

SMART MOBILITY IN A CHANGING ECOSYSTEM



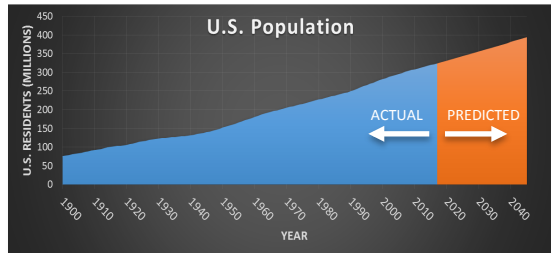
ANN M. SCHLENKER

Director, Center for Transportation Research
Argonne National Laboratory

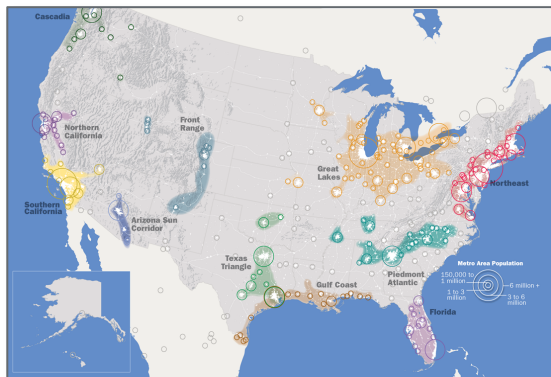
CAE Stakeholder Breakfast Meeting: Energy, Mobility and Transportation
December 7, 2017

CONVERGING TRENDS ARE SHAPING MOBILITY

Population



Population expected to grow by **70 million** in next **30 years**



Demographics

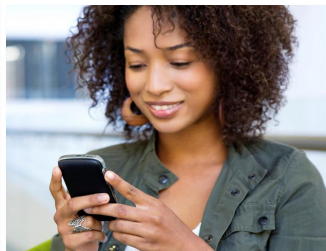
Americans are Living Longer

By 2045, the number of Americans over age 65 will increase by **77%**.



About **one-third** have a disability that limits mobility.

Millennials are Connected & Influential



There are **73 million** Americans aged 18 to 34.

They drove **20%** fewer miles in 2010 than at the start of the decade.

Technology



Integration of Connected & Automated Technologies



Introduction of Shared Service Platforms



Advancements in Energy Storage Technology



Deeper Application of Big Data



Faster Processing Speeds at Decreasing Cost

TRENDS ARE CAUSING A FUNDAMENTAL DISRUPTION



Connectivity



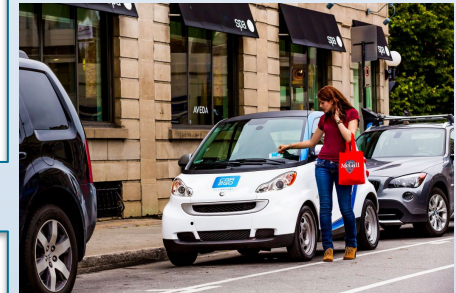
Ride-hailing



New Powertrains



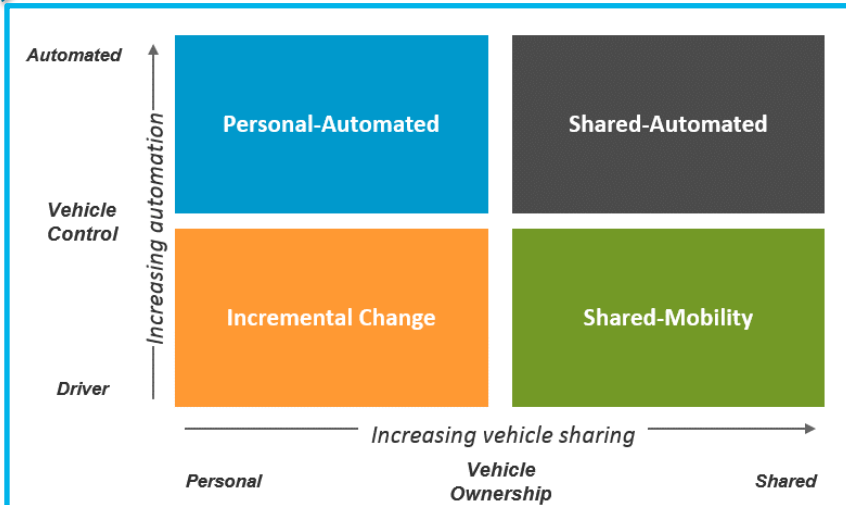
Automation



Car-sharing



New Modes



DAILY HEADLINES – SURPRISING PARTNERS and ENTRANTS

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GM and Lyft to Shape the Future of Mobility

2016-01-04

DAIMLER

AUTONOMOUS DRIVING

Driving autonomously through Nevada
Freightliner Inspiration Truck



Intel predicts a \$7 trillion self-driving future

Over half a million lives will be part of the 'passenger economy'

by Kirsten Korosec | Jun 1, 2017, 4:21pm EDT

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10H

The New York Times

Lyft and Waymo Reach Deal to Collaborate on Self-Driving Cars

THE WALL STREET JOURNAL

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Google, Fiat Chrysler Begin Work on Self-Driving Minivans

Alphabet Inc. unit also will establish self-driving engineering center in Detroit area



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NEWS SPORTS LIFE

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Brett Molina and Marco della Cava, USA TODAY 6:19 p.m. EDT August 18, 2016

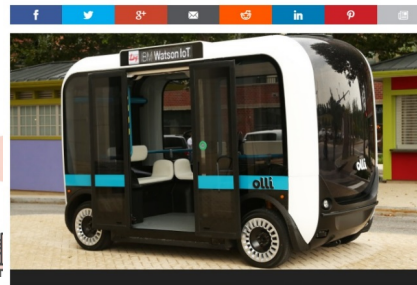
The Washington Post

Transportation

Columbus nabs \$50 million 'smart city' prize



The Local Motors Olli is a driverless EV minibus with IBM Watson inside



MEDIA CENTER

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SEARCH

AUG 16, 2016 | PALO ALTO, CALIF.

FORD TARGETS FULLY AUTONOMOUS VEHICLE FOR RIDE SHARING IN 2021; INVESTS IN NEW TECH COMPANIES, DOUBLES SILICON VALLEY TEAM

Ford announces intention to deliver high-volume, fully autonomous vehicle for ride

Beyond Congestion Impacts: Air Quality, Climate, Quality of Life

Each Year, Traffic Congestion Costs Us:

Time



6.9 Billion Hours

Fuel

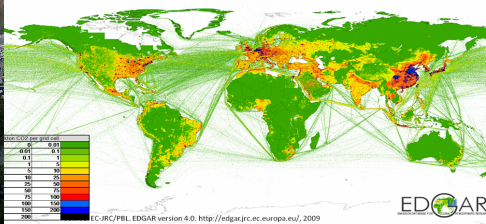
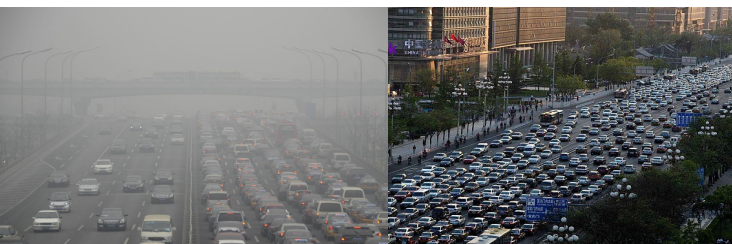


3.1 Billion Gallons

Money



\$160 Billion



Data from Schrank, B., Eisele, B., Lomax, T., and Bak, J. (2015). 2015 Urban Mobility Scorecard. Technical report, Texas A& M Transportation Institute..

Commonality with DOT SMART CITY APPLICANTS



While the cities were diverse, many of the 78 applicants faced similar urban mobility challenges:

Providing first-mile and last-mile service for transit users to connect underserved communities to jobs



The typical job is accessible to only about 27 percent of its metropolitan workforce by transit in 90 minutes or less.

Facilitating the movement of goods into and within a city



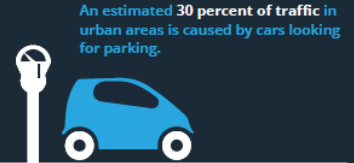
Trucks stuck in stop-and-go traffic in metropolitan areas cost shippers an estimated \$28 million annually in truck operating costs and wasted fuel.

Coordinating data collection and analysis across systems and sectors



28 percent of all of the transit agencies in the United States have open data systems that freely provided transit times to the public.

Reducing inefficiency in parking systems and payment



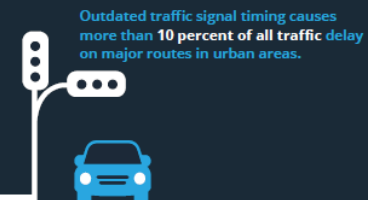
An estimated 30 percent of traffic in urban areas is caused by cars looking for parking.

Limiting the impacts of climate change and reducing carbon emissions



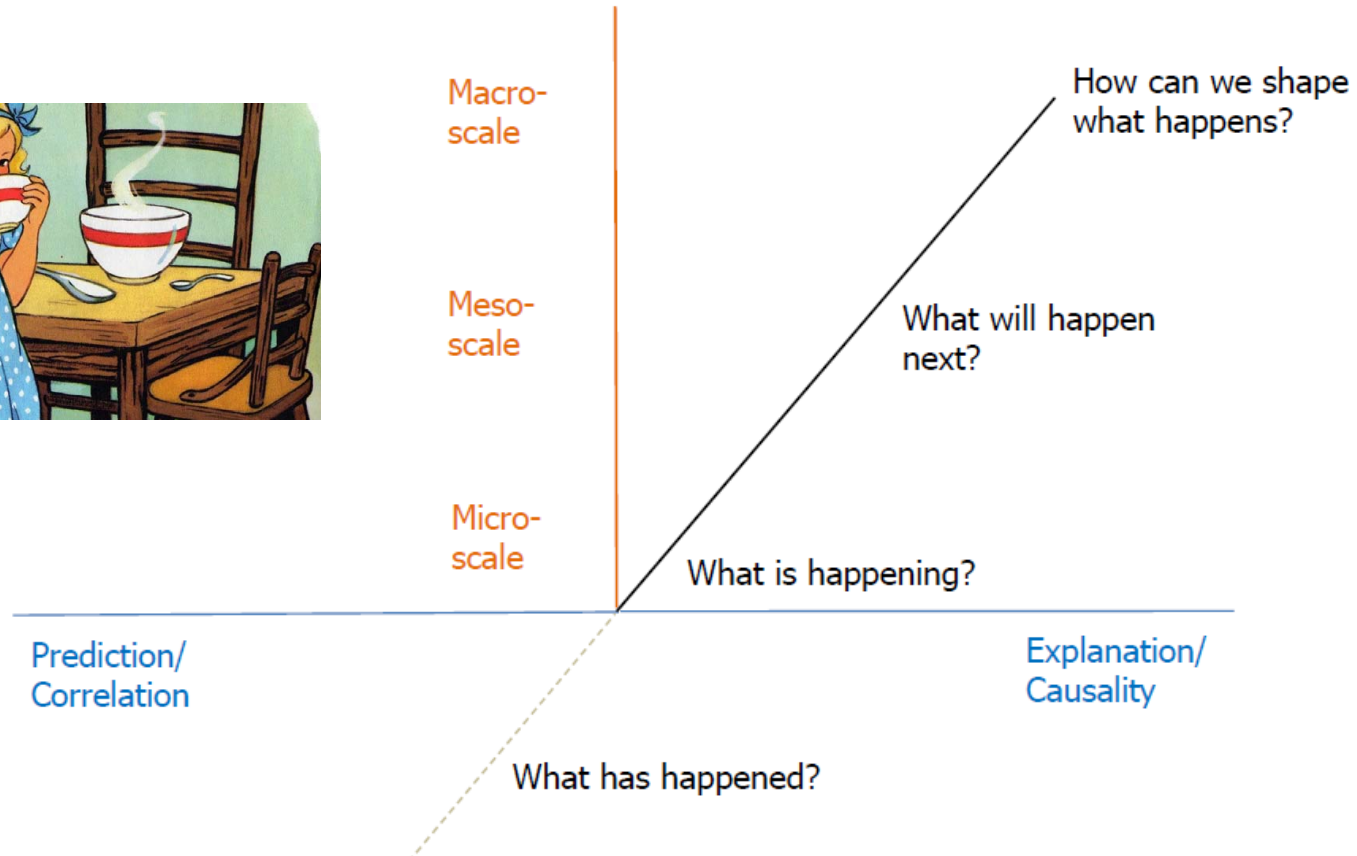
The 78 applicant cities represent over one billion metric tons of CO₂ emissions per year.

Optimizing traffic flow on congested freeways and arterial streets



Outdated traffic signal timing causes more than 10 percent of all traffic delay on major routes in urban areas.

Goldilocks Problem – Mobility Technology, Services And Social Sciences



“If you do not know how to ask the right question,
you discover nothing.”

- W. Edwards Deming