A Framework for Integrating Transportation into Smart Cities

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In recent years, economic, environmental, and political forces have quickly given rise to "Smart Cities" — an array of strategies that can transform transportation in cities. This research provides a smart cities framework that can be employed to: 1) understand what a smart city is and how to replicate smart city successes; 2) the role of pilot projects, metrics, and evaluations to test, implement, and replicate strategies; and 3) understand the role of shared micromobility, big data, and other key issues impacting communities.

Study Methods

This study examined smart cities by employing a multi-method approach to research and develop a framework for smart cities. This approach employed five key methods: (1) a literature review of North American and international literature on smart city strategies; (2) expert interviews representing community stakeholder engagement processes and stakeholder organizations engaged in smart city policymaking; (3) development of a smart city framework based on first-hand experience with the U.S. Department of Transportation's Smart City Challenge and collaboration with the Smart City Lab and the Texas Innovation Alliance; and (4) two deep-dive assessments of issues confronting smart cities, including the role of big data and shared micromobility.

Findings

Smart City Domains and the Pyramid of Innovation: A smart city represents an ecosystem of domains, pilots, innovations, and stakeholders working together at different city scales, from neighborhoods to regional levels. Cities are developing pilot projects and initiatives across seven smart city domains: (1) smart energy and environment; (2) smart transportation; (3) smart governance; (4) smart workforce; (5) smart living; (6) smart economy; and (7) smart connections. Fundamentally, smart cities are about progressively advancing innovation and collaboration.

A Planning, Pilot Implementation, and Evaluation Framework for Smart Cities: Communities can employ a three-phase smart city framework to better understand community concerns, identify potential strategies, create institutional capabilities for collaboration, implement pilot projects, and evaluate outcomes. Phase 1 is comprised of an initial assessment based on expert interviews and city demographics, design-thinking workshops, and problem statement development to better understand community concerns. Phase 2 includes a refinement and prioritization process, while making use of communities of practice to collaboratively advance institutional capabilities. Phase 3 is focused on pilot implementation and evaluation.

A Typology of Smart Cities: Communities pursuing smart city initiatives can be mapped across four different categories, reflecting a range of problems and strategies to facilitate innovation. The four categories of smart cities are:
- Technology-oriented communities and regions driven by technological innovation, often trying to address related challenges, such as housing affordability and cost of living issues;
- Economic revival cities and regions reinventing their economies for post-industrial economic development;
- Growth cities and regions that are expanding economically and spatially, typically with fewer challenges associated with housing affordability and cost of living; and
- Small and rural communities investing in placemaking and workforce development to retain talent.

Smart cities can be described as a "pyramid of innovation" that starts with the individual innovator and becomes progressively more advanced, culminating in increased regional innovation and multi-stakeholder collaboration.

Policy Recommendations

This research highlights three recommendations for policy and professional practice:

• The term "smart cities" implies that it is focused on individual cities themselves, but this study revealed that the success of smart city initiatives depends on how jurisdictions and public agencies engage with the region in developing and implementing strategies. Challenges that are often thought to be typical of the urban environment are being pushed out to suburban and rural communities. For example, affordability and displacement in some communities is forcing the poor to the suburbs where there is also a need for smart city approaches.

• Implementation of smart city initiatives often varies by organizational structure; leadership; and champions (e.g., mayors, city managers, department directors, etc.). In all cases, smart cities require multi-directional leadership vertically through an organization and laterally across agencies and stakeholder groups. This requires executive-level champions of innovation and staff that are empowered to support and carry initiatives forward. Additionally, distributed leadership across organizations is required to foster partnerships, break-down jurisdictional silos, and ensure smart city initiatives endure beyond personnel changes.

• There is an increasing concern that technology-enabled strategies may be leaving the unbanked (those without access to a bank or credit card), underserved, and digitally impoverished (those without access to a smartphone or the Internet) communities behind. There is also worry that these strategies may not be equitably serving all neighborhoods, economic strata, people with disabilities, and other groups. Finally, machine learning/artificial intelligence could be learning/replicating inequities in society and repeating historic biases and injustice. There is a need to ensure that smart city strategies are accessible to everyone. The public sector has many roles in ensuring equitable cities, including acting as a facilitator, funder, regulator, and evaluator of smart city initiatives. For example, this can include facilitating partnerships, providing subsidies and grants, and developing proactive legislation and regulations to guide smart city initiatives toward equitable outcomes.

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For more details about the study, download the full report at transweb.sjsu.edu/project/1705.

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