CONNECTED AUTOMATION:
DISRUPTIVE TRANSFORMATION

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1,000,000 will die in traffic crashes
We’re on the cusp of a transformation in transportation, driven by advances in vehicle connectivity, automation, and electrification. The changes will be disruptive.
Disruption poses challenges.
TECHNICAL CHALLENGES

- Interoperability and standards
- Implementation and support of specific applications & technologies
- Data management
- Data privacy
- Communications and network management
- Security management
- Local network security
- Technical obsolescence
1. **Funding.** Shortfalls impact the ability to deploy.

2. **Education & workforce considerations.** Lack of staff with necessary technical skills.

3. **Business case.** Lack of benefit and cost information to support investment decisions.

4. **Data ownership.** How to access it, who owns it, how do they support it?

5. **Liability.** What’s the risk and how does it get allocated?

6. **Forces outside their control.** Changing technologies and political climate leave public agencies feeling uncertain.
Operational Challenges

- **Education & workforce considerations.** New skills needed in data analytics, IT, application support, software and new algorithms – a new generation of operations staff needed

- **Data management.** Big data from connected vehicles will challenge operational staff – a blessing in disguise

- **Keeping up with advances.** The transportation operations environment will continue to evolve at a rapid pace – don’t just chase the shiny objects

- **New partnerships and business models.** Public and private – evaluate current operations and ask if you need to keep doing them

- **Giving up control.** Greater automation of traffic management functions, greater empowerment of travelers, and impacts of connected automation
DISRUPTION CREATES OPPORTUNITY
AUTOMATED VEHICLES

- USDOT Policy released Sept. 20, 2016
- USDOT AV Proving Grounds designations
- Industry introducing automated features on vehicles
  - Lane tracking
  - Adaptive cruise control
  - Automated braking
  - Park assist & automated valet
  - Platooning technology
- Dynamic mobility ecosystem

Source: General Motors
CONNECTED VEHICLES

- Notice of Proposed Rulemaking on December 12, 2016
- Final rule on V2V – currently in the 90 day comment period
  - Change in administration
  - Spectrum challenge
  - Privacy and security challenges
  - Progress on 5G M2M solutions
- GM moving forward
- Government stimulus for V2I
  - Connected vehicle pilot deployment program
  - Smart City Challenge
  - FAST Act funding

Source: Florida DOT
CONNECTED VEHICLES

Vehicles have 360 degree awareness of surroundings

Communicate with other vehicles 10 times per second

“Basic Safety Message” (J2735 standard)

- Location, heading, speed (Part 1)
- Air temperature, lighting, ABS, traction control, wiper status (Part 2)
ELECTRIC VEHICLES

- Renewed emphasis on zero-emission driving
- Infrastructure – a constraining factor
  - Range anxiety and charging stations
  - Wireless induction
  - Dynamic charging – potential tolling environment for electric vehicles
OPPORTUNITY REQUIRES VISION
VISION OF A SMART CITY

A **Smart City** utilizes **innovative and emerging technologies and concepts** to collect, analyze, and utilize data from many sources to enhance the city’s livability.

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<th>Others</th>
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VISION OF A SMART CITY

Vehicle & infrastructure based data

Communications networks

Data management

Data integration & distribution

Data analytics

Actionable information

Informed decisions

Empowerment of the User
COLUMBUS SMART CITY CHALLENGE

- Columbus was the single winner out of 78 applicants for the Smart City Challenge

- Framework for connecting people with opportunities
  - 4 systems
  - 4 districts
  - 4 outcomes
MOBILITY AS A SERVICE

- Phenomenal growth in TNCs, sharing economy, app development
- Auto companies getting into the game
  - GM/Lyft partnering
  - Ford Smart Mobility
  - Maven
- Buy rides, not cars
- Mobility bundles
- Integrated information and payment solutions
BUSINESS CASES FOR AUTOMATION

- Urban applications – shared use vehicles
- Intermodal facilities – first and last mile opportunities
- Residential and campus applications
- Highway maintenance operations
- Truck platooning
TRANSITIONING ON OUR HIGHWAYS

- Managed lanes in a new context
- Should we separate automated vehicles from others to generate the most benefits?
- At what penetration rate should we dedicate a lane?
- Incrementally increase the number of special lanes as the fleet turns over?
EMPOWERING THE MACHINE

- Traffic signalization impacts
- Signage
- Seamless travel between roads and modes

Source: University of Texas
if CARS don’t CRASH
WHAT’S NEXT?

Flying cars and riding in tubes at the speed of sound
EMERGING MOBILITY SOLUTIONS

- Integration of connected, automated, and electric vehicle technologies into the existing operations environment will be challenging and disruptive to current paradigms.
- Engineering and operational concepts, performance measures, algorithms, the transportation workforce, design standards, traffic control systems, and policies will be transformed.
- Opportunities will be abundant.

We can rewrite the book (or have it read to us).
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