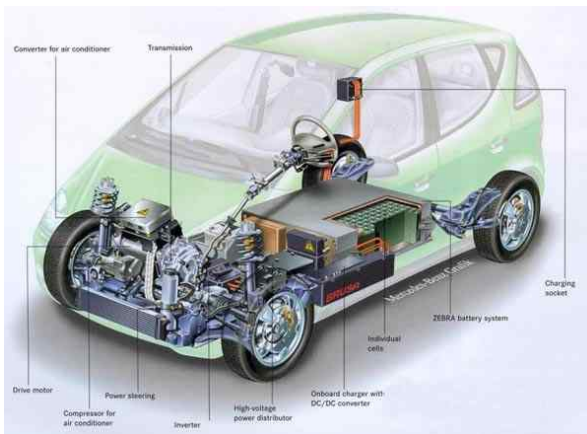
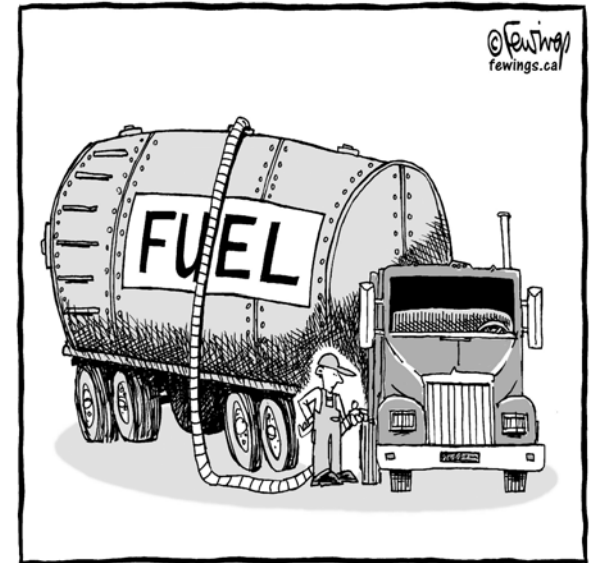


Travel, Transportation and Energy Efficiency Insights for Urban Person Travel

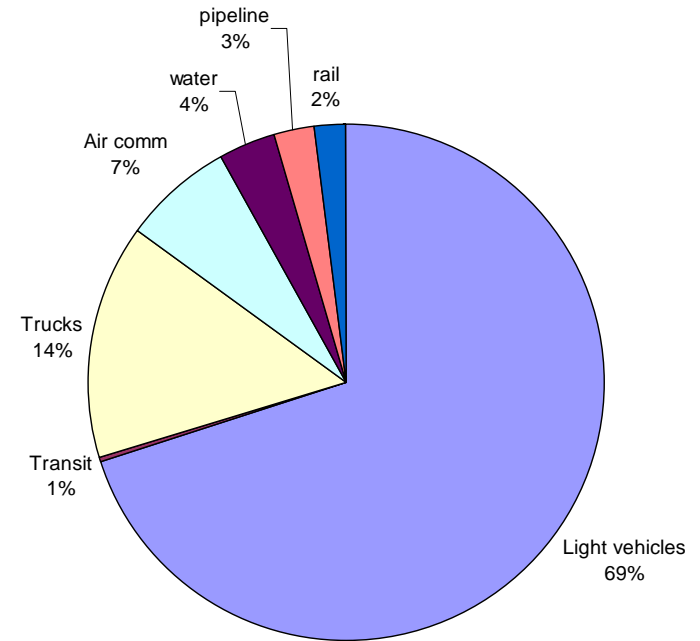
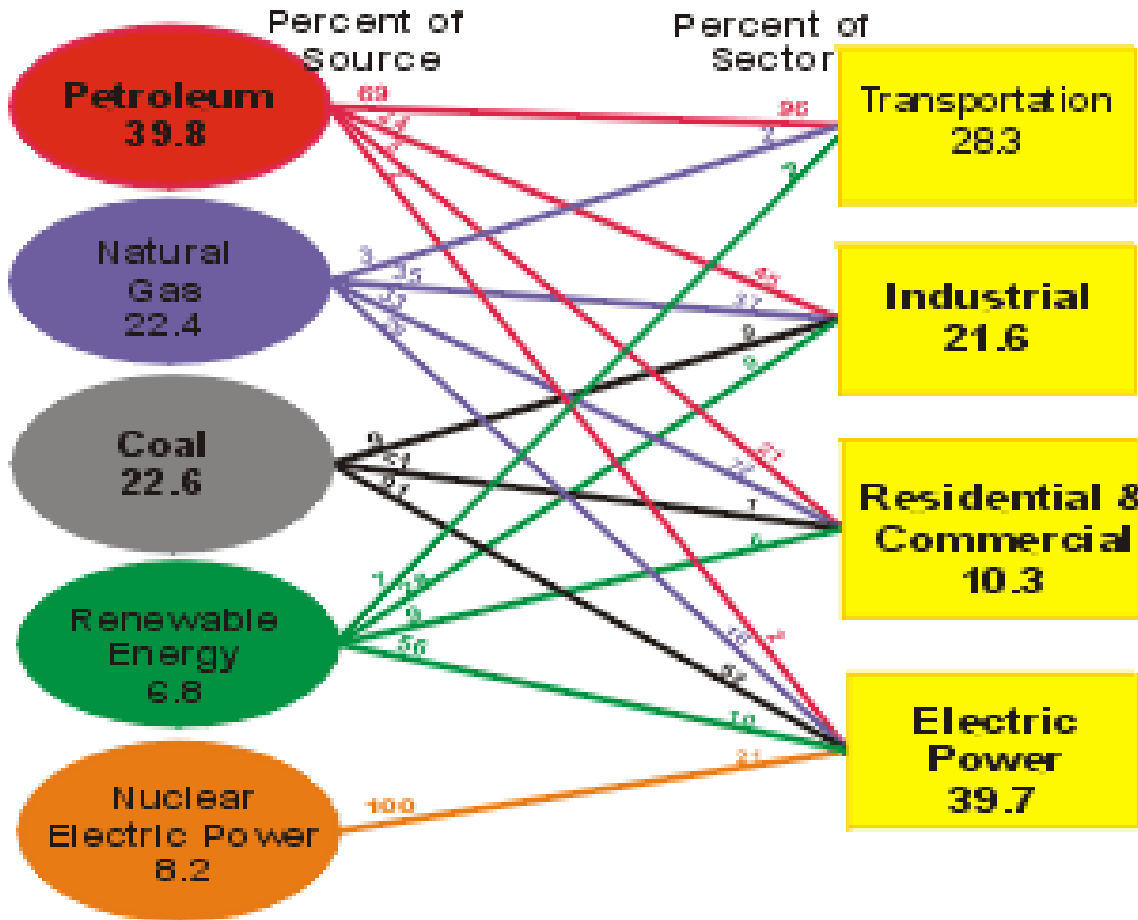
Context, Factors, Options & Opportunities



Joseph L. Schofer
December 3, 2007



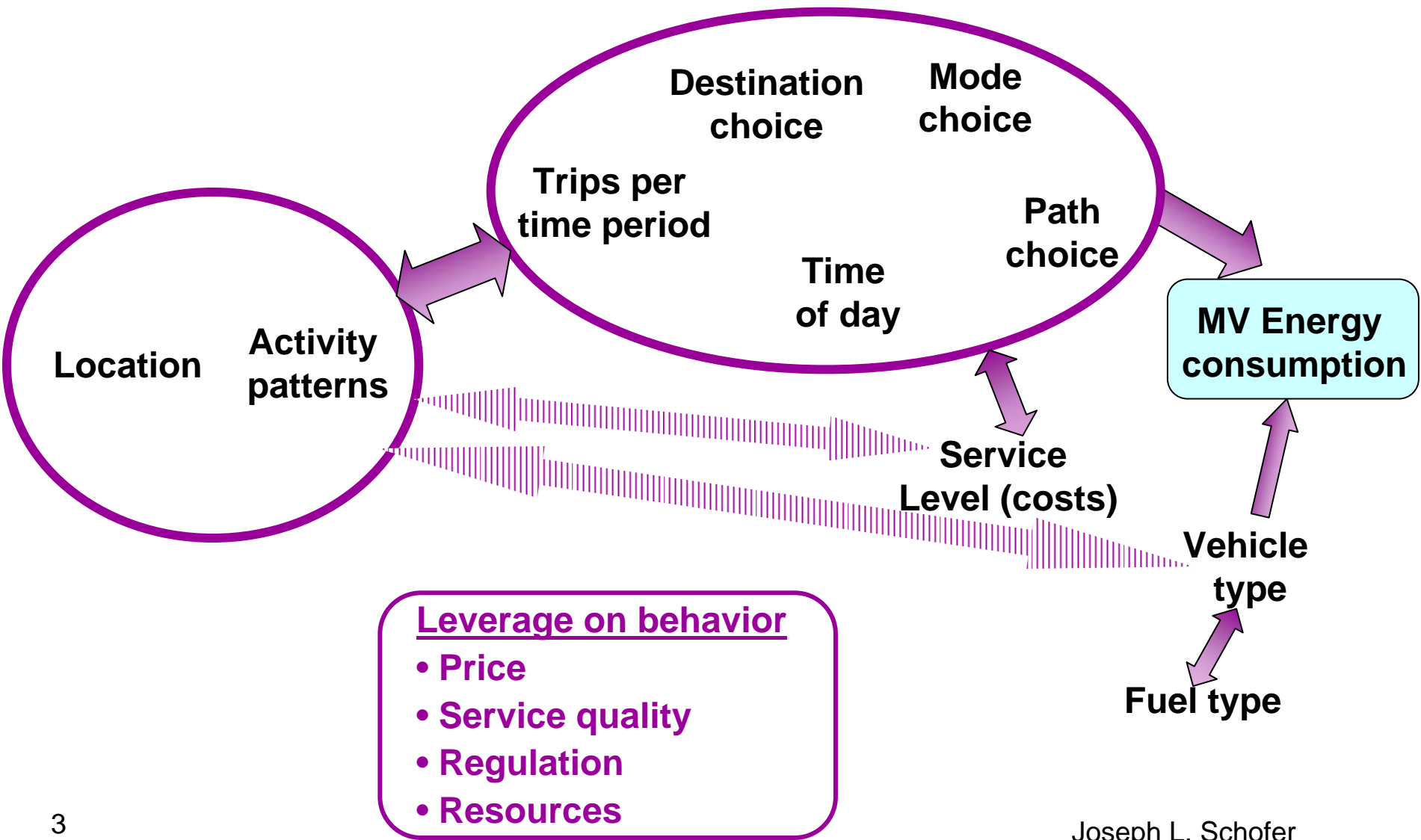
U.S. Primary Energy Consumption by Source and Sector, 2006



<http://www.eia.doe.gov/basics/energybasics101.html>

Quadrillion Btus 10^{15}

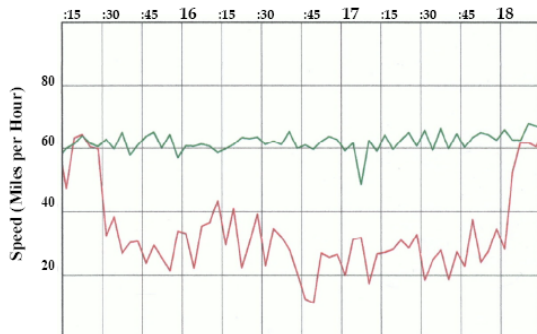
Contributors to Transportation Energy Consumption – HH Travel



Increasing Transportation Energy Efficiency

- Supply actions

- Network management
 - Signals: ITE Grade: D-
 - Ramp metering
 - Real time flow control
 - Incident management
- New highway capacity
 - Induced demand?
- New transit
 - Cost effectiveness?
- Technological advances
 - Fuels & power plants
 - Roadway automation
 - Behavioral stasis



Evaluation of Twin Cities Ramp Metering

- Demand actions, incentives voluntary

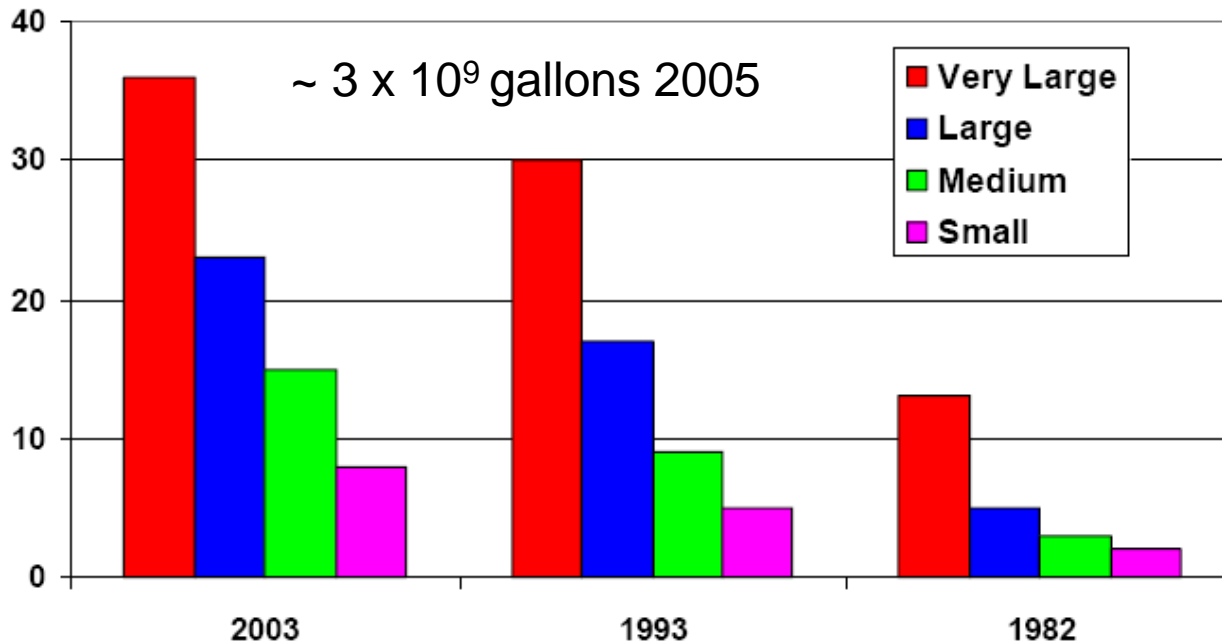
- Congestion pricing
- Traveler information
- Mode shifting
 - Ride sharing incentives (HOV lanes)
 - Transit service quality, information
 - Non-motorized support
 - Travel blending –social marketing
 - Telecommuting
- Time shifting – peak spreading
- Land use: densification, nucleation



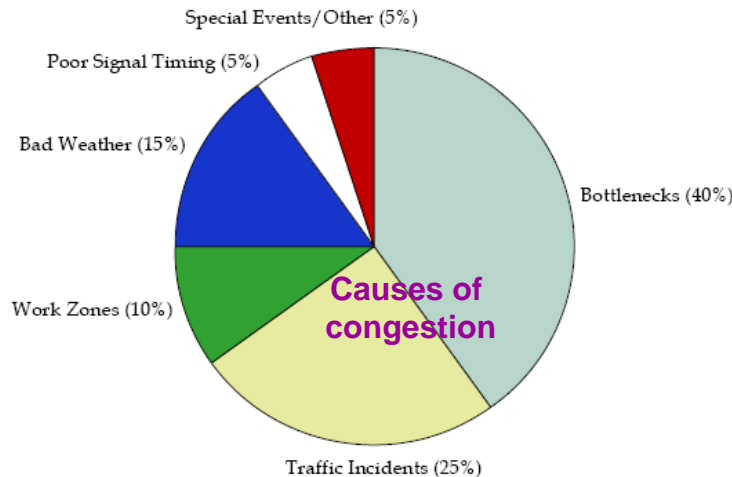
Joseph L. Schofer

Example: Congestion Wastes Fuel

Gallons Wasted per Traveler



http://mobility.tamu.edu/ums/report/congestion_cost.pdf



What to do – supply side

- Operations management
- Add capacity
- New transit, modes
- ...

Utility Maximization & Equilibrium

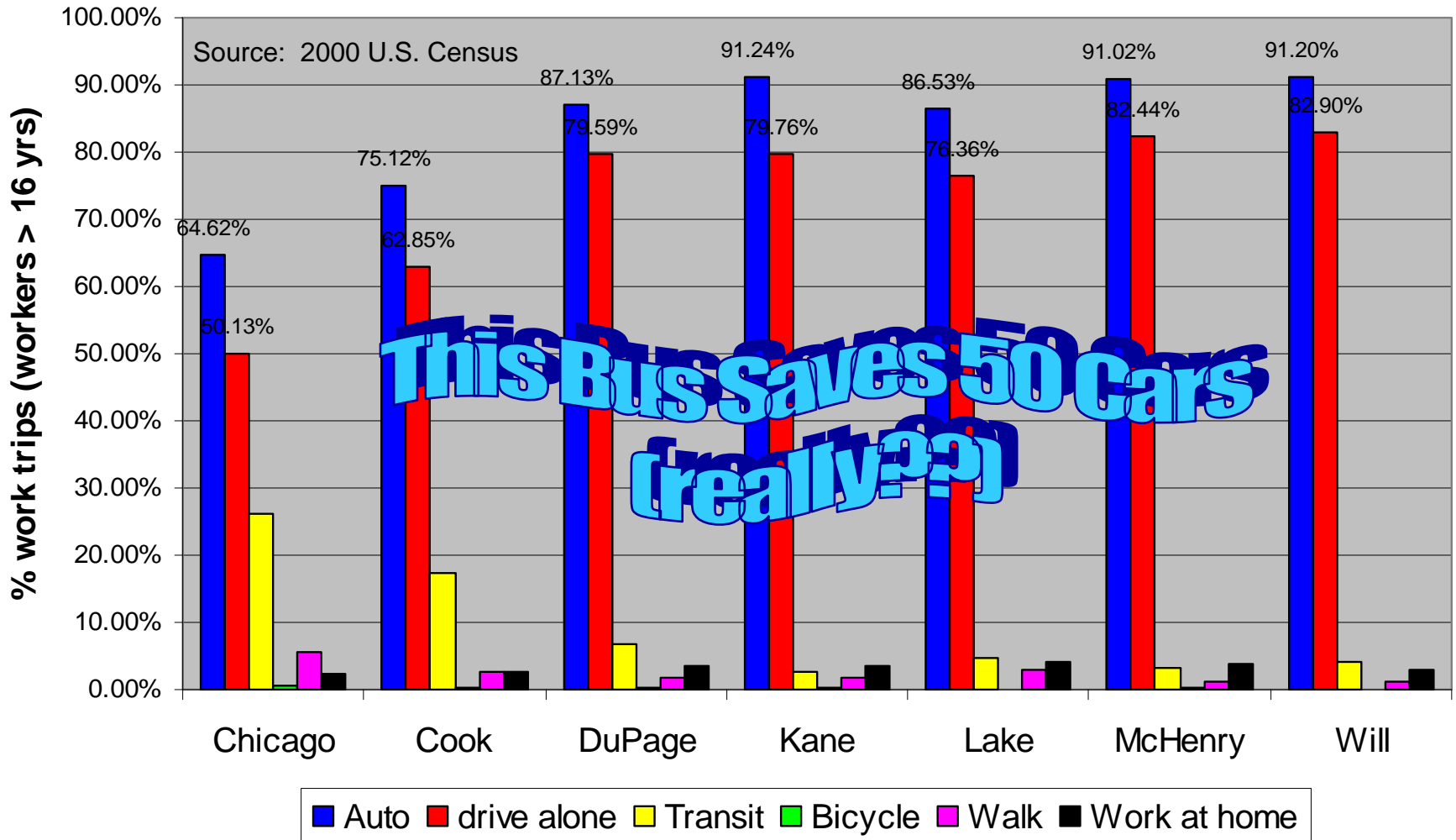


Planned interchange, I-495 (suburban Virginia) \$350 m

- *Induced* demand:
 - Less congestion - lower price – more travel (VMT)
- Unintended consequences?
 - Rational, utility maximizing consumers
 - New equilibrium (individual)
- Managing outcomes
 - Targeted investment
 - Key bottlenecks
 - Pricing and regulation
- Policy should be driven by
 - Process knowledge
 - Prediction: if-then models

SOVs, HOVs & Collective Riding

What's really happening



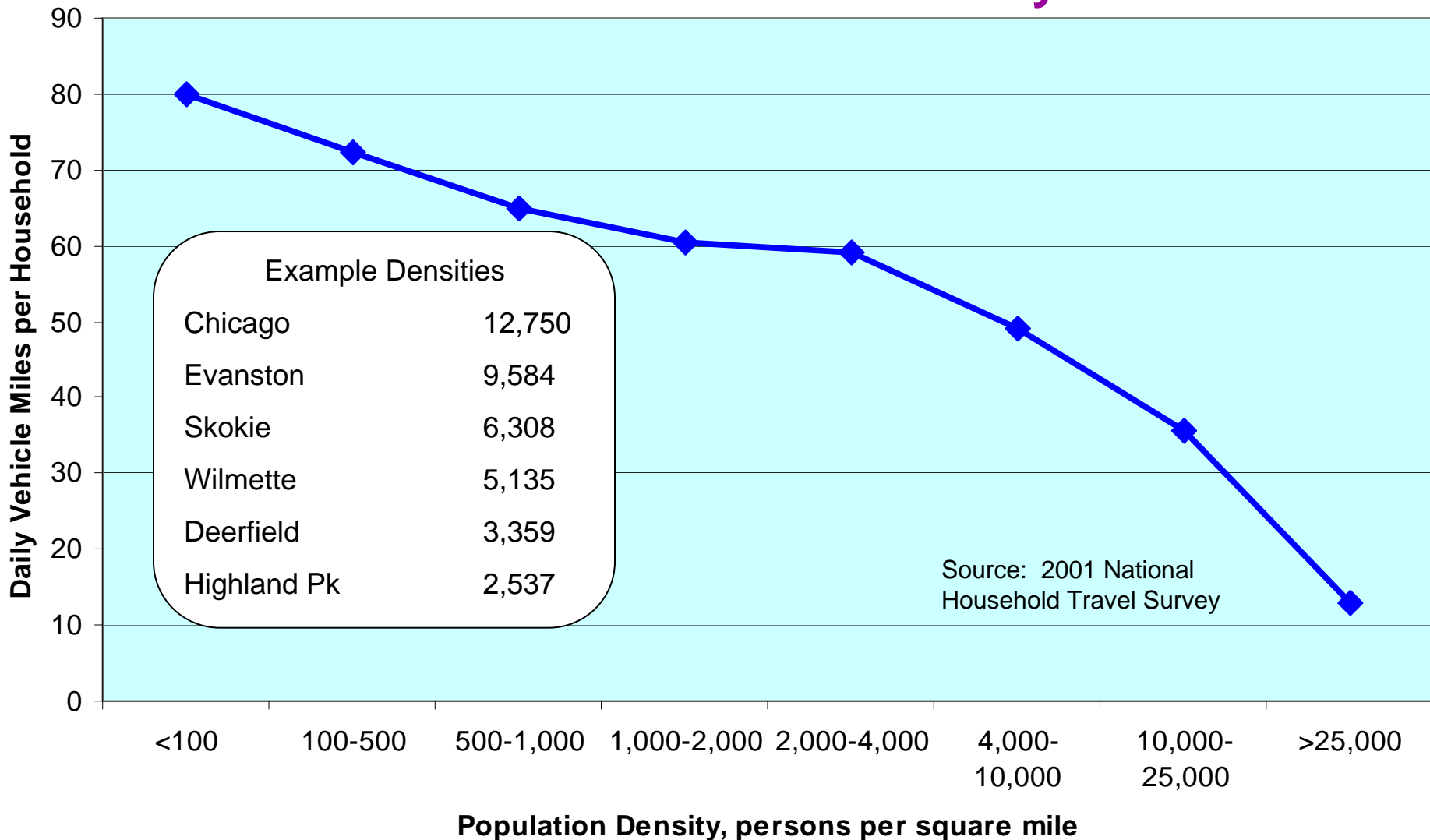
What Leads Travelers to Choose Transit?

- Consumers demand quality
 - Coverage
 - Travel time
 - Reliability
 - Integration – one-ride, one fare
 - Schedule flexibility, Independence
- Price is a factor
- Utilization drives sustainable transit
 - For resource efficiency
 - To justify costs (subsidies)
 - **MARKET DENSITY**



Example: Land Use Makes a Difference

Person Travel and Density



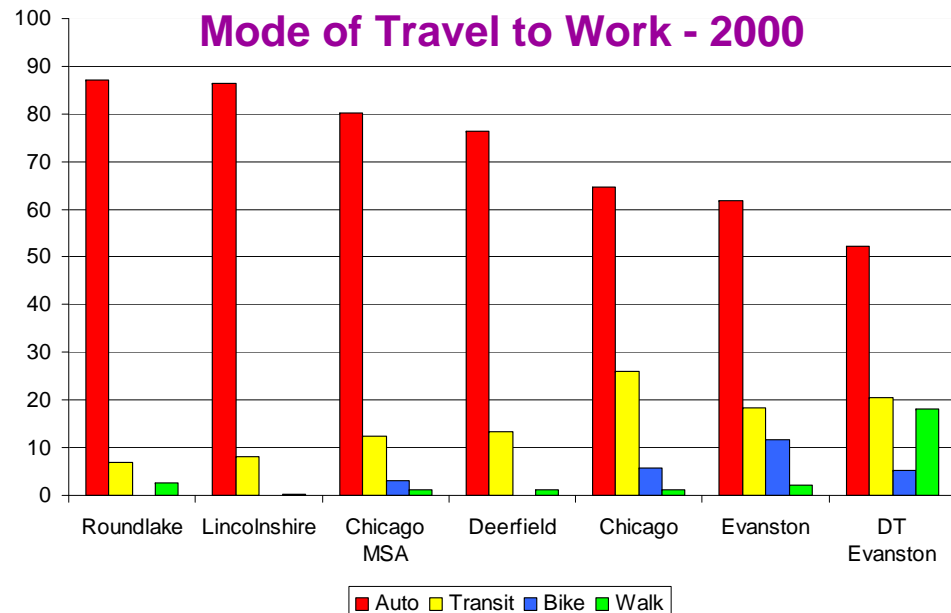
Land Use Policies and Actions

Accessibility, not Just Mobility

- Understanding relationships, tradeoffs
- Providing information
- Rational regional regulations
- Strategic infrastructure investment
- Pricing services
- Effective options, designs
 - Nucleation - location
 - Density
 - Mixed land uses
 - Non-motorized travel
 - Integrated transportation



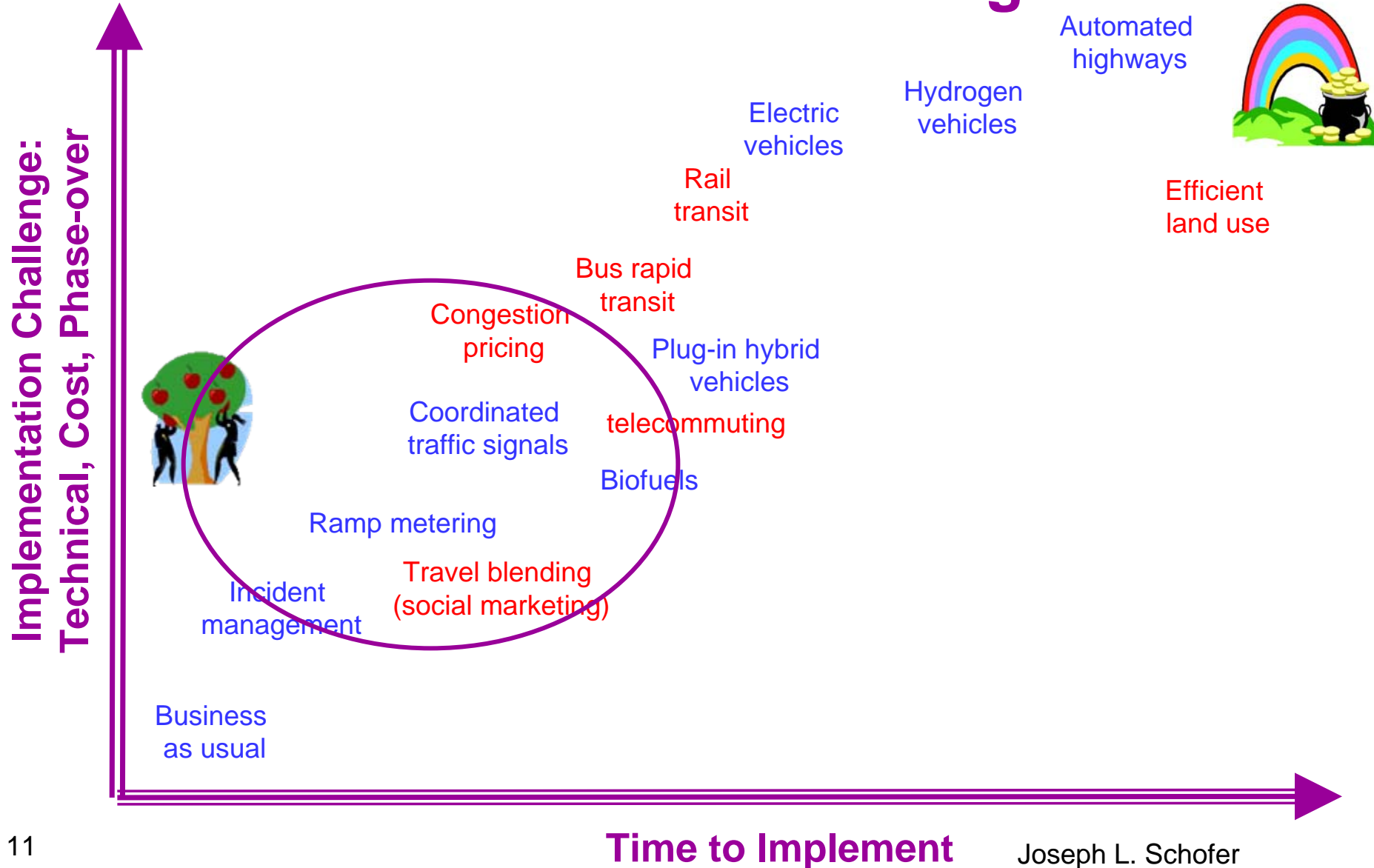
Downtown Evanston



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Implementing Energy Efficient Travel

How difficult? How long?



Barriers to Energy Conservation

- Travelers: utility maximizers
 - Individual vs. social optima
 - Limited information
- Voluntary vs. forced change
 - Switch to better option
 - Pushed to inferior option
- Multi-criteria decision making – trade-offs
 - E.g., housing vs commuting
- Phase-over costs
- Inertia and vested interests
- Uncertainty and forecasting
 - Better models can help



Technology can avoid behavior changes – but is it (1) fast enough? (2) sufficient? (3) sustainable?



Affecting the Policy Process



- Resistance to big change
 - Leadership vacuum
 - High discount rates
 - Something for nothing
- Make policy salient to individuals, leaders
 - Environment
 - Energy
 - Congestion
- Market (voluntary) solutions
 - Attractive options
 - Pricing – signal real costs
- Information, education, prediction