**Smart City**

“A city that uses information and communications technology (ICT) to enhance its livability, workability, and sustainability.”

*The Smart Cities Council*
Digging a Bit Deeper – From “Smart” to “Connected”

- All critical city systems—transportation, energy, public services, public safety, health care, telecommunications are capable of communicating with each other to allow coordination and improve efficiency. They are capable of generating, transmitting and processing data about a wide variety of related activities within the city.

- If a “smart city” is a system of systems that use ICT to communicate with and leverage each other to improve vital city operations,

- Then the ITS JPO’s Connected Cities Research Program is designed to examine the opportunities created where these systems interface with transport and mobility.

In other words, where connected city, the connected citizen and the connected vehicle meet and interact.

The Connected Cities Research Program seeks to maximize and leverage the benefits of connected transportation by integrating those transport services, vehicles and related technologies and data with other data enabled innovations in a city.
“Transportation is critical to making a city work – in commuting to work, education, entertainment, as well as shipping and receiving products.”

Example Components of a Connected City

- **Energy**
  - Sensors on trash cans informing public services when they need to be picked up – reducing unnecessary fleet travel

- **Public Services – Trash, Recycling, Water, and Waste Water**
  - Applications that support connectivity between Electric Vehicles and the Smart Grid or smart street lights triggered when vehicles are nearby

- **Public Safety**
  - Incident Management Applications that reduce response times for first responders

- **Transportation**
  - Smart payment applications for parking, transit, and other services

- **Health and Human Services**
  - Applications to support healthier lifestyles (e.g., biking) and reduced emissions resulting in healthier people – or getting people to health care

- **Telecommunications**
  - Communications to support ITS and connected vehicle applications

Source: USDOT
What Makes a Connected City: Infrastructure

Connected Vehicles
Connected vehicles and travelers send and receive information about their movements in the network – offering cities unprecedented opportunities to provide more responsive and efficient mobility solutions in real-time and long term.

Sensor-Based Cities (IoT)
Connected cities contain and use a collective “intelligent infrastructure” that can sense what’s around and/or sense their own status. These data allow city operators to know how the city is operating and how its performance can be enhanced using real-time information to monitor performance and trends of the city – transportation is part of that. A connected vehicle is another sensor.

Low-Cost ICT/Efficient ICT
ICT infrastructure, technologies and services are a critical part of a connected city; success depends upon affordable ICT, from both a public and personal perspective, and data efficiency (data use/reuse, open data, big data).

Smart Grid
A connected city supports programmable and efficient energy transmission and distribution system (with supporting telecommunication and computing sub-networks) that responds to dynamic demands and is resilient and closely integrated with electric vehicles. ITS is also grid-dependent.
What Makes a Connected City: Data

Data Management and Urban Analytics
In a data-rich environment, cities are increasingly able to deploy (previously unavailable, and now open) datasets to address complex urban problems – connected vehicles and connected travelers are one source of data.

Data Policy
Innovative policies which enable large scale implementation and roll out of city service strategies. Defined roles and responsibilities of the involved entities, governance, authority, compliance, enforcement and institutional approaches to efficient data sharing and quality assurance. Policies must increase interoperability and remove barriers and failures in data sharing.

Data Standards Architectures, Interoperability, Security
The ICT in a connected city, including telecommunications and computing, need to be resilient, secure and respect privacy; it would also support standards harmonization, common technology architectures and integrative policies so that if one part of the system fails or is compromised, the entire system does not collapse, and the gap in service is bridged effectively and restored quickly.
What Makes a Connected City: People

Connected, Involved Citizens
Connected cities use new analytical processes and applications that are facilitated by ICT advances and that engage the connected citizen, allowing and encouraging fully informed choices – particularly with respect to personal mobility – and both generating and sharing information in new and useful ways.

User-Focused Mobility/Service Choice
Connected cities support sustainable mobility including traveler-oriented strategies that deliver innovative solutions across all transportation modes including transit, bicycling, electric vehicles, and shared mobility services. Connected vehicle technologies are likely to foster further innovation in these areas, particularly with respect to automation. Also includes freight and related services.

New Business Models and Partnering Opportunities Exist
Both the public and private sectors are pushing innovation, creating new opportunities and models for governance and interagency partnerships.

Safety
Safety benefits of many kinds can accrue to a connected city that didn’t exist before, including vastly improved safety for drivers, pedestrians, bicyclists, motorcyclists, and ordinary citizens as they move through the city daily.
Recent Publications and Webinars

- **White Paper**: *The Smart/Connected City and Its Implications for Connected Transportation*

- **Stakeholder Webinar**: *Creating Smart Paths for Connected Cities: Introducing a New Connected Cities Research Program* – February 26, 2015
  - Solicit stakeholder input on the Connected Cities Research Program and begin a discussion on the initial vision for the program, initial research questions, and strategies to address these research questions.
The ITS JPO Connected Cities Program
Connected Cities: “Working” Vision

Incorporate and expand connected transportation to ensure that connected transportation data, technologies and applications – as well as connected travelers – are fully integrated with other systems across a city, and fulfill their potential to improve safety, mobility and environmental outcomes in a complexly interdependent and multimodal world that supports a more sustainable relationship between transport and the city.

Source: USDOT
Some Questions That Focused Our Thinking

- **Overarching Issues**
  - What are some **critical issues and challenges facing today’s cities**? How can connected vehicle technologies, data and/or applications help address these issues?
  - How will the integrated and connected nature of today’s cities be of critical importance to the **likelihood of success of the eventual deployment of connected vehicles**?
  - How do **transportation services and connected vehicle technologies, data and applications intersect with other sectors of the city** and how can these be **leveraged** to the overall benefit of a jurisdiction?
  - What are the **proper performance measures** when speaking of connected vehicles operating in a connected city?
  - Who are the **core stakeholders** at the nexus of the connected traveler and the smart city, both inside and outside of transportation? How can necessary partnerships and other relationships among them be developed?
Some Questions on Data and Analysis

- Data and Analysis
  - What data gaps exist?
  - From what variety of sources can transportation data be collected? What technologies and methodologies are most useful?
  - How can all these data be efficiently managed, used and re-used, in a connected city?
  - What is the role of analytics? How can connected vehicle data—be integrated to create innovative and informative techniques to support decision making by public agencies and connected travelers?
  - With limited resources available, how can agencies efficiently leverage and implement smart solutions?
  - Are there examples of public-private partnerships where connected vehicle data is being used?
Some Questions on Strategy and Applications

- Specific Strategies and Applications
  - What is the role of connected vehicle technologies and applications in traffic operations?
  - What are the implications for connected vehicles with respect to shared-use mobility?
  - What types of crowdsourcing, social media, gamification and incentivization can be used?
  - Impacts on modal shift including better management and integration of bicycle traffic into a city’s overall transportation network?
  - How might connected vehicle technologies accelerate or foster electric vehicle adoption?
  - How might electric vehicles align with vehicle automation?
  - What is the relationship between the smart grid and the transportation system?
  - Other questions that YOU think are critical?
Where Do We Go From Here?

- Identify how cities and city agencies can harness the power and potential of connected vehicle data, technologies and applications.

- There are many interesting topics to begin exploring:
  - City-Wide Data Flows and User Needs
  - Interagency Data Exchange
  - Service-Focused Urban Automation
  - Smart, Connected Asset Management,
  - Reducing Barriers, Unifying Communities
  - Innovative Business Models and Partnering
  - Mobility As A Service / Shared Use Mobility
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