Planning for the Future(s)

Guidance on ACES Considerations into Long Range Transportation Plans
Agenda

• Definitions
• Purpose & Approach
• Guide Overview
• Key Findings
• Questions

Source: www.tmcnet.com
ACES Defined

A Automated
Vehicle capable of guiding itself with little or no human input

C Connected
Vehicle linked to other devices to improve safety or efficiency

E Electric
Vehicle using one or more electric motors for propulsion

S Shared-use
Vehicles used (not necessarily owned) by more than one person or organization
Purpose & Approach

Volkswagen expects first self driving cars on the market by 2019

GM states Autonomous cars could be deployed by 2020 or sooner

BMW to launch autonomous iNext in 2021

First autonomous Toyota to be available in 2020

NVIDIA to introduce level-4 enabling system by 2018

Ford CEO announces fully autonomous vehicles for mobility service by 2021

Audi to introduce a self-driving car by 2020

NuTonomy to provide self driving taxi service in Singapore by 2018

Delphi and MobilEye to provide off the shelf driving system by 2019

Uber fleet to be driverless by 2030.

Source: http://www.driverless-future.com/?page_id=384
Purpose & Approach
“If I asked people what they wanted, they would have said faster horses” – Henry Ford
Purpose & Approach

Literature Review
MPO Survey and Interviews
FHWA scenarios
4-step Travel Demand Modeling
# ACES Planning Process

## Enhanced Driving Experience
- **Managed Autonomous Lane Network**: AV lane networks
  - AV travel is considered to a large-scale lane network with significant consumer adoption
- **Ultimate Driver Assist**: Ultra-Connectivity
  - AV adoption stalls, CV becomes pervasive

## Slow Roll
- **Slow Roll**: Minimal Plausible Change
  - Accounts for advances in safety technology, TSMO and mobility services

## Driver Becomes Mobility Consumer
- **Niche Service Growth**: High AV/CV in certain cases
  - Niche applications for CV/AV dominate the landscape
- **Competing Fleets**: Automated TNV fleets compete
  - Level-4 AV is safe for most trips but are dominated by completing fleets
- **RoboTransit**: Automated mobility-as-service
  - Strong public-private partnership for system optimization

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**Trajectories towards CV/AV advancements**

**TODAY**
ACES Planning Process
Policy Guide at a Glance

- Technology Overview
- Safety Impacts
- Travel Demand Impacts
- Highway System Impacts
- Transit System Impacts
- Funding Impacts
- Planning Processes
- Education & Engagement
- Considerations

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Key Points: Safety

- Fatalities in Florida are on the rise, ACES may help reverse the fatalities trend.

- During transition, partial automation may increase risks associated with distracted driving.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Received Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward collision warning</td>
<td>▼27% Front-to-rear crashes, ▼20% Front-to-rear crashes with injuries, ▼7% Claim rates for damage to other vehicles, ▼14% Claim rates for injuries to people in other vehicles</td>
</tr>
<tr>
<td>Forward collision warning plus autobrake</td>
<td>▼50% Front-to-rear crashes, ▼56% Front-to-rear crashes with injuries, ▼13% Claim rates for damage to other vehicles, ▼21% Claim rates for injuries to people in other vehicles</td>
</tr>
<tr>
<td>Lane departure warning</td>
<td>▼11% Single-vehicle, sideswipe and head-on crashes, ▼21% Injury crashes of same types</td>
</tr>
<tr>
<td>Blind spot detection</td>
<td>▼14% Lane-change crashes, ▼23% Lane-change crashes with injuries, ▼9% Claim rates for damage to other vehicles, ▼12% Claim rates for injuries to people in other vehicles</td>
</tr>
<tr>
<td>Rear automatic braking</td>
<td>▼62% Backing crashes, ▼13% Claim rates for damage to the insured vehicle, ▼26% Claim rates for damage to other vehicles</td>
</tr>
<tr>
<td>Rearview cameras</td>
<td>▼17% Backing crashes</td>
</tr>
<tr>
<td>Rear cross-traffic alert</td>
<td>▼22% Backing crashes</td>
</tr>
</tbody>
</table>

Source: IIHS
Key Points: Transit

• ACES may indirectly reduce demand for transit but create opportunities for more cost effective and customer friendly service.

• MPOs are in a unique position to help local transit agencies adapt by transforming into “mobility managers” that help broker trips using multiple providers across an area.
Key Points: Funding

- Financial scenarios can help evaluate the impact on MPO fiscally constrained capital programs.

- Transportation funding relies heavily upon the motor fuel tax; the future of which is uncertain.

- Coordination with federal and state agencies is crucial to develop new funding mechanisms that will be successful in the face of ACES.
Key Points: Planning Processes

• ACES will transform performance-based planning and, with it, the types of projects MPOs prioritize and plan.

• Collecting, storing, and the use of data will change

• Finding locally meaningful data may require MPOs to conduct or participate in pilot ACES projects.
Key Points: Engagement

- ACES introduce equity and other issues that may affect how MPOs define their community visions, goals and performance measures.

- MPOs will face new and perhaps unprecedented demands on engagement staff, resources and technical knowledge to address new needs and new stakeholders.

- ACES open up new and more complex communication needs and opportunities across many broad topic areas.
Considerations Topics

- Education and Engagement
- Planning – Fiscal, Urban
- Modeling
- Policy
- Project Generation and Prioritization
Considerations – Education and Engagement

4. Identify and develop staff skills and knowledge on advances in ACES to help them better inform and serve the public, local decision-makers and other participants in the planning process.

| 1 | Coordinate with other organizations regarding ACES communication roles and responsibilities. |
| 2 | Report ACES impact on transportation system performance and other community vision, goals, objectives and assets. |
| 3 | Collaborate with the private sector to deploy ACES technologies in more uniform, predictable ways. |
| 4 | Identify and develop staff skills and knowledge on advances in ACES to help them better inform and serve the public, local decision-makers and other participants in the planning process. |
| 5 | Help the public understand ACES technology so that community decisions about related investments and impacts are made in a timely, factual and sustainable fashion. |
| 6 | Develop a roadmap of appropriate interactions between MPOs and industry, legislatures, federal government and others to facilitate ACES deployment and accelerate the accompanying societal benefits. |
| 7 | Consider developing an ACES committee to inform other policy committees on the trade-offs of ACES. |
| 8 | Develop an industry council to identify opportunities for private-sector ACES interactions and collaboration. |
Considerations – Fiscal Planning

1. Determine potential effects of ACES on infrastructure funding, revenue sources and stakeholder support.
2. Explore funding scenarios to evaluate effects of revenue shortfalls and alternative revenue sources on capital programs.
3. Investigate road pricing and other non-traditional funding sources that better support desired community outcomes.
4. Coordinate with ACES committee and the public to weigh the benefits and drawbacks of non-traditional funding sources to determine whether there is the political will to adopt and sustain those sources in support of a community vision.
5. Coordinate with federal and state agencies to ensure that new funding mechanisms create opportunities to replace local revenue sources disrupted by ACES.
6. Capitalize on the funding opportunities at federal, state and/or local funds.

### HOW SMART CITY INITIATIVES SHOULD BE FINANCED

<table>
<thead>
<tr>
<th></th>
<th>By Organization Type</th>
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<tbody>
<tr>
<td></td>
<td>Government/Municipality</td>
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<tr>
<td>Public/Private Partnerships</td>
<td>67.6%</td>
</tr>
<tr>
<td>Government Grants/Subsidies</td>
<td>52.2%</td>
</tr>
<tr>
<td>Tax Incentives</td>
<td>39.0%</td>
</tr>
<tr>
<td>Property Taxes</td>
<td>5.1%</td>
</tr>
<tr>
<td>Only Municipal Funds</td>
<td>8.1%</td>
</tr>
<tr>
<td>Only Private Funds</td>
<td>4.4%</td>
</tr>
</tbody>
</table>

Grey shading indicates models higher than others compared to all other groups combined.
Considerations – Urban Planning

1. Refine or revise MPO goals in light of ACES opportunities, impacts and uncertainties.

2. Link local ACES-related long-term goals with state and federal goals to take advantage of benefits and future opportunities.

3. Use regular planning processes such as development of unified work program and scenario planning to capture new data and trends that can be used to achieve regional vision and goals.

4. Transit Planning
   a. Reconsider current transit development plan in light of ACES-related opportunities and threats.
   b. Identify and prioritize major corridors where fixed route transit can be most effective in an ACES future and plan for supporting transit features and land use.
   c. Support integration of transportation payment and trip planning systems across public and private mobility service providers.
   d. Identify locations for mobility hubs where flexible taxi services can interface with fixed route transit.

5. Performance Measures
   a. Develop and continually refine a flexible approach to determining ACES-driven system performance needs and measures.
   b. Create and test new or refined performance measures that better reflect federal and state regulatory requirements while better meeting community needs, preferences and expectations.

6. Smart Cities
   a. Work with municipalities and the private sector to define, collect and share "smart cities" data relevant to long-range planning.
   b. Identify and prioritize major corridors where fixed route transit can be most effective in an ACES future and plan for supporting transit features and land use.
   c. Create and test new or refined performance measures that better reflect federal and state regulatory requirements while better meeting community needs, preferences and expectations.
Considerations – Urban Planning

Parking Space Size
• Reduced width (doors don’t need to open)
• Varied sizes to fit specific vehicle types

Parking Lot Location
• No spaces within 300’ of building entrances?
• On-street parking repurposed
• Passenger drop off/pick up lanes at building entrance (similar to airport design)
• Nests and Hives
• Zombie Tax

Development Patterns
• Higher density requirements may be more attainable
• Lobby Redesign away from garage entrance

“Nobody goes there anymore, it’s too busy” – Yogi Berra
**Considerations – Modeling**

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<tbody>
<tr>
<td>1</td>
<td>Terminal Times, Friction Factors, modifying the Trip Table are three areas to account for ACES technologies in travel demand models</td>
</tr>
<tr>
<td>2</td>
<td>Socioeconomic data may be a factor in market penetration rates of ACES technologies in certain zones</td>
</tr>
<tr>
<td>3</td>
<td>Travel Characteristic surveys may also be used to refine inputs within the Value of Time parameter for additional demand model refinements</td>
</tr>
<tr>
<td>4</td>
<td>ACES impacts on the relationships between VHT, VMT and network speeds within the model vary between FHWA scenarios and may influence goals and objectives</td>
</tr>
<tr>
<td>5</td>
<td>Freeway lanes may realize higher capacity improvements due to fewer friction factors and the lack of pedestrian crossings</td>
</tr>
<tr>
<td>6</td>
<td>The complexity of models impact the results of capacity, speeds, and VMT depending on scenario used. Therefore, no two model results may be alike.</td>
</tr>
</tbody>
</table>

Freeway lanes may realize higher capacity improvements due to fewer friction factors and the lack of pedestrian crossings.

*Source: citilabs*
Considerations – Policy

1. Identify ACES solutions to mitigate potentially increased VMT and vehicle emissions.

2. Coordinate with local governments on land-use and parking policies to achieve local and regional goals.

3. Work with the local transit agency to develop policies that integrate ride hailing and TNCs with traditional transit, including integrated payment.

4. Develop a comprehensive freight strategy that addresses private sector and military freight needs and trends.

Source: www.planetizen.com
Considerations – Project Generation and Prioritization

1. Build consensus with MPO members regarding how to account for ACES in project development and prioritization.

a. Increased road marking implementation and maintenance for machine vision (e.g. electronic lane markings that allow use of V2I to provide more accurate lane markings and to provide changing road lanes for work zones.)

<p>| | |</p>
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<tr>
<td>1</td>
<td>Build consensus with MPO members regarding how to account for ACES in project development and prioritization.</td>
</tr>
<tr>
<td>2</td>
<td>Explore how best to implement new ACES-related infrastructure needs and standards into project planning, including such considerations as the need for:</td>
</tr>
<tr>
<td>a.</td>
<td>Increased road marking implementation and maintenance for machine vision (e.g. electronic lane markings that allow use of V2I to provide more accurate lane markings and to provide changing road lanes for work zones.)</td>
</tr>
<tr>
<td>b.</td>
<td>Increased pavement maintenance for safe automated vehicle operation</td>
</tr>
<tr>
<td>c.</td>
<td>Electric vehicle charging and related power generation and distribution systems</td>
</tr>
<tr>
<td>d.</td>
<td>Supplementary or supportive ITS investments</td>
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<tr>
<td>e.</td>
<td>Dedicated or priority lanes for exclusive use by ACES vehicles (intermittently or uniformly)</td>
</tr>
<tr>
<td>f.</td>
<td>Signal priority for ACES vehicles</td>
</tr>
<tr>
<td>g.</td>
<td>Parking access and priority for ACES vehicles</td>
</tr>
<tr>
<td>h.</td>
<td>Evaluation of future operations related to lane management and restrictions (truck platoons operating in the left lanes rather than the right lanes, for example), pick up zones for transportation network companies, etc.</td>
</tr>
<tr>
<td>i.</td>
<td>Other ACES-related needs as identified</td>
</tr>
<tr>
<td>j.</td>
<td>ACES-related impacts on non-transportation related programs (911, Meals on Wheels, Air Quality, etc.)</td>
</tr>
<tr>
<td>k.</td>
<td>Incorporate into existing or planned Complete Streets projects</td>
</tr>
<tr>
<td>3</td>
<td>Incorporate ACES-related investments into already programmed TIP/STIP and fiscally constrained LRTP infrastructure plans and individual projects.</td>
</tr>
</tbody>
</table>

Source: [www.wonderfulengineering.com](http://www.wonderfulengineering.com)
Questions and discussion

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Source: Mercedes Benz
(mbusa.com/mercedes/future/model/model-All_New_F015_Luxury)