Impacts of emerging trends and technologies
March 8, 2018
Autonomous vehicles are coming.
The evolution of self-driving cars
National Highway Safety Administration classification system

0. No automation
A human driver performs all driving tasks.

1. Drive assistance
Driver-assistance system either steers or controls speed using information about the driving environment. A driver is expected to perform all other aspects of driving.

2. Partial automation TODAY
One or more driver-assistance systems both steer and control speeds using information about the driving environment. A driver is still expected to perform all other aspects of driving.

3. Conditional automation 5-10 YEARS
An automated driving system can perform most tasks, but there's an expectation that a passenger will respond to a request to intervene.

4. High automation 5-10 YEARS
An automated driving system can perform all tasks, even if a passenger does not respond to a request to intervene.

5. Full automation 10+ YEARS
The automated driving system performs all driving tasks, full time, under all road and environment conditions that can be managed by a human driver.

Basics of AV/CV
When will they get here?
<table>
<thead>
<tr>
<th>Company</th>
<th>Availability</th>
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<tbody>
<tr>
<td>Tesla</td>
<td>By 2018</td>
</tr>
<tr>
<td>Ford</td>
<td>2020</td>
</tr>
<tr>
<td>Toyota</td>
<td>2020</td>
</tr>
<tr>
<td>Renault-Nissan</td>
<td>2020</td>
</tr>
<tr>
<td>Hyundai</td>
<td>Highway by 2020; Urban by 2030</td>
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<tr>
<td>GM</td>
<td>2021</td>
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<tr>
<td>Volvo</td>
<td>2021</td>
</tr>
<tr>
<td>Daimler</td>
<td>Early 2020s</td>
</tr>
<tr>
<td>Fiat-Chrysler</td>
<td>2021</td>
</tr>
<tr>
<td>BMW</td>
<td>2021</td>
</tr>
<tr>
<td>Kia</td>
<td>2030</td>
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</tbody>
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Will AV/CV follow electric vehicle adoption trends?

KC named #1 in electric vehicle growth! Since 2015, the metro has increased electric vehicle adoption by 95%.

KC Ahead for EV Growth » The Clean Charge Network
Since the deployment of the KCP&L Clean Charge Network began in 2015, Kansas City has experienced a 95 percent increase in electric vehicle adoption.
cleanchargenetwork.com
Impacts of AV/CV
More cars, less capacity required?

+273%

Impacts on land use of AV/CV
REDUCING HUMAN ERROR

Fully automated vehicles will significantly reduce driving incidents caused by human error. In a study of 723 crashes, driver error caused or contributed to 717*.

- 7.8% OTHER
- 22.7% DRIVER INATTENTION
- 6.4% INCAPACITATION (E.g. fell asleep)
- 10.1% DECISION ERRORS (E.g. turned with obstructed view)
- 15.1% PERCEPTUAL ERRORS (E.g. looked, but didn't see)
- 18.2% ALCOHOL IMPAIRMENT
- 99% OF CRASHES ARE CAUSED BY HUMAN ERROR*

Impacts on mobility of AV/CV
Car ownership? Shared vehicles?

Impacts on household costs / commutes
Safer, more efficient trucks?
Impacts on environment

Zero Occupant Vehicles (ZOVs)

**COULD** result in more VMT-up to:
- 35 percent more for personal AVs
- 90 percent more for shared AVs
Declining fuel tax revenue

Gas Tax Revenue Has Fallen Over the Past Decade
Federal and state fuel tax revenue, adjusted for inflation, 2002-12

Impacts on Revenue

12/7/2017
In 2025 autonomous technology will add $7,000-$10,000 to a car’s price.

2030: $5,000 more

2035: $3,000 more
Potential Missouri policy implications
Status of automated driving legislation

Source: National Conference of State Legislatures; The Center for Internet and Society; and individual state legislatures.
“Self-driving cars will prove an irresistible target for hackers,” warns cyber security expert Eddie Schwartz.
Privacy

If the government knows WHERE YOU ARE

the government knows WHO YOU ARE
Insurance

• The car insurance sector could shrink to 40% of its current size by 2040

• Self-driving cars could cut 90% of all car accidents in the United States

• Tesla is already putting pressure on insurers
Insurance

What people like about driverless cars:
(Respondents could select more than one choice)

- 28% Could be more productive on commute
- 29% Would be safer than today's cars
- 33% Would handle routine tasks such as steering and speed control
- 35% Could reduce cost of auto insurance
- 36% None of the above
When Autonomous Cars Crash, Who's at Fault?

The road to full automation will bring several lifetimes' worth of work for lawyers.
Land use
1/7/2017
Deployment timeline

- Improve signing and striping
- Increase data collection and update models
- Review laws around AV testing and implementation
- Connectivity between all infrastructure assets
- Consider alternate impact of AVs on infrastructure
- Consider new laws based on AVs unique performance
- Consider geometry changes and lane use restrictions
- Consider new/additional transit options

Percent AVs in Fleet

- 0% in 2017
- 5% in 2025
- 10% in 2028
- 15% in 2030
- 30% in 2035
- 50%+ Predicted year

12/7/2017
MoDOT Workshop

- Brought together many stakeholders
- AV/CV will have wide impact on transportation and society
- Participants see MoDOT as a leader in facilitating future conversations
THANK YOU

See you in the FUTURE!