Chassis Plans Leadership in Engineering Scholarship
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Prompt: What do you see as the future of transportation and why?

Down the Road: The Future of Transportation

The future of transportation varies with each road, city, state and country. Unique historical, physical, environmental, and cultural influences translate to individualized solutions. While transportation will transform differently from one place to another, several emerging trends will shift transportation everywhere toward more efficient, sustainable, and Jetson-esque communities. These changes can be largely attributed to the Millennial generation, whose perspectives on technology, sustainability, and quality of life are revolutionary to the transportation field.

One of the most prevalent shifts can be seen in the decline of personal and single-occupancy vehicles. The State Smart Transportation Initiative released FHWA and Census Bureau data illustrating how vehicle miles traveled (VMT) per capita has been declining since 2004, returning to levels last seen in 1996. While many will suggest a correlation to the economic recession, the VMT per capita in recent years has no clear connection to gas prices or economic trends. Meanwhile, the total VMT also declined during the recession and hasn't rebounded at the expected rate (McCahill).

What's causing these changes? An aging Baby Boomer generation causes a slight decline in trips. However, the main cause of the decline can be found in the Millennials. Young people aren't producing trips at the same rate as their predecessors. In 1978, 75% of 17-year-old Americans had their driver's license, compared to just 48% in 2008 (Varga). Driving is no longer a high priority. Neither is purchasing a car, with a 30% decline from 2007 to 2011 alone (Ross).

Why not drive? Although the downward trend is often linked to the recession, the younger generation's VMT per capita has been decreasing since 2001, with a 23% drop from 2001 to 2009 (Baxandall, Davis, & Dutzik). In 2012, American households spent about 16% of their income on transportation, or about $9,000 a year. The car itself, regular maintenance, gas, insurance, and licensure have all deterred vehicle ownership. Transportation costs are drastically lower for those who don't own a personal vehicle (Wesley). Millennials fresh out of school with student debt and limited job options were hit hardest during the recession, and owning a personal vehicle was simply not feasible.

It's not just the finances. Some professionals note the presence of the "backseat effect", where the up-and-coming generation witnessed frustrated parents and were exposed to the stress of traffic at a young age. While their parents' generation found freedom in wheels, Millennials find confinement (Ross). With a slight tinge of rebellion, Millennials refuse to be stuck in the gridlock older generations had grown accustomed to.

If they're not driving, then what are they doing? Amidst a sweep of urban renewal, younger generations are flocking to city lifestyles-an epicenter of sustainable transportation

opportunities. In many cities, it's faster and easier to take alternative modes over gridlock and parking fiascos. Transit, bicycle, and pedestrian modes have all seen overall and per-capita increases in recent years. In addition to a lower price tag, these modes are also linked to better physical and mental health.

Pedestrians and bicyclists enjoy a connection with nature, social interaction, physical activity, and a sense of place. In the US, walking trips saw a 16% increase and biking saw a 24% increase from 2001 to 2009 (Baxandall, Davis, & Dutzik). Other developed countries have witnessed similar decreases in driving and increases in walking and biking. The trendy aspect of sustainability can be seen in developing countries as well. As a tourism attraction, the Philippines began replacing about 3.5 million rental mopeds and motorcycles with bikes in 2012. The business model thrived with both locals and tourists (Hering). Despite varying levels of development, walking and biking gains popularity across the board.

Transit also experienced great growth for younger populations, with a 40% increase from 2001 to 2009. Of the ten billion passenger miles traveled with transit in this range, 60% were comprised of 16-year-old to 34-year-olds (Baxandall, Davis, & Dutzik). Transit's increase can be attributed to a boost in life satisfaction, with users gaining social interaction not found in single occupancy vehicles. Additionally, transit users can utilize travel time to keep up with work, to read, or to play games.

How are they doing all of this? This working, reading, and game-playing is all made possible by the lifeblood of many Millennials: the smart phone. Smart phones play a key role in this transportation shift. A speaker at a recent ITE meeting joked that "if you want to make something popular, take something old and put a smart phone with it". Hitchhiking? Add smart phone, get ridesharing apps such as Uber or Lyft. Bicycling? Add smart phone, get bike sharing programs that ensure operational and available bikes. Buses? Add smart phone, get higher usage and passenger satisfaction with up-to-date transit routing and schedule information. The increase in data availability has been a driving factor in less driving.

What does this mean for the future of cars? Automobiles won't disappear from our lives, but their presence and role will shift. The US saw a 300% increase in electric vehicles sales in 2013, compared to the year before (Hering). But a more efficient car isn't the only thing hitting the market; automated and connected vehicles are rapidly gaining momentum. The idea has been prevalent since computer technology surged, and became well-known news with Google's entire automated fleet.

Automated and connected vehicles present major benefits, including increased safety and efficiency. Their systems are capable of gauging the location, speed, and direction of other vehicles, bicyclists, pedestrians, and animals. Consider the reaction time of a driver, who's either tired, distracted, or drunk. Their safety or the safety of those around them is highly compromised. Now consider the reaction time of an ideal driver. Consider how fast the letters appear on a screen after entering a key-stroke. Even an ideal driver's reaction time is vastly slower than a computer's.

With that safety and reliability comes room for increased efficiency. If a car can connect and exchange information with nearby vehicles, they could presumably drive within inches of

each other-thereby vastly increasing our existing infrastructure's capacity. Adding more lanes to the current system isn't plausible, and although one can encourage alternative modes, not everyone will be on board due to weather, accessibility, or personal space. Not only can the vehicles gain information from each other, but from infrastructure too. From knowing when the light will turn red to finding a parking space for you, connected vehicles bring a broad range of benefits to consumers and alter transportation as we know it.

From the decrease in personal vehicle trips to the increase of alternative modes to the horizon of connected and automated vehicles, Millennials are a driving force in the transportation future.