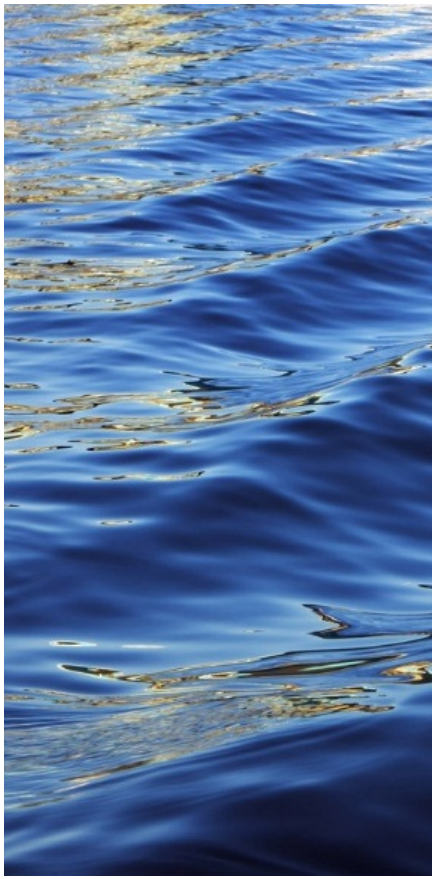
Impact of Shared Mobility and Technology on Public Transportation



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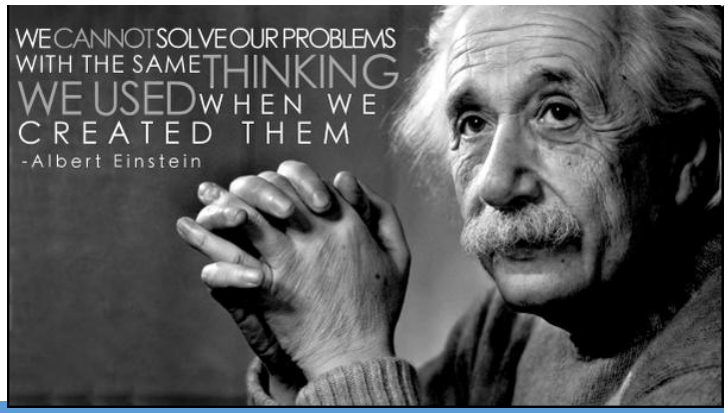
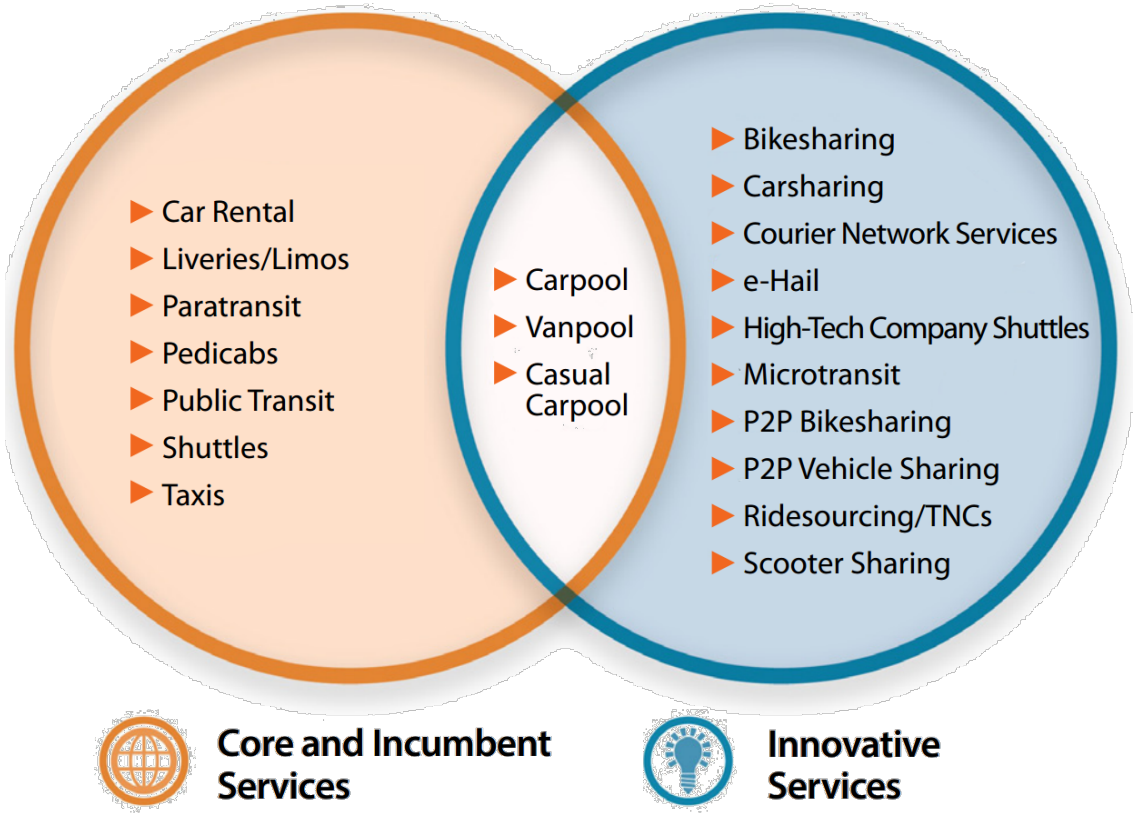
Overview

- Defining shared mobility and impacts
- Declines in public transit use
- Key questions for public transit
- Need for research
- Upcoming studies and current reports



Defining Shared Mobility

Shared mobility—the shared use of a vehicle, bicycle, or other low-speed travel mode—is an innovative transportation strategy that enables users to have short-term access to a mode of transportation on an as-needed basis.



Shaheen et al., 2016

Shared Mobility Impacts

Environmental Effects

- Can yield lower GHG emissions via decreased VMT, low-emission vehicles, carbon offset programs
- Can reduce vehicle ownership

Social Effects

- Offers "pay-as-you-go" alternative to vehicle ownership
- Reasonable for college students and low-income households
- Can increases mobility of low-income residents, disabled, and college students
- Provides car use without bearing full ownership cost

Transportation Network Effects

- Takes cars off the road via reduced VMT, forgone/delayed vehicle purchases or sale of vehicle
- Reduced parking demand
- Can complement/complete with alternative transportation modes, e.g., public transit, walking, biking, etc. , and can help address first and last mile issue

Shaheen, 2017

One-Way Carsharing Study

ONE-WAY CARSHARING IMPACTS

Member Vehicle Holdings

2% - 5%	sold a vehicle
1 - 3	vehicles sold per car2go vehicle
7% - 10%	postponed a vehicle purchase
4 - 9	vehicle acquisitions suppressed per car2go vehicle

1 car2go vehicle replaces 7-11 vehicles

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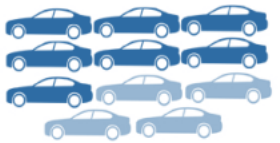


or 28,000 vehicles across 5-city study

Reduction of VMT and GHG emissions

- 6% - 16% Average reduction of VMT per car2go household
- 4% - 18% Average reduction of GHG emissions per car2go household

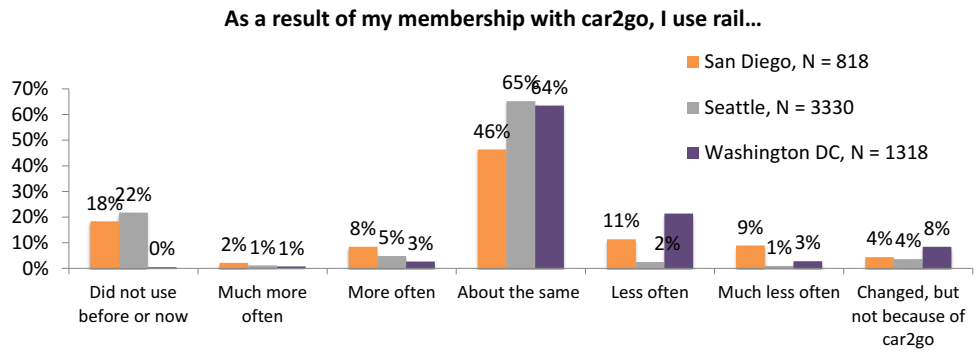
Martin and Shaheen, 2016

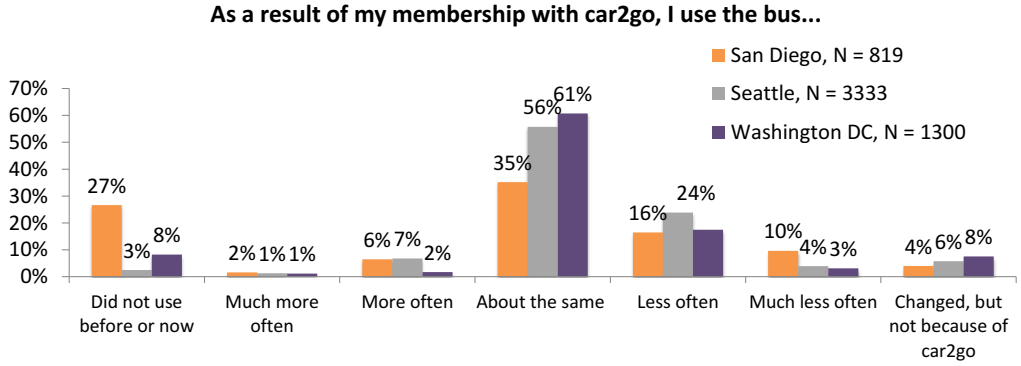
One-Way Carsharing: 5-Cities

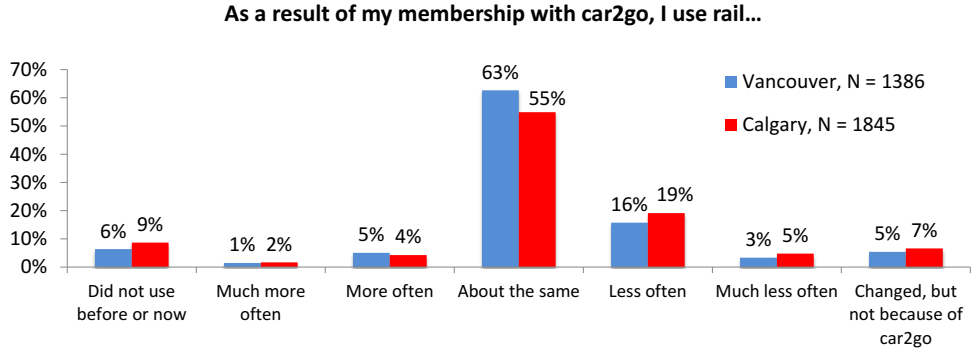
City	Vehicles Sold	Vehicles Suppressed (foregone purchases)	Total Vehicles Removed per Carsharing Vehicle	Range of Vehicles Removed per Carsharing Vehicle	% Reduction in VMT by Car2go Hhd	% Reduction in GHGs by Car2go Hhd
Calgary, AB (n=1,498)	2	9	11	2 to 11	-6%	-4%
San Diego, CA (n=824)	1	6	7	1 to 7	-7%	-6%
Seattle, WA (n=2,887)	3	7	10	3 to 10	-10%	-10%
Vancouver, BC (n=1,010)	2	7	9	2 to 9	-16%	-15%
Washington, D.C. (n=1,127)	3	5	8	3 to 8	-16%	-18%

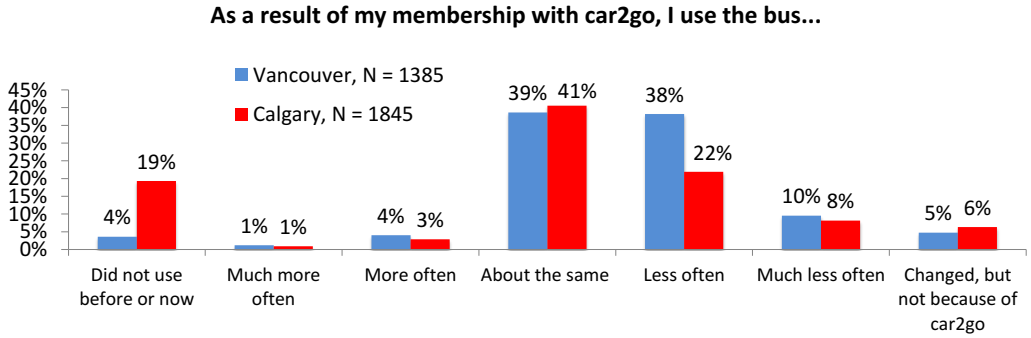
Martin and Shaheen, 2016

Shifts in Rail and Bus









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Bikesharing Impacts

- Large cities - Bikesharing members rode the bus less, due to reduced cost and faster travel
- All cities - Increased bus use attributed to bikesharing improving access to/from a bus line

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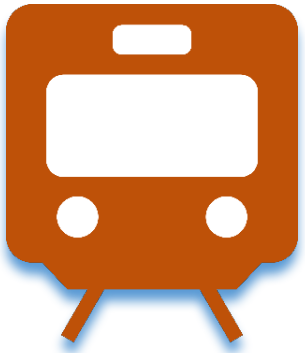


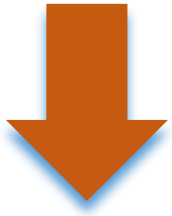
- Small cities – increased rail use
- Large cities – decreased rail use
- Shifts away from public transit often due to faster travel times and cost savings with bikesharing

Shaheen et al., 2014; Shaheen and Chan 2015

Bikesharing Impacts (Cont'd)

5.5% of bikesharing members sold or postponed a vehicle purchase

58% of bikesharing members increased cycling



50% of bikesharing members reduced personal auto use

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Shaheen et al., 2014; Shaheen and Chan 2015

Ridesourcing Modal Shift Impacts

Study Authors Location Survey Year	Rayle et al. San Francisco, CA (2014)	Henao Denver and Boulder, CO (2016)	Clewlow and Mishra* Seven U.S. Cities** Two Phases (2014 – 2016)
Drive	7%	37%	39%
Public Transit	30%	22%	15%
Taxi	36%	10%	1%
Bike or Walk	9%	12%	23%
Would not have made trip	8%	12%	22%
Other / Other Ridesourcing/TNC	10%	7%	-

*Impacts in this study were weighted by usage and aggregated across 7 cities.
**Cities in study include: Austin, Boston, Chicago, Los Angeles, San Francisco, Seattle and Washington, DC.

Ridesourcing VMT Impacts

- **3.5% increase in citywide VMT** and 7% increase in Manhattan, western Queens, and western Brooklyn in 2016 (Schaller, 2017)
- **In Denver, average of 100 vehicle miles to transport passenger 60.8 miles** (~40% deadheading miles) (Henao, 2017)
- **In SF**, SFCTA (2017) found ~**20% of total ridesourcing VMT included deadheading miles**
- **May be increase in VMT due to ridesourcing**, although exact magnitude still unknown and likely varies by location (e.g., density, land use, and built environment)
- Services still new (August 2012) and evolving (e.g., pooling, SAVs)

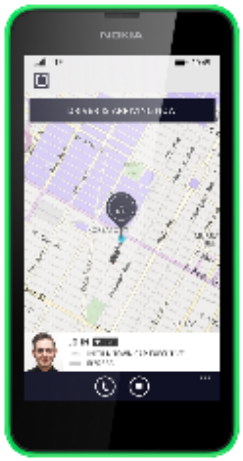
Growing Number of Pooled Options

- **Ridesplitting/pooling** - Users may volunteer to share a for-hire ride for a discount; may or may not be pooled depending on availability (e.g., UberPOOL, Lyft Line)

- **Taxi Sharing** – Users may opt to share a taxi cab (e.g., Bandwagon)

Convergence

Electrification



Mobile Technologies

SECA

T. Papandreou, 2016

Shared Mobility

Automation

Shaheen et al., 2016

Declines in Public Transit Ridership

UZA Name	Sum of 2015	Sum of 2016	Change
Seattle, WA	178,640,154	185,913,534	4.1%
Houston, TX	83,285,295	85,180,489	2.3%
Milwaukee, WI	40,610,851	41,476,982	2.1%
Detroit, MI	36,734,180	37,079,598	0.9%
New York-Newark, NY-NJ-CT	4,222,700,561	4,241,214,495	0.4%
San Francisco-Oakland, CA	454,952,418	454,996,256	0.0%
Boston, MA-NH-RI	403,464,723	402,554,159	-0.2%
Pittsburgh, PA	63,990,430	63,570,697	-0.7%
Denver-Aurora, CO	101,021,365	99,777,407	-1.2%
Portland, OR-WA	112,440,100	110,985,034	-1.3%
San Antonio, TX	37,983,886	37,290,201	-1.8%
Salt Lake City-West Valley City, UT	44,909,741	43,776,825	-2.5%
Minneapolis-St. Paul, MN-WI	96,636,368	93,716,857	-3.0%
Chicago, IL-IN	623,466,948	603,747,357	-3.2%
Urban Honolulu, HI	68,587,549	66,361,162	-3.2%
Las Vegas-Henderson, NV	72,044,767	69,420,973	-3.6%
Dallas-Fort Worth-Arlington, TX	75,998,371	72,137,725	-5.1%
Baltimore, MD	111,070,976	105,214,371	-5.3%
Atlanta, GA	141,154,134	132,925,293	-5.8%
Philadelphia, PA-NJ-DE-MD	369,644,085	346,276,496	-6.3%
Phoenix-Mesa, AZ	69,525,177	64,898,486	-6.7%
San Diego, CA	94,921,830	88,507,937	-6.8%
St. Louis, MO-IL	47,250,866	44,020,031	-6.8%
Cleveland, OH	46,844,074	43,507,057	-7.1%
Los Angeles-Long Beach-Anaheim, CA	619,459,557	572,589,716	-7.6%
San Jose, CA	44,718,244	40,763,554	-8.8%
Miami, FL	156,449,301	141,556,090	-9.5%
Washington, DC-VA-MD	441,222,366	396,260,838	-10.2%
Austin, TX	32,795,531	28,893,986	-11.9%
San Juan, PR	38,853,326	32,289,221	-16.9%

Increase

No Change

Decrease

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NTD, 2017

Key Questions for Public Transportation

- When does shared mobility complement public transit and when does it compete?
  - How does it vary by mode & context?
- What factors influence complementarity vs. competition?

- How can shared mobility be used to enhance accessibility to areas without public transit service?
- How can shared mobility be used to improve efficiency and/or reduce service inefficiencies?
- How should public transportation respond to short-, mid-, and long-term changes? (e.g., shared mobility, AVs, SAVs, and other innovations)

Shared Mobility and Public Transportation: Research

More study needed to evaluate traveler behavior and elasticity of individual and combined variables

- Cost, occupancy
- Fare type (e.g., pass, per trip, per mile) and stability (e.g., fixed vs. variable pricing)
- Temporal and spatial scale
- Convenience
- Travel time
- Wait / transfer times
- Number of modes
- Other factors

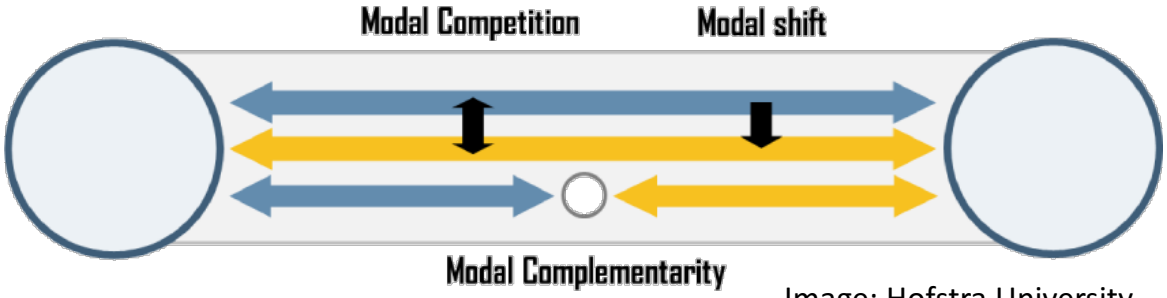
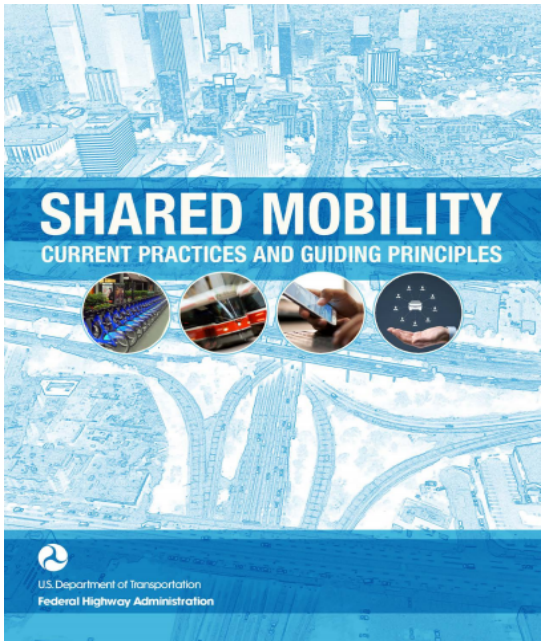
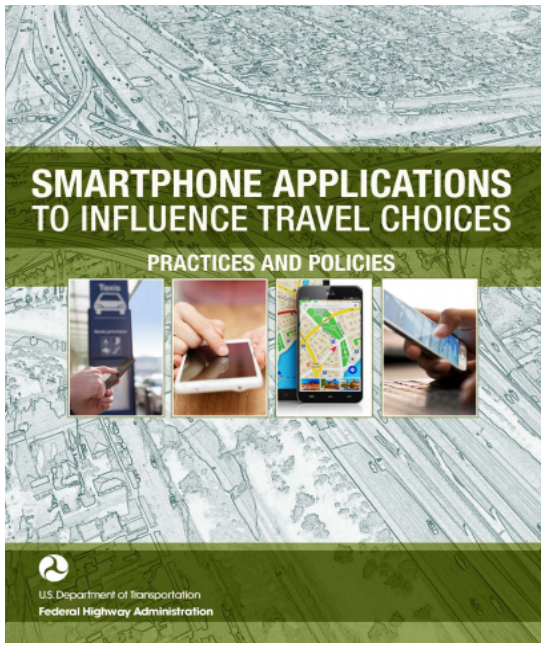


Image: Hofstra University

Recent Reports



https://ops.fhwa.dot.gov/publications/fhwahop16022/fhwahop16022.pdf



https://ops.fhwa.dot.gov/publications/fhwahop16023/fhwahop16023.pdf

https://www.planning.org/publications/report/9107556/

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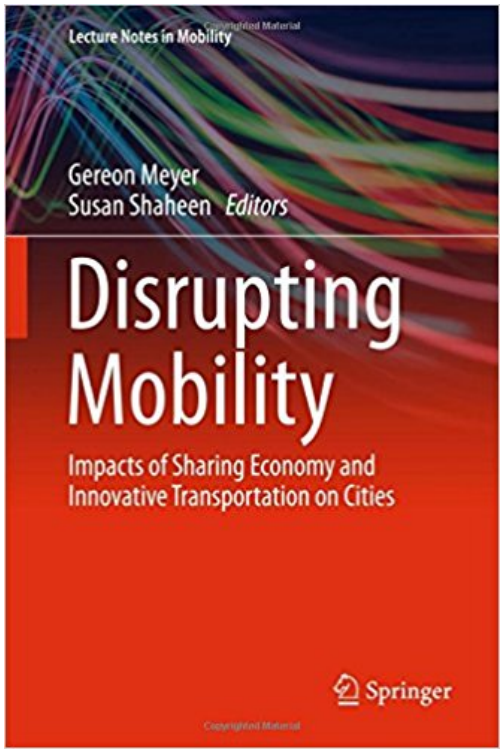
Disrupting Mobility (2017)



Available at:

https://www.amazon.com/Disrupting-Mobility-Impacts-Innovative-Transportation/dp/3319516019

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