EWG Annual Meeting
Technology in Motion

&

*Imagining Mobility in an IoT Age*

Tom Blair, P.E.
Missouri Department of Transportation
7th largest system in the U.S.
AND 12th in highway performance and cost effectiveness
BUT 47th nationally in revenue per mile.
R2T Introduction

• Announced in June 2015
• Offers up I-70 as a 200-mile laboratory for the “highway of the future”
• Seeking ideas from private industry, innovators and entrepreneurs
• Focused on new technologies and new funding mechanisms
What Have We Done?
What Have We Learned?

• Technology is changing fast
• Will disrupt our traditional transportation systems and services
• No DOT is totally prepared
• No DOT is seeking revenue from these opportunities
MPG of All Registered Vehicles, June 2017
Energy Creation in Public Spaces

• Single most suggested innovation
• Growing trend
• Visible innovation that can reduce government costs
Solar Roadways Pilot Project
Solar Project at the Historic Route 66 Welcome Center at Conway, MO
@Route66Solar
WELCOME TO THE RAY.

The Ray is a proving ground for the evolving ideas and technologies that will transform the transportation infrastructure of the future, and it starts on 18 miles of West Georgia’s I-85, and the land and communities surrounding it.

By innovating from the ground up, we’re creating a corridor that reconnects and restores us, paving the way to a safer and more prosperous future for all.

Our mission is for The Ray to achieve

ZERO DEATHS | ZERO WASTE | ZERO CARBON
The Wattway solar pavement is tough and able to withstand harsh weather conditions and plenty of traffic. It can also be installed without all the prep commonly needed for similar systems.

The Wattway installation is our 2nd solar pilot project on The Ray. The first one was the photovoltaic for electric vehicle (PV+EV) fast charger in the background.

The Wattway solar paved road section on The Ray is a 50 square meter pilot at the Georgia Visitor Information Center in West Point, Georgia.
A car rolls over the WheelRight tire pressure and tread depth management system on The Ray.

SOLAR-POWERED VEHICLE CHARGING
Electrifying Interstate 70
**Action Areas**

**COMMUTING**
Transforrn Colorado into the most reliable transportation system for commuting in the nation by deploying technology and infrastructure systems to improve reliability of travel times, and optimize routing and movement of commutes.

**SUSTAINABILITY**
Become the nation’s leader in energy conservation and emissions reduction.

**TRANSPORT**
Deploy emerging in-vehicle technology and supporting infrastructure to improve the safety and efficiency of transporting freight.

**SAFETY**
Make a dramatic leap toward zero deaths on Colorado highways.

**CONNECT**
Develop solutions to turn data into actionable intelligence, and deliver to drivers, cellular/mobile applications, and connected and autonomous vehicles.
Alternate Transportation = Hyperloop?
MO’s BOLD Vision for HQ2
makemohq2home.com

TRANSFORMING THE HEARTLAND

Missouri is blessed to have two vibrant, major metropolitan areas – Kansas City and St. Louis – who submitted independent proposals to bring Amazon’s HQ2 to Missouri.

We are inspired by how these communities rallied and have marshalled the resources of Missouri’s state government to support these two cities’ proposals equally. We believe this is a unique opportunity not just for these cities, but for the entire region.

We want to challenge you, Amazon, to think differently, more expansively in both time and space, more boldly in terms of impact.

A PROJECT FOR A GENERATION

We have a transformative vision to invigorate the Heartland and bring our world closer together. We envision creating a 240-mile innovation corridor that could be traveled end-to-end in just 25 minutes by using cutting-edge technology like Hyperloop. Such a system could transport both passengers and cargo, and could support Amazon’s current and future expansion and growth.
Connected Truck Platooning
MoDOT seeks participants in driverless vehicle pilot program
Missouri’s transportation system safely and reliably connects people with jobs and services, connects businesses with suppliers and customers, moves students to and from school and allows visitors to explore the state’s many destinations. To help make strategic decisions, meet Missouri’s future transportation needs and be good stewards of taxpayer dollars, the Missouri Department of Transportation is updating the state’s Long Range Transportation Plan.
Learn More and Submit Your Idea at:

http://www.MoDOT.org/Road2Tomorrow

Tom Blair
Missouri Department of Transportation
Imagining Mobility in an IoT Age

A mind-blowing glimpse into a more convenient & connected life
COLLISION PREVENTION AND MITIGATION

- Anti-Lock Braking System
- Automatic Emergency Braking
- Adaptive Headlights
- Bicycle Detection
- Brake Assist
- Forward Collision Warning
- Left Turn Crash Avoidance
- Obstacle Detection
- Pedestrian Detection
- Traction Control
U.S. DOT advances deployment of Connected Vehicle Technology to prevent hundreds of thousands of crashes

November 2016

Vehicle to Vehicle

V2V Lifesaving Potential

80%

V2V TECHNOLOGY HAS THE POTENTIAL TO ADDRESS APPROXIMATELY 80 PERCENT OF MULTI-VEHICLE CRASHES.
FHWA guidance on Vehicle to Infrastructure Technology
January 2017
A Dumb Bridge

IF YOU WILL HIT THIS SIGN, YOU WILL HIT THAT BRIDGE
V2X
“Alexa, how much gas is in my car?”
Mercedes-Benz is connecting the Amazon Echo and Google Home to all its new cars

April 2017
Shell App Lets Jaguar Drivers Pay for Gas Using the Infotainment Screen
Delivery to your Trunk?
5th Ave. NYC Traffic in 1900
5th Ave. NYC Traffic in 1900

www.tonyseba.com
5th Ave. NYC Traffic in 1913
Horseless carriages are now driverless, thanks to Waymo’s taxi service

By Stephen Edelstein — Posted on November 7, 2017 10:07 am
USDOT releases Highly Automated Vehicle Policy
September 2016

Accelerating the Next Revolution
In Roadway Safety
Google’s Waymo

“Way forward in Mobility”
Ford plans self-driving car for ride share fleets in 2021
“Full Self-Driving Hardware on All Teslas”
October 2016
Otto and Budweiser:
First Shipment by Self-Driving Truck
October 2016
GM to drive 12 Cadillacs with hands-free driving system from New York to LA

Cadillac Leaps Toward Autonomous Driving With Its New Super Cruise System
GM’s Super Cruise to debut in fall on 2018 Cadillac CT6
USPS plans to deploy self-driving mail trucks by 2025
Impact of one Autonomous Vehicle

Dissipation of stop-and-go traffic waves via control of a single autonomous vehicle
The 'Self Drive' Act puts America on the road to reducing congestion

BY KATIE MCAULIFFE - 09/06/17 08:40 AM EDT

House passes bipartisan legislation paving the way for self-driving cars on America's roads

The SELF-DRIVE Act is first-of-its-kind legislation to ensure the safe and innovative development, testing, and deployment of self-driving cars. While self-driving technology is currently being developed and tested across the country, from Silicon Valley to Detroit, federal motor vehicle safety standards need to be updated to reflect cars without traditional design features.

The US is speeding toward its first national law for self-driving cars

The 'SELF DRIVE' act passes the House with ease

by Sean O'Kane | @sokane1 | Sep 6, 2017, 4:41pm LDT
THE AV START ACT GETS THE RULES OF THE ROAD RIGHT FOR AUTONOMOUS VEHICLES

BY RYAN HAGEMANN

US Senate stamps the gas pedal on law to flood America's streets with self-driving cars
Foes flustered by 'dangerous' light-touch regulation

By Thomas Claburn in San Francisco 4 Oct 2017 at 19:42 59 SHARE

Effort to include trucks fails before Senate panel advances autonomous bill

PCI Applauds Senate Action to Include Critical Data Access in AV START Act

Neill Abt | Oct 04, 2017
Mobility-as-a-Service
Extent to which autonomous vehicle technologies become pervasive:

- Depends upon several key factors as catalysts or deterrents—e.g., technology, regulation, social acceptance.
- Vehicle technologies will increasingly become "smart"; the human-machine interface shifts toward greater machine control.

Future states of mobility:

1. Incremental change
   - Driver: Personal
   - Vehicle ownership: Low
2. A world of carsharing
   - Driver: Shared
   - Vehicle ownership: Low
3. The driverless revolution
   - Driver: Autonomous
   - Vehicle ownership: Low
4. A new age of accessible autonomy
   - Driver: Autonomous
   - Vehicle ownership: High

Note: Fully autonomous drive means that the vehicle's central processing unit has full responsibility for controlling its operation and is inherently different from the most advanced form of driver assist. It is demarcated in the figure above with a clear dividing line (an "equator").
Cost per mile, by future state

- **Personal Vehicle ownership**
  - Autonomous Assist
    - **Driver Incremental change**
      - Low ~$0.97
    - **A world of carsharing**
      - High ~$0.63
  - Autonomous
    - **The driverless revolution**
      - ~$0.46
  - **A new age of accessible autonomy**
    - ~$0.31

Source: Deloitte analysis, based on publicly available information (US DOT, AAA, etc.).
Note: Fully autonomous drive means that the vehicle’s central processing unit has full responsibility for controlling its operation and is inherently different from the most advanced form of driver assist. It is demarcated in the figure above with a clear dividing line (an “equator”).
Cadillac Book
Concierge Service That Will Disrupt the Rental Car, Dealer Industries
February 2017
Whim App by MaaS Global
Self-driving cars just had one of their best months yet

‘Autonomous vehicles are moving from their adolescence.’

by Andrew J. Hawkins | @andrew

House panel to unveil self-driving car legislation soon: aide

David Shepardson

Alphabet Inks Deal for Avis to Manage Self-Driving Car Fleet

By Mark Bergen
June 26, 2017 9:00 AM Updated on June 26, 2017 9:24 AM

Volvo Plans to Go Electric, to Abandon Conventional Car Engine by 2019

CEO reiterates target of selling one million electric cars and hybrids by 2025
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Missouri Department of Transportation
Buckle Up-Phone Down.

Join This Safety Challenge And Make a Difference!
Deloitte’s Prediction

The future of mobility: Ben's journey

THE FUTURE
OF MOBILITY

BEN’S JOURNEY