Policy Implications of Automated Vehicle Technologies in the State of Florida
Executive Summary

Introduction

The Florida Automated Vehicles Policy Working Group believes that automated and connected vehicle technologies offer tremendous potential to improve the safety and efficiency of moving people and goods in Florida. The public, private, and civic stakeholders participating in this group are committed to developing a joint state-level policy framework that encourages the testing and deployment of the most promising technologies, while also helping to ensure public safety and protect public resources during a period of innovation and change. Each of the stakeholders represents an important interest in AV/CV technologies in Florida.

The working group developed the following statement to summarize the overall goal of the FAV initiative:

*Recognizing the anticipated safety and mobility benefits of automated and connected vehicle technologies (AV/CV), Florida will be a national leader in the testing, evaluation, and deployment of AV/CV and “smart” infrastructure through establishment of policies that:*

- Encourage innovation and adoption of AV/CV and “smart” infrastructure
- Promote AV/CV as a method to improve safety and mobility
- Provide flexibility to respond to market demand for AV/CV
- Ensure a high commitment to safety and security
- Strategically and succinctly address liability and financial responsibility

The working group also developed a set of guiding principles covering the topics of proactive leadership, market driven, transitional approach, preparing for the long-term, and collaboration and consistency to support the goal.

Policy Areas and Overarching Issues

Policy Areas
As AV/CV technologies develop, it may be necessary to determine:

- the impacts on safety and traffic laws, including appropriate controls during testing to ensure safety, and longer-term effects on traffic crashes and more human driving decisions are automated.
- who has financial responsibility in the event of a collision or incident and to identify and review the potential implications on personal, commercial, manufacturer and service provider liability.
- the reliability and security of the technologies and the transportation system that supports them.
- what types of data to collect, how to collect it, by whom, and for what use.

Cross-Cutting Issues
Although the Policy Working Group’s discussions mainly focused on issues relevant to the testing and early implementation phases of AV/CV technologies, some longer-term issues that will require the consideration by policy-makers.

- Transportation plans at the local, state, and federal levels should incorporate policies and projects involving AV/CV and other emerging technologies.
- Developing ways to educate the public on the potential traffic benefits related to these new technologies, such as increased fuel efficiency, traffic flow benefits, and reduced need for multiple vehicles per household, may be useful in promoting adoption of AV/CVs.
• AV/CV technologies may affect transportation funding sources as how we travel changes.
• Community and land use planning may need to adapt as well, if, for instance, AV/CV technologies will improve traffic flows and potentially promote higher vehicle occupancies and/or mode shifts.

Testing and Early Implementation Framework

Policy implications may vary depending on the specific testing or early implementation application, such as truck platooning, last-mile transit, or work zone safety. With that in mind, the Policy Working Group developed a Testing and Early Implementation Framework Matrix. The purpose of the matrix is to provide a tool to evaluate policies that may affect a specific testing or early implementation application prior to investing in research, testing, or pilot projects. In some cases, existing policies may inhibit research, testing, or pilot activities or add cost, time, or risk. Knowing policy implications of a specific application prior to investment allows FDOT and its partners to head-off problems, mitigate risks, and understand both short-term and long-term policy issues. The Policy Working Group suggests that FDOT adopt this framework and establish a network of experts in a variety of fields to serve as advisors for applying the framework.

Conclusion

The public, private, and civic stakeholders participating in this group are committed to develop a policy framework that encourages the testing and deployment of the most promising technologies, while also helping to ensure public safety and protect public resources during a period of innovation and change. As a result of Policy Working Group meetings and discussions, the group recommends:

1. The creation of a test or project plan for each testing and early implementation project to contractually outline conditions and restrictions specific to that application, considering things like:
   - Testing duration, locations, times, conditions
   - Testing protocols and criteria
   - Testing and safety precautions and failsafe provisions
   - Data collection, usage, accessibility, analysis, and performance measures, including crash and system failure data
   - Compliance with traffic laws and insurance requirements
2. The selection of testing and early implementation projects that target audiences and AV/CV technologies that are ripe for early adoption.
3. The use of the Testing and Early Implementation Evaluation Matrix developed by the Policy Working Group as a tool to address relevant issues for each specific AV/CV pilot project prior to investment.
4. The establishment of a network of experts in a variety of fields like insurance, law enforcement, technology, driver licensing, motor vehicle regulation, trucking, transit, etc., to provide advice and input regarding policy implications of specific testing and early implementation applications.
5. The development of strong relationships with technology and vehicle manufacturers.
6. Incorporate AV/CV/ITS technology into project prioritization processes.
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*Policy Working Group Testing and Early Implementation Framework Template*
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1. Introduction

1.1. Background

This Policy White Paper outlines the Policy Working Group’s discussions related to the testing and implementation of automate and connected vehicle technologies in the state of Florida.

An automated vehicle (AV) is any vehicle equipped with advanced sensors (radar, LIDAR, cameras, etc.) and computing abilities to perceive its surroundings and activate steering, braking, and acceleration without operator input.

Connected vehicles (CV) employ vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication to provide real-time warnings to a human driver to help them avoid crashes. Additional information can include traffic signal status, traffic congestion and construction warnings, as well as impending severe weather events. CV technologies can also allow back office systems such as the traffic signal control system to react to real-time information from the vehicle.

Developments in the field of AV/CV present unprecedented opportunities to improve transportation safety, reduce congestion, increase fuel economy, and improve the mobility of people and goods. According to the National Highway Traffic Safety Administration, almost 90 percent of traffic crashes are due to human error. AV/CV technologies can improve safety by facilitating informed decisions by a human operator or, in some cases, eliminating those decisions altogether. AV/CV technology also may vastly reduce traffic congestion and improve fuel economy by allowing smaller vehicle headways. AV/CV can provide new mobility options for those who cannot or choose not to drive, and applications of AV/CV technology in freight and transit systems can improve productivity, profitability, and efficiency of goods distribution.

FDOT is bringing vision to reality with a variety of AV/CV pilot deployment projects, research projects, policy analyses, planning efforts, and stakeholder workshops and symposia, working toward permanent and sustained deployment of AV/CV systems and technology that enhance livability in the State.

In 2012, FDOT created the Florida Automated Vehicles (FAV) initiative to engage stakeholders, develop research and pilot projects, and create awareness of the technologies and how they support FDOT’s vision statement. These revolutionary technologies will further FDOT’s mission and vision: “Serving the people of Florida by delivering a transportation system that is fatality and congestion free.”
1.2. Summary of AV/CV in Other States

Running AV/CV tests on public roads in realistic traffic conditions is a key step in developing innovations that could be lucrative and lifesaving. The market for vehicle automation technology could be worth $87 billion by 2030, according to Lux Research, and could one day eliminate the leading cause of traffic fatalities: human error.¹

Florida, Michigan, California, Nevada, and the District of Columbia have enacted laws related to automated vehicles. Florida allows testing of autonomous vehicles and imposes higher insurance requirements than those required of typical motor vehicles.² California’s laws are similar, but also require that manufacturers hire test drivers with clean driving records, train them, and notify regulators any time they are forced to shut off automation or their cars crash. In addition to higher insurance coverage, Nevada requires that self-driving cars be tested extensively on private tracks and have special license plates before getting on the road.

No state has passed legislation to make autonomous vehicles legal since 2013, and while bills were proposed in 16 states during 2015, none have passed. In states such as Virginia and Texas, self-driving cars are considered legal since the current law doesn’t state otherwise. Virginia has designated 70 miles of public roads for AV/CV testing, offering to repaint roads or provide high-definition maps for tests sanctioned by the Virginia Tech Transportation Institute.

Fearing that the technology’s development could be stifled, Google has lobbied state lawmakers nationwide not to advance legislation. Enacting a law that explicitly allows testing, for example, could cause problems when automakers are ready to start selling their cars. In 2013, federal traffic safety regulators echoed that caution, urging states to wait to delay passing laws addressing self-driving cars until the technology is more established. The National Highway Traffic Safety Administration has not made any formal recommendations.

Setting up testing requirements can be difficult and costly, as state agencies typically do not deal with auto manufacturing or advanced technology. State DMVs have traditionally handled licensing drivers and registering vehicles, while the federal government regulates the safety of the cars themselves. California’s rules for AV/CV testing are considered the nation’s most comprehensive, yet DMV officials continue to wrestle with how to regulate autonomous cars’ everyday use, highlighting the challenge self-driving cars present state regulators.

1.3. FAV Working Group Process

FDOT established working groups in the spring of 2014 to bring stakeholders together from across Florida to address opportunities and challenges associated with implementing automated and connected vehicle technology on Florida roadways. FDOT recognized the importance of involving other national, state, and local government agencies, industries, and researchers, as they will each play an important role in the testing, early implementation, and adoption of AV/CV technologies. The three working groups are:

1. Technology & Infrastructure
2. Policy
3. Modal Applications – Freight, Transit, and Transportation Disadvantaged

Each working group is comprised of individuals who represent organizations and agencies that may benefit from or be impacted by these technologies. More than 20 individuals representing state agencies, trade organizations, transportation consultants, insurance providers, automobile manufacturers, and others make up the Policy Working Group.

Among the most complex issues regarding the deployment of automated vehicle technologies include insurance and liability, operator responsibility, the interaction between vehicle and operator, vehicle ownership and travel patterns, and how this will affect transportation planning needs. The opportunities that these technologies could generate may significantly affect a broad range of industries, including health care, automobile manufacturers, auto collision repair centers, insurance providers, public transportation operators, freight operators, shared mobility providers, and transportation infrastructure providers.

The Policy Working Group held a series of face-to-face workshops and web-enabled meetings to discuss policy implications of AV/CV technologies and developed a testing and early implementation framework matrix to evaluate policy areas, challenges, and potential ideas.

1.4. Context and Vision for the Policy Working Group

The Florida Automated Vehicles Policy Working Group believes that automated and connected vehicle technologies offer tremendous potential to improve the safety and efficiency of moving people and goods in Florida. The public, private, and civic stakeholders participating in this group are committed to developing a joint state-level policy framework that encourages the testing and deployment of the most promising technologies, while also helping to ensure public safety and protect public resources during a period of innovation and change. Each of the stakeholders represents an important interest in AV/CV technologies in Florida.

The working group developed a goal and guiding principles intended to help the Policy Working Group and other stakeholder groups in the development of policies, plans, and programs related to AV/CV in Florida.

1.4.1. Goal

The working group developed the following goal to summarize the overall purpose for the FAV initiative:

Recognizing the anticipated safety and mobility benefits of automated and connected vehicle technologies (AV/CV), Florida will be a national leader in the testing, evaluation, and deployment of AV/CV and “smart” infrastructure through establishment of policies that:

- Encourage innovation and adoption of AV/CV and “smart” infrastructure
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Draft October 2015

- Promote AV/CV as a method to improve safety and mobility
- Provide flexibility to respond to market demand for AV/CV
- Ensure a high commitment to safety and security
- Strategically and succinctly address liability and financial responsibility

1.4.2. Guiding Principles
The following set of guiding principles were developed to accompany the goal:

Proactive Leadership
- Position Florida to be a national leader in the testing, evaluation, and deployment of automated vehicle technologies through cooperation with, and acceptance of, new AV/CV related businesses.
- Establish policies and programs that provide incentives to encourage businesses involved in AV/CV research, development, testing, manufacturing, and related services to locate or expand in Florida.

Market Driven
- Focus initially on technologies and systems that currently are or are anticipated soon to be in demand by Florida’s residents, visitors, and businesses.

Transitional Approach
- Be flexible and adaptable to encourage innovation and respond to rapidly evolving technologies and systems during initial development and deployment of AV/CV technologies.
- While encouraging innovation, ensure a continuing high commitment to protecting the safety and security of the public and respecting private property.
- Facilitate robust evaluation of initial pilot projects to assess the potential contribution of AV/CV technologies to statewide safety, mobility, and other transportation goals, as well as to identify potential technical and policy issues.
- Facilitate ongoing research, development, and collaboration to resolve both technical and non-technical/policy issues related to AV/CV technologies.
- Periodically reevaluate policies, plans, and programs to respond to changes in technology, consumer and business demand, and lessons learned from initial pilot projects.
- Plan and manage Florida’s transportation system to balance support for vehicles equipped with AV/CV technologies and vehicles not equipped with these technologies.

Preparing for the Long-Term
- Facilitate robust, long-term research to identify the potential impacts of AV/CV technologies on transportation safety, security, and mobility, including implications for future travel demand, investment plans, land use decisions, and transportation revenues.
- Facilitate the ongoing measurement and reporting of Florida’s progress in accomplishing the objectives of its AV/CV programs.

Collaboration and Consistency
- Be consistent with the goals and objectives of the Florida Transportation Plan (FTP), and the Strategic Highway Safety Plan (SHSP), and other relevant local and statewide agency plans.
- Collaborate with public, private, and civic stakeholders.
- Develop consistent policies, plans, and programs at the state, regional, and local levels, building on the established transportation planning framework.
- Use clear and consistent terminology that reflects national and industry standards.
2. Specific Policy Areas and Issues

The following subsections highlight the policy areas and issues identified by the group as being the most relevant to AV/CV testing and implementation.

2.1. Safety and Enforcement

Most sources, including the manufacturers of AV/CV technology, project significant reductions in traffic crashes, and corresponding injuries and fatalities, through the use of AV/CV technologies. AV/CV technologies are designed to automate driving decisions and operations to remove the human variable, which is estimated to contribute to 90 percent of traffic crashes. Due to the emerging nature of these technologies, limited data is available to support these projected reductions.

While a portion of the driving population welcomes AV/CV technologies, up to and including fully autonomous, other portions will want proof that the technologies are reliable and safe. Additionally, because the technologies are new and relatively untested, it is critical that any testing or early implementation application collect and analyze safety data and that appropriate controls are in place during the testing or early adoption application to mitigate the risk to those involved as well as the motoring public as a whole.

Some potential approaches for ensuring safety during AV/CV testing and implementation include:

- Identifying appropriate facilities/times to test to limit risk
- Evaluating safety during testing
- Educating drivers unfamiliar with the technology
- Training and engaging law enforcement in the planning, testing and early implementation
- Implementing multiple pilot projects to test for different variables and with different controls in place, for example, rural, urban, light traffic
- Setting safety performance criteria appropriate for different needs

Because of the need for flexibility at this stage of the AV/CV technology development, the Policy Working Group discussed that standardization of testing criteria or controls may be premature. Instead, the Policy Working Group suggests that each testing or early implementation application have a test or application plan that outlines the time and location, any restrictions or conditions, risks and risk mitigation strategies, and acceptable criteria for completion of the test or application. The plan should be developed with the manufacturer, testing facility, and appropriate state/local agencies.

In addition to safety-related policy implications, AV/CV technologies may also affect traffic laws and their enforcement. For testing and early implementation, it will be important to carefully review traffic laws to ensure that any proposed testing or early implementation applications do not violate existing laws. For example, existing Florida law prohibits electronic displays visible to the driver except for GPS.

2.2. Financial Responsibility

As AV/CV technologies develop, it may be necessary to determine who has financial responsibility in the event of a collision or incident and to identify and review the potential implications on personal, commercial, manufacturer and service provider liability.

Currently, Florida law requires that a manufacturer provide proof of $5 million in insurance or as a bond prior to conducting testing of autonomous vehicles in Florida. The law defines autonomous vehicle very specifically and does not include levels of automation up to fully automated, nor does it include connected vehicle technologies. Although other motor vehicle insurance requirements apply, like
Personal Injury Protection and Liability Insurance, it is unknown whether the required coverage levels are sufficient.

Some potential approaches for ensuring appropriate financial responsibility during AV/CV testing and implementation include:

- Involving insurance industry representatives and regulators in planning, testing, and early implementation of AV/CV technologies
- Assess risk involved with the specific testing or early implementation application to determine potential liability
- Evaluate applicable existing insurance requirements above and beyond motor vehicle insurance to compare coverage to potential liability or risk
- Consider the implications on testing and early implementation applications if additional insurance is required, including cost-benefit and risk mitigation

AV/CV are designed to shift physical control of the motor vehicle from the person in the driver’s seat to the vehicle’s automated system. This may, in turn, imply a shift in responsibility for any damages resulting from system failure. Existing insurance practices to determine who owes a duty of care may no longer apply. These issues may be resolved in the court system as incidents occur and any necessary changes in insurance requirements are unknown until further research and data is available.

While it is believed that AV/CV technology may reduce the frequency of insurance claims if, as promised, AV/CV technologies prevent crashes, it could have the opposite effect on severity of claims. AV/CVs may be very expensive to repair or replace and, if AV/CV technologies fail at high rates of speed or at close following distance, injuries and other damages may be greater. Insurance underwriting practices may change, as variables that are currently used in rating personal auto insurance rates may not be as significant if the driver’s own skill and attention become less of a contributing factor.

The most important element in accurate pricing of an insurance product is the availability of relevant historical data. It would be appropriate to require a systematic collection of data concerning the crash history of test vehicles as well as any other indicators of failure in AV/CV technology. It is critical that the insurance industry be part of the AV/CV implementation discussions.

### 2.3. System Security & Reliability

Our society relies heavily on modern technology for communication, as well as for automation and improved efficiency of everyday tasks. Many of these new technologies provide real-time information and updates via communications networks. AV/CV technologies are no different, as they rely on wireless communications to send and receive data to other vehicles and infrastructure. The security and reliability of the transportation system is of extreme importance.

To ensure system security and reliability during testing and early implementation applications, it will be necessary to consider:

- The potential compatibility of technologies to ensure vehicles and infrastructure effectively work together, as applicable.
- Acceptable testing conditions, controls, and protocols in the event of a system failure.
- System redundancies and other types of risk mitigation to ensure safe operation in the event of a system failure. In some cases, the redundancy may be physical control by a human operator, whether in the vehicle or remotely.
Risks related to system hacking, cybersecurity, and system reliability are not exclusive to future AV/CV testing, early implementation and adoption, but rather exist today. Many vehicles currently in use or able for purchase include automated systems and computer chips that may be vulnerable to these risks. In fact, some vehicle manufacturers have reported such incidents. Continued research and development in this area is critical and will require strong partnerships with technology manufacturers.

2.4. Data Collection, Retention, and Usage
Due to privacy and data security concerns related to modern technology, the collection, retention, and usage of data will be an important issue related to AV/CV technologies. It may be necessary to identify and address concerns regarding what types of data to collect, how to collect it, by whom, and for what use. This includes public and private data collection, potential exemptions from public records laws, proprietary information, possible conflicting goals of public and private entities, and the public’s concerns about privacy.

Data collection and analysis is an important factor in determining the safety effects of AV/CV technologies, as well as other benefits like fuel efficiency and travel time reliability. For testing and early implementation applications, data requirements and performance measures must be considered as part of any pilot project plan. Data needs must be specified early, with consideration to how the data will be used and analyzed and by whom.

3. Cross-cutting AV/CV Issues

3.1. Local, State, & Federal Plans
Transportation plans at the local, state, and federal levels should incorporate policies and projects involving AV/CV and other emerging technologies. FDOT is currently updating the Florida Transportation Plan (FTP). The FTP is the single overarching long-term plan guiding Florida’s transportation future. It is a plan for all of Florida created by, and providing direction to, the FDOT and all organizations that are involved in planning and managing Florida’s transportation system, including statewide, regional, and local partners. The FTP Vision Element considers the vision for transportation in Florida out 50 years; the FTP Policy Element establishes goals, objectives, and supporting ideas for the 20-30 year time frame. For the first time ever, AV/CV and other emerging technologies are a key part of the FTP, with an emphasis on the importance of these technologies in changing how we move people and freight. The FTP Implementation Element, to be developed in 2016, will identify short-term (five year) actions and measures to help Florida achieve the goals of the FTP, including the use of AV/CV and other emerging technologies.

Additional considerations regarding how AV/CV is considered in local, state and federal transportation plans include:

- The authority of federal, state, and local entities
- Effects on travel behavior and developing tools, including models, to measure these impacts to support better planning decisions
- The authority to operate these vehicles on different facilities, including county roads and city streets
- Changes in infrastructure needs to support AV/CV/ITS and incorporating AV/CV/ITS technologies into project prioritization processes
- Changes in traffic flow patterns and customer travel preferences on design standards

As these technologies progress, it will be beneficial to see how other states consider them in their transportation planning efforts.
3.2. Adoption Issues

Similar to many new products, there may be some reluctance from the public to accept AV/CV technologies. Developing ways to educate the public on the potential traffic benefits related to these new technologies, such as increased fuel efficiency, traffic flow benefits, and reduced need for multiple vehicles per household, may be useful in promoting adoption of AV/CVs. It will be important to understand the willingness and ability of the public to invest in and adopt AV/CV technologies. Public outreach will play a large role in promoting the acceptance and adoption of the new technology, however, it should also be considered that 100 percent usage of AV/CV may not occur for many years.

Some portions of the traveling population may be more open to early adoption of AV/CV technologies than others. For example, international visitors flying into Florida may more quickly adopt automated transit, or transportation disadvantaged populations may happily embrace mobility solutions that allow them more flexibility and convenience than they have today. The Policy Working Group suggests targeting specific audiences and AV/CV applications that are ripe for early implementation.

3.3. Longer-Term Issues

Although the Policy Working Group’s discussions mainly focused on issues relevant to the testing and early implementation phases of AV/CV technologies, some longer-term issues that will require the consideration by policy-makers were identified. These issues arose during the working group discussions and were determined to have too many unknown factors at these early stages of testing and implementation to warrant further discussion.

One of these longer-term issues is related to the AV/CV policy implications on transportation funding and revenue sources. In the future, it may be necessary to identify and address potential implications of AV/CV technology implementation on current and future sources of funding to support state transportation infrastructure. For example, if AV/CV technologies reduce fuel consumption, whether directly through fuel efficiencies or alternative fuel uses or indirectly through changes in travel preferences, traditional fuel tax funding may be affected. If AV/CV technologies change vehicle ownership patterns, then vehicle registration fees may decline as well. A negative effect on transportation funding might be offset societally by savings in costs associated with traffic crashes or by efficiencies in the movement of freight. The funding topic is complex, with many unknowns.

Another longer-term issue is the impact that AV/CV technologies will have on long-term planning of transportation facilities. AV/CV technologies could create a paradigm shift in how we travel, affecting not only transportation planning but community and land use planning as well. For instance, if AV/CV technologies will improve traffic flows and potentially promote higher vehicle occupancies and/or mode shifts, what will be the impact on issues such as lane widths, the number of lanes required, posted speed limits. If AV/CV technologies support on-demand travel without single-car ownership, how will that affect community design and land use?

In the long-term, national coordination with and among vehicle manufacturers will be necessary and the development of national security standards will be important to support compatibility between systems and system reliability and security. It will be necessary to consider the impact of additional communication volume on existing bandwidth and to minimize the number of dead zones where connection to communications networks is unavailable or insufficient.
And, if AV/CV technologies prevent a significant portion of human judgement and error, how will this affect our existing traffic laws? Will some traffic laws no longer apply and will we need new laws to address behaviors or risks that are unknown today?


As AV/CV technologies will benefit Florida, it is important to review policy implications related to supporting and encouraging opportunities for testing and early implementation of new AV/CV technologies.

Policy implications may vary depending on application to testing or actual implementation of a system. With that in mind, the Policy Working Group developed a Testing and Early Implementation Framework Matrix. The purpose of the matrix is to provide a tool to evaluate policies that may affect a specific testing or early implementation application prior to investing in research, testing, or pilot projects. In some cases, existing policies may inhibit research, testing, or pilot activities or add cost, time, or risk. Knowing policy implications of a specific application prior to investment allows FDOT and its partners to head-off problems, mitigate risks, and understand both short-term and long-term policy issues.

The Policy Working Group used the matrix to evaluate policy implications for three sample testing and early implementation applications: truck platooning, autonomous last-mile transit, and work zone safety. The matrix focused the discussion on the specific application, allowing the group to set aside longer-term policy issues, recognize common themes, and identify methods to address or mitigate policy risks for each application.

This tool is most effectively used with input by appropriate stakeholders. As the AV/CV technologies may vary greatly, the make-up of stakeholders may also vary to ensure that the appropriate parties are represented in the identification of issues for each particular application. For example, if a particular project might have financial responsibility/insurance implications, representatives from the insurance industry and the state’s Office of Insurance Regulation are important contributors. If a project involves a transit application, then input from transit experts, both in operations and in regulations, is important. Recognizing the value of input from various stakeholders, the Policy Working Group suggests that FDOT establish a network of experts in a variety of fields to serve as advisors.

An important part of the matrix is the definition of assumptions and parameters for the specific testing or early implementation application. The assumptions and parameters create the scope, or boundary, of the project and help to contain the discussion of policy implications to those most pertinent to the application in question. It is also helpful to identify potential benefits of the application, so that stakeholders understand why this application is of value.

After assumptions and parameters have been clarified, the matrix is used to identify specific obstacles/challenges and potential ideas and approaches, based on the following policy areas:

- Financial responsibility/insurance
- Enforcement/laws
- Safety and Security
- Data collection and usage
- Other issues
This matrix is a helpful tool for evaluating implications for specific testing and early implementation applications. This tool can and should be used as we move forward in selecting pilot projects to ensure that we identify and address or mitigate issues early, before investments are made.

5. **Conclusion**

The Policy Working Group recommends:

1. The creation of a test or project plan for each testing and early implementation project to contractually outline conditions and restrictions specific to that application, considering things like:
   a. Testing duration, locations, times, conditions
   b. Testing protocols and criteria
   c. Testing and safety precautions and failsafe provisions
   d. Data collection, usage, accessibility, analysis, and performance measures, including crash and system failure data
   e. Compliance with traffic laws and insurance requirements
2. The selection of testing and early implementation projects that target audiences and AV/CV technologies that are ripe for early adoption.
3. The use of the Testing and Early Implementation Evaluation Matrix developed by the Policy Working Group as a tool to address relevant issues for each specific AV/CV pilot project prior to investment.
4. The establishment of a network of experts in a variety of fields like insurance, law enforcement, technology, driver licensing, motor vehicle regulation, trucking, transit, etc., to provide advice and input regarding policy implications of specific testing and early implementation applications.
5. The development of strong relationships with technology and vehicle manufacturers.
6. Incorporate AV/CV/ITS technology into project prioritization processes.
Appendix: Policy Working Group Testing and Early Implementation Framework Matrix
TESTING AND EARLY IMPLEMENTATION FRAMEWORK

EARLY IMPLEMENTATION EVALUATION: INSERT NAME OF TECHNOLOGY HERE

BENEFITS
Insert brief description of technology and list the benefits.

ASSUMPTIONS/PARAMETERS
For the discussion, and to have everyone on the same page related to who will be doing the testing and what requirements are necessary, several assumptions will be made for purposes of testing. These assumptions include:

- List all relevant assumptions and parameters here
  
  General description of how the system works
  
  Scope of application, including any exclusions, restrictions, or parameters
  
  Assumptions regarding conditions for the application – testing environment, duration, availability, etc.
<table>
<thead>
<tr>
<th>FAV Policy Area</th>
<th>Obstacles/Challenges</th>
<th>Potential Ideas/Approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Responsibility/Insurance</td>
<td>- What insurance requirements apply and are they sufficient?</td>
<td>- If possible, list potential ideas/approaches to address each obstacle/challenge here.</td>
</tr>
<tr>
<td></td>
<td>- Is it clear who is financially responsible for an incident involving injury/death</td>
<td></td>
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<tr>
<td></td>
<td>or property damage</td>
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<tr>
<td></td>
<td>- What is the potential liability to DOT and other entities involved?</td>
<td></td>
</tr>
<tr>
<td>Laws, Enforcement, and Perception</td>
<td>- Are there any traffic or other laws that create barriers?</td>
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<td></td>
<td>- What involvement is required from law enforcement?</td>
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<tr>
<td></td>
<td>- Are there any red flags with respect to public perception or support from law</td>
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<td></td>
<td>enforcement, policy makers, or special interests?</td>
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<tr>
<td>Safety and Security</td>
<td>- During testing, how do we ensure the safety of other road users? Are there system</td>
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<td>redundancies or failsafe procedures in place?</td>
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<td></td>
<td>- How will other drivers interact with these vehicles?</td>
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<td></td>
<td>- Where will testing occur and how can we mitigate safety concerns in different</td>
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<td></td>
<td>environments?</td>
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<td></td>
<td>- Will any driver or operator training be required? Or safety equipment?</td>
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<td></td>
<td>- How will safety incidents be reported and tracked?</td>
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<td></td>
<td>- What risks are there related to system reliability and availability?</td>
<td></td>
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<td></td>
<td>- Are there possible issues with system bandwidth or accessibility?</td>
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<tr>
<td>Data Collection/Usage</td>
<td>- What data or data analysis is needed to support the application?</td>
<td></td>
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<td></td>
<td>- Are systems collecting data that might be considered private or proprietary?</td>
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<td></td>
<td>If so, how is that handled?</td>
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<td></td>
<td>- Who will have access to data?</td>
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<td></td>
<td>- Who will collect, store, and analyze the data?</td>
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<td></td>
<td>- What will determine a successful test/application?</td>
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<tr>
<td>Other Issues</td>
<td>-</td>
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