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STRATEGIC REALIGNMENT WITHIN SMART ECOSYSTEMS: ORGANIZATIONAL PREPAREDNESS FOR SMART CITIES AND THE SHARING ECONOMY

Abstract:

Intelligent technologies such as block chain, internet of things, data analytics, artificial intelligence, and sensor fusion that are all necessary for smart cities and the sharing economy are now wide-spread. The Four Pillars of Productivity (4POP) framework is applied to determine the appropriate business positioning, given that these modern cities will very soon start to emerge and will make even greater use of the sharing economy. The financial gain, convenience, and overall quality of life improvements that the sharing economy can offer need to be fully realized. This will involve the sharing of almost all resources and skills, both in the home and work environments. Alignment with intelligent technology trends are considered; these include coordination of logistics and operations, digital governance, corporate culture, and smart urbanization effects on behavior and business practices. The paper also addresses the increased systematic risk and cybersecurity implications that come with complexity and uncertainty.

Keywords:

Smart city, sharing economy, Intelligent technologies, Four Pillars of Productivity Framework

Introduction

Digital technologies have begun to enter our urban life. In recent times the image of our day to day activities is now being altered with the emergence of intelligent machines, which are also slowly becoming the foundation for solving the problems of the future. The rapid development of Internet and Communication Technologies (ICT) have shaped the way we work, study, entertain, behave, and live our daily lives.

On a typical day those living “smart” lifestyles wake up with the help of an artificially intelligent virtual assistant running on an internet-connected speaker device. It plays their preferred songs from a music streaming service, and the smart lightbulbs in the rooms of their choosing are turned on automatically. Coffee is ready by the time they get to the kitchen, thanks to a Wi-Fi enabled smart coffee maker; The virtual assistant audibly delivers the weather forecast and reads the highlights of the day or provides any other information of the user’s choosing. A person’s car will open when approached by the owner and it will unlock the door with a simple touch by the authorized driver. Voice commands can launch real time traffic information and project the directions onto a “heads-up-display” on the windshield when the destination is announced by the driver. At work applications like GoToMeeting, Skype, WhatsApp, and Viber have become the norm for real time communication with clients, and emails are reserved for undertakings that are less urgent. During lunch people browse social media sites to connect with friends, family, colleagues, and clients. On the commute back home, dinner can be ordered using a phone app and food can be delivered from most restaurants soon after one is back in his or her home. After dinner, household necessities can be ordered from one’s phone using shopping apps, while some items may have been automatically re-ordered due to smart sensors in fridges and other internet-of-things devices. TV shows are watched on demand from various video streaming services, and magazines and newspapers are read on tablets or e-ink devices. The day ends when a smart watch informs the wearer it is time to sleep; as one heads to the bedroom the lights and TVs are turned off automatically by giving a simple audio cue to the virtual assistant.

The fact of the matter is, a wide range of digital technologies are now integrated into our daily lives, which makes us more efficient, productive, and helps us to find more time for things that really matter to us. Households are becoming “smarter”, and the next logical step is to scale this concept to the city level.

The future cities can be altered by intelligent and connected technologies to tackle the problems associated with the growth of the world’s population and increasing urbanization. It is a known fact that the world population has constantly been growing and is expected to reach 9.8 billion by 2050 (United Nations, 2017). With the growth of urbanization, cities are now expected to do more with less. They need to be more organized, more productive, and more innovative. Modern ICTs such as computer vision, sensor fusion, machine learning, Internet of things (IoT), smart data, robotics, and blockchain technology can be leveraged to build the foundation of future cities. Ménard (2017) indicated that “the conceptual idea of a ‘smart city’ is to create adaptive communication networks

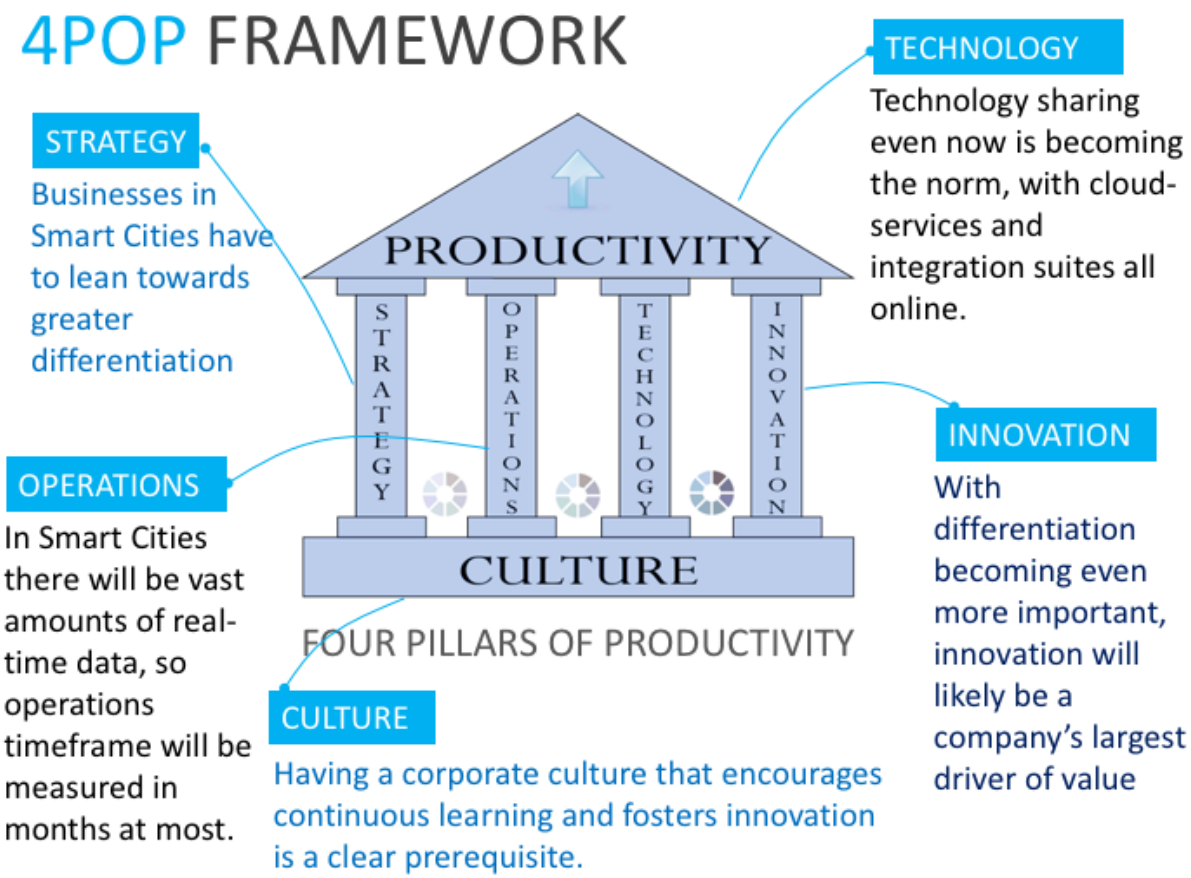
that are closely integrated into the municipal property management system." Policymakers at different layers of government and industry leaders will have to work together to build the infrastructure required for smart technologies and smart networks.

With the emergence of intelligent technologies, smart-city initiatives have been growing around the world. Modern ICT shows promise in increasing the quality of urban life, boosting productivity of public services, and reducing waste. Government, academia, and industry have been working together to leverage modern ICT and improve the well-being of their citizens. Ménard (2017) found that "If policy makers and businesses get it right, linking the physical and digital worlds could generate up to $11.1 trillion a year in economic value by 2025." In recent years, the European Union's (EU) target to reduce 80% of carbon emission by 2050 as well as *EU's Smart Cities and Communities Initiative* have inspired many European cities to develop innovative smart-city projects (Snow, Hakonsson, Obel, 2016). Navigant Research's Smart City Tracker (monitors 221 city projects around the world) expects "73 million connected street lights to be deployed globally by 2026" (Navigant Research, 2018). The nature of businesses within smart and shareable cities will certainly be different, but several of the strategic frameworks used for analysis and decision-making currently in use will still be applicable. One such framework is that of the Four Pillars of Productivity (4POP), which will be used to discuss how business should position themselves and operate in the new environment.

The Four Pillars of Productivity (4PoP) Framework Overview

4PoP is a systematic framework developed to assist SMEs in aligning core business pillars allowing for rapid and sustainable productivity gains. The framework Four Pillars of Productivity (4PoP) includes: strategy, operations, technology, and innovation that stand upon a base of a supportive organizational culture. While most firms already have plans in place for strategy, operations, technology, innovation, and organizational culture, they are not always aligned in a manner that is conducive to productivity gains and overall business competitiveness (Chowdhury, 2016).

Figure 1. Four Pillars of Productivity (4PoP) Framework



Strategy: Through strategic analysis and execution SMEs regain their direction. Strategy interrelates with all other components of the 4PoP model as strategy is the guiding force behind decision making. One fundamental aspect to strategy is the trade-off chosen between low-cost leadership and differentiation. Typically, the more differentiated a company's offerings are, the higher premium it can charge for its goods and services. With people more willing to rent out their possessions and services (car travel, accommodations, and more) the supply side of the market has vastly increased in size. Prices are being driven down for this reason, and as time progresses competing on a differentiation basis will be increasingly important. There will always be room for low-cost leadership firms, but the proportion of firms that will have to compete based on differentiation will increase by necessity in the sharing economy.

Operations: By creating operational efficiency in areas such as marketing, HR, production, and processes SMEs are able to boost efficiency and productivity. Operations can be thought of as the tactics and short-term implementation of a strategy. These are the decisions that materialize progression. Productivity and operational efficiency are strongly tied concepts. Operations are a product of the strategy that guided its selection, which is why it is the second pillar and follows strategy in the model. Operations in the smart economy will probably involve a lot more outsourcing

due to the low-cost solutions it will provide. This will offer firms a lot of flexibility; and though historically operations have been revised on a semi-annual or annual basis, in this new economy the operational horizon will be even shorter. Revisions may have to be considered on a monthly basis in some extreme cases.

Technology: The technologies available when this framework was developed were predominantly related to Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) suites, and this will still be the case going forward. Fundamentally they will do the same thing, foster business integration and create loyalty and satisfaction amongst customers. However, the sharing economy is poised to complicate the number and type of smaller applications that make up these suites. As is happening at the consumer level, companies, particularly Small and Medium sized Enterprises (SMEs), will have to make use of sharing applications in order to keep costs down. Instead of buying resources that are only used once, or very infrequently, they can be rented from businesses that provide such resources through sharing. Those will include human resources such as consulting services, as well as physical assets such as 3D printers.

Innovation: As the framework is designed to make companies globally competitive, the fourth pillar of 4PoP is innovation. Innovation is required for a company to become a world leader in productivity. Companies may be able to survive for a while by maintaining the status quo, but they thrive through innovation. One-time innovation happens naturally and infrequently, but continuous innovation is difficult. Innovation has to ultimately translate into commercial success. It can do that in any number of ways, but ultimately it comes down to changes in revenue, cost, or both that lead to greater profits. Innovation for the sake of innovation is not the goal; useful innovation is the target. Not all innovation will result in gains for the company, but the more targeted innovation that can be produced, the more useful and productive innovations will arise. The sharing economy and smart cities do not change the approach to innovation; they will simply guide the type of innovations that arise (innovation is contextual).

Culture: An organizational culture changes over time through the implementation of steps and actions towards productivity growth, and cultures geared towards change lead to future sustainable successes. Once the top levels of the organizational hierarchy are on board with a culture change initiative, internal culture will shift to embrace the changes that will come from aligning the four pillars. As such, regardless of the type of market or complexity of the city in which a firm operates, every company that wants to have sustainable productivity and innovation growth must first create an organizational culture that can encourage and foster such changes.

SMART City Eco-System

Smart cities are not just about ICT; human and institutional factors play a big role in shaping the future. Lea (2017) indicated that “a smart city is not just a city that leverages new technologies but is a complex ecosystem made up of many stakeholders including citizens, city authorities, local companies and industry and community groups.” Rapid development of digital technologies needs to be leveraged to create, capture, and deliver values for the entire ecosystem. The technology,

human, and institutional facets of smart ecosystems need to be aligned to improve quality of life, solve critical problems, and offer value to everyone (not just the rich, certain industries, or groups of companies).

City Governance can be closer to a truly democratic process, as opposed to the representative democracy we have grown accustomed to. Any action to tackle a controversial issue can be put to a very quick referendum. Identities can be verified using blockchain technology, and as much as with voting booths each person will be awarded one vote but their vote choice will not be visible to anyone else. As such, the voting process can take place from one's home. Mayoral decisions not put to a referendum will be based on the analysis of "big data". Automating processes also awards many opportunities for logging actions and behaviors. Information about foot traffic, park usage, transportation usage, and the usage of many other things can be the determinants of appropriate fund allocation. It will also allow for better decision making with regards to zoning and future planning. Law enforcement also becomes much easier, as knowing a persons' location at a given time is far easier. For similar reasons, the city will be much safer. Any form of crime is far riskier for criminals, and therefore there is more incentive to operate within the law. The McKinsey Global Institute's expectations for the reduction of crime incidents once a city becomes "smart" are around 30% to 40% (Woetzel, Remes, Boland, Lv, Sinha, Strube, Means, Law, Cadena, Tann, 2018). There are privacy concerns associated with this, which will be discussed later in the text. With regard to minor disputes or permissions, some of these processes can likely be automated. This is particularly true when there is very little subjective judgment involved, and resolving the dispute is just a matter of knowing the relevant law or laws.

Crowdfunding platforms such as EcoLab, So Lunch, CN Smart L'Hub etc. offer new forms of civic collaboration to support civic projects and improve social impact (Care, Trotta, Care, Rizzello, 2018). These already exist and serve both in terms of choosing the developmental areas a smart city pursues. Trusting that people will vote with their wallets ensures priority is given to the projects people desire the most. As with every society, particularly in urban areas, there is a tendency for rich and poor segregation. Smart cities may not reduce the income inequality, but they will certainly reduce quality of life disparities. With reduced crime, improved transportation, shopping online, and more working-from-home the incentive to cluster based on income to avoid crime and be near work is almost eliminated. The sharing economy will give people of all incomes access to almost everything, and work will be more enjoyable for all since several automated tasks will be delegated to AI and robots. This will leave more varied and satisfying tasks for people.

Figure 2. Smart City Ecosystem

Automation will be vital to the operations of a smart city. An important motivation for creating a smart city is to minimize the time people spend doing things which they do not enjoy. Most repetitive tasks fall into this category. For example, there are entire professions that are almost exclusively dedicated to monitoring areas. A security guard could spend 90% or more of their time checking

various monitors for suspicious activity. Aside from the fact that people are not well equipped for such tasks to begin with, these jobs tend to be at night, which makes it even more likely even a hard-working and well-intentioned guard could make an error. A smart city with cameras can delegate this monitoring responsibility to artificial intelligence, which is extremely reliable at simple tasks such as monitoring if any activity is taking place in a room or area it should not be.

Adjusting train schedules based on demand in traditional cities is extremely problematic. The person driving the train has expectations based on the schedule, as do people who intend to ride the train. However, in a smart city everybody can announce their needs for the following day on the day before, and a schedule can be set accordingly. The trains will not need a driver, and therefore that particular current concern will be a non-issue in the near future. There are countless other city-level decisions and needs that can be made without any human input whatsoever. One or more people may be tasked with monitoring the artificial intelligence decisions and be allowed to override them if there is some glaring oversight.

Energy and Infrastructure are necessary building blocks for the formation of a smart city. The consequences of a power outage in a smart city are much greater than in a traditional city, which will be discussed more in detail further-on in the text. As such, a system that minimizes power outages is necessary. The use of renewable energy of course has a myriad of benefits, but in a smart city it can serve as a safety redundancy. The use of smart microgrids, which are essentially smaller incarnations of a bulk power grid that are designed for a specific local purpose. They can, and usually do, link up to the larger power grid and will sell electricity to the larger grid when excess energy is generated, and they will buy when there is an energy deficit.

Figure 3. Smart City Technological Ecosystem

ICT is the cornerstone of a smart city. Smooth operation of city functions requires vast levels of real-time coordination, and this is achieved largely by the Internet and Telecom players. High-bandwidth connections with very fast Internet speeds and encryption used where appropriate must be present at all, or at least almost all, points throughout the city. This requires both hardware and software investments throughout the communications networks, and technology adoption and integration will occur at a very fast pace. Being able to maintain and upgrade such an important network is extremely difficult, but thanks to artificial intelligence and many checks throughout the system, it is a manageable feat.

A smart city is extremely dependent on communications and power. This of course poses a major threat to security if there is a power outage or communications disruption, either due to natural disasters and phenomena, or due to more nefarious causes such as cyber or physical attacks on ICT hubs or providers. With regard to safely persisting data (ensuring it is never lost), backing information up in one or more locations has tended to be the solution. This of course has several vulnerabilities, the largest of which is that if someone discovers both locations it is possible to erase all copies of it. However, a public Blockchain's decentralized data maintenance means potentially thousands, even millions, of copies of critical data (such as identification) can be maintained at nodes all around the world, eliminating the data persistence concern that has traditionally been a problem. This is extremely useful once the city comes back "online", but it would of course be foolish

to have a city that would shut down for any length of time during a crisis. As such, a smart city must still have partially traditional infrastructure that prevents chaotic results when communications or power disruptions occur. This includes simple things like physical key-locks systems for homes, manual overrides on vehicles such as cars, and many more. The smart city must at any time be able to operate as a traditional city in order to be considered truly secure.

Whilst a smart city is extremely reliant on technology, and ideally almost all low-skilled and repetitive tasks will have no human input whatsoever, the entire purpose of the smart city is to make peoples' lives better and handle population density difficulties. Humans will ideally be a small part of how a smart city works, but the city will be in place to serve humans. Much of the automation is designed to minimize people's physical and mental burden. People will have to learn to operate in this "tech-heavy" society, which will require some basic understanding of how things operate. This could have drastic implications on what materials are taught in all levels of education. In higher education, academia needs to be able to keep up with the relevant changes, integrate intelligent technologies and business processes into the curriculum, offer professional development for the educators, and produce the workforce of tomorrow. Knowledge of how identification systems work and how to protect one's identity will be far more emphasized than it is at present.

As with normal cities, institutions are still critical to the running of day to day events, as well as dealing with longer-term matters. The mayoral offices will lead smart cities, but in contrast to their running of traditional cities they will have far superior tools for decision-making (including delegating certain decisions to their constituents). Many public services will exist entirely, or at least in a large part, online. Things such as libraries will provide electronic books, and city planning decisions may be largely managed by artificial intelligence, with a handful of people simply present for oversight and ability to override what may be deemed as erroneous permissions being granted or declined. Requests for zoning permissions can be handled in much the same way. Education at all levels can be moved to online delivery or hybrid systems, eliminating or reducing the need for physical campuses. Perhaps campuses will still be maintained in a large way (particularly for early education) to ensure that the in-person socialization aspect of a schooling environment is not lost, but certainly students will not need to physically attend nearly as frequently as they do now. Similarly, the centralization of materials online will allow students to learn from whichever teacher they feel helps them the most, as they will no longer be limited by proximity.

Digital Connectivity and Sharing Economy

Emerging technologies such as IoT, artificial intelligence, blockchain, data analytics, sensor fusions and robotics are critical components for smart cities around the world. Most areas of city management and services can adopt smart initiatives. For instance, smart sensors can monitor parking spots, or pot holes on the streets, and notify the city officials; smart parking meters will help drivers find parking through an app, or through connected cars. These meters can accept digital payments. Smart street-lights will save energy by dimming lights when no cars or pedestrians are around. Networks of all sorts, such as electricity and traffic, will be improved by smart technologies: a smart grid will make the electricity transmission more efficient and reduce maintenance cost, and

smart traffic management will prevent traffic jams. McKinsey Global Institute estimates reduced gridlock and roughly 15 to 30 minutes of saved time per day per worker due to traffic improvements (https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/smart-cities-digital-solutions-for-a-more-livable-future). Furthermore, smart public transit will boost efficiency and passenger satisfaction, smart trash cans will notify the garbage collector when the cans are full, and smart buildings will monitor structural health and notify officials when maintenance is required. There are too many examples to list as things stand even now, and there will certainly be more examples as time goes on and new technologies emerge.

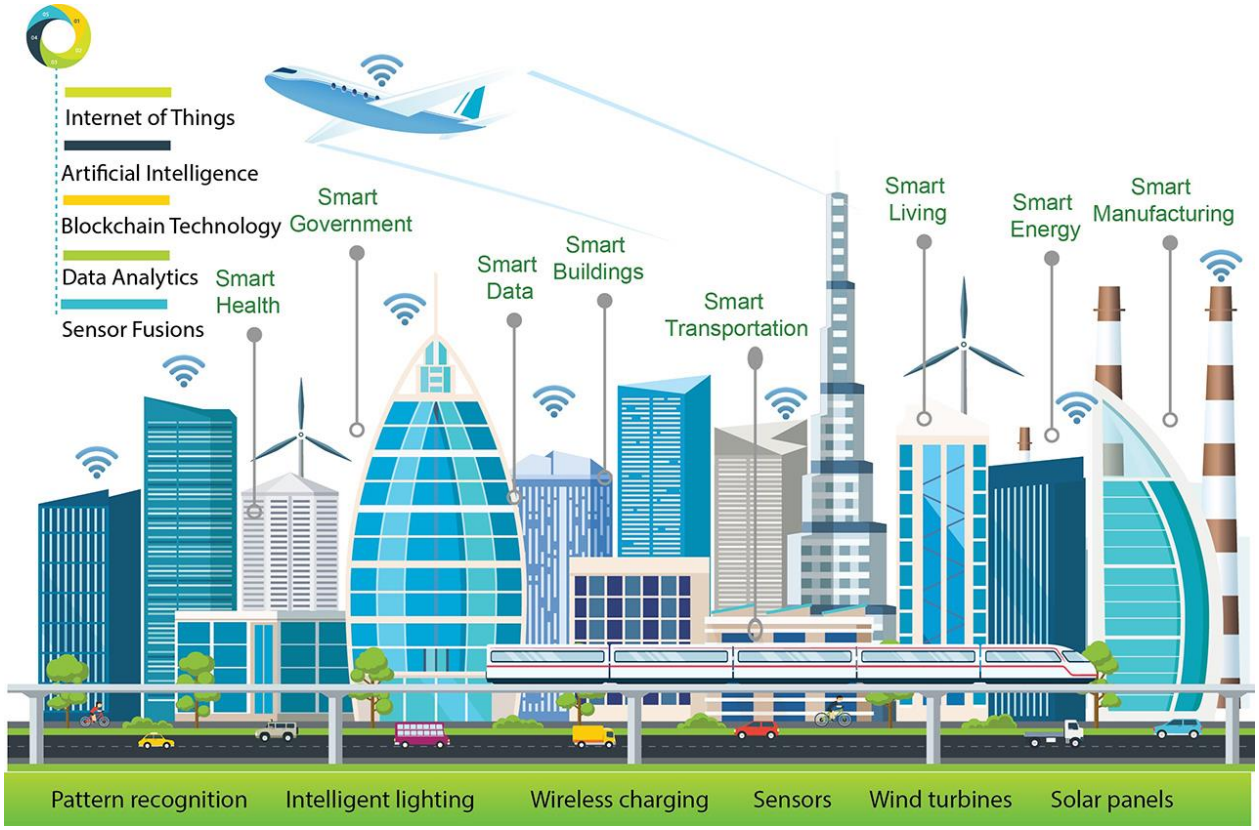
Cities are now growing exponentially, which means there are more people, more cars, more pedestrians, and there is more demand for public services. However, people, cars, and cities are not currently talking to each other or sharing data on a meaningful scale. Microsoft recently announced new features for their Azure public cloud to support the location based geographical data needed to support smart cities, infrastructure, and IoT systems. Such a move towards building the integrated ecosystem would help to connect cities and infrastructure with road-utilising vehicles and the road-traffic infrastructure. Autonomous and connected cars would interact with the roads, traffic lights, and street signs. This would result in improved commute times, improved monitoring of pedestrians and vehicles to avoid accidents, and make the city both safer and more sustainable (Ravi, 2017). A recent McKinsey analysis indicated that “the municipal setting is likely to be the second-largest beneficiary of IoT improvements with potential impact as great as $1.7 trillion by 2025” (Ménard, 2017).

The sharing economy is something that developed nations are becoming increasingly familiar with. Companies such as Uber, Lyft, and AirBnb have radically changed the car-transportation and temporary accommodation industries. The same will no doubt be true for several other industries in years to come. In fact, almost all industries will face disruption in the form of leveraging the desire for a sharing economy. For example, the food industry could change radically if people within a building start cooking slightly more food than they need and sell the excess to neighbours through an application. The sharing economy jobs allow for far more flexibility in terms of work schedule and availability. For instance, Toronto-based company, Smart Ecosystems, is developing technology to essentially share everything imaginable. From one’s possessions to his or her skills, at any time of the day resources or services can be requested and anyone willing to render those items or services can do so.

Another massive benefit in a sharing economy is the sharing of data, particularly with governments. This sharing can be at an aggregated level so as not to invade peoples’ privacy, but knowing patterns of eating, travelling, and usage of any sort of services allows governments to shape policy around what people are actually doing, as opposed to what these people are expected to do. It takes the guess-work out of many services. For example, knowing how many people are on the road on a given day travelling on particular routes can change the traffic light patterns or even turn certain streets to be one-way only for a period of time. Temporarily assigning additional employees or resources to government services based on activity, particularly on a day when it is known with

near certainty that demand will be higher, will also be possible for the first time in history. This equates to the city being truly adaptable, and that simply cannot be the case until big data and widespread real-time connectivity start to become mainstream.

Figure 4. Smart City Digital Connectivity



It is unclear the extent to which cryptocurrencies will be able to replace traditional fiat currency. However, the underlying technology for these cryptocurrencies (Blockchain) has numerous applications that may well serve as one of the core infrastructure components of a smart city. The technology does something that may seem relatively insignificant at first glance, but in reality it solves one of the core problems of a sharing technology: cutting out intermediaries by eliminating the need to exchange with someone trusted. The decentralized nature of blockchain and the ability to maintain a secure public ledger makes fraud close to impossible to commit. This technology puts peoples' data in their own hands and gives them control over who and what has access to it. A truly incredible benefit of the blockchain is that the more time that has elapsed since a transaction of any kind is recorded, the more secure it becomes. With this in mind, people will be much more comfortable storing and sharing more data online, as identity theft from hackers becomes less likely and there is confidence that records are secure. As was mentioned earlier, sharing of data allows a smart city to operate in a far better manner by eliminating guess-work.

Many technology start-ups are now combining modern intelligent technologies for the purpose of improving quality of life for private citizens and businesses. Blockchain-platform development company CREDITS finds that distributed registry technology would benefit future smart cities and smart homes, “By combining sensors, smart contracts and a high level of security in blockchain, the management of mega-cities can significantly improve the quality of life of the population” (CryptoSlate, 2018). Slock (slock.it) is in the process of developing infrastructure for the sharing economy; one of their products is an ethereum-enabled [blockchain development platform] IoT platform. The application can be used to automate services such as Airbnb, car or bicycle rentals, and other shared rental services for smart devices by using smart contracts, and paying each other using a decentralized platform (Chowdhury, 2018). Otonomo (otonomo.io) is in the process of building the first connected car data marketplace to improve accessibility and the integration of vehicle data for the other players of the smart technological ecosystem.

“The ‘smartness’ of a smart city is in using that information from the cars to act, to improve, [for the software] to get better every day,” Mr van Manen says. “We can’t control a complex system like a city. We have to let it evolve—learn, improve and repeat. In a city context, what makes data ‘smart’ is the intention and ability to change things, to make things flow and run better (BMW Group, 2018).

Large firms have also begun to leverage innovations in IoT and other intelligent technologies. BMW recently launched their car sharing service DriveNow (drive-now.com) in a few European cities with the latest BMW and MINI models; Users can use a mobile app to locate the car, use a chip card as the electronic key, and park at any public parking space to end rental; DriveNow is designed to rent their cars flexibly (when and where users need them) and reduce congestion of parking spots as cars will be utilised more and spend less idle time.

Recommendations and Conclusion

ICT infrastructure and smart technologies of cities need to speak the same language. Municipalities around the country need to collaborate and work with businesses and technology service providers to share their information in a standardized fashion. For instance, vehicle manufacturers need to be able to access parking information for all cities and municipalities with a standard gateway or application programming interface (API) and will not be required to work with municipalities individually to access their information. An API is essentially a communication platform between technologies, which allows one technology to request or give information to the other. As with all things interconnected there are some risks involved.

A city with interconnected intelligent technologies will also face interconnected risks. Much as globalization means that one economic crisis of a large player in the world market can have “knock-on effects” for all other nations, so too can integrated technologies lead to a quick spreading of problems. A security breach may allow an identity thief to have access to all information belonging to the person whose identify was stolen, as well as access to all their services and possibly their property. This would not be the case if just a credit card were stolen as things operate in a traditional city. To combat such an event, a holistic approach to risk management will have to be adopted; all

smart city players will have to collaborate to mitigate risk. This might involve redundancies so that no one technology can be interfered with to bring the whole system down, and multi-factor authentication to minimize identify theft threats. A generous annual budget for cybersecurity should be allocated and talent needs to be developed and hired to maintain security across the technologies. Cybersecurity is not a one-time endeavour; it is a constant effort to thwart malicious hackers and prevent errors from causing significant damage.

Advanced data analytics can be embraced to improve the decision-making process for infrastructure maintenance, resource allocation, capital planning and so on. This must be handled very delicately, however, due to privacy concerns. Smart cities need to ensure their citizens that data will be protected and it is not the end of privacy; aggregated and real time data will be used to make living better and not to spy on individuals. Constituents will have to be assured that their personal data is within their control. Another concern for the typical citizen may be his or her technological aptitude. In a “tech-heavy” society smart city players need to pay attention to usability and user friendliness. This is especially important for government services. There must be a concerted effort to ensure a high level of abstraction for the common user. That is to say, a user must not need to know the inner workings of every technology to make use of them. If users are scared of how to use a service because of complexity, they will simply avoid it. The key is to make all technologies as accessible as possible through good design.

Strategy and operations need to be aligned. The upfront investment of deploying new intelligent technologies for long-term cost savings for many cities can be difficult. Cities need to adopt systematic procurement and financing practices to support long term strategic priorities. Fortunately, technologies are becoming very modular, meaning that a city does not need to become “smart” overnight. It can be a gradual and deliberate process as components are added and the city becomes progressively “smarter”.

The smart city by definition improves as knowledge is gained. So too must be the human approach to designing a smart city. Looking to other examples of smart cities for what does and does not work will help to take the shortest “route” to the best result. Even now there are examples of smart cities emerging. One such example is Alphabet subsidiary Sidewalk Labs’ (www.sidewalklabs.com) collaborating with Toronto to offer driverless and artificial intelligence public transportation, sanitation, and even building operations (Woyke, 2018). Examples within the country are of course extremely valuable because they operate under the same federal regulations and laws, but all examples can be useful. There are several instances of early-stage smart cities across the globe, the observation of which can lead to insights and the discovery of best practices. As such, it is recommended to constantly monitor other smart cities to help shape a new smart city and update that city as time progresses.

A smart city is not merely about adopting new technologies just to increase productivity or gross domestic product; new intelligent technologies need to be leveraged to create, capture, and deliver values to benefit the society at large. Smart city players such as entrepreneurs, government, industry, and academia need to collaborate to foster social innovation to address issues related to

urban expansion, inequality, diversity and inclusiveness, poverty, health, infrastructure, public services, and social instability. Put in its most simple terms, a smart city's purpose is to improve all constituents' quality of life.

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