AUTONOMOUS VEHICLES
Implications for Planning

by Ryan Snyder
AUTONOMOUS VEHICLE FUTURE
Problems Solved or Auto-Dystopia
LEVELS OF AV TECHNOLOGY

LEVEL 1
vehicle assists with certain functions

LEVEL 0
human-driver does everything

LEVEL 2
vehicle does some driving, human monitors environment

LEVEL 3
vehicle drives/monitors, but human takes over when required

LEVEL 4
full self-driving automation only in certain environments

LEVEL 5
full self-driving automation all the time
STATE OF THE ART

In Autos

Most cars sold today have LEVEL 1 TECHNOLOGY

52% have at least forward crash alerts*

SINCE 1990s

27% of vehicles sold have automatic emergency braking*

September 2015

NHTSA and IIHS agreed with 10 auto manufacturers to make automatic emergency braking standard

Some cars now offer COMBINED AUTOMATION (lane assist, crash avoidance)

*Insurance Institute of Highway Safety (IIHS) (Status Report Vol. 50, No. 7, August 26, 2015.)
**STATE OF THE ART**

*Human Error Crashes*

- 93% of crashes are caused by **HUMAN ERROR**
- 1 fatality per **18.55 million** miles driven
- 1 injury crash per **637,000** miles driven

Google has had 1 crash per **125,000** miles driven; no report on injuries/fatalities; none the fault of the car.

STATE OF THE ART

Communications Technology

NHTSA is experimenting with Vehicle-to-Vehicle (V2V) technology

General Motors will have V2V technology on some cars by 2017*

US DOT is now testing Vehicle-to-Infrastructure (V2I) technology

WHEN?

2018
Commercial AV car service aiming for operation in Singapore*

2021
Uber plans to have fully autonomous ride hailing service*

2025
Continental Automated Systems projects producing cars with a high level of self-automation

22%-59% of vehicles on the road could be self-driven**

Uncertain, but within the foreseeable future

+ nuTonomy Blog, Sept 23, 2016
ECONOMICS

58 cents/mile to drive an average car*

= $725/month

With carsharing, roughly less than 72 hours/month better than owning ($10/hour)

Cost of transit bus drivers 54% of operating costs**

At some point is it cheaper to take “driverless Uber pool” than to own.

Then why own a car?

*“Your Driving Costs 2015”, American Automobile Association
POTENTIAL BENEFITS

User Conveniences

- Mobility for those who don’t drive
- Better use of time
- Less stress
- Deliveries
- Select an appropriate vehicle for the trip
POTENTIAL BENEFITS

Safety

- Fewer crashes
- Already likely receiving benefits
- Will improve conditions for walking and bicycling
TECHNOLOGICAL CAPABILITIES

Increased Capacity
POTENTIAL BENEFITS

Capacity & better use of streets

- Roughly double
- Less congestion
- More opportunities for road diets
POTENTIAL BENEFITS

Capacity & better use of streets
TECHNOLOGICAL CAPABILITIES
Repurposing Space in Our Streets
TECHNOLOGICAL CAPABILITIES

Optimized Traffic Flow
TECHNOLOGICAL CAPABILITIES

Lane Clearance for Priority Vehicles
TRANSIT BENEFITS

- Feeder Service
- Increased service
- Faster service
- New viable ridesharing services
- Possibility of high-speed buses
FEEDER SERVICE TO TRANSIT

Ridesharing
GREATER USE OF MICRO TRANSIT

Source: www.gizmodo.com
VEHICLE SCALED TO APPROPRIATE SIZE
TECHNOLOGICAL CAPABILITIES

High-Speed Buses
TECHNOLOGICAL CAPABILITIES

Long distance high-speed bus
TECHNOLOGICAL POSSIBILITIES
Enhanced detection of pedestrians and bicycles
GREATER USE OF ELECTRIC VEHICLES

Source: www.all-electric-vehicles.com
POSSIBLE GHG REDUCTIONS
from Autonomous Vehicles

- Through safety, more walking and greater use of bicycles
- Through more efficient use of streets, more walking and greater use of bicycles
- More buses of various sizes
- Faster buses
- Electric vehicles
- Vehicle scaled to appropriate size
POTENTIAL BENEFITS

FASTER Emergency ACCESS

Less congestion to drive in

With lane clearance, emergency vehicles could have priority
POTENTIAL DRAWBACKS

Job Loss

- Likely the biggest problem from AVs
- Bus, taxi, truck, delivery driver jobs
- Some other auto industry jobs
- Need retraining programs to emerging technologies
POTENTIAL DRAWBACKS

Encouraging driving and longer commutes

- Better use of time not driving
- No stress
- Reduces “cost” of driving
- Enact policies to encourage efficient travel
POLITICS OF ALGORITHMS

Determining Priority

- Private companies might start lobbying for control
- Prioritize multi-occupant vehicles over single-occupant cars
- Ped/Bike priorities
- System needs to reflect good policy over politics
POLICIES

- Decide where AVs can operate during transition
- Equipment requirements
- Revisit the issue of a requirement for the driver
- Research & Development
POLICIES

- Pricing strategies
- Give time advantages
- Liability issues
- MUTCD issues
- Parking codes
CONCLUSIONS

AVs offer many potential benefits

Policy can and should speed AV

Policy should ensure beneficial outcomes

We should change assumption in today’s decisions