THE TRANSPORTATION REVOLUTION NO ONE PLANNED AND NO ONE SEEMED TO NOTICE

Total and Per Capita Vehicle Miles Traveled (VMT) 1970 - 2016

State Smart Transportation Initiative
US. Federal Highway Administration

Sam Schwartz
“IT’S TOUGH TO MAKE PREDICTIONS ESPECIALLY ABOUT THE FUTURE” – YOGI BERRA
THE PARADIGM IS CHANGING

Washington State DOT Revises VMT Forecast

RECESSIONS DAMPEN VMT, THEN IT REBOUNDS WITH THE ECONOMY. BUT, NOT THIS TIME

Estimated Vehicle Miles Traveled on US Roads 1971-2015

Source: “Vehicle Miles Traveled on ALL Roads,” Doug Short, August 2015.
WHO’S DRIVING LESS? MILLENNIALS

“The Millennial generation seems to be defying its sheltered, suburban upbringing by delaying the acquisition of a driver’s license and choosing transit. Meanwhile, Baby Boomers, who grew up using transit and were encouraged to do so, are defying their upbringing by avoiding transit now.”


Sources: “The Future Isn’t What It Used to Be,” Victoria Transport Policy Institute, 28 March 2014; “Percentage of Young Persons With a Driver’s License Continues to Drop,” Michael Sivak and Brandon Schoettle, July 20, 2012; National Household Travel Survey, 2011; “Millennials in Motion,” U.S. PIRG, 2014
MILLENNIALS AREN’T BUYING CARS LIKE PREVIOUS YOUNG PEOPLE

Car loan originations per capita by age

Source: Federal Reserve Bank of New York

City Observatory
MANY MILLENNIAL PARENTS NOT FLEEING TO SUBURBS

% Say this occurred within the **past 1-2 years**
(Among % Parents & Non-Parents)

- Parents (of children 18 or under living in household): 21%, 25%
- No children (aged 18 or under living in household): 21%, 15%
- Bought a car: 37%, 24%

% Say they anticipate this happening within the **next 5 to 10+ years**
(Among % Parents & Non-Parents)

- Parents (of children 18 or under living in household): 22%, 20%
- No children (aged 18 or under living in household): 23%, 29%
- Buy a car: 45%, 47%

Source: “Millennials and Mobility: Understanding the Millennial Mindset,” APTA, October 2013
WHY ARE THEY DRIVING LESS?

- Neighborhood choice: 38% of under-30s live in urban areas vs. 22% of 30-60s and 14% of over-60s
- Socializing: more via social media, less in person
- Shopping: more via Amazon, less at brick and mortar shops
- Graduated Driver Licensing statutes: harder to get a license
- Sharing economy
  - Car share
  - Bike share
  - Via, Uber, Lyft
- Student debt: no disposal income for a car
- Backseat rebellion: Millennials grew up watching their parents suffer while driving; mobility peaked in the 70’s and 80’s
- Unlocking the “mysteries” of transit
- Freedom Redefined

Car Ownership

WHY?

1970: Freedom =

2016: Freedom = + Mobility portfolio
HOW ARE PEOPLE GETTING AROUND WITHOUT CARS?

Active Transportation

Any method of travel that is all or partly human-powered. It refers to transportation that supports walking, stair use, cycling, and transit. It includes long-term land use and transportation planning to encourage alternate (non-motor vehicle) forms of transport.
STREETS ARE MADE FOR WALKING

• Promotes weight loss
• Improves physical health
• Improves mental health
• Better cognitive function
• Sustainable
• Resilient
• Reduces pollution
• Stimulates economy
• Promotes social interaction
• Increases romantic opportunities ♥
• Greater appreciation of architecture
• Provides a sense of place
• Cost-effective
NATURAL ALLIES: PUBLIC HEALTH AND TRANSPORTATION PROFESSIONALS

Obesogenic Environment: Infrastructure, Land-use, Policies, Foods That Lead To Obesity

Source: Neighborhood Environments And Resources For Healthy Living – A Focus On Diabetes In Toronto
Glazier RH and Booth GL. November 2007
SURGEON GENERAL'S RX FOR HEALTH: WALK

Source: Sept 9, 2015 Step It Up! The Surgeon General’s Call to Action to Promote Walking and Walkable Communities

<table>
<thead>
<tr>
<th>Children and Adolescents</th>
<th>Adults</th>
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<tbody>
<tr>
<td>- Improved cardiorespiratory fitness.</td>
<td>- Lower risk of early death.</td>
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<tr>
<td>- Improved muscular fitness.</td>
<td>- Lower risk of heart disease and stroke.</td>
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<td>- Improved bone health.</td>
<td>- Lower risk of high blood pressure and adverse blood lipid profile.</td>
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<td>- Favorable body composition.</td>
<td>- Lower risk of type 2 diabetes.</td>
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<td>- Improved markers of cardiovascular and metabolic health.</td>
<td>- Lower risk of colon and breast cancer.</td>
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<td>- Lower risk of metabolic syndrome.</td>
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<td>- Prevention of weight gain.</td>
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<td>- Weight loss, particularly when combined with reduced calorie intake.</td>
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<td>- Prevention of falls.</td>
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<td>- Reduced depression.</td>
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<td>- Better cognitive function (for older adults).</td>
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NY REGION’S LIFE SPAN AMONG HIGHEST IN NATION

*Life expectancy in the New York region has surpassed that of the United States.*

Life expectancy, 1990-2010

**United States**
- 1990: 71.5
- 2010: 76.1 (+4.6)

**New York Region**
- 1990: 71.0
- 2010: 82.7 (+7.1)

**Women**
- 1990: 78.3
- 2010: 80.8 (+2.5)

**Men**
- 1990: 67.5
- 2010: 78.1 (+7.1)

Institute for Health Metrics & Evaluation
PAYOFFS HIGHEST IN MORE WALKABLE COUNTIES

While life expectancy has increased overall, New York City in particular has seen impressive gains.

Change in life expectancy for women, 1990-2010
Source: Institute for Health Metrics & Evaluation

Change in life expectancy for men, 1990-2010
Source: Institute for Health Metrics & Evaluation
OBESITY RATES GENERALLY HIGHEST IN COUNTIES FURTHEST FROM MANHATTAN

There are big disparities in obesity rates between different counties.

Share of obese women, 2011
Source: Institute for Health Metrics & Evaluation

Share of obese men, 2011
Source: Institute for Health Metrics & Evaluation
The last decade saw a drop in mortality from many chronic diseases in Connecticut, New Jersey and New York.

Change in mortality rates per 100,000 people

Sources: Centers for Disease Control and Prevention, New York City Department of Health and Mental Hygiene
ENCOURAGING ACTIVE TRANSPORTATION

- Dense cities with mixed land-use generate short trips
- Safe, convenient cycling including bike parking
- Connected, direct, and pleasant sidewalks and paths
- Traffic systems and designs with pedestrians and cyclists in mind
- Good transit
- Coordinate transit, cycling, and walking
- Laws and enforcement to protect peds + bikes > cars
- Education programs (public health + planning community)
- Equitable cost of transportation by mode
- Start young; encourage walk-to-school and “free-range kids”
- Safety from crime (Good lighting, defined paths, in some cases well-patrolled, removal of obstacles, etc.)
ROAD TRANSFORMATIONS: MELROSE AVENUE
WEST HOLLYWOOD, CA
ROAD TRANSFORMATIONS: SPRING GARDEN STREET
PHILADELPHIA, PA
ROAD TRANSFORMATIONS: FOWLER AVENUE
TAMPA, FLA

E Fowler Ave at Spectrum Blvd/McKinley Dr

Existing Condition
ROAD TRANSFORMATIONS: FOWLER AVENUE
TAMPA, Fla.

E Fowler Ave at Spectrum Blvd/McKinley Dr

Potential Condition

Sam Schwartz
NOT JUST AN EAST/WEST COAST PHENOMENON

Metropolitan Share of Non-Car Commuters, 2007 to 2013

Source: Brookings Analysis of American Community Survey Data
AND EVERY CITY, IT SEEMS, WANTS A TECH HUB

metrorevolution.org
AND EVERY CITY, IT SEEMS, WANTS A TECH HUB
GDP INVERSELY RELATED TO VMT

Per Capita GDP and VMT for US States

Source: “Smart growth and better transit can grow wealth,” Houston Tomorrow, 24 January 2011.
VENTURE CAPITAL INVESTMENT POSITIVELY CORRELATES WITH TRANSIT RIDERSHIP

WHAT DOES IT ALL MEAN?

With 20% Fewer VMT in the USA Annually:

- 7,000 fewer road deaths, 700,000 fewer injuries
- 94 gallons of gas per capita not consumed, 30 million gallons of gas not consumed total
- 1,429 tons CO2 per capita not released, 22.8 million tons CO2 total not released
- Z healthier citizens, X fewer cars bought
- $Y saved/vehicle mile shifted to active transportation
- Cities grow in population
- Livable cities become magnets where GDP soars

Transit systems “get fully funded when used by both the well-to-do and the not-doing-so-well.” A system viewed as ‘for the poor’ will be poorly maintained.

Source: “Street Smart, the Rise of Cities and the Fall of Cars” Samuel I. Schwartz, September 2015.
TRANSIT SYSTEMS + IMPACTS OF SHARED MOBILITY
A National Study

Joe Iacobucci
jiacobucci@samschwartz.com
CONCLUSION: PLANNERS AND ENGINEERS HAVE A CHOICE

Source: David Alpert, “Hey, Streetcar Critics: Stop Making ‘Perfect’ the Enemy of ‘Good,” City Lab, 1 October, 2014
THE NEXT FRONTIER-AUTONOMOUS VEHICLES
THINK UBER WAS DISRUPTIVE?
Wait Till Autonomous Cars Arrive in a Neighborhood Near You

Samuel I. Schwartz, P.E.
Institute of Transportation Engineers
August 15, 2016
PROMISES OF AUTOISTS

1900 Dawn of the Auto

Dispense with a horse and save the expense, care and anxiety of keeping it.
The Winton Motor Carriage Company

1920s Modernist Era

“The city of tomorrow will be an automotive city.”
Miller McClintock

1940s Sprawl + Interstate Era

“Traffic will run pretty smoothly... Within three years, the time needed to carry out our plans.”
Robert Moses, 1941

2016 Dawn of Autonomous Vehicles

“In less than 20 years, owning a car will be like owning a horse.”
Elon Musk

Sam Schwartz
STAGES OF AUTONOMY

**MONITORED DRIVING**

- **LEVEL 0 (EYES ON, HANDS ON)**
  - Driver is continuously exercising longitudinal AND lateral control

- **LEVEL 1 (EYES ON, HANDS OFF)**
  - Driver is continuously exercising longitudinal OR lateral control

- **LEVEL 2 (TEMPORARY HANDS OFF)**
  - Driver has to monitor the system at all times

**NON-MONITORED DRIVING**

- **LEVEL 3 (EYES OFF, HANDS ON)**
  - Driver does not have to monitor the system at all times; must always be in a position to resume control

- **LEVEL 4 (EYES OFF, HANDS OFF)**
  - Driver is not required during defined use case

**VEHICLE ROLE**

- **LEVEL 5 (FULL AUTOMATION)**
  - System can cope with all situations automatically during the entire journey. No driver required

**Note:**

- Driver only: Level 0
- Assisted: Levels 1 and 2
- Partial automation: Level 3
- Conditional automation: Levels 4
- High automation: Level 5

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Mike Lemanski

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Sam Schwartz
THE GOOD, THE BAD AND THE UGLY (POSSIBILITIES)

**THE GOOD**
- Congestion diminishes
- Crashes, injuries, and deaths plummet
- Disabled well-served
- Last mile solved
- Parking demand goes way down

**THE BAD**
- VMT soars & congestion increases
- Many jobs disappear
- Peds, bikes squeezed out
- Unaffordable for poor and rural dwellers
- Reverses millennial trend eschewing driving

**THE UGLY**
- Public transportation decimated
- Cardio/stroke/diabetes sky rocket
- Everybody gets a license (even your dog)
- A new “modernist” view of cities
- Encourages sprawl
THE GOOD – MUCH SAFER

DID YOU READ ABOUT THE FATAL ACCIDENT INVOLVING ONE OF THOSE DANGEROUS SELF-DRIVING CARS?
THE GOOD – MAY BE 90% SAFER THAN CARS

Passenger deaths per 1 billion passenger miles, 2000 to 2009

- Car: 7.28
- Ferry: 3.17
- Train: 0.43
- Subway: 0.24
- Bus: 0.11
- Plane: 0.07

Source: Ian Savage, Northwestern University
THE GOOD – MAY BE 90% SAFER THAN CARS

But Transit is Already 95% Safer

Passenger deaths per 1 billion passenger miles, 2000 to 2009

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<thead>
<tr>
<th>Mode</th>
<th>Rate per 1 billion miles</th>
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Source: Ian Savage, Northwestern University
THE GOOD – IMPROVED LAST MILE FOR TRANSIT ACCESS

ONE GAJILLION NEW STOPS.

DOWNLOAD & RIDE
When Mobility as a Service includes the option of Ridesource AVs, there is great potential for a reduction in privately owned single occupancy vehicles.
THE BAD – VMT SOARS

Total and Per Capita Vehicle Miles Traveled (VMT) 1900 - 2030

Annual vehicle-miles traveled (VMT), total and per capita, in United States.
THE BAD – CONGESTION REMAINS AWFUL

Life without driverless cars

Life with driverless cars

All hail the revolution!
"The leading causes of death aren’t infections or accidents, but non-communicable diseases like diabetes, stroke and cardiovascular disease…. and probably 80% of all preventable deaths. A sizeable chunk … is due to inadequate exercise…”

- Street Smart: The Rise of Cities and The Fall of Cars, based on interview with Dr. Karen Lee
INACTIVITY TAKES MORE LIVES THAN CRASHES

Sources:
NHTSA, 2015
PLOS Medicine, 2005
WHO, National Safety Council, 2013
The Lancet, 2008
THE UGLY – OVERSIZED INFLUENCE OF AVs
WE WERE CAUGHT FLAT-FOOTED BY UBER ET AL.

Uber’s Lobbying Empire Extends From Coast To Coast

Over the past two years, Uber has hired an armada of contract lobbyists, vacuuming up some of the most skilled and politically connected representatives in at least 50 U.S. cities and states. The company will not release a full list of its lobbyists, but public records show lobbyists have registered on Uber’s behalf in the following places, likely an underestimate of the company’s full lobbying strength.
GOOGLE INVESTING IN UBER
GOOGLE INVESTING IN UBER
GOOGLE INVESTING IN UBER
TRANSLIT STRATEGIES

Join a road train
A safe and energy-efficient way to travel

- Don’t believe the hype on road trains
- Maintain good existing systems
- Use AVs for last mile transport
- Prepare transit workers for work in AV transit
AVs DON’T CHANGE THIS EQUATION MUCH

Amount of space required to transport the same number of passengers by car, bus, or bicycle.

(Des Moines, Iowa - August 2010)
SO WHAT SHOULD WE DO?

Government and Society Should Get Ahead of the Curve

- Discourage private ownership, incentivize shift to transportation as utility
- Maintain and support effective *mass* transit
- Emphasize last mile in sprawl areas and transit deserts
- Ensure system equity for low income, disabled, and elderly
- Utilize congestion pricing & TDM to maintain adequate mobility
- Prioritize lighter, smaller, lower energy, and less polluting vehicles
- Don’t mess with bike/ped growth in cities
- Reallocate parking for better use
- Apply appropriate taxes and fees
- Enact legislation and enforcement policies preemptively
- Promote full airing of ethics
- Humanize street design: widen sidewalks, don’t add lanes
- Identify and address workforce impacts
CONCLUSION

“Your future is whatever you make it, so make it a good one.”

Emmet “Doc” Brown, Back to the Future

Learn from history
Be wary
Plan for the Future