



Transformation Technologies in Transportation: Data Implications

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TRB Critical Issue: TRANSFORMATIONAL TECHNOLOGIES

*Transformational, or “disruptive” technologies, are those that can be expected to **completely displace the status quo**, forever changing the way we live and work.*



TRANSFORMATIONAL TECHNOLOGIES: General Examples

Internet, personal computer, email, smartphone,
GPS, big data

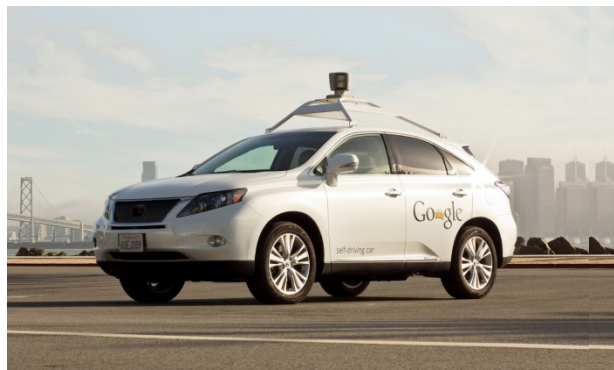




TRANSFORMATIONAL TECHNOLOGIES: Transportation



Connected/automated vehicles, shared mobility services, unmanned aerial systems, NextGen, big data, cog in “internet-of-things,” 3D printing



Possible Transformational Impacts



- On transportation?
- On how we collect data?
- On what data we collect, and why?

Connected & Automated Vehicles (CAVs): Some Points (& Counterpoints)



From TRB Conferences,
Meetings, and Research Projects



Point

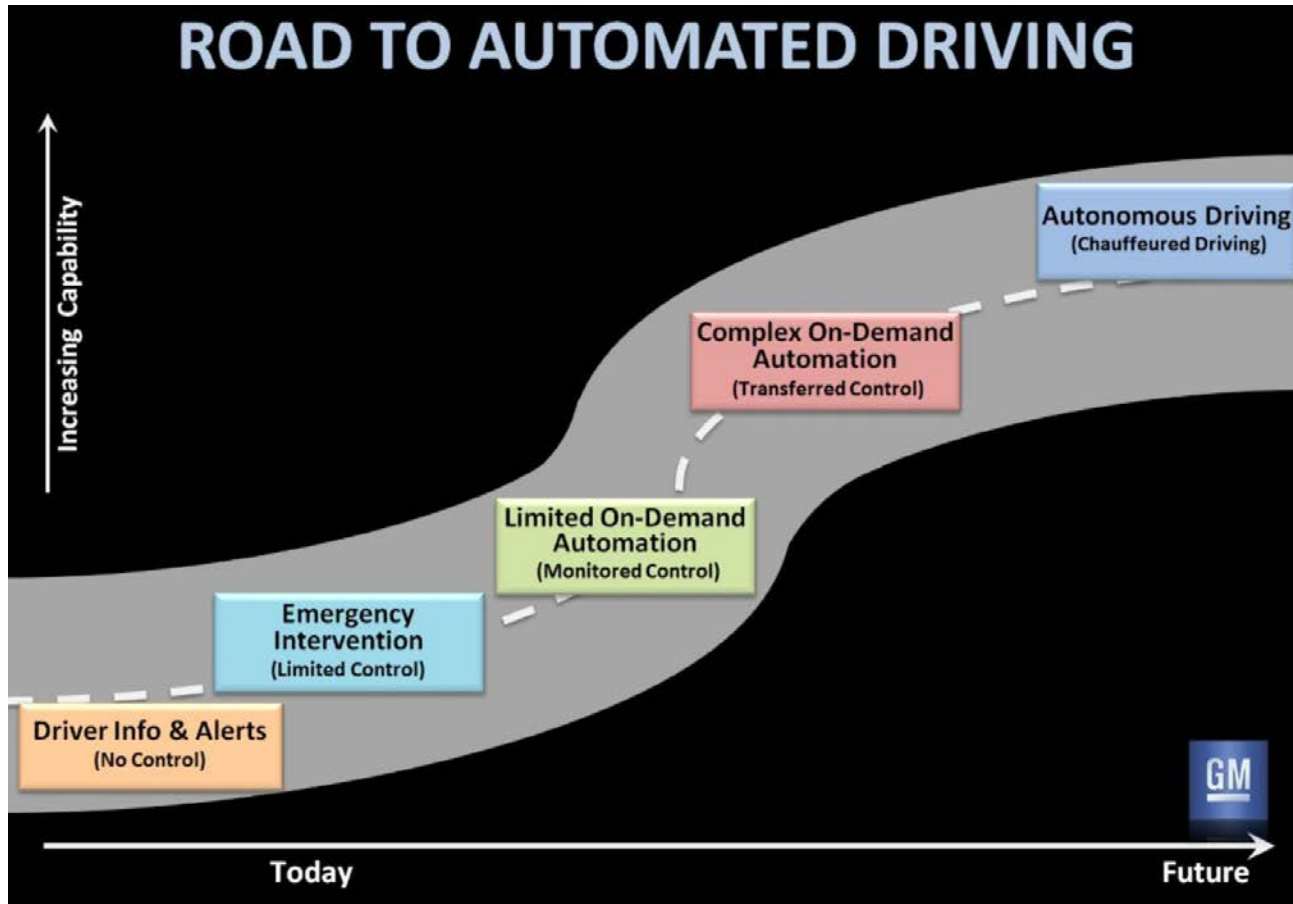
Automated Vehicles Will Be Available to the Public by 2020



Automated Vehicles Will Be NOT Available to the Public Anytime Soon



Counterpoint





Point

CAVs Will Be the Biggest Transformational Change Since the Invention of the Automobile



CAVs May NOT Significantly Change Transportation



Counterpoint

	Would the buyer benefit?	
Mobility	Yes	Buyer only gets <i>some</i> benefits
Cost of congestion	Yes	
Safety	Partly	
Congestion	No	
Energy consumption/ emissions	No	
Land use	No	



Source: James Anderson, Rand



This Will be the Next Federal Interstate-Type Program

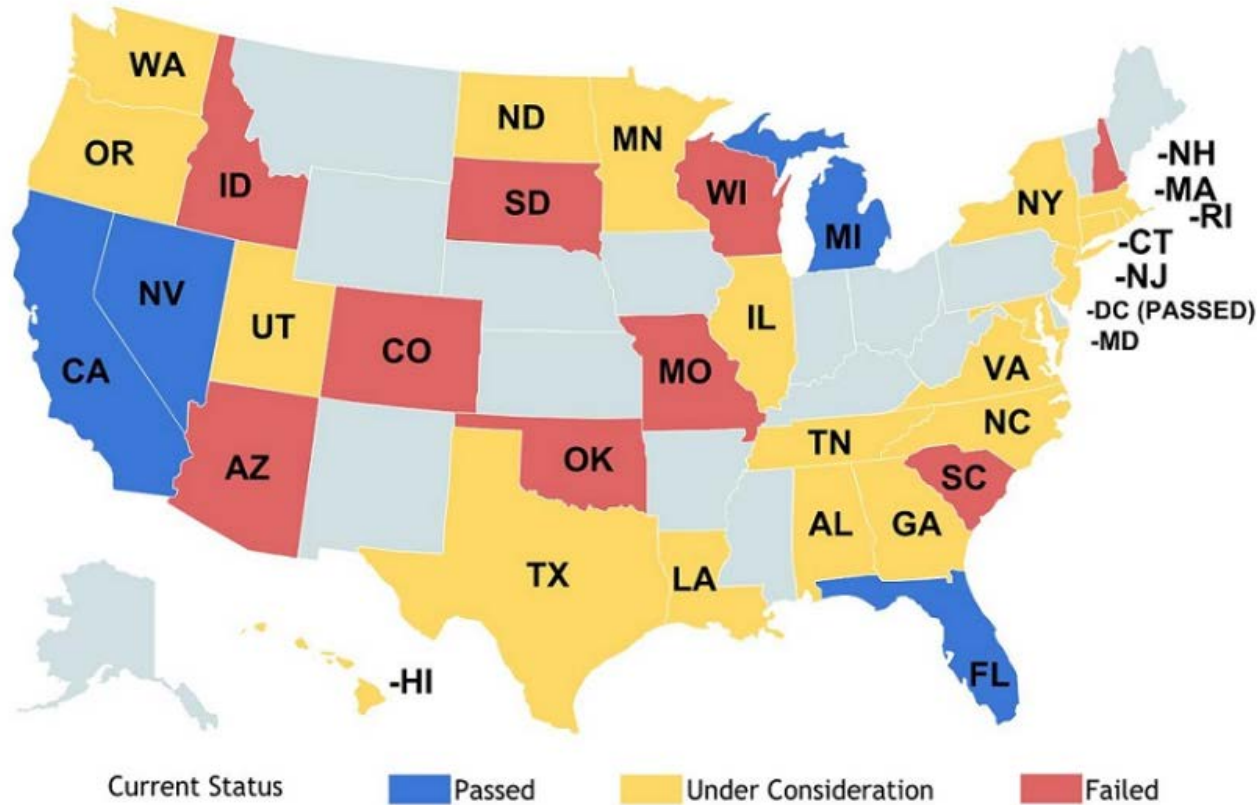
Point



Not! Others Will be Leading the Way

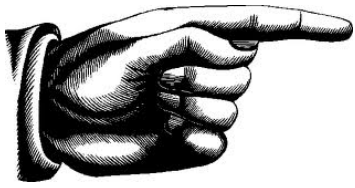


Counterpoint



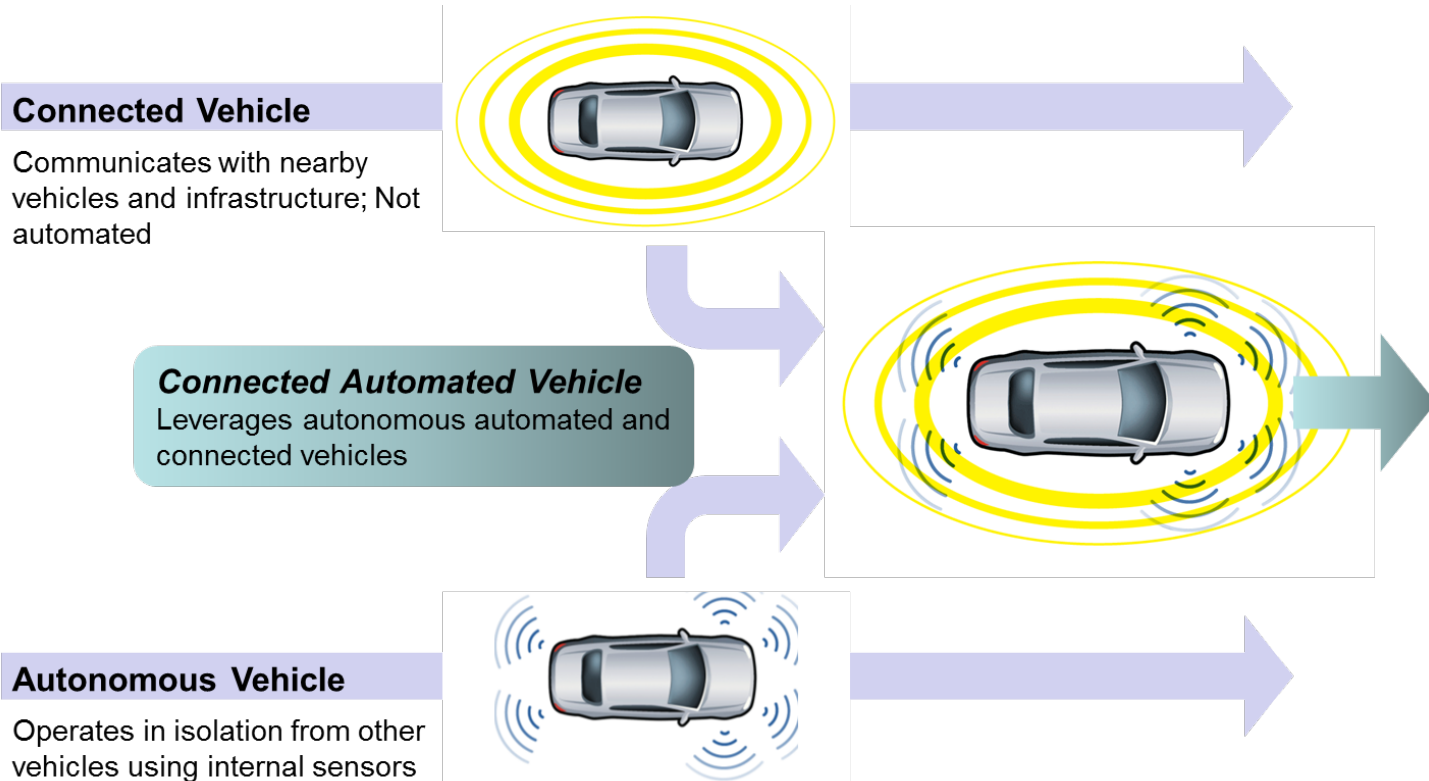
Automated Driving Legislation

Gabriel Weiner and Bryant Walker Smith, Automated Driving: Legislative and Regulatory Action, cyberlaw.stanford.edu/wiki/index.php/Automated_Driving:_Legislative_and_Regulatory_Action



These Vehicles Must be Connected with the Infrastructure to be Successful

Point



Automated Vehicles Can Succeed on Their Own

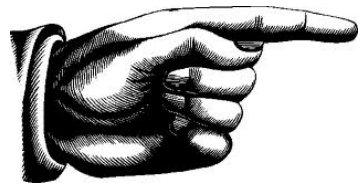


Counterpoint



**Something everywhere
vs.
everything somewhere**





Point

Connected-Automated Vehicles Will Eliminate 80 Percent of Serious Accidents



The Potential Safety Impacts of These Vehicles Can't be Taken for Granted



Counterpoint





Connected – Automated Vehicles Will Eliminate Congestion

Point

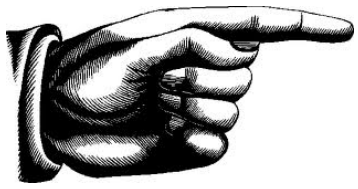


Traffic Congestion Will Remain a Serious Problem – And Might Get Worse



Counterpoint





Connected-Automated Vehicles Will Be Better for the Environment & Land Use

Point

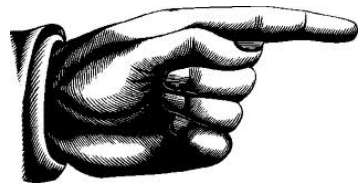


These Vehicles Will Negatively Affect the Environment & Land Use



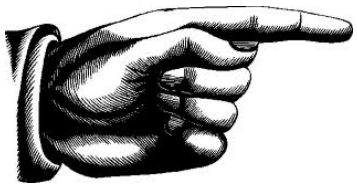
Counterpoint





Data Implications?





Will Enable Data Driven Solutions

Point



Big Data Will Create Its Own Issues



Counterpoint

- Collection, sharing, and analysis
- Ownership
- Interoperability
- Privacy and security
- Reserved spectrum



Data Collection Technologies: How Will We Measure?



- **Sensors?**
- **Cameras?**
- **Probes?**
- **WIM?**
- **Crash Records?**



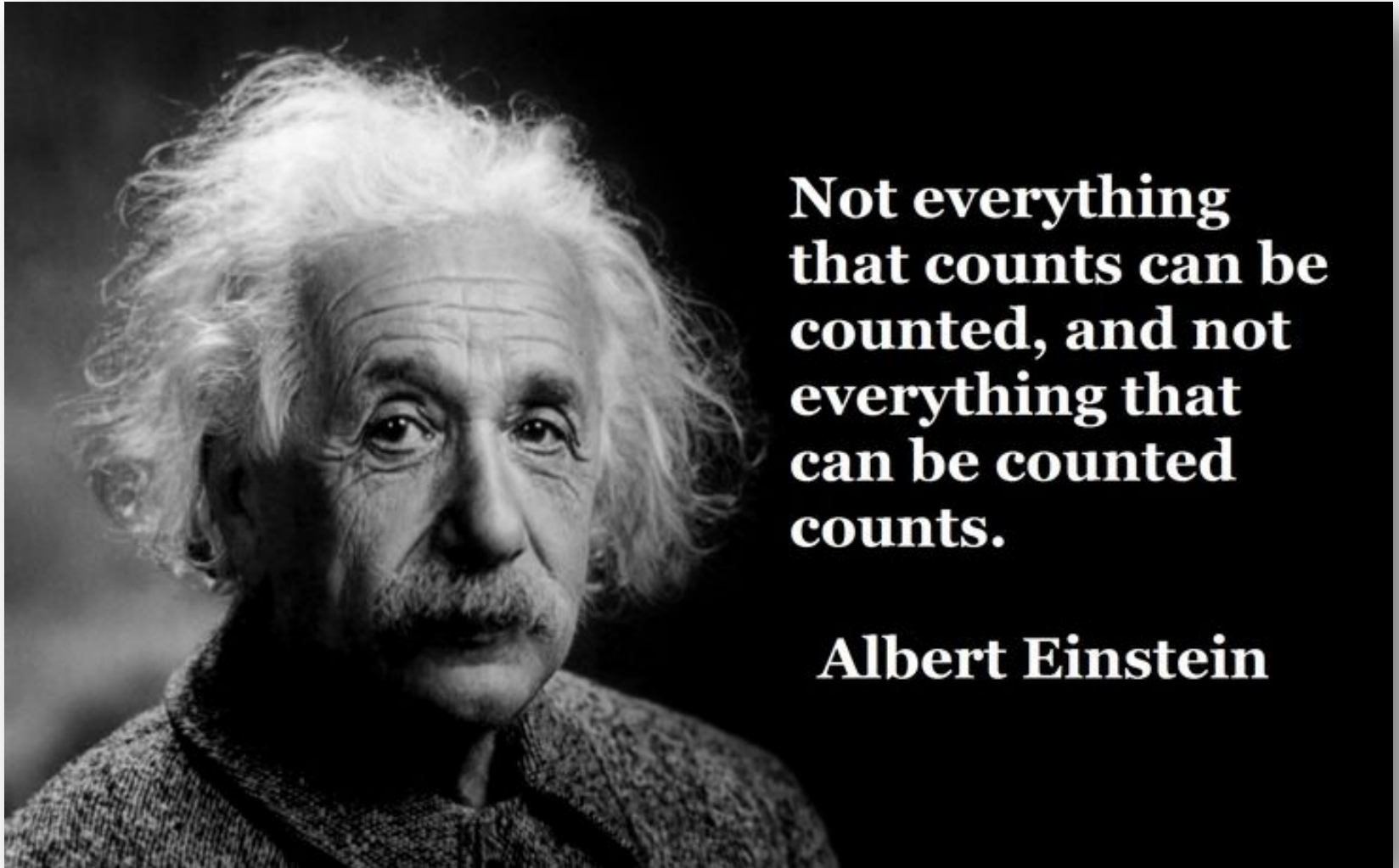
- **DSRC?**
- **Cellular phones?**
- **Connected vehicles?**
- **Toll transponders?**
- **Public/private data sharing?**
- **Drones?**

Growing Number of States Using UAVs (Drones)

AASHTO March 2016 Survey



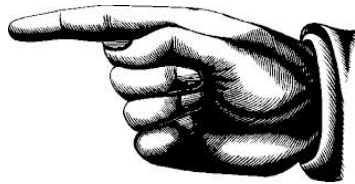
- **17 State DOTs researched and/or use drones**
- **Bridge inspections**
- **Surveying & aerial photography**
- **Mitigating landslide risks**
- **Benefits:**
 - Better data
 - Save time, reduced costs, increased safety, reduced congestion



**Not everything
that counts can be
counted, and not
everything that
can be counted
counts.**

Albert Einstein

What Will We Need to Measure, and Why?



CAV Impacts:



- **Data needed to help generate significant positive impacts on:**
 - **Safety**
 - **Congestion**
 - **Environment**
 - **Demographics & land use**
- **Changes in data needs if we ultimately are (or are NOT) successful?**

Some Things We Can Agree On!



- The truth lies somewhere in the middle
- Data will play a critical role
- Need to question WHAT we need to measure, and WHY
- We have more questions than answers
- Need research!
- Let's get started!



Questions?



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