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Presentation Title: Measuring What Matters in Transportation at a Human Scale: A Discussion Paper on New Metrics to Help Guide the Future of Automated, Connected, Efficient, and Shared (ACES) Mobility

Abstract: Transportation is in a period of rapid technological transformation, with evolutions to new choices that will likely be characterized by increasingly automated, connected, efficient, and shared (ACES) mobility services. These options promise greater energy efficiency, affordability, accessibility, and the potential for improved human movements and quality of life. However, these desired benefits may not be realized if the management of our surface transportation systems continues to focus on investments in the movement of vehicles rather than the movement of people across all modes. It is important, therefore, to examine the impacts of improving vehicle occupancy on system efficiency, both by increasing the number of passengers per vehicle-trip and by enabling multimodal trips involving higher-occupancy modes. This paper aims to identify what we should be measuring along with key related questions about the impact of ACES technologies on a number of important factors including vehicle miles traveled (VMT), person miles traveled (PMT), congestion, land use, public health, quality of life, and energy intensity of the transportation system. The U.S. Department of Energy (DOE) and U.S. Department of Transportation (USDOT) have identified a need for new integrated metrics, using human-centered approaches. This paper aims to frame the discussion about defining and measuring occupancy, asset utilization, efficiency, and productivity to work towards that goal. The key measures and multiple human behavioral factors that influence them described in this paper, will play an essential role in fully understanding (and managing) impacts of new ACES technologies and help to articulate the advantages of different modes that require less energy and space than single-occupant automobiles. It also lays the groundwork for exploring the implications of these metrics for better analysis of mobility systems and ultimately for improving system management by optimizing the movement of people and goods.