Information Security Thought Paper
Smart Cities

The wide range of technologies implemented under the smart city label makes it difficult to instil a precise definition of a smart city. One of the main technologies used with all Smart Cities is **Information Communication Technologies or ICT** to improve the efficient use of physical infrastructures such as roads, buildings, power and water grids, transportation systems etc.

Evolution to integration; all dimensions of human and collective intelligence together with artificial intelligence of the city itself, the city's intelligence lies in the effective combination of digital telecommunications networks (the nerves of the city), **embedded intelligence** (the brains of the city), sensors and **tags** (the sensory organs of the city), and software (city's cognitive function).

Building a Smart City

One of the biggest problems in building a smart city is that there is no single solution. Cities can succeed only if they have a consortium of partners, working together in a cohesive way to find the right solution for what is needed and planned for. For a more precise description of the Smart City partnership concept we need to consider specific factors.

- **Technology factors:** A Smart City is not just a concept but also a varied combination of the smart city concept technological infrastructures.
- **Human factors:** A key partner for city development is human infrastructure (i.e. citizens, creative and labor industries, knowledge networks).
- **Institutional factors:** In order to succeed, any Smart City initiative requires management support. The success of intelligent community initiatives requires institutional involvement.
- **Energy factors:** In smart cities Energy is crucial and therefore utilities play a key role.
- **Data Management factors:** Smart cities use a combination of network and computer technology data gathering, processing and propagation.

After partners have collaborated and cities have found their ideal mix of technologies, it is important to remember who is going to implement and use the technology. Putting the citizen at the center and offering an experience that makes life in that city memorable and useful is essential in building a smart city.

Benefits of Smart Cities

The Internet of Things and Big Data technologies will allow relevant local governments to develop and deploy transport, water distribution, crime prevention and traffic control related Smart City systems. A smart city leverages IT's power to improve residents quality of life, enhance economic development, and efficiently manage and utilize natural resources. For example; smart meters allow for better use of the electric grid by allowing cities to anticipate future demand, which could allow for more efficient capital expenditures. Installing sensors and tags that authorities can access via the Internet for real-time monitoring/measurement of water levels, pressure, flow rate and chemical composition would reduce operating costs and increase savings. Installed along major roads and at intersections, sensors, GPS systems, traffic cameras, and roundabouts could help cities manage traffic flow more effectively.

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Because a large proportion of the growing world population is moving to urban areas, smart cities will be beneficial. There are now around 7.1 billion people living in urban areas; by 2025 this figure will rise to 8 billion and by 2050 the number of older people will rise from the current 841 million to over 2 billion. Migration to urban areas has brought with it several unique challenges, such as large-scale transportation, especially at peak times.

 Another major issue facing the world is water scarcity. By 2025, 50% of the world's population will be living in areas where water is scarce. Unfortunately, the loss of 32 billion cubic meters of water per year is due to spills.

 Energy will also be a huge problem as global energy demand is estimated to rise by 56% by 2040.

Developing and implementing multifaceted smart urban management strategies is the best way to address these issues. First of all, municipal councils should develop large-scale data collection, storage and analysis (big data) programs. Second, urban center governments need to invest in IoT technology.

Possible Drawbacks of Smart Cities

Some of Smart Cities very benefits may be perceived as an erosion of their privacy rights by some of its citizens. Cameras on roadways and intersections, smart power meters, smart water meters will reveal things some people don't feel comfortable revealing. Another serious problem with so many critical systems sending data is the failure of even one of them can be catastrophic. Consider, for example, a public transport system that uses IoT sensors: when life is at stake, downtime will no longer be an acceptable result of overloading data.

The evolution of smarter cities offers both local authorities and IT professionals many opportunities and challenges. As cities become more technologically dependent than ever before, IT professionals will become exponentially more important, data storage and availability will be crucial. Security and Privacy concerns will also increase in volume and severity.

Recommendations

Governments should actively pursue a Smart City strategy due to increasing levels of "smart" technology being employed in all cities as we move forward. New cities or established cities will be forced to become "smarter". We only need to recall when Smart Meters were required in all new construction and retrofitted into all older buildings in British Columbia to realize this is true. Climate change is beginning to adversely impact resources forcing us to make better use of what we have -- including the physical space of the city itself as more people move there from suburban areas.

There are significant benefits to gain from executing on a Smart City strategy and citizens will benefit through additional convenience and services while making less of an impact on our environment. In order to ensure the benefits are maximized it is critical to embrace "security by design" and ensure that Smart Cities benefit from security built in from the ground up.

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Resources

Information Communication Technologies or ICT
https://www.thecanadianencyclopedia.ca/en/article/information-and-communications-technology

Open Innovation
http://www.businessdictionary.com/definition/open-innovation.html

Embedded Intelligence
https://www.techopedia.com/definition/32504/embedded-intelligence

Smart labels/Tags
https://en.wikipedia.org/wiki/Smart_label

Smart South Island Vision 2040
https://static1.squarespace.com/static/59dcb467268b96b747e9f85d/t/5ae116042b6a28e4bdaac103/1524700690666/Smart+South+Island+Vision+2040.pdf

City of Vancouver
http://vancouver.ca/your-government/smart-cities-canada.aspx