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The evolution from traditional traffic simulation to Mobility Digital Twins (MDTs) marks a significant leap in the design and management of urban transportation systems. This talk examines critical issues from the perspective of real users, including accessibility, system reliability, and adaptability to changing mobility demands. From the simulation modeling perspective, challenges such as scalability, real-time data integration, and validation are explored, highlighting the need for transitioning to MDTs.

MDTs represent a dynamic framework for simulating, analyzing, and managing mobility systems in real time, acting as an advanced decision-making tool. This paper introduces NextSIM, a pioneering Mobility Digital Twin project in Korea, which integrates hybrid simulation engines, AI-driven urban and traffic management tools, and real-time data inputs to optimize urban planning and transportation networks.

The architecture of NextSIM is discussed, emphasizing its ability to combine micro, meso, and macro simulation scales for seamless data flow and decision support. Its AI-powered tools enhance capabilities in traffic management, safety analysis, and demand forecasting, while its planning support system addresses long-term urban growth scenarios.

This talk outlines the transformative potential of Mobility Digital Twins as decision-making systems, offering real-time insights and actionable strategies for creating efficient, sustainable, and user-centric mobility ecosystems. By bridging simulation modeling with digital twin technologies, NextSIM exemplifies a comprehensive solution to modern urban mobility challenges, supporting both operational management and strategic urban planning.