Where will Automated Vehicles take us? A Framework for Impact Assessment

Defining the Automated Vehicle System

Sensitivity Table

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<tr>
<th>SAE Level of Automation</th>
<th>Type of Sensitivity</th>
<th>Example of Impact</th>
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Impact Mechanisms

As there are different levels and concepts of automation, no single approach can be recommended for all impact assessments. Yet, our Framework includes potential impact paths starting from direct impacts on vehicle populations, driver or non-driver, quality of travel and transport system. These graphics are not exhaustive, but can be used as a starting point for systematically determining the impact paths. Naturally, there are obvious links between impact areas. Thus, assessment for related impacts is also recommended.

Direct Impacts

Safety
- Mostly related to shared travel (e.g., carpooling, ridesharing) when many travelers share a single vehicle.
- In general, AVs have lower collision rates compared to human-driven vehicles.

Vehicle Operations
- Impact on traffic congestion and travel time as AVs may need less human intervention at intersections.

Energy / Emissions
- AVs can reduce emissions by optimizing route and speed, reducing idling.

Personal Mobility
- AVs can improve accessibility and affordability for individuals with limited mobility.

Indirect Impacts

Network Efficiency
- Changes in travel demand and mode choice may affect network efficiency.

Travel Behavior
- Travel patterns may change due to increased convenience and reduced travel time.

Public Health
- AVs can improve health outcomes by reducing exposure to air pollution.

Land Use
- AVs can change land use patterns, potentially reducing urban sprawl.

Socio-Economic
- Changes in employment patterns due to increased automation and reduced commuting.

Uncertainties

- Aspects of automation that will affect societal impacts.
- Extent of the operation domain (e.g., L2 vs. L4).
- Vehicle data ownership and control over data of transport.
- Accessibility and usefulness of AVs.

Impact Pathway Matrix

- Vehicle operations (e.g., speed, acceleration, lane changes).
- Energy and emissions (e.g., battery, fuel consumption).
- Personal mobility (e.g., accessibility, affordability).
- Network efficiency (e.g., traffic flow, congestion).
- Public health (e.g., health outcomes, air quality).

Examples of Key Performance Indicators

- Network efficiency (e.g., speed, acceleration, lane changes).
- Travel time and travel cost.
- Pollution and emissions.
- Land use changes (e.g., urban sprawl).
- Socio-economic impacts (e.g., employment, income).

Examples of Key Performance Indicators

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This research is sponsored by the USDOT Intelligent Transportation Systems Joint Program Office (ITF-JPO), the CIVITAS project in Europe, and MEXT in Japan. Development of this poster was supported by the USDOT.

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