The Gremlins vs. Automated Vehicles: Toll Highways to the Rescue?

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Three Converging Technology Streams

1) On-board vehicle technology
2) Vehicle-to-vehicle technology
3) Vehicle-to-infrastructure technology
CONSUMPTION SPREADS FASTER TODAY
Something This Good Can't Go Wrong

• This will be “as big a deal as the PC.”
  - Steve Jobs

• It may be “bigger than the Internet.”
  - John Doerr
Meet the Ghost Looming Over AV

The *Ghost* of *Segway* Haunts Automated Vehicles
The Gremlin Menagerie
The “Not Impressed” Gremlin

- Expensive transition

- No fundamental change in highway operating system – speed/travel time reliability

- No improvement in driver experience
The “Rip Van Winkle” Gremlin

- Vehicle **wakes up driver** when things go bad
- Control **returned with liability** at inopportune moments
- Consumers feel that **vehicles trick** them into taking control and associated liability
“Tower of Babel” Gremlin

- Vehicles, infrastructure and cloud all talking
- What if the technologies communicates in multiple languages?
  - Do we trust Google Translate at 100 km/hr.?
- Who pays for bandwidth and management of data flows?
The “Uber” Gremlin

- Many groups *adversely affected* by automated vehicle technology
- Highway authorities may *feel threatened* by rapid adoption
- Together, public and private sectors may *create legal roadblocks* to automated vehicle technology
The “Castle” Gremlin

- Early adopters get an electronic castle and moat to **protect them** from the rest of us

- Electronic vehicle buffer **reduces** highway carrying capacity

- Adverse safety impacts as non-automated vehicles are **squeezed out** by automated vehicles
The “What Me Worry” Gremlin

- **Benefits** of automated vehicle technology shared with non-equipped vehicles

- Non-equipped vehicles can **freeload**, gaining benefits of automated vehicle technology at no cost

- Freeloading will **slow adoption** of and limit benefits from automated vehicle technology
The “Jabba The Hutt” Gremlin

- Automated vehicle technology implemented unevenly – e.g., expressways and not arterials
- Disruption in the highway transportation network
- Speed and reliability benefits squandered
Taming the Gremlins

- Develop **compelling product**
- Create incentives to **encourage** mass adoption
- Cooperative **standards**
- Build machines that will "man up" and **take responsibility**
- Establish **political coalitions** to plan for counter-revolution
- Comprehensive **planning and rollout**
TOLL HIGHWAYS TO THE RESCUE
Toll Highways: Key Business Drivers

- Customer service—offer premium transportation service so people will pay to travel on our roads
- Bottom Line—focus on revenue/costs to meet financial obligations
- Safety—reducing accident rate improves traffic flow and hence revenue/customer satisfaction
- Control—toll highways are highly regulated environments
- Focus—single transportation mission
Toll Highways: What Do We Offer?

• Stable and controlled operating environment
• Solid electronic infrastructure (e.g., fiber)
• Experience communicating with and billing our customers
• Liability protections (e.g., sovereign immunity) that can be shared with private sector through collaboration
• History of innovation
  o Turnpikes jumpstarted interstate system
  o AV implementation by toll highways will jumpstart Highways 2.0
AVs Help Replace Tired Business Model
Customer Demand For AV

• For connected people driving is the distraction
• Big demand for in-vehicle connection
• Young people have less interest in driving—see it as mundane manual activity
• License and car ownership rates dropping among young
• Car sharing growing as alternative--travel as a service rather than vehicles as high-value possessions
Travel Enhancements Through AVs

• Faster speeds
• More reliable travel times
• Less stress
• Ability to do other things than operate vehicle
• These customer benefits can be priced
• Toll highways poised to bill customers for value of enhanced customer experience
Connected Vehicle Technology Platform

• New ways to communicate with customers
• New ways to provide services to customers
• New ways to collect tolls
• Toll highways can build on their experience in communicating with highway users/customers
Connected Vehicles = More Capacity
Highway Capacity Enhancement

Source: http://betterinstitutions.blogspot.com/2012/12/with-driversless-cars-on-way-smarter.html

Patcharinee Tientrakool, Columbia University
AV = Market Expansion

• Mobility benefits extended to current non-drivers
  o 21.5 million blind Americans
  o 54 million disabled Americans
  o 12.7% of adults w/no drivers license

• Extend driving life of aging population
  o 27.8 million Americans over 65 in 2010
  o 71.5 million over 65 in 2030

• Driverless vehicles shuttling from place to place
Cost-Effective Capital Investment

- Third parties will bear much of cost of AV technology
- At some point, AV technology will become better bet for capacity expansion than physical expansion in some corridors
- Toll highways get bottom line benefit from more effective capital investments
Safety
Safety Drives Bottom Line

- Safety is a core value
- Reducing “accidents” delivers bottom line benefits
- Customer perception of safety enhances value of toll highway travel
- Toll highways have economic incentive to harvest safety gains from AV technology
Control

• AV technology challenges who controls roadway
  o Speed
  o Number of lanes
  o Queue jumping
  o Diversion around congestion

• Embracing AV gives toll authorities opportunity to shape Highways 2.0
• provide a safe and reliable toll road system
• increase value and mobility options for our customers
• operate the Authority in a businesslike manner
• protect our bondholders
• partner to meet our region's growing need for transportation infrastructure