**Smart Cities**

**Introduction**

In many ways, the first question which comes to my mind is how to define "Smart City"? Fortunately, there exists no single definition on how it should be defined. Importantly, it means that the constituents of the smart city initiative may vary from city to city. Infact, as I search for examples and norms across the internet for "smart cities" and their components, I observed that the definition also varies from country to country, depending on the level of countries development, willingness to change and reform, resources and aspirations of the city residents.

However, it will not be wrong to say that for any city to progress as "Smart City", it must keep technology at the forefront. Nevertheless, it is important to note that the "Smart City" is not only "all" about technology but its rather a futuristic status quo which strikes a cordial balance between the four key pillars of the society – institutional infrastructure, physical infrastructure, social infrastructure and economic infrastructure.

In the USA, Obama's Administration announced "Smart City Initiative" in 2015 a federally supported program with an aim to help the local communities tackle the key challenge such as reducing traffic congestion, fighting crime, fostering economic growth, managing the effects of a changing climate, and improving the delivery of city services. The objective is to utilize federal resources to meet local needs and community led solutions (White House 2015). I would like to quote President's Obama speech during the launch of the program *"Every community is different, with different needs and different approaches. But communities that are making the most progress on these issues have some things in common. They don't look for a single silver bullet; instead they bring together local government and nonprofits and businesses and teachers and parents around a shared goal."* - President Barack Obama (White House 2015). They key here is "…*don't look for a single silver bullet",* which pretty much summarizes the critical point that there exists no "One Size Does Not Fit All" type of solution. Therefore, cities like ours can work towards developing comprehensive infrastructure incrementally by adding on the layer of smartness by balancing the resources and aspirations of the city residents.

**Potential key components of Smart Cities**

Following are the four key components I think the Lexington Government may focus on pursuing their vision to make our city smart.

1. **Invest in the building block** – Internet of Things (IoT) – In a nutshell, the Internet of things (IoT) is the nothing but a network of interconnected devices that have the technology to interact and exchange data. Arguably, IoT is the building block for next generation of smart cities as they have the potential to exploit sustainable information and communication technologies. Such devices can help the city monitor sewers, air quality and rubbish, lit street lamps by tracking pedestrian volumes, or monitor and evaluate city air quality. Perhaps, the current coronavirus pandemic is an opportunity call for all the cities including Lexington to redefine, strategies and accelerate their investment strategy so that current technology framework could be well integrated with future IoT technologies with aim to enhance community resilience during tough times. Take example of China which is the center of COVID19 epidemic. It is said that China is winning the fight against the novel virus by heavily leveraging IoT framework such as artificial intelligence (AI), big data, cloud computing, blockchain, and 5G (QI Xiaoxia 2020). In 2017, Indiana-based MetroNET proposed to invest $70-100 mil to build an ultra-high-speed fiber optic network which was scheduled to go live by end of 2018, however as of today I could not find any future updates on this proposal. Proposals like this should be fast-tracked and should be considered on a priority basis (Katie Pyzyk 2017).

**For example**: New York City's Mayor Initiative a) The New York City Department of Transportation's Midtown in Motion is a congestion management system that has improved travel times on the avenues in Midtown by 10%. b) Automated water meters : Automated Meter Reading systems consist of small devices connected to individual water meters. They send daily readings to a computerized billing system. It also allows tracking consumption from home. c) LinkNYC is providing free super-fast free Wi-Fi, phone calls, device charging, and a tablet for access to city services, maps, and directions. **Other American Cities adopting these framework** - Los Angeles, Chicago, San Francisco, Washington, Boston, Miami, Phoenix, Dallas, and San Diego (Berrone et al. 2019)

2. **Cultivating and harnessing data for Lexington's urban transformation** – While governance still remains a key instrument in terms of achieving future challenges, it is the data which turns our vision into a reality. Thus, government must bring "data" into the focus for all future outcome-based planning projects. Adopting this strategy will act as an ice-breaker and help in achieving wider and quicker consensus among various stakeholders who maybe working in vertical or horizontal silos. They often might be holding often useful data which may not be shared among others, hence these data sharing exercise will allow seamless and integrated flow of information with departments. City must exploit the presence of University of Kentucky and its research labs along with startups/innovators/incubators within the Fayette county or beyond to create an "acceptable" ecosystem which not only promotes innovation and technology but yield practical solutions which may act as a catalyst for economic and social growth of Lexington. Such practice would allow open and transparent governance which would lead to empower community and garner their active support.

   Take case the case of Tel-Aviv, Israel - DigiTel Program. Launched in 2013, after receiving lot of backlash from its citizen over wrongly towing a citizen's car. The local government launched this program to change the public's negative perception of its local government. It has two parts – DigiTel smartphone app and DigitTel ResidentCard. The smartphone app is alternative to local govt's website and one-stop window to deal with local government related bills, permissions/permits, complaints etc. While, the Resident Cards offered discounts on all government led events. The cards are built on smart technology thereby enabling the government to track individual's interest and habits. The information stored in central repository helped them to break down organizational silos and help establish transparency and openness, facilitating dialogues, decision-making and innovation (Fox n.d.; Press n.d.).

   Mobility Data Specification (MDS) is another excellent example of data sharing among urban transport sector. In a nutshell, MDS through its APIs allows the city to gather, analyze and compare real-time data from mobility-as-a-service (MaaS) companies. The specification can also serve as a measurement tool that eases municipalities' ability to enforce regulations.

3. **Intelligent Transit** – We all understand the "true" cost of traffic congestion and gridlocks on city commerce, environment and safety. The city should invest in intelligent transportation solutions with the purpose of limiting the traffic congestion, improving emergency incident response and optimizing traffic flows and proactively manage traffic conditions. The latter being already well implemented in Lexington but it could be further enhanced and integrated with the public transportation services. This could be well achieved using existing and further investing in IP cameras, radar and under-road loop detectors as well as systems based on Bluetooth or mobile phone technology on a common city network infrastructure. Installation of sensors, to monitor transport assets and infrastructure so that safe and sustainable investment decision could be made. This may involve prioritizing road infrastructure upgradation, repair or restoration from simple road bed insulation to prevent from extreme weather conditions, proper drainage to environmental solutions of using water-soluble (and less toxic) paints for road safety markings.

   For example, in 2011 Barcelona implemented data-driven, smart city technology to better its public transport service. They city invested in necessary IoT sensor infrastructure with over 500km of fiber

optic infrastructure and a WiFi Network, which they used to source data about energy, transportation and air quality. By monitoring them they encouraged inter-modality, deliberately placing bus stops to permit connections between tram lines and bus lines, bicycles, metro trains etc. Further invested in 6000 bicycles which were actively utilized by public whose locations were strategically chosen to facilitate located close to public transportation and parking areas for convenience. They also invested in sensors beneath the road which when connected through mobile app directs the driver to vacant parking berths (Here Mobility 2020).

The USDOT's Beyond Traffic: The Smart City Challenge and its vision document is a good starting point towards making Lexington's transit smart (USDOT 2016). Four key areas are

- Improve Safety: Reduce the number of collisions, fatalities, and injuries for both vehicle occupants and non-vehicle occupants by adopting advanced vehicle and infrastructure technologies.
- Enhance Mobility: Offer various urban mobility modes/services to assist mobility and accessibility needs of lower incomes, people with special needs. Provide real time traveler information to the public to better manage their trip and their trip times.
- Ladders of Opportunity: Use technology to serve the most needful citizens in terms of employment, education and other necessary services.
- Address Climate Change: Use technologies to mitigate the negative cost of transportation on the urban environment and human health.

**Potential Challenges**

While "smart city" is the next buzzword and all levels of the government are performing and cooperating their best among each other to make this initiative a huge success, there remain ample challenges.

- **Concerns around safety, security and data privacy**

This is singly the most challenging aspect of the initiative. Cities like Toronto, San Francisco, Los Angeles California which are considered to be forefront in adopting innovative and futuristic technology are also facing hurdles in utilization of data due to apprehension from its citizens on grounds of privacy concerns. Technologies likes mobile location and facial recognition data and its usage are vehemently opposed.

For example, in Oct 2017, Canadian Prime Minster along with the Toronto Mayor announced a partnership with the Sidewalk Labs, subsidiary arm of Alphabet Inc. to plan and turn a parcel of land along Toronto's prime-estate i.e. waterfront into a smart city. The company proposed to built this land parcel into future ready neighborhood which includes all the futuristic "smart-city" technology implemented including an advanced, smart power grid that utilizes thermal energy, a freight management system aided by underground tunnels and "smart containers," dynamic streets that can serve a range of purposes in a given day, as well as highly efficient stormwater and waste management systems, to name just a few.

However, its almost two-years since the announcement the project has been subjected to numerous concerns and litigations challenging them on issues likes data security, ownership and privacy rights. Moreover, scandals like Cambridge Analytica, Congress Anti-trust hearings and users personal and credit-card information leak through sophisticated cyber-attacks has further deteriorated the necessary support from the common man on such technological initiatives (Lindzon, 2019).

- **Developing Interconnecting trust**

Data exchange is critical for any project to succeed under smart cities. Therefore, data trust issues like data privacy and its exchange should be should be addressed in a diligent way. If required, it needs to be weaved along with the necessary legal framework so as to have necessary buy-in among the respective stakeholders or members.

Data exchange is essential for smart cities to succeed in their promise to deliver safer, healthier and more sustainable communities. Data trusts can address data privacy concerns but need to ensure that data is exchanged securely and reliably between participants. Take the case from India which is in the cusp of rapid urbanization and embarked into their own smart city project. Under their "smart-city" umbrella, they

are setting up a data maturity assessment framework. Keeping "People, Process and Platform" as a focus, the framework assists the participating cities to structure their approach according to the existing data ecosystem. As the city matures, the framework forces them to evolve their platform both on system and sectoral basis and thus keeping up with the aspects of data security and ownership rights concerns. Another advantage of adopting this kind of strategy is that it will allow cities the necessary breather in terms of technology adoption but at the same time enable competitiveness among peer cities and also enable peer learning and exchange (MoHUA 2019).

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