Road Traffic of the Future: Challenges and Perspectives in the Cities

Driver Assistance Technologies & Automation in the Context of City Planning & Policy: Near & Longer Term Considerations

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Question: To what extent will the continued introduction of advanced driver assistance systems (ADAS) and highly automated vehicle (AV) technologies have transformative impacts on road traffic and urban design? What will city traffic look like in the coming decades?

Corollary: To the extent that these technologies can have an impact, what potential policy directions should be considered to maximize positive outcomes and minimize negative ones?

Some High Level Perspectives:

- It will take longer than many have predicted for fully automated road vehicles to have a significant impact

- However, some steps to support AVs are relevant for improving human driven ride-hailing services (taxis, "ubers") now

- ADAS technologies have the potential for meaningful positive impacts on traffic flow, environmental concerns & safety now, but caution is also in order

- The long term significance of AVs is best considered as a component of an integrated transportation network

What does the near-future city look like?
(Image – Place Design Group)

Some Potential Benefits of AVs

Many benefits of AVs have been proposed - thoughtful evaluation is warranted.

- Automated driving technologies that control the speed and spacing of vehicles are expected to reduce energy waste (decreasing pollution) and improve traffic flow (decreasing congestion)

- Availability of robotaxies may increase the willingness of some individuals to take AVs or mass transit to urban centers

- AVs are expected to reduce the need for urban parking space

  - Free-up on-street space for pedestrians, cyclists, outdoor dinning & recreation

  - Free-up parking lot and garage space for housing, offices, businesses, recreational space

- Afford safety benefits by reducing human error & inattentiveness (and adding vehicle to vehicle communication)

- Expand mobility options for people who are unable or reluctant to drive (increased equity)

- Improve freight delivery between cities

Thoughtful evaluation is warranted

Barriers, Limitations & Cautions

While there are many potential benefits to ADAS and highly automated vehicles, they need to be kept in perspective.

- Large scale deployment of fully automated road vehicles will take longer than many had predicted
    - Technical challenges
    - Business cases continue to be reassessed

- Interconnected intelligent transport systems (including V-V and V-infrastructure) have been discussed for years, but deployment is limited

- Consumer hesitancy around purchasing and/or riding in AVs

- Similarly, some users of vehicles with ADAS technologies may be hesitant to engage them – thus not realizing potential safety and efficiency benefits

- Some potential benefits of current and soon to be introduced ADAS technologies may be partially off-set by mode-confusion, misunderstanding of system capabilities and limitations, and increased inattentiveness

- Potential for ADAS and AV system failures and hacking interference

An automated future is coming soon - 1956

ITS technology has yet to emerge in a significant way – why? (Image – Getty)

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Are there Actions that Can Support Success? - Yes

- Improved public education around current and soon to be introduced ADAS technologies' capabilities and limitations can enhance appropriate use and benefit realization

  - This is relevant across the road traffic spectrum

  - Address issues of deceptive technology naming & marketing (?)

- Invest in designated Pick-up and Drop-off spaces for ride-hailing vehicles (both human driven & AV) to replace a portion of the space currently devoted to street parking

  - Thoughtful positioning could enable a tailored augmentation of existing urban mass transportation infrastructure

  - Offers benefits now - as well as for the future

  - Consideration should be given to accessibility and location - e.g., access for those with low mobility (curb height, etc.), low vision (labeling), etc.

- Improve / standardize construction zone demarcation

  - In some localities, construction zones are marked inconsistently, likely due to a low level of rules and vague contract language

  - Construction zone uniformity would reduce AV perception system confusion and thus reduce passenger delays

Expand & improve designated Pick-up & Drop-off areas

Construction zone signage

Other Points for Discussion & Consideration

- AVs are likely to be equipped with robust pedestrian detection (PD) systems - should municipalities consider phasing-in requirements for human driven ride-hailing vehicles (taxies, "ubers") to have PD, AEB, etc. to take advantage of these technologies sooner?

- The long term significance of higher levels of automation and AVs is best considered in the context of an integrated transportation network

- Their potential should not take-away focus from maintaining & improving other components of the urban transportation system (e.g., mass transit, pedestrian & cyclist protection infrastructure, etc.)

Pedestrian, Cyclist, and Other Safety Detections Systems. (Alamy Stock Photo)

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High Level Perspectives to Keep in Mind:

- It will take longer than many have predicted for fully automated road vehicles to have a significant impact

- However, some steps to support AVs are relevant for improving human driven ride-hailing services (taxis, "ubers") now

- ADAS technologies have the potential for meaningful positive impacts on traffic flow, environmental concerns & safety now, but caution is also in order

- The long term significance of AVs is best considered as a component of an integrated transportation network

What does the near-future city look like?
(Image – Place Design Group)
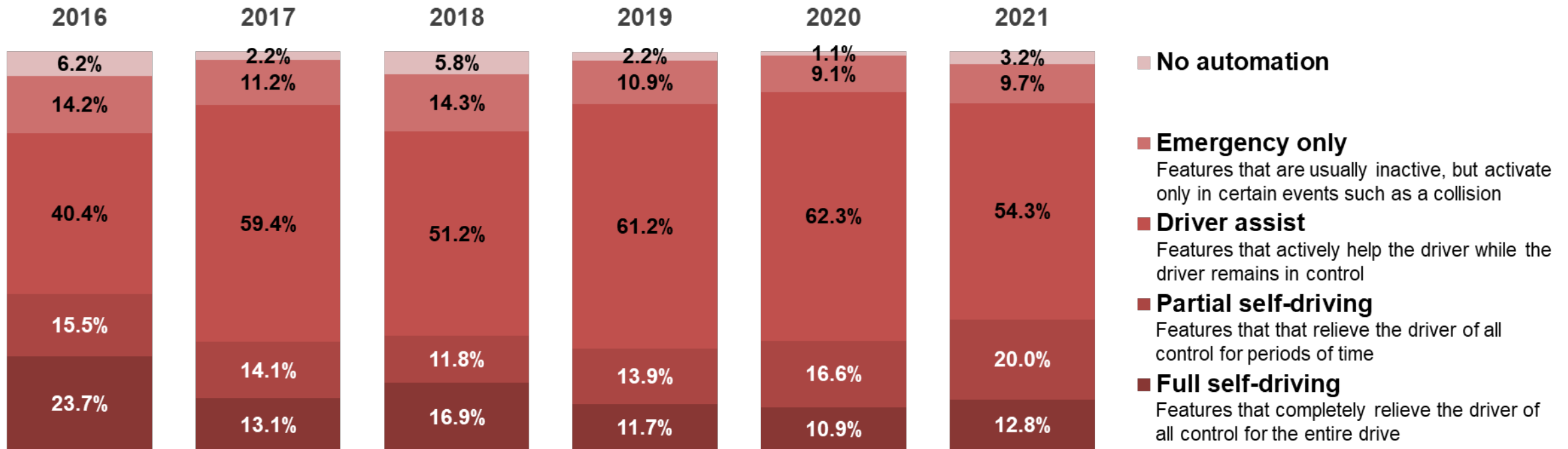
Appendix A: Selected References

The following is a sampling of research relevant to topics raised in this presentation. The positions and interpretations in some do not necessarily agree with points suggested in this presentation. Many highly relevant papers are likely not included in this brief selection.

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Appendix B: Consumer Acceptance of Automation

Patterns over time in the maximum level of automation with which consumers reported feeling comfortable

For Follow-up:

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