Operational

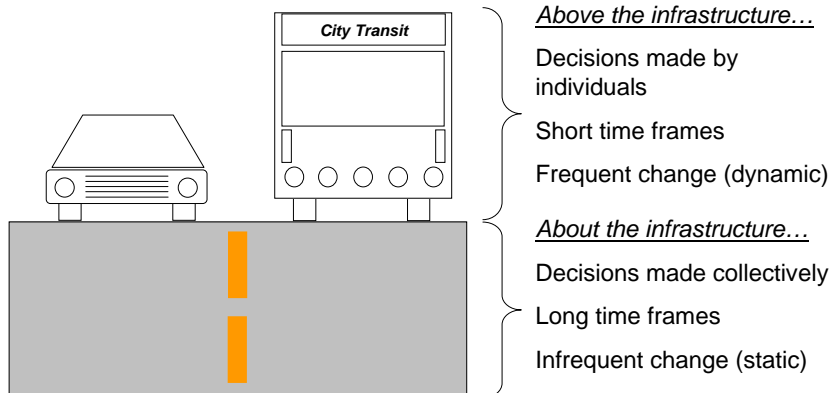
- For individuals
 - Activity choices
 - Departure time
 - Mode choices
 - Route choices
- For organizations
 - Incident response and management
 - Traffic flow management, including, for instance, signalization
 - Real-time routing of individual motorists and/or transit vehicles
 - Real-time variable pricing
 - Special events management

Strategic

- For individuals
 - Vehicle purchase/renewal
 - Residential location
 - Employment Location
- For organizations
 - Infrastructure capacity expansion and maintenance prioritization
 - Land-use controls
 - Transit fleet renewal
 - Regulations (safety, environmental, etc.)
 - Long-range budgeting
 - Organizational structure

Operations vs. Strategy in Surface Transportation

- Operational decisions tend to be made **above** the infrastructure
- Strategic decisions tend to be made **about** the infrastructure



“Game-changing” technologies

- Communications
- System monitoring
- Revenue collection

Communications



Highways

Delayed → Real-Time

Transit

Delayed → Real-Time

- Cellular & WiFi networks
- FOC networks
- TMCs
- Multi-agency collaboration
- 511



Operational Benefits

Faster exchange of information among travelers and system managers for real-time decision-making, e.g., for recurrent congestion, incidents, weather, and construction

Possible strategic uses

- Project staging
- Planning for operations

Strategic implications

How is responsibility for long-term maintenance and expansion of the communications networks assigned? Will the same transportation agencies and organizations have responsibility both for planning and operations?

System monitoring



Highways
Counts & Surveys → Real-Time Data

Transit
Manual → Automated

- GPS/AVL
- Cellular & WiFi networks
- Weigh-in-motion
- APC
- Camera & sensor networks



Operational Benefits

- Provide better information to travelers for decision-making
- Improve congestion, emissions, safety
- Improve reliability, efficiency

Possible strategic uses

- Infrastructure network investment decision-making
- Transit service planning

Strategic implications
Which organizations will control the data and information generated by these systems? Can they use these data in place of or in addition to traditional sources of information to inform strategic investment decisions?

Revenue collection



Highways
Fuel tax → Electronic toll collection

Transit
Cash & passes → Electronic farecards

- Camera systems
- 915 MHz Transponders
- 5.9 GHz DSRC
- GPS
- Cellular/WiFi
- Stored Value Farecards



Operational Benefits

- Improve safety & efficiency of toll/fare collection, while reducing emissions
- Reduce operating costs
- Variable pricing – congestion reduction

Possible strategic uses

- New, additional sources of transportation revenues
- Higher-resolution demand data to inform infrastructure supply

Strategic implications
The capability for local collection of revenues changes the geographic scales at which we can develop strategy. Is “state” or “regional/metropolitan” still appropriate? Something smaller? Something larger?

Motivating future research

Some fundamental questions

- How can we use new sources of data to support existing activities that are strategic in nature?
 - Do existing strategy development processes (e.g., strategic transportation planning) have the flexibility and adaptability to accommodate major changes in the type and quantity of system data?
- Ubiquitous, real-time data can support decentralization of decision-making and greater local financial autonomy (if institutional changes are made).
 - Is this feasible for transportation infrastructure? Is it desirable?
 - What is the “right” spatial scale at which to develop strategy for transportation in this dawning “new era”?
- How should the transformation best proceed from the current institutional and decision-making structure to a future paradigm?

Realizing strategic value

- Transportation agencies *are* beginning to use data generated from advanced technologies for planning
 - highlighting the *strategic* importance of ICT innovations in transportation
 - e.g., many transit agencies use data from electronic farecards in service planning
- It's a two-way street!
 - Desirable institutional changes often require innovative technologies and data → Technology as the *enabler*
 - At the same time, innovative technologies and data will drive institutional changes → Technology as the *mover*

Realizing strategic value

ICT innovations clearly have real-time value for transportation system users...

...but the data they generate also have unexplored *strategic* value.

Thank You

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