Human Factors Notes

Bryant Walker Smith

Associate Professor
University of South Carolina School of Law
and (by courtesy) School of Engineering

Affiliate Scholar
Center for Internet and Society at Stanford Law School

Codirector
Program on Law and Mobility at University of Michigan Law School

Note: These slides are formatted for integration with a webcam in a virtual presentation.

law of the newly possible
newlypossible.org

Questions for Prof Martens

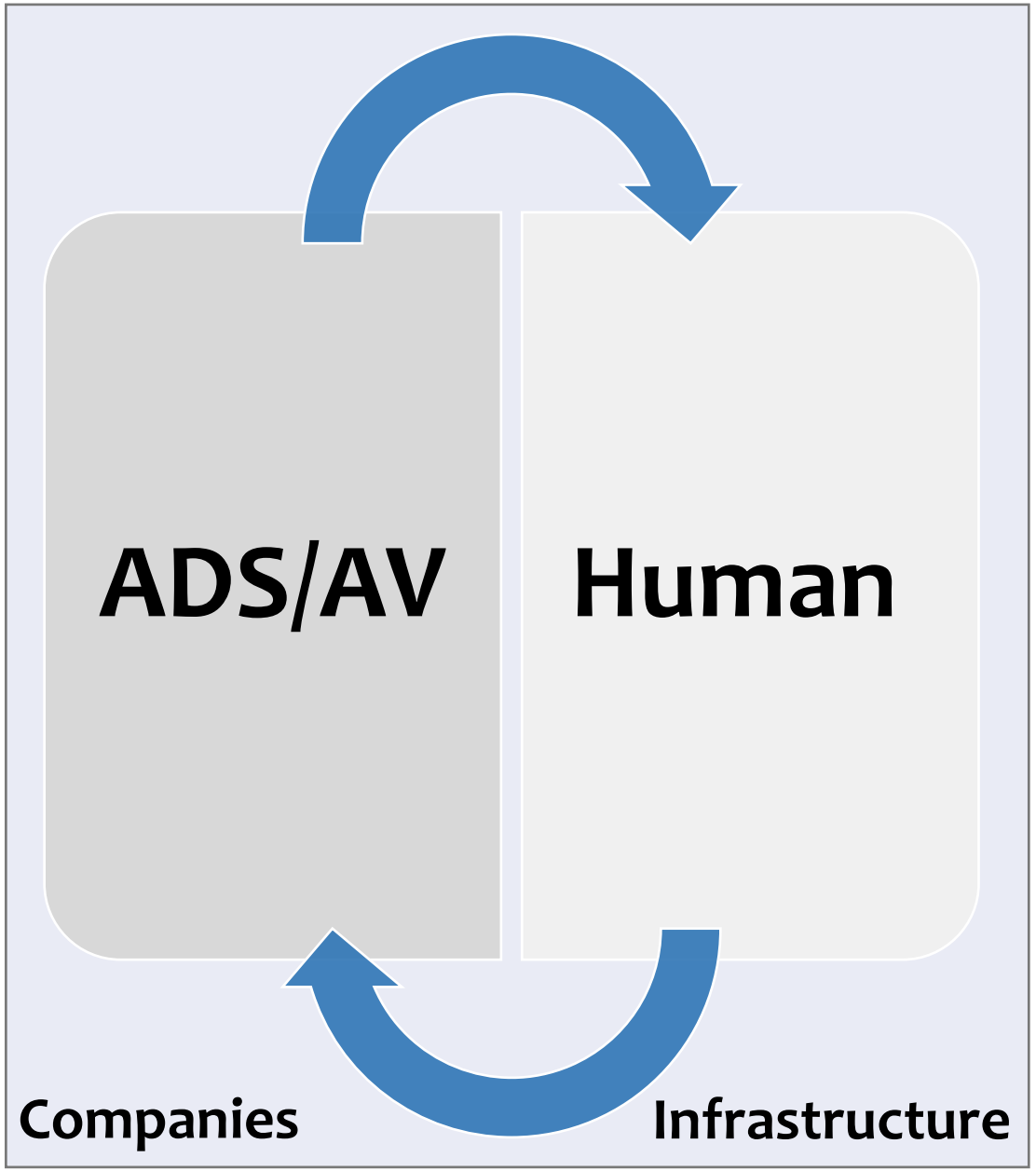
- Could convenience technologies encourage the adoption of safety technologies? How should regulators approach this relationship?
- What is the scope of human factors? Is everything human factors?

Questions for Prof De Sio

- Might a search for human responsibility shift that responsibility to obvious humans like pedestrians or vehicle occupants rather than more instrumental humans like engineers and managers?
- The term “meaningful human control” comes from the realm of lethal autonomous weapons. Are there risks to borrowing languages and concepts from this very different domain?

Human factors
/
Human-machine interaction
/
Ergonomics
/
Human-centered design

Safe systems approach


ADS/AV
Human
Companies
Infrastructure

Near-term dynamics

Old norms

Discomfort

New gaming

Long-term dynamics

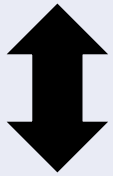
New norms?

Comfort?

Continued gaming?

Signal (outgoing)

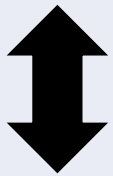
Direct: *Display turn signal*



Indirect: *Turn vehicle*

Receive (incoming)

Direct: *Perceive turn signal*



Indirect: *Perceive turning*

Design of ADS/AV

Behavior of ADS/AV

- toward ADS/AV human users
- toward other humans

Behavior of humans

- ADS/AV human users
- other humans

Education of humans

IV

Police officer
Firefighter
Rescuer
Tow operator

I

Remote monitor
Remote assistant
Remote dispatcher
Remote driver

III

Motorist
Transit operator
Emergency operator
Vulnerable road user
Road worker
Traffic controller

II

Driver
Fallback-ready user
User-in-charge
Occupant
Remote user

Humans won’t drive AVs

Computers won’t drive AVs

Companies will drive AVs

… by acting through their human and machine agents

Where should the Global Forum…

… disseminate

… decide

… defer

… dialogue

?

1. From Driverless Dilemmas to More Practical Commonsense Tests for Automated Vehicles, Proceedings of the National Academy of Sciences (PNAS) (March 16, 2021) (with Julian De Freitas, Andrea Censi, Luigi Di Lillo, Sam E. Anthony, and Emilio Frazzoli). This article sketches a pragmatic framework for testing driving common sense as part of AV testing.

2. How Reporters Can Evaluate Automated Driving Announcements, 2020 Journal of Law and Mobility 1 (2020). This article identifies a series of specific questions that reporters can ask about claims made by developers of automated motor vehicles. Its immediate intent is to facilitate more critical, credible, and ultimately constructive reporting on progress toward automated driving. In turn, reporting of this kind advances three additional goals. First, it encourages AV developers to qualify and support their public claims. Second, it appropriately manages public expectations about these vehicles. Third, it fosters more technical accuracy and technological circumspection in legal and policy scholarship.

3. Ethics of Artificial Intelligence in Transport, in The Oxford Handbook of Ethics of Artificial Intelligence (2020). This chapter uses the example of automated driving to highlight key ethical issues in the use of artificial intelligence in transport. These include the tension between technological solutions and policy solutions; the consequences of safety expectations; the complex choice between human authority and computer authority; and power dynamics among individuals, governments, and companies. The chapter begins with the foundational relationship between ethics and transport more generally and concludes with a focus on the trustworthiness of the companies developing and deploying automated motor vehicles (referred to colloquially as autonomous or driverless cars) and other advanced technologies.

10. Controlling Humans and Machines, 30 Temple Int'l. & Comp. L.J. 167 (2016). This article considers the "meaningful human control" of lethal weapons. However, unlike others on this topic, this article does not focus on the role that a human should play in an otherwise automated weapon system. Rather, it reverses these human and machine roles to consider automated systems that limit human-initiated lethal force. After discussing the concept of control generally, this piece argues, first, that a bias toward human authority could impede eventual restrictions on that authority and, second, that the line between automated systems that initiate lethal force and automated systems that restrict that force is potentially unclear.

14. Lawyers and Engineers Should Speak the Same Robot Language (book chapter), in Robot Law (2015); see also the freely available draft or poster. Engineering and law have much in common. Both require careful assessment of system boundaries to compare costs with benefits and to identify causal relationships. Both engage similar concepts and similar terms, although some of these are the monoglot equivalent of a false friend. Both are ultimately concerned with the actual use of the products that they create or regulate. And both recognize that the use depends in large part on the human user. This book chapter emphasizes the importance of these four concepts -- systems, language, use, and users -- to the development and regulation of robots. Although the chapter applies broadly to robotics, motor vehicle automation provides the primary example.

law of the newly possible

newlypossible.org