

The Internet Paradigm: How Universal Connectivity Changes Transportation

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Universal Connectivity

- Connectivity used to be hard
 - TMC, Transit
- Now we are all on one network
 - The Internet
- Universal connectivity is changing everything
 - New systems
 - New usefulness
 - New challenges!!

Revolutionary Changes

1. Closed systems
... become open
2. New systems
... cost little
3. Data
... emerges as the new challenge
4. Governance:
... Control becomes collaboration

1. Closed Systems Become Open

- Many systems already exist
 - Transit information, TMC, corridors
 - Connected devices
 - Sensors, central managers, signals
- Systems are closed
 - Limited by their connections
- Now: universal connectivity
 - All devices everywhere can connect
 - API's
- No clear boundaries
 - No limit to the possible systems

Open Systems

Connect New Devices

- Sensors
 - Existing: loops, vehicles, video
 - New: phones, blue tooth
- System management
 - Existing: Traffic/Transit management centers
 - New: traveler is empowered
- Signals
 - Existing: signs, traffic signals
 - New: screens (phone, desktop, dashboard)

Builders of Open Systems

- Combine existing devices
 - To create new systems
- “Apps”
 - Entrepreneurs who combine elements
- Google transit
- Walkability score

2. New Systems Cost Little

- Devices are already paid for
 - Now they perform new functions
 - They generate new value
- New uses
 - A phone is a traffic sensor
 - A video camera is a weather sensor
 - A screen is a traffic sign
- *High value ... at low cost*
 - “It’s all gravy”
- The value proposition...

3. Data: The New Frontier

- Solve one challenge...
 - connectivity
- ... and the next challenge appears
 - Data
- Data must be “good”
 - Else, “Garbage in, garbage out”

What is Good Data

- Accessible
- Standard format
- Relevant
- Timely

4. Governance: Control Becomes Collaboration

- Closed systems
 - Align with organizational boundaries
 - A TMC system has a TMC organization
- Open systems
 - Have multiple, collaborating organizations
- Inter-organizational coordination
 - Trust
 - Contracts
 - Market

Organizational Concerns

- Loss of control
 - Of systems
 - Of self
- Data out:
 - Liability, cost-recovery, abuse, exposure
- Data in:
 - Accuracy, reliability, cost
- Responsibility without control
- But: benefits exceed costs/risks