The Road to Self-Driving Cars

Chan D. Lieu
Venable LLP

35,092
fatalities in 2015

fatality rate per 100 million VMT

0.75
1.75
2.75
3.75
4.75
5.75


25,000
30,000
35,000
40,000
45,000
50,000
55,000
94% of crashes caused by driver

$836,000,000,000$
crash worthiness

crash avoidance
Levels of Automation

Level 4/5 fully autonomous
Ford announces intention to deliver high-volume, fully autonomous vehicle for ride sharing in 2021.

rulemaking takes years


May 2005—Rep. King reintroduces legislation in House

Nov. 2005—Sen. Clinton introduces legislation in Senate

Feb. 2007—Sen. Clinton introduces legislation in Senate


Feb. 2007—Senate Commerce Committee holds hearing

May. 2007—Senate Commerce Committee discharges bill

Dec. 2007—Legislation passes House

Feb. 2008—Legislation passes Senate

Feb. 2008—Signed by President, becomes Public Law 110-189

Dec. 2010—NHTSA issues NPRM

Mar. 2011—NHTSA holds public meeting and workshop

Apr. 2014—NHTSA issues final rulemaking

May 2016—Compliance phase-in begins

May 2018—Full compliance mandatory

case study—rear visibility
“In the seven-and-a-half years of my presidency, self-driving cars have gone from sci-fi fantasy to an emerging reality with the potential to transform the way we live.”
I. **vehicle performance guidance**
   outlines a 15 point “Safety Assessment” for the safe design, development, testing & deployment of automated vehicles

II. **model state policy**
   outlines the distinction between federal and state roles in regulating autonomous vehicles

III. **current regulatory tools**
   outlines the agency’s current regulatory tools and authorities that modified or streamlined to accelerate autonomous vehicle deployment

IV. **modern regulatory tools**
   identifies potential new regulatory tools and statutory authorities that the agency may consider adopting or requesting
15 point safety assessment

- operational design domain
- object event detection & response
- minimal risk condition
- validation methods
- registration & certification
- data recording & sharing
- post crash behavior
- privacy
- system safety
- vehicle cybersecurity

- human machine interface
- crashworthiness
- consumer education & training
- ethical considerations
- federal, state, & local laws
### Framework for Vehicle Performance Guidance

<table>
<thead>
<tr>
<th>Scope &amp; Process Guidance</th>
<th>Guidance Specific to Each HAV System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test/Production Vehicle</td>
<td>Describe the ODD (Where does it operate?)</td>
</tr>
<tr>
<td>FMVSS Certification/Exemption</td>
<td>Object and Event Detection and Response</td>
</tr>
<tr>
<td>HAV Registration</td>
<td>Fall Back Minimal Risk Condition</td>
</tr>
</tbody>
</table>

#### Guidance Applicable to All HAV Systems on the Vehicle
- Data Recording and Sharing
- Privacy
- System Safety
- Vehicle Cybersecurity
- Human-Machine Interface
- Crashworthiness
- Consumer Education and Training
- Post-Crash Vehicle Behavior
- Federal, State and Local Laws
- Ethical Considerations

<table>
<thead>
<tr>
<th>Geographic Location</th>
<th>Roadway Type</th>
<th>Speed</th>
<th>Day/Night</th>
<th>Weather Conditions</th>
<th>Other Domain Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Driving</td>
<td>Crash Avoidance - Hazards</td>
<td>Driver</td>
<td>System</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Testing and Validation
- Simulation
- Track
- On-Road

### Safety Assessment Letter

- **Meets the guidance area**
- **Does not meet the guidance area**
- **n/a Guidance area not applicable**
<table>
<thead>
<tr>
<th>Item</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>operational design domain</td>
<td>✓</td>
</tr>
<tr>
<td>object event detection &amp; response</td>
<td>✓</td>
</tr>
<tr>
<td>minimal risk condition</td>
<td>✓</td>
</tr>
<tr>
<td>validation methods</td>
<td>✓</td>
</tr>
<tr>
<td>registration &amp; certification</td>
<td>✓</td>
</tr>
<tr>
<td>data recording &amp; sharing</td>
<td>✓</td>
</tr>
<tr>
<td>post crash behavior</td>
<td>✗</td>
</tr>
<tr>
<td>privacy</td>
<td>✓</td>
</tr>
<tr>
<td>system safety</td>
<td>✓</td>
</tr>
<tr>
<td>vehicle cybersecurity</td>
<td>✓</td>
</tr>
<tr>
<td>human machine interface</td>
<td>✓</td>
</tr>
<tr>
<td>crashworthiness</td>
<td>✓</td>
</tr>
<tr>
<td>consumer education &amp; training</td>
<td>n/a</td>
</tr>
<tr>
<td>ethical considerations</td>
<td>✗</td>
</tr>
<tr>
<td>federal, state, &amp; local laws</td>
<td>✓</td>
</tr>
</tbody>
</table>

**actions for states**

- foster safe & rapid deployment
- determine servicing requirements
- insurance requirements
- licensing and registration
- compiling crash data