



Autonomous Vehicles Information Sharing Group  
Analysis of Issues Related to Automated and Autonomous Vehicles  
Prepared by the Framework Subgroup

**Analysis of Issues Related to Automated and Autonomous Vehicles**

The framework subgroup of AAMVA’s Autonomous Vehicle Information Sharing Group identified and organized key issues related to the development, testing, and implementation of automated and autonomous vehicles in order to provide a better understanding of the impact that this technology will have on the regulation of vehicles and the operators. This table also identifies by whom and with which partners these issues should be addressed. This should help jurisdictions to identify the private and/or public entities that may need to be involved and engaged in the policy development process. The objective of this document is to identify the legal framework that must be considered by government agencies and their partners as they begin to regulate automated and autonomous vehicles in a manner consistent with our commitment to highway safety.

Autonomous Vehicles Information Sharing Group  
Analysis of Issues Related to Automated and Autonomous Vehicles  
Prepared by the Framework Subgroup

**Summary of Levels of Driving Automation for On-Road Vehicles**

This table summarizes SAE International's levels of *driving* automation for on-road vehicles. Information Report J3018 provides full definitions for these levels and for the italicized terms used therein. The levels are descriptive rather than normative and technical rather than legal. Elements indicate minimum rather than maximum capabilities for each level. "System" refers to the driver assistance system, combination of driver assistance systems, or *automated driving system*, as appropriate.

The table also shows how SAE's levels definitively correspond to those developed by the Germany Federal Highway Research Institute (BAST) and approximately correspond to those described by the US National Highway Traffic Safety Administration (NHTSA) in its "Preliminary Statement of Policy Concerning Automated Vehicles" of May 30, 2013.

| Level   | Name                   | Narrative definition   | Execution of steering and acceleration/ deceleration | Monitoring of driving environment | Fallback performance of <i>dynamic driving task</i> | System capability ( <i>driving modes</i> ) | BAST level          | NHTSA level |
|---|------------------------|--|--|-----------------------------------|---|--|---------------------|-------------|
| <i>Human driver monitors the driving environment</i>                        |                        |  |  |                                   |   |  |                     |             |
| 0   | No Automation          | the full-time performance by the <i>human driver</i> of all aspects of the <i>dynamic driving task</i> , even when enhanced by warning or intervention systems   | Human driver   | Human driver                      | Human driver  | n/a  | Driver only         | 0           |
| 1   | Driver Assistance      | the <i>driving mode</i> -specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the <i>human driver</i> perform all remaining aspects of the <i>dynamic driving task</i>           | Human driver and system                              | Human driver                      | Human driver  | Some driving modes                         | Assisted            | 1           |
| 2   | Partial Automation     | the <i>driving mode</i> -specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the <i>human driver</i> perform all remaining aspects of the <i>dynamic driving task</i> | System   | Human driver                      | Human driver  | Some driving modes                         | Partially automated | 2           |
| <i>Automated driving system ("system") monitors the driving environment</i> |                        |  |  |                                   |   |  |                     |             |
| 3   | Conditional Automation | the <i>driving mode</i> -specific performance by an <i>automated driving system</i> of all aspects of the <i>dynamic driving task</i> with the expectation that the <i>human driver</i> will respond appropriately to a <i>request to intervene</i>  | System   | System                            | Human driver  | Some driving modes                         | Highly automated    | 3           |
| 4   | High Automation        | the <i>driving mode</i> -specific performance by an <i>automated driving system</i> of all aspects of the <i>dynamic driving task</i> , even if a <i>human driver</i> does not respond appropriately to a <i>request to intervene</i>  | System   | System                            | System  | Some driving modes                         | Fully automated     | 3/4         |
| 5   | Full Automation        | the full-time performance by an <i>automated driving system</i> of all aspects of the <i>dynamic driving task</i> under all roadway and environmental conditions that can be managed by a <i>human driver</i>  | System   | System                            | System  | All driving modes                          | .                   |             |



Autonomous Vehicles Information Sharing Group  
 Analysis of Issues Related to Automated and Autonomous Vehicles  
 Prepared by the Framework Subgroup

|                          | Testing of Highly Automated Vehicles<br>(SAE level 3 and 4, NHTSA level 3)   |  | Testing of Fully Automated Vehicles<br>(SAE level 5, NHTSA level 4)  |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 3 and 4, NHTSA level 3)  |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 5, NHTSA level 4)   |   |
|--------------------------|--|--|--|---|---|---|--|---|
|                          | Industry roles and responsibilities  | Administrations roles and responsibilities   | Industry roles and responsibilities  | Administrations roles and responsibilities  | Industry roles and responsibilities   | Administrations roles and responsibilities  | Industry roles and responsibilities  | Administrations roles and responsibilities  |
| <b>Automated Vehicle</b> | <ul style="list-style-type: none"> <li>- Research</li> <li>-Road tests</li> <li>-Human machine interface (minimize driver distraction)</li> <li>- Technical and Safety standards or guidelines (in collaboration with government)</li> <li>-Communication and information sharing</li> </ul> | <ul style="list-style-type: none"> <li>-Legislation/project (road tests): <b>State and Provincial administrations</b></li> <li>-<b>NHTSA</b> is doing research on system performance requirements framework and objective test procedures.</li> <li>-<b>NHTSA</b> testing and evaluation is also a key area of research. (Controlled test track studies and field operational tests).</li> <li>-<b>NHTSA</b> is doing human factors research.</li> </ul> | <ul style="list-style-type: none"> <li>- Research</li> <li>-Road tests</li> <li>-Human machine interface (minimize driver distraction)</li> <li>- Technical and Safety standards or guidelines (in collaboration with government)</li> <li>-Communication and information sharing</li> </ul> | <ul style="list-style-type: none"> <li>-Legislation/project (road tests): <b>State and Provincial administrations</b></li> <li>- <b>NHTSA</b> is working on System performance requirements framework and objective test procedures.</li> <li>- <b>NHTSA</b> testing and evaluation is also a key area of research. (Controlled test track studies and field operational tests).</li> <li>-<b>NHTSA</b> is doing human factors research.</li> <li>(SAE is developing</li> </ul> | <ul style="list-style-type: none"> <li>-Certification (who/how)</li> <li>-Production and commercialisation</li> <li>-Standardise levels of automation</li> <li>-Specify the level of automation for each vehicle</li> <li>-Warning specifying the automation capabilities of a particular model</li> <li>-Aftermarket automation</li> </ul> | <ul style="list-style-type: none"> <li>-Technical and Safety standards: <b>NHTSA/TC</b> or guidelines (in collaboration with industry)</li> <li>-Testing the vehicles or the application's capability to drive as would be required by a human driver for licensing: <b>State, Provincial</b></li> <li>- Develop certification process: with industry, self-certification, 3<sup>rd</sup> party</li> <li>-Insure that automation capabilities are divulged</li> </ul> | <ul style="list-style-type: none"> <li>-Certification (who/how)</li> <li>-Production and commercialisation</li> <li>-Standard levels of automation</li> <li>-Specify the level of automation for each vehicle</li> <li>-Warning specifying the automation capabilities of a particular model</li> <li>-Aftermarket automation</li> </ul> | <ul style="list-style-type: none"> <li>-Technical and Safety performance standards: <b>NHTSA/TC</b> or guidelines (in collaboration with industry)</li> <li>-Testing the vehicles or the application's capability to drive as would be required by a human driver for licensing: <b>State, Provincial</b></li> <li>- Develop certification process: with industry, self-certification, 3<sup>rd</sup> party</li> <li>-Insure that automation capabilities are divulged</li> </ul> |



Autonomous Vehicles Information Sharing Group  
 Analysis of Issues Related to Automated and Autonomous Vehicles  
 Prepared by the Framework Subgroup

|   | Testing of Highly Automated Vehicles<br>(SAE level 3 and 4, NHTSA level 3)  |   | Testing of Fully Automated Vehicles<br>(SAE level 5, NHTSA level 4)   |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 3 and 4, NHTSA level 3) |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 5, NHTSA level 4)   |   |
|---|---|---|---|---|--|---|--|---|
|   | Industry roles and responsibilities   | Administrations roles and responsibilities  | Industry roles and responsibilities   | Administrations roles and responsibilities                          | Industry roles and responsibilities  | Administrations roles and responsibilities  | Industry roles and responsibilities  | Administrations roles and responsibilities  |
|   |   | (SAE is developing testing safety standards (J3018))                              |   | testing safety standards (J3018))                                   |  |   |  |   |
| <b>Automated hardware</b>               | - Research<br>-Testing<br>-Bug fixes<br>- Technical and Safety standards or guidelines (in collaboration with government) | -Maybe eventual guidelines or standards<br>-No specific legislation               | - Research<br>-Testing<br>-Bug fixes<br>- Technical and Safety standards or guidelines (in collaboration with government) | -Maybe eventual guidelines or standards<br>-No specific legislation | -Certification (who/how)<br>-Production and commercialisation  | -Maybe eventual guidelines or performance standards<br>-No specific legislation<br>-Driver distraction guidelines | -Certification (who/how)<br>-Production and commercialisation  | -Maybe eventual guidelines or performance standards<br>-No specific legislation   |
| <b>Automated software</b>               | - Research<br>-Testing<br>-Bug fixes<br>-Evaluate and address security issues   | -Maybe eventual guidelines or standards<br>-No specific legislation               | - Research<br>-Testing<br>-Bug fixes<br>-Evaluate and address security issues   | -Maybe eventual guidelines or standards<br>-No specific legislation | -Certification (who/how)<br>-Production and commercialisation<br>-Provide updates<br>-Evaluate and address security issues     | -Maybe eventual guidelines or performance standards<br>-No specific legislation<br>Driver distraction guidelines  | -Certification (who/how)<br>-Production and commercialisation<br>-Provide updates<br>-Evaluate and address security issues | -Maybe eventual guidelines or performance standards<br>-No specific legislation   |
| <b>V2X (with regards to automation)</b> | - Research<br>-Testing<br>-Bug fixes<br>-Security issues  | -Not necessary for automation, but a "good-to-have"<br>-Legislation: <b>NHTSA</b> | - Research<br>-Testing<br>-Bug fixes<br>-Security issues  | -Not necessary for automation, but a "good-to-have"                 | -Certification (who/how)<br>-Production and commercialisation  | -Not necessary for automation, but a "good-to-have"<br>-Legislation: <b>NHTSA</b>                                 | -Certification (who/how)<br>-Production and commercialisation  | -Not necessary for automation, but a "good-to-have"<br>-Legislation: <b>NHTSA</b> |



Autonomous Vehicles Information Sharing Group  
 Analysis of Issues Related to Automated and Autonomous Vehicles  
 Prepared by the Framework Subgroup

|   | Testing of Highly Automated Vehicles<br>(SAE level 3 and 4, NHTSA level 3) |   | Testing of Fully Automated Vehicles<br>(SAE level 5, NHTSA level 4) |  | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 3 and 4, NHTSA level 3) |  | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 5, NHTSA level 4) |  |
|---|--|---|---|--|--|--|--|--|
|   | Industry roles and responsibilities  | Administrations roles and responsibilities  | Industry roles and responsibilities                                 | Administrations roles and responsibilities   | Industry roles and responsibilities  | Administrations roles and responsibilities   | Industry roles and responsibilities  | Administrations roles and responsibilities   |
|   |  | going ahead with V2V<br>-Research and testing:<br><b>DOT/RITA/ITS</b> (Safety pilot)<br>- Develop certification process for safety issues |   |  | -Provide updates<br>-Maintain security   | standardisation/mandatory V2V technology<br>-Develop certification process for safety issues   | -Provide updates<br>-Maintain security   | standardisation/mandatory V2V technology<br>-Develop certification process for safety issues   |
| <b>Road access</b><br>(in the case of AVs, use of automated driving function) | Meet requirements for testing  | -Legislation/project:<br><b>State and Provincial and administrations</b><br>-Type of roads<br>-Type of environment                        | Meet requirements for testing                                       | -Legislation/project:<br><b>State and Provincial and administrations</b><br>-Type of roads<br>-Type of environment<br>-Steering wheels and pedals for testing? | Meet requirements for road use   | -Legislation: <b>State and Provincial administrations</b><br>- Modify laws and regulations to allow automated driving on public roads<br>-Type of vehicle<br>-CMV vs passenger<br>-Type of roads and environment for different automation levels | Meet requirements for road use   | -Legislation: <b>State and Provincial administrations</b><br>- Modify laws and regulations to allow automated driving on public roads<br>-Type of vehicle<br>-CMV vs passenger |
| <b>Licensing</b>  | Meet requirements for testing  | -Legislation/project:<br><b>State and Provincial administrations</b><br>-No special licence<br>-Good driver record                        | Meet requirements for testing                                       | -Legislation/project:<br><b>State and Provincial administrations</b><br>-No special licence<br>-Good driver record   | -Standardise levels of automation<br>-Specify the level of automation for each vehicle   | -Legislation: <b>State and Provincial administrations</b><br>- Modify laws and regulations related to  | -Standardise levels of automation<br>-Specify the level of automation for each vehicle                                   | -Legislation: <b>State and Provincial administrations</b><br>- Modify laws and regulations related to  |



Autonomous Vehicles Information Sharing Group  
 Analysis of Issues Related to Automated and Autonomous Vehicles  
 Prepared by the Framework Subgroup

|  | Testing of Highly Automated Vehicles<br>(SAE level 3 and 4, NHTSA level 3) |   | Testing of Fully Automated Vehicles<br>(SAE level 5, NHTSA level 4) |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 3 and 4, NHTSA level 3) |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 5, NHTSA level 4) |   |
|--|--|---|---|---|--|---|--|---|
|  | Industry roles and responsibilities  | Administrations roles and responsibilities  | Industry roles and responsibilities                                 | Administrations roles and responsibilities  | Industry roles and responsibilities  | Administrations roles and responsibilities  | Industry roles and responsibilities  | Administrations roles and responsibilities  |
|  |  | (criteria to be determined/attributes used by insurance companies)<br>-Drivers from other countries (how to or who verifies driver records) |   | (criteria to be determined/attributes used by insurance companies)<br>-Drivers from other countries (how to or who verifies driver records) |  | driver requirements?<br>- Consider if automation will have an impact on driver training (is it necessary to reevaluate)<br>- Determine if a new class of licence will be required (to be discussed by each administration)<br>-How to handle reciprocity if there are different licences from one administration to another |  | driver requirements?<br>- Consider if automation will have an impact on driver training (is it necessary to reevaluate)<br>- Determine if a new class of licence will be required (to be discussed by each administration)<br>-How to handle reciprocity if there are different licences from one administration to another<br>-Do drivers need to have a licence or be trained? (Google car for example with no controls except a “panic button” |
| <b>Registration and Title (Brands)</b> | Meet requirements for testing  | -Legislation/project: <b>State and Provincial administrations</b><br>-Brand the vehicles to   | Meet requirements for testing                                       | -Legislation/project: <b>State and Provincial administrations</b><br>-Brand the vehicles to   | -Standardise levels of automation<br>-Specify the level of automation for each   | -Legislation: <b>State and Provincial administrations</b><br>- Modify laws and  | -Standardise levels of automation<br>-Specify the level of automation for each   | -Legislation: <b>State and Provincial administrations</b><br>- Modify laws and  |



Autonomous Vehicles Information Sharing Group  
 Analysis of Issues Related to Automated and Autonomous Vehicles  
 Prepared by the Framework Subgroup

|                  | Testing of Highly Automated Vehicles<br>(SAE level 3 and 4, NHTSA level 3) |  | Testing of Fully Automated Vehicles<br>(SAE level 5, NHTSA level 4) |  | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 3 and 4, NHTSA level 3)   |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 5, NHTSA level 4)   |   |
|------------------|--|--|---|--|--|---|--|---|
|                  | Industry roles and responsibilities  | Administrations roles and responsibilities   | Industry roles and responsibilities                                 | Administrations roles and responsibilities   | Industry roles and responsibilities  | Administrations roles and responsibilities  | Industry roles and responsibilities  | Administrations roles and responsibilities  |
|                  |  | be able to identify them (needs to be addressed by administrations)  |   | be able to identify them (needs to be addressed by administrations)<br>-Special licence plates?  | vehicle  | regulations to register automated vehicles?<br>-Brand the vehicles to be able to identify them (needs to be addressed by administrations)   | vehicle  | regulations to register automated vehicles?<br>-Brand the vehicles to be able to identify them (needs to be addressed by administrations)<br>-Special licence plates? (benefits and drawbacks)  |
| <b>Insurance</b> | Meet requirements for testing  | -Legislation/project: <b>State and Provincial administrations</b><br>-Operator has insurance<br>-Manufacturer has insurance for the specific type of technology (minimum insurance established by each administration) | Meet requirements for testing                                       | -Legislation/project: <b>State and Provincial administrations</b><br>-Operator has insurance<br>-Manufacturer has insurance for the specific type of technology (minimum insurance established by each administration) | -New criteria for insurance?<br>-Drivers manual explaining the proper use, misuse or abuse of the technology? (e.g. using lane departure and adaptive cruise control to drive a vehicle when this is not their intended use) | -Legislation: <b>State and Provincial administrations</b><br>- How to address responsibility<br>- How to revise laws or regulations for administrations that determine minimum criteria for insurance or that insure directly (state or provincial insurance) | -New criteria for insurance?<br>-Drivers manual explaining the proper use, misuse or abuse of the technology? (e.g. using lane departure and adaptive cruise control to drive a vehicle when this is not their intended use) | -Legislation: <b>State and Provincial administrations</b><br>- How to address responsibility<br>- How to revise laws or regulations for administrations that determine minimum criteria for insurance or that insure directly (state or provincial insurance) |
| <b>Consumer</b>  |  |  |   |  | -Product liability   | -Is this an issue for   | -Product liability   | -Is this an issue for   |





Autonomous Vehicles Information Sharing Group  
 Analysis of Issues Related to Automated and Autonomous Vehicles  
 Prepared by the Framework Subgroup

|                       | Testing of Highly Automated Vehicles<br>(SAE level 3 and 4, NHTSA level 3)                   |   | Testing of Fully Automated Vehicles<br>(SAE level 5, NHTSA level 4)                          |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 3 and 4, NHTSA level 3)  |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 5, NHTSA level 4)  |   |
|-----------------------|--|---|--|---|---|---|---|---|
|                       | Industry roles and responsibilities  | Administrations roles and responsibilities  | Industry roles and responsibilities  | Administrations roles and responsibilities  | Industry roles and responsibilities   | Administrations roles and responsibilities  | Industry roles and responsibilities   | Administrations roles and responsibilities  |
| <b>safety</b>         |  |   |  |   | -Address the issues of proper use, misuse or abuse of the technology (e.g. using lane departure and adaptive cruise control to drive a vehicle when this is not their intended use) | jurisdictions?  | -Address the issues of proper use, misuse or abuse of the technology (e.g. using lane departure and adaptive cruise control to drive a vehicle when this is not their intended use) | jurisdictions?  |
| <b>Data</b>           | Meet requirements for testing  | What data needs to be collected during testing?   | Meet requirements for testing  | What data needs to be collected during testing?   | -Data use and private information<br>-Mapping<br>-disclose to the consumer the data being collected   | -Legislation?<br>- Data use and private information<br>-Who needs the data and why                      | -Data use and private information<br>-Mapping<br>-disclose to the consumer the data being collected   | -Legislation?<br>- Data use and private information<br>-Who needs the data and why  |
| <b>Cyber security</b> | -Certification (who/how)?<br>-Prevent hacking or cyber attacks<br>-More transparency towards | -The scope of this aspect is larger than automated vehicles and MV<br>Administrators may not be able to | -Certification (who/how)?<br>-Prevent hacking or cyber attacks<br>-More transparency towards | -The scope of this aspect is larger than automated vehicles and MV<br>Administrators may not be able to | -Certification (who/how)?<br>-Prevent hacking or cyber attacks<br>-More transparency towards  | -The scope of this aspect is larger than automated vehicles and MV<br>Administrators may not be able to | -Certification (who/how)?<br>-Prevent hacking or cyber attacks<br>-More transparency towards  | -The scope of this aspect is larger than automated vehicles and MV<br>Administrators may not be able to determine the legislation pertaining to |





Autonomous Vehicles Information Sharing Group  
 Analysis of Issues Related to Automated and Autonomous Vehicles  
 Prepared by the Framework Subgroup

|  | Testing of Highly Automated Vehicles<br>(SAE level 3 and 4, NHTSA level 3)  |   | Testing of Fully Automated Vehicles<br>(SAE level 5, NHTSA level 4)   |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 3 and 4, NHTSA level 3) |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 5, NHTSA level 4) |   |
|--|---|---|---|---|--|---|--|---|
|  | Industry roles and responsibilities   | Administrations roles and responsibilities  | Industry roles and responsibilities   | Administrations roles and responsibilities  | Industry roles and responsibilities  | Administrations roles and responsibilities  | Industry roles and responsibilities  | Administrations roles and responsibilities  |
|  | administrations: ask the manufacturers what steps they are taking to mitigate the risks from hacking and cyber-attacks. | determine the legislation pertaining to cyber security.<br><br>-Mainly stay informed in order to answer questions:<br>1) Who else addresses this issue?<br>2) Steps already being taken?<br>3) Touch base with industry to see how their addressing the issue?<br><br>-Maybe examine the issue from an enforcement perspective: appropriate legislation to charge people who have committed crimes by hacking or conducting a cyber-attack. | administrations: ask the manufacturers what steps they are taking to mitigate the risks from hacking and cyber-attacks. | determine the legislation pertaining to cyber security.<br><br>-Mainly stay informed in order to answer questions:<br>1) Who else addresses this issue?<br>2) Steps already being taken?<br>3) Touch base with industry to see how their addressing the issue?<br><br>-Maybe examine the issue from an enforcement perspective: appropriate legislation to charge people who have committed crimes by hacking or conducting a cyber-attack. | administrations: ask the manufacturers what steps they are taking to mitigate the risks from hacking and cyber-attacks.        | determine the legislation pertaining to cyber security.<br><br>-Mainly stay informed in order to answer questions:<br>1) Who else addresses this issue?<br>2) Steps already being taken?<br>3) Touch base with industry to see how their addressing the issue?<br><br>-Maybe examine the issue from an enforcement perspective: appropriate legislation to charge people who have committed crimes by hacking or conducting a cyber-attack. | administrations: ask the manufacturers what steps they are taking to mitigate the risks from hacking and cyber-attacks.  | cyber security.<br><br>-Mainly stay informed in order to answer questions:<br>1) Who else addresses this issue?<br>2) Steps already being taken?<br>3) Touch base with industry to see how their addressing the issue?<br><br>-Maybe examine the issue from an enforcement perspective: appropriate legislation to charge people who have committed crimes by hacking or conducting a cyber-attack.<br><br><b>NHTSA</b> is also working on cyber security threats, vulnerabilities, |



Autonomous Vehicles Information Sharing Group  
 Analysis of Issues Related to Automated and Autonomous Vehicles  
 Prepared by the Framework Subgroup

|                        | Testing of Highly Automated Vehicles<br>(SAE level 3 and 4, NHTSA level 3) |   | Testing of Fully Automated Vehicles<br>(SAE level 5, NHTSA level 4) |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 3 and 4, NHTSA level 3) |  | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 5, NHTSA level 4) |   |
|------------------------|--|---|---|---|--|--|--|---|
|                        | Industry roles and responsibilities  | Administrations roles and responsibilities  | Industry roles and responsibilities                                 | Administrations roles and responsibilities  | Industry roles and responsibilities  | Administrations roles and responsibilities   | Industry roles and responsibilities  | Administrations roles and responsibilities  |
|                        |  | NHTSA is also working on cyber security threats, vulnerabilities, countermeasures assessment  |   | NHTSA is also working on cyber security threats, vulnerabilities, countermeasures assessment  |  | NHTSA is also working on cyber security threats, vulnerabilities, countermeasures assessment   |  | countermeasures assessment  |
| <b>Law enforcement</b> |  | -Keep law enforcement in the loop with regards to permits for testing<br>-Specify the use of the term automation<br>-Review the concept of “operation of a vehicle”<br>-review traffic laws and sanctions<br>-How to verify if the person behind the wheel is trained to be |   | -Keep law enforcement in the loop with regards to permits for testing<br>-Specify the use of the term automation<br>-Review the concept of “operation of a vehicle”<br>-review traffic laws and sanctions<br>-How to verify if the person behind the wheel is trained to be |  | -Legislation: <b>State, Provincial, Federal and Municipal administrations</b><br>-Keep law enforcement in the loop<br>-Specify the use of the term automation<br>-Review the concept of “operation of a vehicle”<br>-review traffic laws and sanctions |  | -Legislation: <b>State, Provincial, Federal and Municipal administrations</b><br>-Keep law enforcement in the loop<br>-Specify the use of the term automation<br>-Review the concept of “operation of a vehicle”<br>-review traffic laws and sanctions<br>-How to verify if the person behind the wheel |



Autonomous Vehicles Information Sharing Group  
 Analysis of Issues Related to Automated and Autonomous Vehicles  
 Prepared by the Framework Subgroup

|                            | Testing of Highly Automated Vehicles<br>(SAE level 3 and 4, NHTSA level 3)                      |   | Testing of Fully Automated Vehicles<br>(SAE level 5, NHTSA level 4) |  | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 3 and 4, NHTSA level 3) |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 5, NHTSA level 4) |   |
|----------------------------|---|---|---|--|--|---|--|---|
|                            | Industry roles and responsibilities   | Administrations roles and responsibilities  | Industry roles and responsibilities                                 | Administrations roles and responsibilities   | Industry roles and responsibilities  | Administrations roles and responsibilities  | Industry roles and responsibilities  | Administrations roles and responsibilities  |
|                            |   | there?<br>-Work on different scenarios of undesirable conduct in automated mode (soda can taped to the steering wheel of an Infinity to keep in “autopilot mode”)<br>-Best Practice or Checklist: A comprehensive list of items to consider when looking at this technology in terms of laws, liability, etc. |   | there?<br>-Work on different scenarios of undesirable conduct in autonomous mode<br>-What not to forget when considering enforcement options<br>-Best Practice or Checklist: A comprehensive list of items to consider when looking at this technology in terms of laws, liability, etc. |  | -Work on different scenarios of undesirable conduct in automated mode (soda can taped to the steering wheel of an Infinity to keep in “autopilot mode”)<br>-What not to forget when considering enforcement options<br>-Best Practice or Checklist: A comprehensive list of items to consider when looking at this technology in terms of laws, liability, etc. |  | is trained to be there?<br>-Work on different scenarios of undesirable conduct in autonomous mode<br>-What not to forget when considering enforcement options<br>-Best Practice or Checklist: A comprehensive list of items to consider when looking at this technology in terms of laws, liability, etc. |
| <b>Road infrastructure</b> | - Develop solutions to adapt the road network for automated cars in partnership with government | -Collaborate with the appropriate entities to start examining solutions to adapt road infrastructure and traffic signals for  |   | -Collaborate with the appropriate entities to start examining solutions to adapt road infrastructure and traffic signals for   | - Develop solutions to adapt the road network for automated cars in partnership with government                                | -Legislation: <b>State, Provincial, Federal and Municipal administrations</b><br>- Modify laws and regulations to take  |  | -Legislation: <b>State, Provincial, Federal and Municipal administrations</b><br>- Modify laws and regulations to take into   |



Autonomous Vehicles Information Sharing Group  
 Analysis of Issues Related to Automated and Autonomous Vehicles  
 Prepared by the Framework Subgroup

|                                | Testing of Highly Automated Vehicles<br>(SAE level 3 and 4, NHTSA level 3) |   | Testing of Fully Automated Vehicles<br>(SAE level 5, NHTSA level 4) |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 3 and 4, NHTSA level 3)  |  | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 5, NHTSA level 4)                                       |   |
|--------------------------------|--|---|---|---|---|--|--|---|
|                                | Industry roles and responsibilities  | Administrations roles and responsibilities                                      | Industry roles and responsibilities                                 | Administrations roles and responsibilities                                      | Industry roles and responsibilities   | Administrations roles and responsibilities   | Industry roles and responsibilities  | Administrations roles and responsibilities  |
|                                | authorities  | automated vehicles:<br><b>State and Provincial and national administrations</b> |   | automated vehicles:<br><b>State and Provincial and national administrations</b> | authorities   | into account automated driving<br><br>-Collaborate with the appropriate entities to find solutions for automated cars: reserved lanes, traffic signs, designated parking (without driver), road signals, their consistency, etc.<br><br>-How to adapt Tolling? |  | account automated driving<br><br>-Collaborate with the appropriate entities to find solutions for automated cars: reserved lanes, traffic signs, designated parking (without driver), road signals, their consistency, etc.<br><br>-How to adapt Tolling? |
| <b>Awareness and education</b> |  |   |   |   | -Product awareness and vehicle capabilities (as vehicles become more and more automated)<br>-Human machine interface<br>What will vehicle dealers be expected to provide to consumers | -What responsibility does the manufacturer or dealer have to notify the consumer of the technology in the vehicle and how to use it.(Legislation or a recommendation to NHTSA for a FMVSS  | -Product awareness and vehicle capabilities (as vehicles become more and more automated)<br>-Human machine interface<br>What will vehicles dealers be expected | What responsibility does the manufacturer or dealer have to notify the consumer of the technology in the vehicle and how to use it.(Legislation or a recommendation to NHTSA for a FMVSS label)   |



Autonomous Vehicles Information Sharing Group  
 Analysis of Issues Related to Automated and Autonomous Vehicles  
 Prepared by the Framework Subgroup

|                                   | Testing of Highly Automated Vehicles<br>(SAE level 3 and 4, NHTSA level 3) |  | Testing of Fully Automated Vehicles<br>(SAE level 5, NHTSA level 4) |  | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 3 and 4, NHTSA level 3) |  | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 5, NHTSA level 4) |   |
|-----------------------------------|--|--|---|--|--|--|--|---|
|                                   | Industry roles and responsibilities  | Administrations roles and responsibilities   | Industry roles and responsibilities                                 | Administrations roles and responsibilities   | Industry roles and responsibilities  | Administrations roles and responsibilities   | Industry roles and responsibilities  | Administrations roles and responsibilities  |
|                                   |  |  |   |  |  | label)<br>- Foster public awareness of alert driving and driver distraction : <b>State and Provincial administrations</b><br>-Foster public awareness on the new dynamic of road sharing: human-driven vehicles, automated vehicles, cyclists and pedestrians: <b>State and Provincial administrations</b> | to provide to consumers  | - Foster public awareness of alert driving and driver distraction? ( <b>State and Provincial administrations</b> )<br>-Foster public awareness on the new dynamic of road sharing: human-driven vehicles, automated vehicles, cyclists and pedestrians? ( <b>State and Provincial administrations</b> ) |
| <b>Partners and collaboration</b> |  | -What partners need to be evolved in the process of permitting and regulating testing?<br>-Develop an inclusive list going all the way down to the municipal |   | -What partners need to be evolved in the process of permitting and regulating testing?<br>-Develop an inclusive list going all the way down to the municipal |  | -What partners need to be evolved in the process of permitting and regulating operation?<br>-Develop an inclusive list going all the way down to the municipal   |  | -What partners need to be evolved in the process of permitting and regulating operation?<br>-Develop an inclusive list going all the way down to the municipal level  |



Autonomous Vehicles Information Sharing Group  
 Analysis of Issues Related to Automated and Autonomous Vehicles  
 Prepared by the Framework Subgroup

|                   | Testing of Highly Automated Vehicles<br>(SAE level 3 and 4, NHTSA level 3)  |  | Testing of Fully Automated Vehicles<br>(SAE level 5, NHTSA level 4)  |  | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 3 and 4, NHTSA level 3)   |   | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 5, NHTSA level 4)  |   |
|-------------------|---|--|--|--|--|---|---|---|
|                   | Industry roles and responsibilities   | Administrations roles and responsibilities   | Industry roles and responsibilities  | Administrations roles and responsibilities   | Industry roles and responsibilities  | Administrations roles and responsibilities  | Industry roles and responsibilities   | Administrations roles and responsibilities  |
|                   |   | level  |  | level  |  | level   |   |   |
| <b>Platooning</b> | <ul style="list-style-type: none"> <li>-Research and Development</li> <li>-Road tests</li> <li>-Interaction driver/vehicle (minimize driver distraction)</li> <li>- Technical and Safety standards or guidelines (in collaboration with government)</li> <li>-V2I - is there infrastructure investment needed?</li> <li>-HAZMAT considerations</li> <li>- V2V communications</li> <li>-HAZMAT considerations</li> </ul> | <ul style="list-style-type: none"> <li>-Legislation/project (road tests): <b>State and Provincial administrations</b></li> <li>-Technical and Safety standards : <b>NHTSA/TC</b> or guidelines (in collaboration with industry)</li> <li>-V2I - is there infrastructure investment needed?</li> <li>-HAZMAT considerations</li> <li>- V2V communications</li> <li>- liability</li> </ul> | <ul style="list-style-type: none"> <li>Research and Development</li> <li>-Road tests</li> <li>-Interaction driver/vehicle (minimize driver distraction)</li> <li>- Technical and Safety standards or guidelines (in collaboration with government)</li> <li>-V2I - is there infrastructure investment needed?</li> <li>-HAZMAT considerations</li> <li>- V2V communications</li> </ul> | <ul style="list-style-type: none"> <li>-Legislation/project (road tests): <b>State and Provincial administrations</b></li> <li>-Technical and Safety standards : <b>NHTSA/TC</b> or guidelines (in collaboration with industry)</li> <li>-V2I - is there infrastructure investment needed?</li> <li>-HAZMAT considerations</li> <li>- V2V communications</li> <li>- liability</li> </ul> | <ul style="list-style-type: none"> <li>-Certification (who/how)</li> <li>-Production and commercialisation</li> <li>-Continue R&amp;D</li> <li>-Responsible marketing. Public needs to understand the technology and limitations of the vehicle. Public needs to understand the technology and need for human interaction.</li> <li>-Label vehicles based on technology in vehicle.</li> <li>- Privacy issues</li> </ul> | <ul style="list-style-type: none"> <li>-Legislation: <b>State, Provincial, Federal and Municipal administrations</b></li> <li>-Develop certification process: with industry, self-certification, 3<sup>rd</sup> party</li> <li>- Assign a special status or not to platooning</li> <li>- Examine the need for a new licence class or endorsement for platooning, for both a heavy vehicle and a passenger vehicle (pilot vehicle) at the head of a line.</li> <li>- specific registration for a vehicle used for</li> </ul> | <ul style="list-style-type: none"> <li>Certification (who/how)</li> <li>-Production and commercialisation</li> <li>-Continue R&amp;D</li> <li>-Responsible marketing. Public needs to understand the technology and limitations of the vehicle. Public needs to understand the technology and need for human interaction.</li> <li>-Label vehicles</li> </ul> | <ul style="list-style-type: none"> <li>-Legislation: <b>State, Provincial, Federal and Municipal administrations</b></li> <li>-Develop certification process: with industry, self-certification, 3<sup>rd</sup> party</li> <li>- Assign a special status or not to platooning</li> <li>- Examine the need for a new licence class or endorsement for platooning, for both a heavy vehicle and a passenger vehicle (pilot vehicle) at the head of a line.</li> <li>- specific registration for a vehicle used for</li> </ul> |



Autonomous Vehicles Information Sharing Group  
 Analysis of Issues Related to Automated and Autonomous Vehicles  
 Prepared by the Framework Subgroup

|  | Testing of Highly Automated Vehicles<br>(SAE level 3 and 4, NHTSA level 3) |  | Testing of Fully Automated Vehicles<br>(SAE level 5, NHTSA level 4) |  | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 3 and 4, NHTSA level 3) |  | Commercialization of Automated Vehicles<br>Available for Operation by the General Public<br>(SAE level 5, NHTSA level 4) |  |
|--|--|--|---|--|--|--|--|--|
|  | Industry roles and responsibilities  | Administrations roles and responsibilities | Industry roles and responsibilities                                 | Administrations roles and responsibilities | Industry roles and responsibilities  | Administrations roles and responsibilities   | Industry roles and responsibilities  | Administrations roles and responsibilities   |
|  | - V2V communications<br><br>- liability                                    |  | - liability   |  |  | platooning purposes<br><br>-Aftermarket install?<br>- NHTSA require placard or some type of labeling in the vehicle that has automated technology<br><br>-Privacy issues | based on technology in vehicle.<br><br>- Privacy issues  | platooning purposes<br><br>-Aftermarket install?<br><br>- NHTSA require placard or some type of labeling in the vehicle that has automated technology<br><br>-Privacy issues |