New vehicle technologies

What are they and what does this mean for our industry?
Automated Vehicles

At SAE Level 0, the human driver does everything;

At SAE Level 1, an automated system on the vehicle can *sometimes assist* the human driver conduct *some parts of the driving task*;

At SAE Level 2, an automated system on the vehicle can *actually conduct* some parts of the driving task, while the human continues to monitor the driving environment and performs the rest of the driving task;

At SAE Level 3, an automated system can both actually conduct some parts of the driving task and monitor the driving environment *in some instances*, but the human driver must be ready to take back control when the automated system requests;

At SAE Level 4, an automated system can conduct the driving task and monitor the driving environment, and the human need not take back control, but the automated system can operate only in certain environments and under certain conditions; and

At SAE Level 5, the automated system can perform all driving tasks, under all conditions that a human driver could perform them.
A Little History
We’ve Come a Long Way
Automated Vehicle Predictions

When will they be here?

- **Today**: Teslas are “90% autonomous”
- **Next Year**: GM to offer “super cruise”
- **2017**: Google Car publicly available
- **2018**: Nissan introduction
- **2020**: “Semi-autonomous” introductions by most of market
- **2026**: Autonomous standard issue
- **2040**: IEEE prediction that 75% of vehicles are autonomous

**Self-driving cars in California doubled in June 2015.**
Automated Vehicle Predictions

**Autonomous Vehicle Sales by Region, World Markets: 2015-2035**

- North America
- Western Europe
- Eastern Europe
- Asia Pacific
- Latin America
- Middle East & Africa

*Source: Navigant Research*
The Wild Card
So What Are The Issues?

1. Our roadway system was designed based on years of research of human behavior
2. Well maintained roads are somewhat critical to autonomous performance
3. Complex urban environment can cause challenges
4. Weather
5. Liability
6. Fleet Management
7. Safety and Security
Years of Research of Human Behavior
Well Maintained Roads
Complex Urban Environment
Weather
Liability
Fleet Management
Safety and Security
The Effects of These Technologies

Behavior changes

- Currently - According to the California PATH, drivers space themselves so that 5% or road is used.
- Soon - New behaviors will emerge with the advent of connected and automated vehicles:
  
  - Better driving patterns will also emerge through the influence on non-AV/CV drivers. Studies show as little as 20% population penetration has impacts.
  - Fewer accidents due to less human error.

Source: Highway Capacity Benefits from Using Vehicle-to-Vehicle Communication and Sensors for Collision Avoidance, by Patcharinee Tienttrakool, Ya-Chi Ho, and Nicholas F. Maxemchuk from Columbia University
The Effects of These Technologies

Spatial changes

• Less parking needed
• Freeing up of space -> repurposing
• Less chaotic, more livable environments emerge
• Less signage needed – no traffic signals?
The Effects of These Technologies

Road design and land use changes

- Roundabouts much more efficient
- Less human error so – tighter radii
- Property near roads not as blighted
- Closer interaction between vehicles and pedestrians
New types of projects emerge.....

Goods movement

- Helping cities work better
- Detroit-based
- Platoonning technology
- Lead driver controls acceleration and braking
- Drafting creates 10% fuel savings
New types of projects emerge

FRATIS – Freight Advanced Traveler Information System

- Revolutionize the efficiency of ports – “Smart Ports”
- Coordinated goods transfer
- Decreased footprint
- Connected vehicle applications
  - Freight-Specific Dynamic Travel Planning and Performance
  - Drayage Optimization
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