HOW EMERGING TECHNOLOGIES WILL DISRUPT OUR TRANSPORTATION SYSTEM...IS YOUR AGENCY PREPARED?

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ADVANTEC Consulting Engineers
How Emerging Technologies will Disrupt Our Transportation System...Is your Agency Prepared?

- Smart Cities
- Car Sharing
- Bike Sharing
- Connected Vehicles
- Autonomous Vehicles
- Big Data
- Ride Sharing
- MaaS
- IoT
- Cyber Security
- Mobility Hubs
- Electrification
- Drones

Think of all of the things you need to do...
CV and AV Deployment Race

➢ Ford to invest **$1 billion** in Autonomous Vehicle Tech Firm Argo AI (February 10, 2017)

➢ Reach its goal of producing a self-driving vehicle for commercial ride sharing fleets by 2021

➢ Rival GM made a billion-dollar bet a year ago with its acquisition of Silicon Valley self-driving startup Cruise Automation. GM also invested $500 million to buy a 9-percent stake in San Francisco-based ride services firm Lyft, a competitor to Uber

➢ An arms race is already underway between the auto and tech industries to own the knowledge and know-how around bringing self-driving cars out of the research phase and into the market. Competitive hybrid companies like Tesla are aggressively updating its Autopilot software. Meanwhile, Alphabet Inc.’s new Waymo division is ramping up commercial efforts and Uber is testing a self-driving ride-hailing service
USDOT to award $40 million as part of new Smart City Challenge

New York City DOT, ICF/Wyoming, and the Tampa Hillsborough Expressway Authority begin testing connected vehicle applications in real-world settings

Expect that a majority of new light vehicles sold will have connected vehicle technology

20% of Traffic signals are able to communicate with connected vehicles

Over 50% of vehicles will be automated

National Level Process
## CV / AV Applications

### V2I Safety
- Red Light Violation Warning
- Curve Speed Warning
- Stop Sign Gap Assist
- Spot Weather Impact Warning
- Reduced Speed/Work Zone Warning
- Pedestrian in Signalized Crosswalk Warning (Transit)

### V2V Safety
- Emergency Electronic Brake Lights (EEBL)
- Forward Collision Warning (FCW)
- Intersection Movement Assist (IMA)
- Left Turn Assist (LTA)
- Blind Spot/Lane Change Warning (BSW/LCW)
- Do Not Pass Warning (DNPW)
- Vehicle Turning Right in Front of Bus Warning (Transit)

### Environment
- Eco-Approach and Departure at Signalized Intersections
- Eco-Traffic Signal Timing
- Eco-Traffic Signal Priority
- Connected Eco-Driving
- Wireless Inductive/Resonance Charging
- Eco-Lanes Management
- Eco-Speed Harmonization
- Eco-Cooperative Adaptive Cruise Control
- Eco-Traveler Information
- Eco-Ramp Metering
- Low Emissions Zone Management
- AFV Charging/Fueling Information
- Eco-Smart Parking
- Dynamic Eco-Routing (light vehicle, transit, freight)
- Eco-ICM Decision Support System

### Mobility
- Advanced Traveler Information System
- Intelligent Traffic Signal System (I-SIG)
- Signal Priority (transit, freight)
- Mobile Accessible Pedestrian Signal System (PED-SIG)
- Emergency Vehicle Preemption (PREEMPT)
- Dynamic Speed Harmonization (SPD-HARM)
- Queue Warning (Q-WARN)
- Cooperative Adaptive Cruise Control (CACC)
- Incident Scene Pre-Arrival Staging Guidance for Emergency Responders (RESP-STG)
- Incident Scene Work Zone Alerts for Drivers and Workers (INC-ZONE)
- Emergency Communications and Evacuation (EVAC)
- Connection Protection (T-CONNECT)
- Dynamic Transit Operations (T-DISP)
- Dynamic Ridesharing (D-RIDE)
- Freight-Specific Dynamic Travel Planning and Performance Drayage Optimization

### Agency Data
- Probe-based Pavement Maintenance
- Probe-enabled Traffic Monitoring
- Vehicle Classification-based Traffic Studies
- CV-enabled Turning Movement & Intersection Analysis
- CV-enabled Origin-Destination Studies
- Work Zone Traveler Information

### Road Weather
- Motorist Advisories and Warnings (MAW)
- Enhanced MDSS
- Vehicle Data Translator (VDT)
- Weather Response Traffic Information (WxTINFO)

### Smart Roadside
- Wireless Inspection
- Smart Truck Parking
Traffic Incident Management Applications (V2V)

Incident Ahead
Reduce Speed
Move to left Lane

INCIDENT ZONE WARNING
Traffic Incident Management Applications (V2V)
Weather Management Applications (V2V)
How Emerging Technologies will Disrupt Our Transportation System...Is your Agency Prepared?
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Policies
- General Plan
- Transportation Circulation Plan
- Transportation Policies
- Freight Delivery Policies
- Funding Programs
- Parking Revenue
- P3 Programs

Planning
- Guidelines
- Land Use
- Traffic Models
- Development Fees
- Transportation, Parking, etc. Mitigations
- Complete Street Programs
- Grant Programs

Design
- Roadway Classifications
- Roadway Standards
- Technology Requirements
- Communication Networks
- Shared Use Facilities
- Mobility Hubs
- Cyber Security

Operations
- Budgets
- Operations, Management and Training
- Big Data Management
- Assets Management
- Agency Owned or Leased Vehicles
- Transit System
- First and Last Mile

Workforce
- Data Chief Officer
- Cyber Security Chief Officer
- IT Staff
- System / Software Engineers
- O&M Technical Staff
How Emerging Technologies will Disrupt Our Transportation System...Is your Agency Prepared?

- **New Career Opportunities**
  - Civil Engineers: computing, telematics, systems, communications, network
  - Electrical Engineers
  - Mechanical Engineers
  - Computer Science
  - Communications / Network
  - System Engineers
  - Robotics
  - Cyber Security
  - Big Data Management (Chief Data Officer)
Public Agencies: Preparing for the Changes

- Vancouver, Canada

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MOTION ON NOTICE

4. Preparing Vancouver for Autonomous and Driverless Cars

MOVED: Councillor Neggs
SECONDER:

WHEREAS

3. Driverless or autonomous vehicle technology is now progressing so rapidly that Ontario has permitted testing of such vehicles in 2016 and may allow regular use in the near future;

4. This new technology poses new challenges to protection of privacy in its collection of data, and offers new margins of safety, dramatic improvements in efficiency and the potential to free large areas of urban land for better use;

THEREFORE BE IT RESOLVED THAT Council direct staff to report back on:

- the implications, both positive and negative, of this technology on the City’s transportation, land use, economic and sustainability plans, as well as the steps necessary to update those plans; and

- the views of the City’s planning, transportation and technology experts on the best ways to maximize the benefits of this technology for the city and its economy while mitigating potential negative impacts.
How is the Coachella Valley Preparing for these Changes?

- Coachella Valley
  - Resorts/Tourist Attraction
  - Over 100 Golf Courses
  - Indian Wells Tennis Garden
  - Coachella Festivals at Polo Grounds
  - Riverside County Fair
  - Tamale Festival
  - Golf Cart Xmas Parade
  - Indian Casinos
  - Snow Birds Heaven
How is the Coachella Valley Preparing for these Changes?
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- Coachella Regional Traffic Signal Synchronization Program

- Project NTP
- ITS Master Plan PS&E
- System Integrator Construction
- System Operations Maintenance
- Connected Vehicles
  Smart Cities

- 2016
- 2017
- 2018
- 2019
- 2020
How is the Coachella Valley Preparing for these Changes?
How is the Coachella Valley Preparing for these Changes?

VALLEYWIDE BUILDOUT CONDITIONS

COACHELLA VALLEY

PROJECT IMPROVEMENTS - BUILDOUT CONDITIONS
How is the Coachella Valley Preparing for these Changes?
How is the Coachella Valley Preparing for these Changes?
How is the Coachella Valley Preparing for these Changes?

ECO GLIDEPATH AT SIGNALIZED INTERSECTIONS

1. Traffic Signal Controller
   - The roadside unit transmits SPaT and MAP messages using DSRC

2. Onboard Unit

3. Roadside Unit
   - Communications back to TMC

4. Onboard Computer with Automated Longitudinal Control Capabilities

5. Back Office:
   - A local TMC processes data from roads and vehicles

6. Driver-Vehicle Interface
   - GO
   - Selected Speed
   - Current Speed
   - Speed Up
   - Stop Data
   - Exit/Enter On/Off

7. Backhaul:
   - Communications back to TMC

ADVANTEC Consulting Engineers
How is the Coachella Valley Preparing for these Changes?

SPAT – CONNECTED VEHICLE FEATURES

Regionwide FO Cable Management

144 Strand Fiber Optic Cable

- 16% Reserved - Future Dark Fiber
- Fiber Backbone Ring Communications
- Fiber Local Leaf Communications
- Inter-Agency C2C Communications
- Smart Cities Communications
- ITS Elements Communications

Multi-Purpose Use
How is the Coachella Valley Preparing for these Changes?
How is the Coachella Valley Preparing for these Changes?

CONNECTED VEHICLES

CVLINK CONNECTIVITY

DETAIL "A"

SMART LIGHTING/ SMART PARKING

DETAIL "B"

DETAIL "C"

EXAMPLE SMART CITIES APPLICATIONS - BUILDOUT CONDITIONS
How is the Coachella Valley Preparing for these Changes?

- Opportunities for CV / AV Pilot Projects
Private Developments: Planning for the Present and Future

- New communities preparing for upcoming disruptive transportation technologies – Lilac Hills Ranch, San Diego, CA

Driverless Technology Hits Residential

By Carrie Rosenfeld | San Diego


BONSALL/VALLEY CENTER, CA—Driverless technology, run by an app, will allow Lilac Hills Ranch to operate as a pedestrian-friendly community with state-of-the-art sustainability features, developer Accretive Investments Inc.’s president Jon Rilling tells GlobeSt.com. The proposed development is a half mile off the I-15 freeway to the east here and is the first master-planned community to go through the new county general plan process.

The development will feature a village-style approach whereby every home will be within a 10-minute walk to the grocery store and village center. The proposed 1,700-unit build out in five phases will have a K-8 school, a 50-room country inn, senior center, water-reclamation plant and other amenities and is expected to go before the County Board of Supervisors soon. It’s been approved by county staff and the planning commission, and Accretive plans to start development in about a year. We spoke exclusively with Rilling about the proposed driverless technology and how it will impact community development.

GlobeSt.com: Please explain how driverless technology is coming to this community.

Rilling: We’ve collaborated with SB Robotics, a local technology firm in Carlsbad, CA, to introduce in concept autonomous or driverless vehicles in the Lilac Hills Ranch community that would provide services to establish a more pedestrian-oriented community and more interconnected neighborhoods. It’s widely accepted that people will walk more if there are alternative modes of travel available to them. This technology would allow somebody to pull up an app on their smartphone and order a driverless electric vehicle to pick them up and take them to another point in the community. It could also be used to deliver groceries or household goods. Technology like this can reduce greenhouse-gas emissions by reducing the number of car trips that a household would need to take in a given day.

The goal is to use 21st-Century technology to augment and promote the pedestrian experience in the community. The plan is to integrate these vehicles throughout the community, and they would only be available to residents in the community to help people with daily household chores. They can also be used to increase safety by providing advanced life-support systems such as automatic external defibrillators. We’re primarily focused on introducing the technology and allowing the use to be adapted and used as necessary. It works on a localized virtual rail network—not a GPS system—that keeps the vehicles on a defined pathway. If someone summons a car, it will be preprogrammed to follow a certain route, and the resident can take it anywhere within the community. The car can come in a lot of different shapes and forms; it’s platform adaptable.

Last week, during the approval of the SANDAG San Diego Forward regional plan, there was a discussion of the future of our roads and infrastructure being focused on driverless technology. This will be the first community in the state that will implement that technology.
ITE Councils

Coordinating Council

Employer-Type Councils
- Public Agency
- Transportation Consultants
- Transportation Education

Technical Councils
- Complete Streets
- TSM&O
- Traffic Engineering
- Transportation Expert Witness
- Transportation Planning
- Transportation Safety
- Pedestrian and Bicycle
- Freight
- Roundabout
- Joint Rail Grade Crossing
- Parking
- Sustainability
- CV/AV (PROPOSED)

Program Schedule at a Glance

Transportation System Management & Operations: ITE's Executive Council Wants You!

What is the TSM&O Council doing about TSM&O?

Our 2017 Strategic Action Plan is available for download in the ITE Community at this link:
http://community.ite.org/viewDocument/2017-TSMO-Council-Strategic-Action-PlanCommunity/edit/205933-64e0-48ce-8e68-d974e985e69e/file/librarydocuments

At a high-level we are working towards the following objectives:

- Audit existing TSM&O Council Activities
- Fully integrate and welcome members of the Freight Standing Committee
- Develop a framework between the TSM&O Council and the National Operations Center of Excellence
- Develop a baseline for positioning ITE as the thought leader for Connected and Autonomous Vehicle Public Policy
- Develop an ITE District, Chapter, and Section Outreach Plan.

In addition, the Institute of Transportation Engineers' TSM&O Council is leading an effort in 2017 on behalf of ITE to determine their position in the Smart Communities space. Rather than try and define the solution and implement the change to build this concept from the ground-up, Smart Communities, as defined by ITE, include the urban core that Smart Cities is based on, and adds in the other geographical areas ITE members encompass, including suburban, rural, and others. As part of this effort, the TSM&O Council is requesting a 45-50 minute interactive session at your District Annual Conference and/or local Section meeting. This session will be dedicated as a facilitated discussion to answer some of the following questions:

- How has the concept of smart cities/communities been received in your District?
- Is there an appetite for smart cities/community education?
- What do you need to make your community “Smart?”
- Are there immediate questions you need answered?

The outcomes of this meeting will be compiled with other District/Section area meetings and delivered to ITE HQ. This will set the Smart Communities Strategic Direction for 2018. It is very possible that a compilation of minutes from similar presentations at other ITE Section and District meetings will be presented in a future ITE Journal article.

How can I get involved in the TSM&O Council?

It’s easy - just log onto the ITE Community and join or contact Eric Ronell (eronnell@pohst.com), Anthony Casillone (acassillone@pohst.com) or Doug Getman (doug.getman@kpmg.com)

We are actively looking for younger ITE members to assist with Outreach to/from our Council to your Section/District – join today and tell us what your passion is!
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