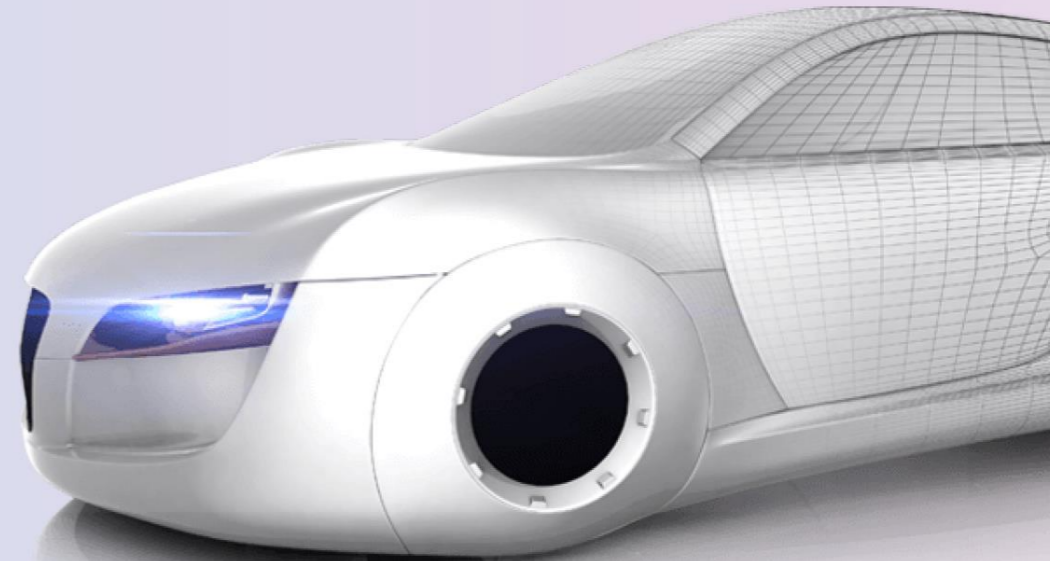DUBAI WORLD CONGRESS
FOR SELF-DRIVING TRANSPORT
OCT | 2019

Addressing Policy Issues Associated with Automated Driving Systems (ADS)

Steven E. Shladover, Sc.D.

University of California PATH Program

Automated Driving Systems (ADS)

- **Defined in SAE J3016:**
  - **The hardware and software that are collectively capable of performing the entire *dynamic driving task* on a *sustained* basis, regardless of whether it is limited to a specific *operational design domain (ODD)***

- **Representing SAE Level 3, 4 or 5 driving automation**
  - **Not normally requiring driver tactical or operational actions or supervision to maintain safety**

Policy Challenges for ADS

1. Marketing hype producing unrealistic expectations
2. Technology challenges not understandable by general public and policy makers
3. No recognized authority for trustable information
4. No technical standards for performance or scenarios
5. No agreement on "how safe is safe enough?"
6. Does not fit existing regulatory frameworks
7. Need for close public-private and infrastructure-vehicle cooperation
8. Combination of vehicle, information technology and roadway infrastructure industries
9. Diverse opinions about overall societal goals to serve

Marketing Hype Challenges

- **Competitive pressures motivate exaggerations**

- **Industry spokesmen (CEOs, government relations and marketing people) don't generally represent technological reality**

- **Media are motivated to amplify industry hype (more clicks!)**

- **Result: Majority of media reports on ADS (especially online) are false, or at best misleading**

Signs of progress…

- **The ratio of true to false stories is improving gradually**

- **More companies are learning to make more realistic claims**

- **Reporters are learning to become more skeptical of claims**

- **Industry has started to recognize risks of public backlash**

Understanding ADS Technologies

- **Complicated mixture of sensor, communication, control and software technologies operating in complicated environments**

- **Assessing risks requires understanding of probabilistic systems**

- **Very few technical people understand this, and fewer of them understand how to explain it to others**

Signs of progress…

- **Industry has started to recognize this problem**

- **Industry consortia have formed to develop realistic and understandable material to explain ADS technologies**

- **Public outreach and education has started in several countries**

Recognized Authority for Accurate Information

- **Difficult when expert knowledge is not generally respected**
- **Hard to identify unbiased expert sources that do not have proprietary interests creating conflicts of interest**
- **Government agencies often lack interest and capability to take on this traditional government responsibility**
- **Result: no authoritative source of trustable information**

Signs of progress….

- **Some ADS development industry groups are starting to recognize this is needed**
- **Insurance industry and consumer and traffic safety advocates are motivated to address this need**

Technical Standards - Performance and Scenarios

- No technical standards defined yet on ADS performance, safety
- No technical standards to define relevant hazard conditions or operating scenarios (especially "edge cases")
- Extensive technical effort and data needed as basis for standards
- Reaching industry consensus on standards is time consuming
- Standards are needed as technical foundation for regulations

Signs of progress…

- The need for standards is now widely recognized by industry and regulators
- Standards work has started at national and international levels

How safe is safe enough?

- **Bare minimum – at least as safe as driving today**

- **How much safer than that? (+10%? X2? X10? X100?)**

- **Existing traffic safety baseline (in developed countries) is already extremely high, but this is not well understood**

- **Not a technical question, but a societal consensus, across broad range of stakeholders**

- **Different countries will define different answers**

Signs of progress….

- **The need for this societal discussion is recognized by industry**

- **It should be coupled with public outreach and education**

- **Politicians are starting to recognize the need**

Regulatory Frameworks

- **Vehicle and information technology industries hate regulations**
- **Some major governments are reluctant to create regulations**
- **Existing regulatory frameworks assume driving behaviors are human, not technological**

Need…

- **Industry to recognize that regulations benefit them by:**
  - **Constraining "bad actors" from "race to the bottom"**
  - **Raising public confidence in ADS safety by keeping unsafe systems off the road and providing "seal of approval"**
- **Governments to recognize that not all ADS will be safe without regulations requiring minimum safe performance**

Public-Private, Infrastructure-Vehicle Coordination

- **ADS need to be treated as an integrated vehicle-infrastructure system, like railroads and air traffic, to reach similar safety levels**

- **Infrastructure functions complement vehicle functions**

- **This needs public-private cooperation, which is not well established in the road traffic world**

Signs of progress…

- **Mature ADS developers have learned how dependent they must be on infrastructure**

- **ADS are being designed for very limited ODDs, with geographic constraints, based on technological limitations**

Vehicle, infrastructure and IT industries

- **Radically different product lifetimes**
- **Radically different planning and decision horizons**
- **Radically different capital/operating cost models**
- **Different cultures of innovation and safety**
- **Lack of mutual understanding**
- **Need to develop ADS collaboratively**

Signs of progress…

- **Mature developers have learned they need each other**
- **Alliances are forming across these industries**

Broader Societal Goals to Serve

ADS can support different combinations of goals:

- **Enhancing transportation safety**

- **Reducing energy use and environmental impacts**

- **Increasing mobility/accessibility for disadvantaged travelers**

- **Making travel easier and less stressful for everybody**

- **Reducing traffic congestion and delays**

- **But there are essential trade-offs among these goals**

- **Different countries/cities will have different priorities**

Review of Current Status

- **Only modest progress to date on resolving ADS policy issues, mainly because ADS technology is still in its infancy and not well understood yet**

- **Rate of progress is increasing as a few ADS developers have gained maturity from at least a decade of work and can provide more realistic perspectives**

- **Policy development varying widely internationally**

    - **Slow and messy in democracies**

    - **Faster and more coherent (not necessarily better) in centralized authoritarian settings**