Ministerio
de Telecomunicaciones y de la
Sociedad de la Información

National IT Industry Promotion Agency

Reference Book of Smart Cities

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Prólogo

El Ministerio de Telecomunicaciones y de la Sociedad de la Información (MINTEL) y la National IT Industry Promotion Agency (NIPA) en el marco de Cooperación International entre Ecuador y Korea del Sur, presentan el documento: "Reference Book of Smart Cities". El presente documento es un aporte para el desarrollo de Territorios Digitales y fue elaborado por Woon Kang Chung, Expert National It Industry Promotion, quien se encuentra colaborando en la Dirección de Fomento de la Industria y Servicios para la Sociedad de la Información.

El MINTEL tiene como objeto garantizar el acceso igualitario a los servicios relacionados con telecomunicaciones, para de esta forma asegurar el avance hacia la Sociedad de la Información y así el buen vivir de la población ecuatoriana asegurando niveles progresivos de acceso de la población a las TIC, mejorando las capacidades de la ciudadanía para el uso eficiente de las TIC, asegurando la existencia de aplicaciones y plataformas informáticas, fomentado el desarrollo de la industria de la información y del conocimiento, promoviendo marcos regulatorios, legales, culturales e institucionales adecuados y asegurando que los segmentos más desfavorecidos sean incluidos en el desarrollo de la Sociedad de la Información con proyectos y acciones específicas.

En el Marco del "Programa Nacional de Gobierno Digital" establecido en la Estrategia Ecuador Digital 2.0, se busca acercar la administración pública a la ciudadanía y sector productivo, a través de la formulación de programas y proyectos; además de empoderar al Estado, a los Gobiernos Autónomos Descentralizados y a la población ecuatoriana en el manejo, perfeccionamiento y buen uso de las Tecnologías de Información y Comunicación para su aprovechamiento en los procesos productivos, educativos, sociales, económicos alineados al Plan Nacional del Buen Vivir y por ende en procura de la mejora de la calidad de vida de la población ecuatoriana.

El proyecto plantea a través del *Componente: Proyectos emblemáticos de e-servicios implementados*, promover la transformación de diferentes ciudades en el país a fin de que logren convertirse en "Territorios Digitales"; para ello establece líneas de acción que el MINTEL ha consolidado a través del Libro Blanco de Territorios Digitales en Ecuador, publicado en el Portal del Observatorio TIC y en el cual se destacan: el modelo, fases de desarrollo, mecanismos de gestión, sustentabilidad y sostenibilidad.

El Modelo de Territorio Digital considera al ciudadano como actor central, tres componentes transversales: Infraestructura, Normativa y Sistemas de Información, y cuatro ejes fundamentales: Gobierno Electrónico, Alistamiento Digital, Temáticos Esenciales y Productivos.

Preface

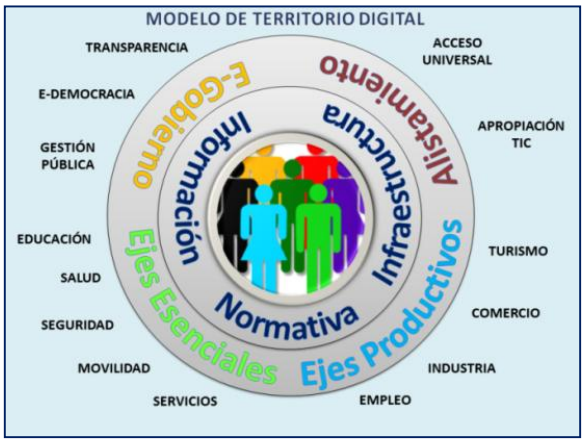
"Ministerio de Telecomunicaciones y de la Sociedad de la Información, MINTEL" and "National IT Industry Promotion Agency, NIPA" in the framework of International Cooperation between Ecuador and South Korea, show the document: "Reference Book of Smart Cities". This paper is a contribution to the development of Digital Territories and was elaborated by Woon Kang Chung, Expert National it Industry Promotion, who is working at "Dirección de Fomento de la Industria y Servicios para la Sociedad de la Información"

The MINTEL aims to ensure equal access to services related to the telecommunications area, to thereby ensure progress towards the Information Society and so good live Ecuador's population ensuring progressive levels of public access to ICT, improving the capabilities of citizenship for efficient use of ICT, ensuring the availability of applications and platforms, encouraged the development of information industry and knowledge promoting regulatory, legal, cultural and institutional frameworks appropriate and ensuring that the poorest segments are included in the development of the Information Society projects and specific actions.

In the framework of the "National Program for Digital Government" established in Ecuador Digital 2.0 Strategy seeks to bring the public service to citizens and productive sector, through the development of programs and projects; besides empowering the State, the autonomous governments and the Ecuadorian population in the management, development and proper use of Information and Communication Technologies for its use in the aligned productive, educational, social, economic processes to the National Plan for Good Living and therefore in pursuit of improving the quality of life of the citizens.

The aforementioned project aims through *Component: Major projects of e-services implemented*, promote the transformation of different cities in the country in order for them to become "Digital Territories"; for it defines action lines that Mintel has consolidated through the "Libro Blanco de Territorios Digitales en Ecuador", published in the Portal of ICT Observatory and which are: the model, stages of development, management mechanisms, sustainability and sustainability.

Digital Territory Model has citizen as central actor, three transverse components: Infrastructure, Standards and Information Systems, and four axis: Electronic Government, Enlistment Digital, Essential Thematic and Productive.



M1. Defining Smart Cities

A1. Research a definition for Smart Cities that best fit the Ecuador context

Definition for Smart Cities

Todays, the word 'Smart' is being used across many fields, such as Smart cities, Smart phone, Smart grid, Smart car, Smart education, etc.
The word 'Smart' means improved function, ease and efficiency using all of the state-of-the-art ICT technology.

Let's assign the 'Smart' of 'smart cities' from the 'Smart' of 'smart phone'.
Then, drawing the need and the direction of the development of smart cities will be easy.
When cell phones came out at first, it had only a call feature.
But now the smartphone is popularized, and the smartphone has a variety of features including the Internet, Bluetooth, Lighting, Dictionary and Navigator other than the call feature.

These various features of the smartphone give the convenience, and the sufficiency of the various needs, and the improvement of satisfaction to users.
As same as that, the smart cities can make to smart all facilities, all business, all the administrative services by the connection of all infrastructure of the city based on the state-of-the-art ICT technology.

To be successful the implementation of smart cities, the policy should be established after recognize the exact meaning and need of smart cities.
Smart City's technical definition is summarized the followings.

- Possessing an High Level Netwoks (HLN) that enables citizens and organizations to make an independent and innovation use of it,
- Being “Smart”, i.e. is using the hard and soft infrastructure to transform connected information into knowledge, to encourage partnerships that create synergy and value, and to deliver innovative solutions to the community.

The need for Smart Cities

According to the announcement of the UN in 2013, the world's population exceeded the current 7.1 billion people. And in 2050, 10 billion people are expected to break through.
Today, more than 50% of the world's population lives in cities. They have become the dominant forces in economy and society.

To accommodate the more population with limited space and resources, and to provide better quality of service, it is inevitable the construction of a new city or the structural change of the old city.
In particular, in order to keep the existing vested interests of the city, the change of the existing city is more effective in terms of cost and efficiency rather than the construction of a new city.

The effort to improve the quality of life of the citizens in urban area, and to improve the competitiveness of the city, has been continued.
Also central government had been unfolding policy and the constant support because they know that improving the quality of individual cities gives a significant impact on the competitiveness of the entire country.

Todays, Smart Cities is the new form of a city.
It resolves the increase of the city's population problem, improves the quality and environment of citizen's life, maximizes the value of the city, and creates new business opportunity at the national and city level.

Smart City in Ecuador

The planning of the smart cities project in line with the reality of Ecuador should have the following three basic principles.

1. ICT-based urban transition to new value creation model
2. The preparation of the smart cities according to the information promotion strategy
3. Smart City's value creation strategy

The detailed strategy will be documented in the next chapter 'The Smart Cities Strategy'.
The subject in this chapter is that to create the best master plan with above principals.
After the master plan is created perfectly, the implementation will be going one by one according to the plan.
Of course, no matter how good a plan if not done the realization, it will be a huge waste.
Thus, the following approach should be considered.

1. Creation the master plan of smart cities
2. Investigate and verify the existing infrastructure utilization
3. Determine the priority on the master plan
4. Step-by-step hardware, software infrastructure implementation
5. Proceed in order of priority as determined
6. When more than 50% of the entire master plan are progressed, manage the integration of the entire projects

A2. Research the Smart Cities components and its benefits

The typical software areas and its services to improve the quality of life of citizens using Smart Cities hardware infra leverage are as followings.

Solutions to cities' challenges

Smart Energy

- Smart Grid Automation & Flexible Distribution
- Smart Metering Management & Demand Response
- Renewables Integration & Micro Grid
- Real-Time Smart Grid Software Suite
- Gas Distribution Management

Smart Mobility

- EV Charging Infrastructure & Supervision Services
- Traffic Management
- Tolling & Congestion Charging
- Integrated Mobility : Public Transit, Traveler Information

Smart water

- Distribution Management & Leak Detection
- Power, Control & Security Systems integration
- Stormwater management and Urban Flooding

Smart public services

- Public Safety : Video Surveillance, Emergency management
- Digital City Services : eGovernment, Education, Healthcare, Tourism
- Street Lighting management

Smart buildings & homes

- High-performance Buildings : Energy Efficiency & Security, Energy Services
- Efficient Homes : Home Energy management
- Connection to the Smart Grid

Smart public services

Smart public services area is the most closely with civil within Smart Cities solutions. The concrete contents of the field of the services are as followings.

Healthcare :

- Care-at-a-Distance for underserved communities in the city.
- Healthcare Information Exchange
- Smart City Health Card

- Asset tracking within the Hospitals
- Inter-hospital collaboration

Education :

- Education Technology Platform
- Unified Communication
- Wireless Access Across the School Campus
- Secure High Bandwidth Broadband Access
- Desktop Collaboration

Safety and Security

- Multi-disciplinary City Wide Video Surveillance
- Proactive Safety & Security Monitoring
- Intra-Agency Collaboration
- Unified Emergency Call Centre (911,060, etc)
- AVL - Automatic Vehicle Location

Transportation

- Smart City Card
- Personal Travel Assistant
- Intelligent Traffic Management & Control Centre
- Smart Transportation Pricing
- Smart Work Centre
- Connected Bus
- Connected Driver Services

e-Government

- Smart City Card
- Digital Inclusion Community Centers
- Citizen-Business Interaction Network
- Secretariat Teleworker
- Connected City Agent
- Energywise
- Greenaware
- Digital Display Media

Value proposition of Smart Cities

Government, Master developer (In case of Korea)

- Public Benefit through Smart City Services : Smart City Benefit/Cost ratio: 1.57
- Minimizing Operation Cost of Smart City Services : 10% saved Smart City Implementation and Operation Cost

- Increased Asset Value & Marketing Effect : 10% increased property value (USD 600/m2)

Citizens, Visitors

- Improved Safe and Secure City : 40 % decreased crime rate
- Effective Urban Infra : 40 % increased parking lot capacity case

A3. Research about the smart cities and its role in the information society

About Smart cities

Do more with less:

In today's difficult global economy, municipal governments are struggling with demands to increase basic services and to do so with fewer available resources. So municipal government should have more smarter, more strategic investments in their communities, to make the maximizing value in the long term.

Bridge silos in information and operations:

Even as cities tackle issues that cut across segments of society - for example, transportation policies that affect economic development - their operations are organized and their data is collected separately. Changes in technology, data analytics and other tools can help cities bridge those gaps and enhance collaboration across departments.

Use civic engagement to drive better results:

When cities contemplate new ways to deliver basic services, support from their citizens is essential to their success. Citizens who are uninformed or disengaged cannot support, and may actively oppose, even the best policies. It is need to reimage the relationships with citizens, leveraging them as both sources of data - the pulse of the city - and as partners in seeding change.

Invest in infrastructure for better management:

Many of today's cities are suffering from years of disinvestment in basic infrastructure, and especially technology infrastructure. These gaps, due in part to budgetary pressure but also to the regular turnover of leadership, have kept cities, their leaders and citizens from realizing their full potential, slowing economic development and constraining their ability to make informed, data-driven decisions. Smarter Cities all over the world are demonstrating how the right investments in infrastructure can show long-term efficiencies and dramatically transform a city's prospects for growth.

Role of Smart cities

Cities can't focus on such short-sighted solutions. They need systemic and longer term improvements. And that begins with examining their data and using it to take decisive action and reengineering how their governments are organized. For example, while school achievement data might be a good parameter for determining which schools and teachers are effective and which are not, a closer child-by-child examination — which is

now possible using data analytics — can determine not only which students are doing well, but for those not doing well it can analyze the cause of the problem and suggest to the teacher a more effective solution. The result - increasing achievement and decreasing costly remediation.

In areas of the country most affected by snow, the use of weather prediction and analytics software can help determine in advance which storms are most likely to require more snow removal equipment and staff and help manage the resultant budgets accordingly. In public safety, better analysis of crime data can lead to better deployment of the public safety workforce, lowering crime and reducing cost. Smarter Cities are possible and better choices regarding budget cuts are possible, but only with better use of data.

Organizing our cities in inefficient and duplicative silos should become a thing of the past. Every department of government doesn't need its own data center and every school district doesn't need to order its own supplies or route its own buses. Consolidation across departments and across cities, counties and states can allow for significant efficiencies and economies with the savings used to reduce budgets or enhance services.

Another important step is to engage the public, and seek its support, by arming it with the data.

For the foreseeable future, cities may have to do more with less, but that need not make them less livable. By starting with the data, which know no political party, and working collaboratively across the public, private and civic sector, city governments can take the first steps toward creating more livable cities and a brighter future for all citizens.

A4. Ranking of Smart Cities in the world

Various indicators to measure Smart Cities

As mentioned earlier in the definition of Smart Cities, the construction of the new city and the innovation of the existing urban must be required to prepare for the growing urban population.

But the city is also a base for environmental destruction. The population density will be caused by the following problems.

- Soil and air pollution
- Volume of waste generated
- Greenhouse gas emissions caused by the use of energy-intensive
- Occurrence of water stress due to the excessive use of water resources

Thus the concept of the smart city was born. However, the definition has been discussed, but has many twists. Finally, the following 3 keywords can be called "least common multiple" of the variety smart cities concept.

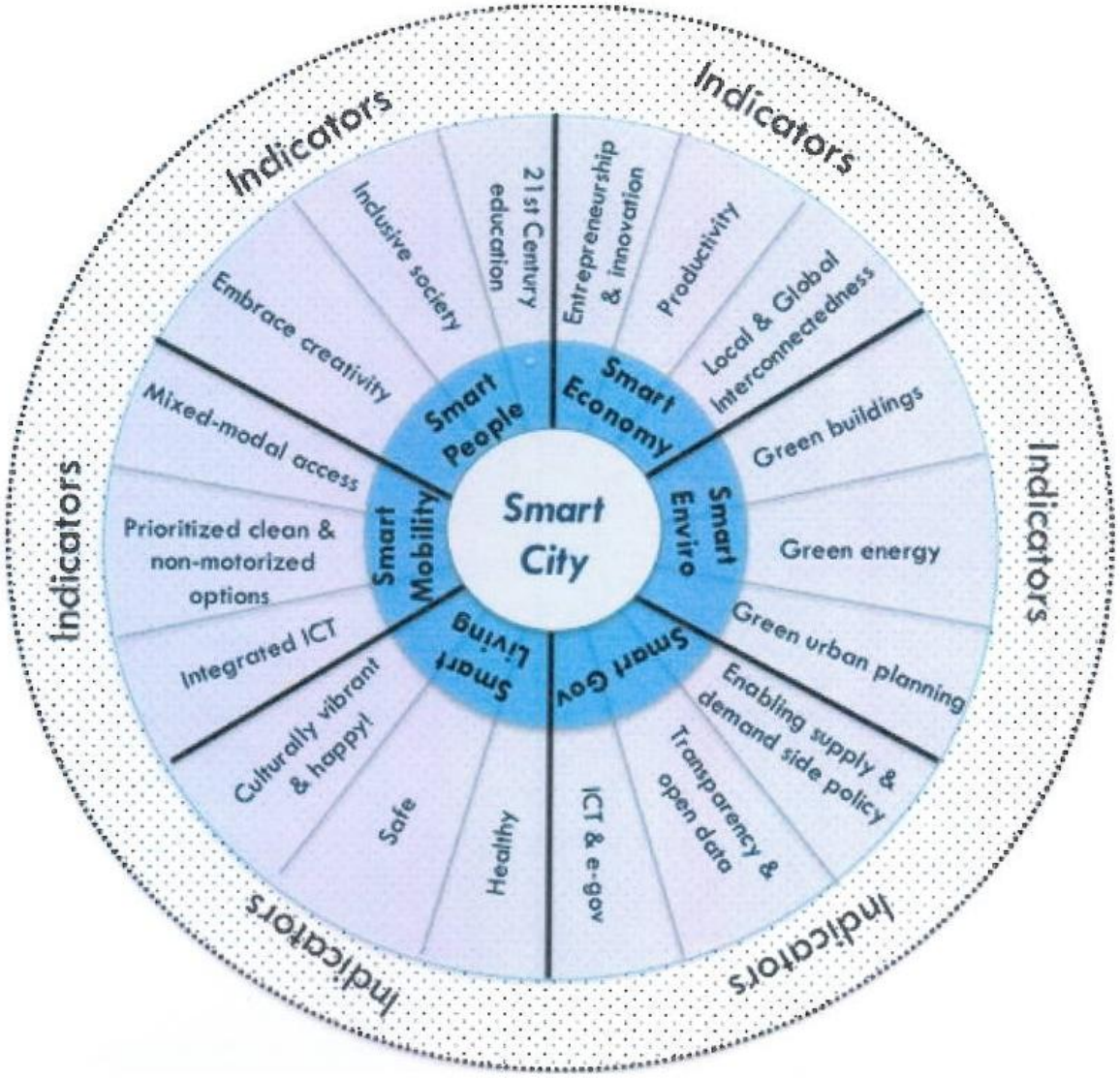
- State-of-the-art technology
- Conveniences of cities
- Environmental appropriateness

These days there is no perfect methodology to measure the ranking of smart cities. Therefore, it has relied on the Innovation Cities Index mostly.

Innovation Cities collects more than 160 indicators on innovation in global cities and then provides a ranking.

A smart city must be an innovative city. From this point, the following table is used to develop and implement a smart city strategy. And we can measure a ranking of Smart Cities using this table.

Anyway, this methodology allows us to begin benchmarking and sharing information across cities around the world.



Picture : **Smart Cities Wheel** by **Boyd Cohen**

Because multiple data sources to compare Smart Cities have regional characteristics, ranking were determined by the region. Therefore, top 10 of the Smart Cities in Europe, North America and Asia/Pacific were set.

The 10 Smartest Cities in Europe

Final Rank	City	Smart Economy	Smart Environ.	Smart Govern.	Smart Living	Smart Mobility	Smart People
1	**Copenhagen**	7	1	8	4	3	1
2	**Stockholm**	2	2	5	7	5	4
3	**Amsterdam**	6	3	7	5	1	5
4	**Vienna**	10	8	1	1	2	7
5	**Paris**	4	5	4	8	7	2
6	**Berlin**	1	4	6	6	6	9
7	**London**	5	6	3	9	10	3
8	**Barcelona**	8	7	2	10	4	6
9	**Munich**	3	9	9	2	8	10
10	**Frankfurt**	8	10	10	3	9	8

1. **Copenhagen.**
   The city may be most famous for its crazy high rates of cycling commuters (close to 40%!) but Copenhagen is more than people in suits on bikes. Their green credentials are world class. Copenhagen ranked number one in Europe on the Siemens Greenest City Index and number one in my Smart Environment ranking as well. Copenhagen has a bold target of becoming the first major capital city to achieve carbon neutrality by 2025. The city generally scored well across all components, but also took home first place in the Smart People category due to its strong human capital ranking.
2. **Stockholm**.
   Stockholm also has strong green, ranking number two in Europe on the Siemens index and also aspiring to achieve carbon neutrality by 2050. Stockholm ranked second on Smart Economy component.
3. **Amsterdam**.
   While Copenhagen gets more attention for its enthusiasm for cycling, Amsterdam is the undisputed leader in Europe, and probably the globe, with respect to non-motorized transit use. Almost 70% of total mobility in Amsterdam is either walking or cycling--what the European Metropolitan Transportations Authority refers to as sustainable mobility. Amsterdam also scored in the top five in the Smart People, Smart Environment, and Smart Living categories.
4. **Vienna**.
   Vienna has quietly become a leading smart and sustainable European city. Vienna scored first or second in three of the six components: Smart Mobility, Smart Governance, and Smart Living. Out of 100 capital cities around the globe, Vienna's e-government initiatives rated 12th, and third among the finalists in this ranking. Vienna also has embraced open data with 168 data sets available to the public. It is among a few cities in the top 10 to be actively participating in the development of the City Protocol.

5. **Paris**.
   Paris was ranked the top five in four of them (Smart Economy, Smart People, Smart Governance, and Smart Environment). On the Smart Economy front, Paris was rated the second-best city in Europe for startups. With respect to Smart People, Paris rated only barely behind Copenhagen in the Citigroup study (Copenhagen's score was 80.2 while Paris's was 80.1). And despite only being ranked seventh in the list for Smart Mobility, Paris has shown real innovation in the mobility space.
6. **Berlin**.
   While Scandinavia represented well with the top two spots in the ranking this year, Germany has three cities in the top 10, beginning with Berlin. Berlin scored number one in Smart Economy and fourth in Smart Environment. Berlin has low rental prices, low housing costs, lower salaries, a high-quality labor force, great engineers, and it's a fun and creative place.
7. **London**.
   This city was rated the No.1 startup capital in all of Europe. Aside from having a Smart Economy, London also ranked third in both Smart People and Smart Governance. London scored ninth of the 100 capital cities surveyed for e-government efforts, which placed the city only behind Stockholm among the top 10 European cities in this ranking. London's transit system is still enviable, particularly compared with major cities around the globe.
8. **Barcelona**.
   Barcelona made the top 10 global rankings last year so it is no surprise that it would be on this more robust ranking of smart European cities. Barcelona is doing so many things well that it is hard to highlight only a few: municipal leadership, innovation, and green initiatives like requiring solar hot water in larger buildings. But overall it is the city's governance that stands out. It has the second highest volume of open-data sets (over 500) of the finalists, and city leaders are not only seeking to transform Barcelona into a leading European smart city, but also to provide leadership to aspiring smart cities around the globe.
9. **Munich**.
   The second of three German cities to make the top 10 this year, Munich ranked highest in Smart Economy (third) and Smart Living (second). It has the lowest crime rate in all of Germany and more head offices of international companies than any other German city. It is also the global headquarters of Siemens, one of the major multinational players leading the smart cities revolution. Munich is not a city just for multinationals--it was rated eighth best startup city in Europe.
10. **Frankfurt**.
    Its highest ranking of the six components was for Smart Living, where it ranked third amongst the 10 finalists. However, Frankfurt also showed leadership in other areas. It was rated 57th in the world on the Brookings Institute economy ratings. Frankfurt is also home to the world's first green skyscraper (Commerzbank Tower).

The 10 Smartest Cities in North America

Final Rank	City	Smart Economy	Smart Environ.	Smart Govern.	Smart Living	Smart Mobility	Smart People
1	**Boston**	1	5	3	5	4	1
2	**San Francisco**	5	1	6	4	2	1
3	**Seattle**	2	3	1	9	8	3
4	**Vancouver**	7	2	7	1	3	6
5	**New York**	3	5	2	8	1	8
6	**Washington, DC**	5	7	4	6	7	4
7	**Toronto**	8	7	8	2	9	5
8	**Chicago**	9	9	5	6	5	8
9	**Los Angeles**	4	4	9	10	10	6
10	**Montreal**	10	10	10	3	6	8

1. **Boston**.
   Aside from having a world-class innovation system (as evidenced by things like New Urban Mechanics office, which “serves as the City’s innovation incubator, building partnerships between City agencies and outside institutions and entrepreneurs to pilot projects in Boston that address resident and business needs") Boston also has some of the smartest residents in the world. It helps that Boston is home to more than 70 universities and colleges, eight of which are dedicated research universities with $1.5 billion in annual R&D expenditures.
2. **San Francisco**.
   San Francisco is a vibrant city with a high quality of life and a thriving entrepreneurial economy. San Francisco has become a destination for technology and civic-minded entrepreneurs: Aside from the well-known tech-world heavyweights, it is also the home to numerous organizations like Code for America, which definitely bodes well for its smart future. One of the areas where San Francisco really stands out is in its environmental leadership. Out of 30 leading North American cities studied, San Francisco rated among the top three in several categories, including in energy, building, waste, and air quality.
3. **Seattle**.
   Seattle impressively scored in the top three in four of the six components. Seattle achieved top billing in smart governance, grabbing a No.1 position in the e-governance ranking from the E-Governance Institute. Seattle has been a North American pioneer developing its first e-government strategy in 2004, and more recently using both RFIDs to track waste and Twitter to communicate about stolen vehicles. The city also performed well on the Smart Economy component. In fact, Seattle had the highest economic performance rank of U.S. cities resulted by measuring economic performance as a function of GDP, employment, population, and income.

4. **Vancouver**.
   Vancouver was second in North America behind San Francisco on the Siemens Green City Index. And along with San Francisco, Vancouver was the only other city to achieve a top-10 ranking in all nine index categories. Vancouver aims to become the greenest city in the world by 2020. Vancouver has the highest quality of life in North America: Low crime rates, good education, temperate climate, and easy access to nature. Vancouver is not yet a leading city in the use of smart ICT solutions, but it does have a thriving ICT sector so it is probably only a matter of time until it becomes one.
5. **New York City.**
   It had the highest walkability score, the highest transit use, and the No.1 position on the transit component of the Siemens Green City Index. Aside from transit, New York also scored top honors in open data, an indicator of smart governance. New York's 1,306 open data sets make it the clear leader in North America and Europe. NYC is clearly committed to involving the developer community as evidenced by its pioneering effort with its NYC Big Apps competition.
6. **Washington, D.C.**
   While D.C. did not lead in any of the six components, it was amongst the top five in three (economy, governance, and people). D.C. is one of the top cities in the U.S. for transit use and e-governance (D.C. was 2nd amongst this list according to the E-governance Institute rankings). Washington D.C. has been a pioneer in the adoption of new technology, including the launch of a private cloud in 2010 and the early use of mashups to become a "GIS model city."
7. **Toronto**.
   Like Vancouver, Toronto scores high in Smart Living as measured by the Mercer Quality of Life index. Toronto was also rated as having one of the smartest populations among big cities in Canada according to Maclean's recent ranking. Furthermore, Waterfront Toronto recently built and launched Canada's first open-access broadband community network that uses fiber optics.
8. **Chicago**.
   Former Mayor helped usher in numerous innovations and was committed to greening the city, and under Rahm Emanuel, the city seems to be headed toward even more smart city improvements. For example, Chicago has committed to open data: it now has 851 open data sets. As part of an initiative first launched in 2007, Chicago's Digital Excellence Smart Communities Program is working with five local communities in an attempt to close the digital divide for the elderly and lower-income residents of the city.
9. **Los Angeles**.
   Los Angeles is famous for its sprawl and traffic jams, which are reflected in a low rate of transit use (11.6%), the lowest by far of any of the cities in this ranking. However, L.A. is starting to break out of the box with increased density, growing its network of pedestrian and cycling paths and increased use of renewable energy. L.A. also is starting to create a thriving technology entrepreneurial ecosystem and is rated fourth globally in the inventive cities ranking. L.A. is now home to dozens of technology accelerators and incubators, including Launchpad L.A., which funded and supported 23 ventures between 2009 and 2011.

10. **Montreal**.
    One of the most “European” cities in North America, Montreal is also one of the more dense cities with high-quality public transit. Montreal is one of the best cities for cycling in North America. Montreal has plenty of room to improve as a smart city but it is on the right path.

The 10 Smartest Cities in Asia/Pacific

Final Rank	City	Smart Economy	Smart Environ.	Smart Govern.	Smart Living	Smart Mobility	Smart People
1	**Hong Kong**	2	2	2	6	1	1
2	**Singapore**	3	4	5	3	4	3
3	**Seoul**	5	1	1	7	5	10
4	**Tokyo**	8	5	7	4	5	7
5	**Auckland**	9	6	4	1	10	2
6	**Sydney**	6	10	6	2	9	4
7	**Kuala Lumpur**	1	6	8	8	7	6
8	**Taipei**	7	3	9	9	3	5
9	**Shanghai**	4	6	3	10	8	8
10	**Osaka**	10	6	10	5	2	9

1. **Hong Kong.**
   Of the 10 cities in the study, Hong Kong scored in the Top 2 in five of the six categories, and earned top honors in Smart Mobility and Smart People.
   Hong Kong is a dense and cosmopolitan city, which has attracted highly educated expatriates from around the globe. Hong Kong is also actively leveraging information and communication technologies (ICT) to improve efficiency and citizen services. The city has one of the first and most successful implementations of smart cards for residents (Octopus), allowing them to use one card to pay for public transit and parking, schools, and in some cases even access to smarter buildings.
2. **Singapore.**
   It was impressed with numerous initiatives and smart/green implementations, from rainwater capture to the city's impressive, clean, and punctual transit system. The city-state ranks particularly well in terms of its physical capital (ranked joint first overall), financial maturity (joint first), institutional effectiveness (6th), environment and natural hazards (joint 8th) and global appeal (4th).
3. **Seoul.**
   Seoul was actually ranked No.1 in two components: Smart Environment and Smart Governance. Seoul got top billing due to its impressive performance in the climate change arena. Seoul has one of the lowest CO2 emissions rates of any major city around the globe. With respect to governance, Seoul obtained a No.1 ranking in the Rutgers e-governance study -- not only in Asia, but also as compared to all 100 capital cities studied around the globe.

4. **Tokyo.**
   Tokyo ranged between 4th and 8th place on all six components. Last year it was reported that Tokyo is collaborating with the private sector -- key to successful smart cities initiatives -- to create a smart town in one of its suburbs, Fujisawa. Specifically, nine companies, headlined by Panasonic, have joined forces with Fujisawa to initiate the pilot smart technology solutions for the community, ranging from a complete EV infrastructure implementation to smart homes and renewable energy supply to reduce dependence on nuclear energy.
5. **Auckland.**
   Auckland scored in the Top Five in three components, including a 1st place ranking in Smart Living and 2nd in Smart People. Auckland also ranked 14th globally in the Rutger's e-governance study, resulting in a 4th place finish in this Asia/Pacific smart cities ranking. Just like Tokyo's pilot project in Fujisawa, Auckland has its own smart cities test bed in what is referred to as Waterfront Auckland. This waterfront redevelopment project, expected to be home to 20,000 people, is embracing a range of sustainable and smart solutions, including: super energy efficient buildings and a conference center, smart water solutions, smart lighting in public spaces using sensors, and digital multimedia information kiosks for Waterfront Auckland visitors
6. **Sydney.**
   Just like Auckland, Sydney got its highest marks for Smart Living and Smart People. Sydney excels in fostering an innovation economy. One major concern for Sydney is its climate. Without a doubt, Sydney's approximately 27 tons of greenhouse gas emissions per capita, per year. Sydney will struggle to move up in any benchmarking of major cities that factors in emissions, until it takes more aggressive measures to spawn a low-carbon economy.
7. **Kuala Lumpur.**
   Yet Kuala Lumpur fared well enough across the six components to earn a No.7 ranking. The Brookings Institute lauded Kuala Lumpur for its rate of income growth: Residents in this developing city have seen their average income grow by more than 50 percent in the past 15 years. That, of course, can help increase the quality of life and spur further local innovation.
   Perhaps most importantly, Kuala Lumpur has taken a leadership role in introducing a wide range of transit modalities. It has implemented a light rail system and a bus rapid transit program; and a new underground metro system is under construction.
8. **Taipei.**
   The city turns in a consistently strong performance, with above average rankings in seven of the eight individual categories. In the energy and CO2 category, Taipei City has the second lowest energy consumption level in the Index, and among cities with a similarly high income (above $25,000 in GDP per capita), it has the lowest CO2 emissions per person. In addition to being green, Taipei has actively embraced ICT solutions to improve the quality and efficiency of service delivery to its citizens, as well as to support a local innovation economy. A few examples include an integrated citizen hotline linking more than 200 city departments; the use of open GIS tools for communicating real-time traffic patterns; and the establishment of the 770 hectare Taipei Technology Corridor to promote the growth of the ICT sector in the region.

9. **Shanghai.**
   Shanghai was rated 10th best capital city for e-governance by Rutgers.
   Shanghai, like Taipei, has engaged in numerous ICT-related projects in recent years. It rolled out China's largest broadband network, which now reaches 6.5 million homes in the city. Shanghai has rolled out WiFi access in 17,000 public venues. More recently, the city implemented smart grid technology as well as an electronic road tolling system.
10. **Osaka.**
    With major multinational technology companies like Panasonic, Sharp, and Sanyo, it is no surprise to see the city begin to explore partnerships for testing smart solutions. Like other cities in this ranking, Osaka is embarking on a test project for smart technologies. From 2012-2014 Osaka will create a test bed in the Sakishima District for a range of solutions from smart grid and building sensor technology to nursing-care robots.

Smart Cities Ranking Methodology by Boyd Cohen

Without a team of researchers, nor the budget of a multinational, I have relied on the Innovation Cities Index to narrow down the pool to a manageable list of cities to rank.

Innovation Cities collects more than 160 indicators on innovation in global cities and then provides a ranking. I believe that a smart city must be an innovative city.

So in order to be considered in the Asia/Pacific smart cities rankings, the city must have achieved a Top 100 global ranking in the Innovation Cities Index. This narrowed down the potential candidates to 17.

Once I had the 17 cities for consideration, I leveraged the Smart Cities Wheel to search for databases with comparative data on essential components. Below is a table that summarizes the secondary data sources used to benchmark and rank smart cities.

Table : Data Sources

Component	Publisher	Description	Notes	Links (where applicable)
Smart Economy	Brookings	Brookings Institute researches economic growth rates in 300 of the largest cities across the globe.		Global MetroMonitor 2012
Smart Environment	Siemens	Siemens developed the Green Cities Index for most major regions including Asia.	Premier ranking of green cities in Asia but does not include Australian and New Zealand cities.	Siemens Green City Index

	Other	CO2 per capita	Using Siemens data and data from other sources, to obtain CO2 per capita for each city.	
Smart Governance	Rutgers	Gathered data on 100 major cities to assess security, usability, and content of municipal websites; the type of online services currently being offered; and citizen response and participation through websites established by municipal governments.	While the researchers have not yet published their latest ranking, they were kind enough to provide me an advanced copy for use in this report.	N/A
	Carbon Disclosure Project	The CDP recently launched a standard for cities to transparently report their carbon footprints.	Note, the use of CDP for cities reporting was a binary measure in this study (yes/no) as a proxy for levels of transparency in cities.	CDP Results
Smart Living	Mercer	Mercer measures a range of indicators on the quality of life in cities around the globe.		Mercer's 2012 Quality of Living Survey Results
Mobility	Siemens	Green Cities Index contains analysis of 3 aspects of municipal transit.	Cities are grouped into 4 different categories depending on their performance on those 3 aspects of municipal transit.	Siemens Green City Index
	Other	I used multiple sources to obtain information on public transit ridership per capita.	It is surprisingly difficulty to obtain comparable data on transit ridership across cities in the region. Ideally, would like to add non-motorized transit but data not widely available.	N/A

Applying the Smart Cities Wheel

Whenever possible, I identify robust sources of data that have in themselves utilized multiple indicators to assess one component of the smart cities wheel.

Smart Living is measured very well by Mercer's annual Quality of Living rankings. Mercer uses 39 criteria across health, crime, education, climate, and other categories to rank the quality of life in more than 200 cities each year.

The same goes for Citigroup's Hotspots report and its application to the Smart People component. The Hotspots report "compares 200 of the world's major urban agglomerations across eight distinct categories of competitiveness and 31 individual indicators." I used Citigroup's Human Capital dimension as the lone metric for Smart People.

I sought to use the same data source to compare all cities in the study. Unfortunately, that was not always possible, so I had to use multiple sources. This opens up the risk that some of the data is not perfectly comparable. This occurred, for example, in the analysis of Smart Mobility. While Mobility is one of the categories of the Siemens Green City Index -- a great resource for comparing cities on sustainability -- this study did not include cities from Australia and New Zealand in its ranking. Therefore, I found additional information about mobility in these cities. (I sought, but was unable to obtain, comparable data on non-motorized transit use in the Asia/Pacific region. I believe high rates of non-motorized transit [e.g., walking and cycling] demonstrate smart urban planning.)

While the data used here is secondary, this methodology leads to quality results and opens up the discussion of what makes a city smart, allowing us to begin benchmarking and sharing information across cities around the world.

Bibliography:

6 Key Components for Smart Cities - Boyd Cohen
Smart Cities Ranking Methodology - Boyd Cohen

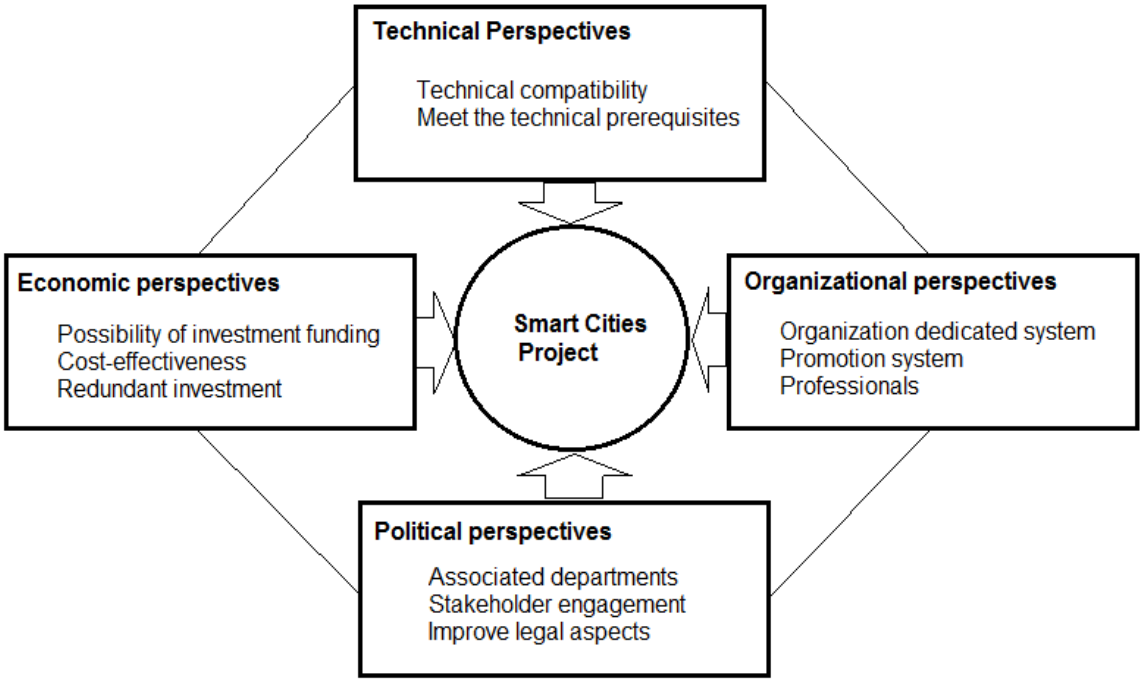
M2. Smart Cities Implementation considerations

A1. The important aspects to be considered for implementing Smart Cities

1. Four aspects

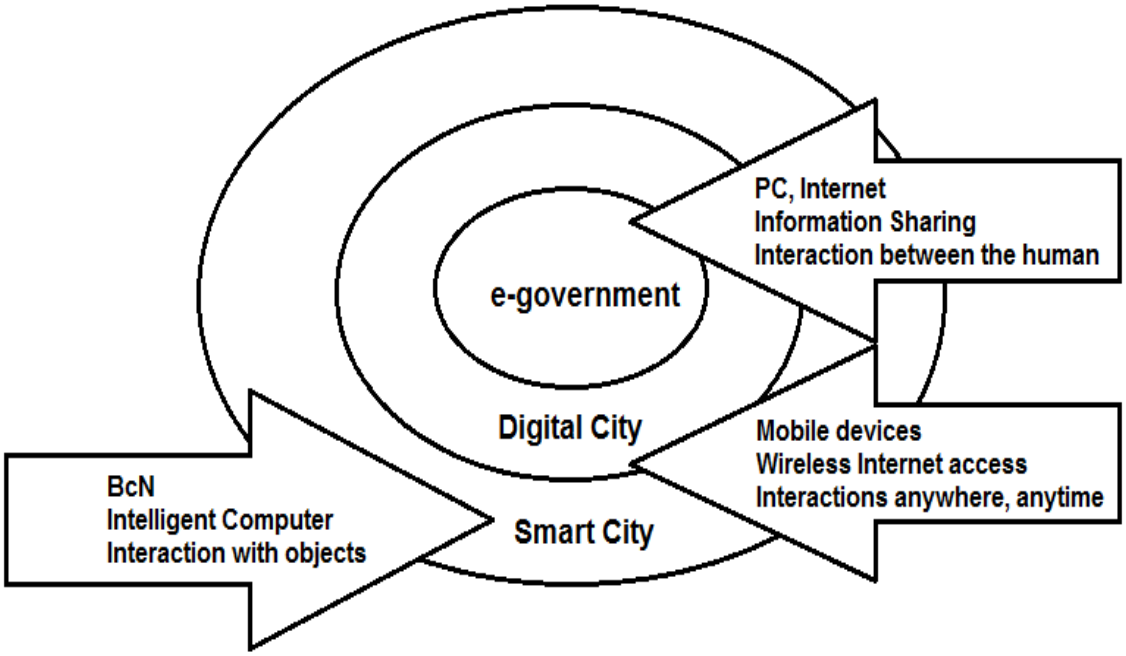
Smart Cities Project should be propelled with the following four aspects:

- Technical perspectives
- Economic perspectives
- Organizational perspectives
- Political perspectives



The current implementation status of Smart Cities in many local governments be confusing for the concept. The reason is that they are promoting Smart Cities project only by changing the name to 'Smart' from e-government project.

2. Relationship of e-government, Digital city, Smart Cities



3. The Local Government Strategies for the Realization of smart Cities

3.1 Basic Strategy

Many cities around the world are being successful in efficiency of city's function and in attracting foreign companies and tourists, through expanding digital services by promotion of Smart Cities to fit its environment.

However, the following is true that there are many non-effective promotion.
- Smart Cities promotion plan without considering strategies
- Declaration of vision only, without concrete strategies
- Lack of e-government maturity

Eventually the concept of Smart Cities means the extension of e-government.
Currently most of the business called Smart Cities project are the most advanced technological level of e-government projects.
Thus, Smart Cities project should be applied state-of-art technologies on the basis of e-government business.

Awareness of the need for step-by-step promotion
- Smart Cities project can be implemented effectively on the foundation of e-Government and Digital Cities.
- Smart Cities project is not mandatory, it is an optional to determine after

consideration of various status. Also it will not be a good for too fast time. Therefore, when there is a lot of feasibility, the Smart Cities implementation strategy will be effective.

3.2 The strategy of Technical aspects

Preparing of guidelines of the central government to improve the technical compatibility

- Comprehensive guidance, technical standards
- Goal of local government.
- Common information technology and products.
- Central governments provide support for the standards of local government

Upgrading of the network

- Research of publicity implementation method of fixed-line network
- Fiber link to Home
- Anywhere, anytime wireless network construction

3.3 The strategy of Economic aspects

- Securing diversified investment funds
- The demands determine with considering the cost effectiveness
- Improving the s/w consultation and adjustment system to prevent overlapping investments
- The development of additional services

3.4 The strategy of Organizational aspects

- Plan the installation of a dedicated organization
- Upbringing of specialized personnel
- The establishment of promotion system

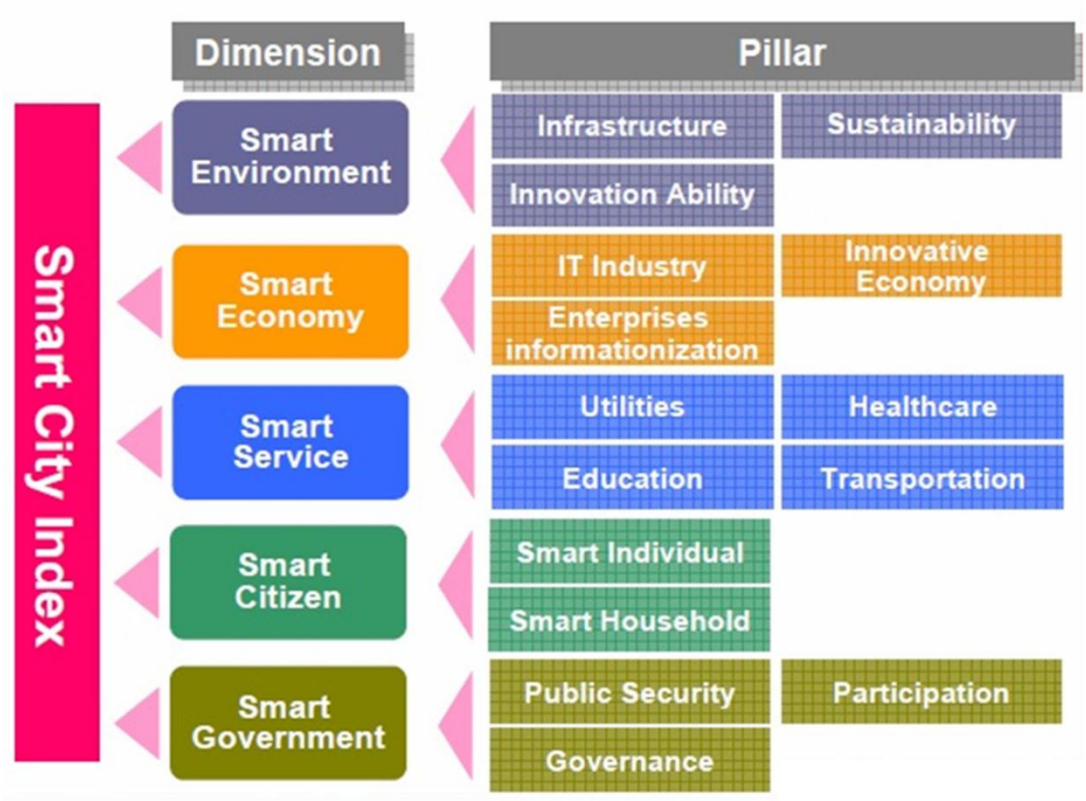
3.5 The strategy of Political aspects

- Linkage between relevant ministries
- Activation of stakeholder engagement
- Linkage to existing plans
- Improve the law and institution

A2. The importance of process automation and Smart Cities services

Many of future city-related indices have been developed for assessing Smart City. Though the concept of smart city and that of Digital-City are slightly different, it is still valuable to explore indices related to Smart City as another concept of the future city.
In this chapter, the structural analysis of Smart City, the major indices for Digital City assessment, and the process automation factors of the Smart Cities Services were described.
Therefore, the definitions of the Smart Cities and Digital Cities must be distinguished exactly. After that, the implementation goal should be set.

1. Structural Analysis of Smart City



Source: FIND-III, CCID, 2010

2. Indicators Included in the Digital-City assessment

Division	Sub-Division	Indicators
ICT	Infrastructure and access	Fixed-telephone subscriptions
		Percentage of households with a computer
	Use	Percentage of individuals using the Internet
		Number of Internet subscriptions
	Skill	Secondary gross enrollment ratio
		Tertiary gross enrollment ratio
Infrastructure	Intelligent facilities	Civil affairs administration
		Transportation
		Medical welfare
		Environment
		Crime/disaster prevention
		Education
		Culture
		Work/employment
	Communications network	Cable
		Wireless
	Operation center	
Service	Civil affairs administration	
	Transportation	
	Medical welfare	
	Environment	
	Crime/disaster prevention	
	Education	
	Culture	
	Work/employment	
Management	Software	
	Hardware	

3. Process automation factors of Smart Cities

Characteristics	Factors
Smart economy	Innovative spirit
	Entrepreneurship
	Economic image & trademarks
	Productivity
	Flexibility of labor market
	International embeddedness
Smart people	Level of qualification
	Affinity to lifelong learning
	Social and ethnic plurality
	Flexibility
	Creativity
	Cosmopolitanism / open-mindedness
	Participation in public life
Smart governance	Participation in decision-making
	Public and social services
	Transparent governance
Smart mobility	Local accessibility
	(inter-)national accecibility
	Availability of ICT-infrastructure
	Sustainable, innovative and safe transport systems
Smart environment	Attractivity of natural conditions
	Pollution
	Environmental protection
	Sustainable resource management
Smart living	Cultural facilities
	Health conditions
	Individual safety
	Housing quality
	Education facilities
	Touristic attractivity
	Social cohesion

A3. The technological considerations for Smart Cities process automation services

1. The human-centered intelligence society

Smart Cities is a intelligence society that maximize the human-centered, eco-friendly, communications expansion based on ICT technologies.
A clear understanding of the desired future vision with the advancement of technology, and the master plan to achieve the vision after consider the political and social base are very important.

- Detail review for Technology & socio-cultural factors
- Development of various business models for the realization of intelligence society
- Requirement of the development effort for leading intelligent public services

2. The technological considerations for process automation services

In order to automate the Smart Cities process, the following new technical trend to be taken into account.

Mobility
- "Things Internet" to connect people and things
- The war In the clouds, "Cloud computing"

Autonomy
- "Intelligent robot" to replace the human
- The core of a human-centric services, "Context-aware computing"

Conversion
- Life extension's dream, "IT-Bio conversion Technology"
- A combination of real and virtual, "Augmented reality"

Bidirectional
- The open world by the communication and rapport, "Social Network"
- Optimization of communication, "Unified communications technologies"

A4. A model for e-services criteria selection for Smart Cities implementation

1. The core infrastructure to implement "Smart Cities"

"Smart Cities" is an organically combined city of seven core infrastructures such as city service, business, transport, communication, water, energy and citizen.

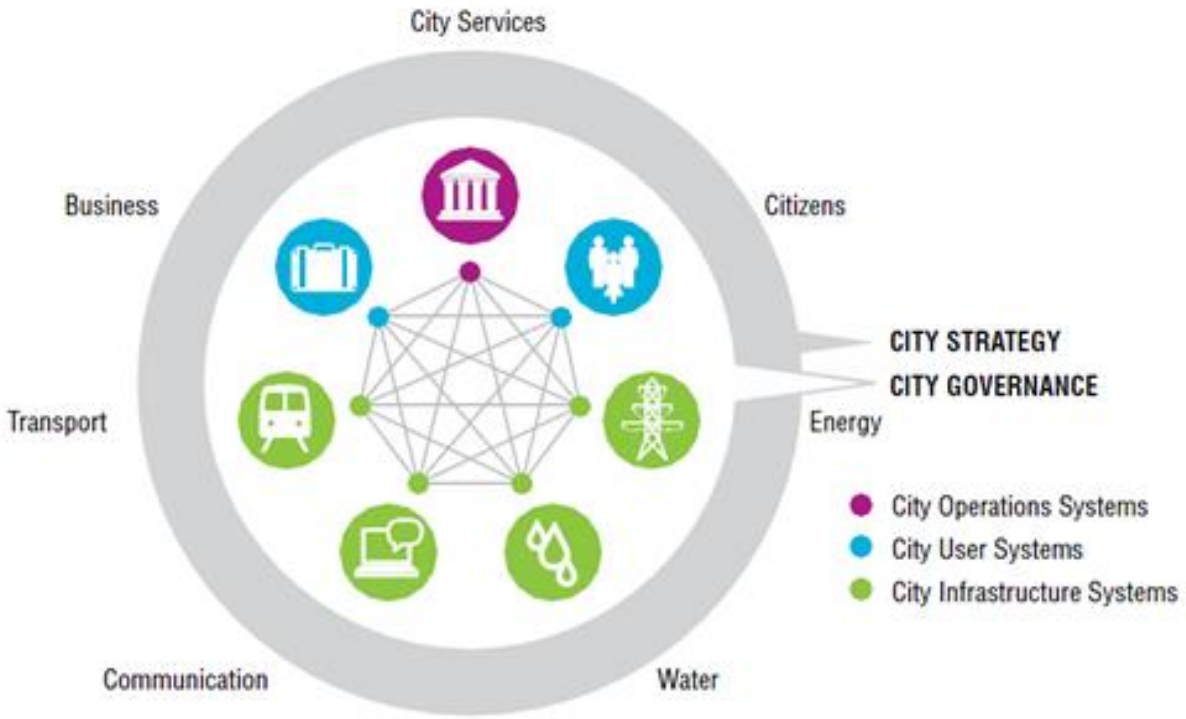


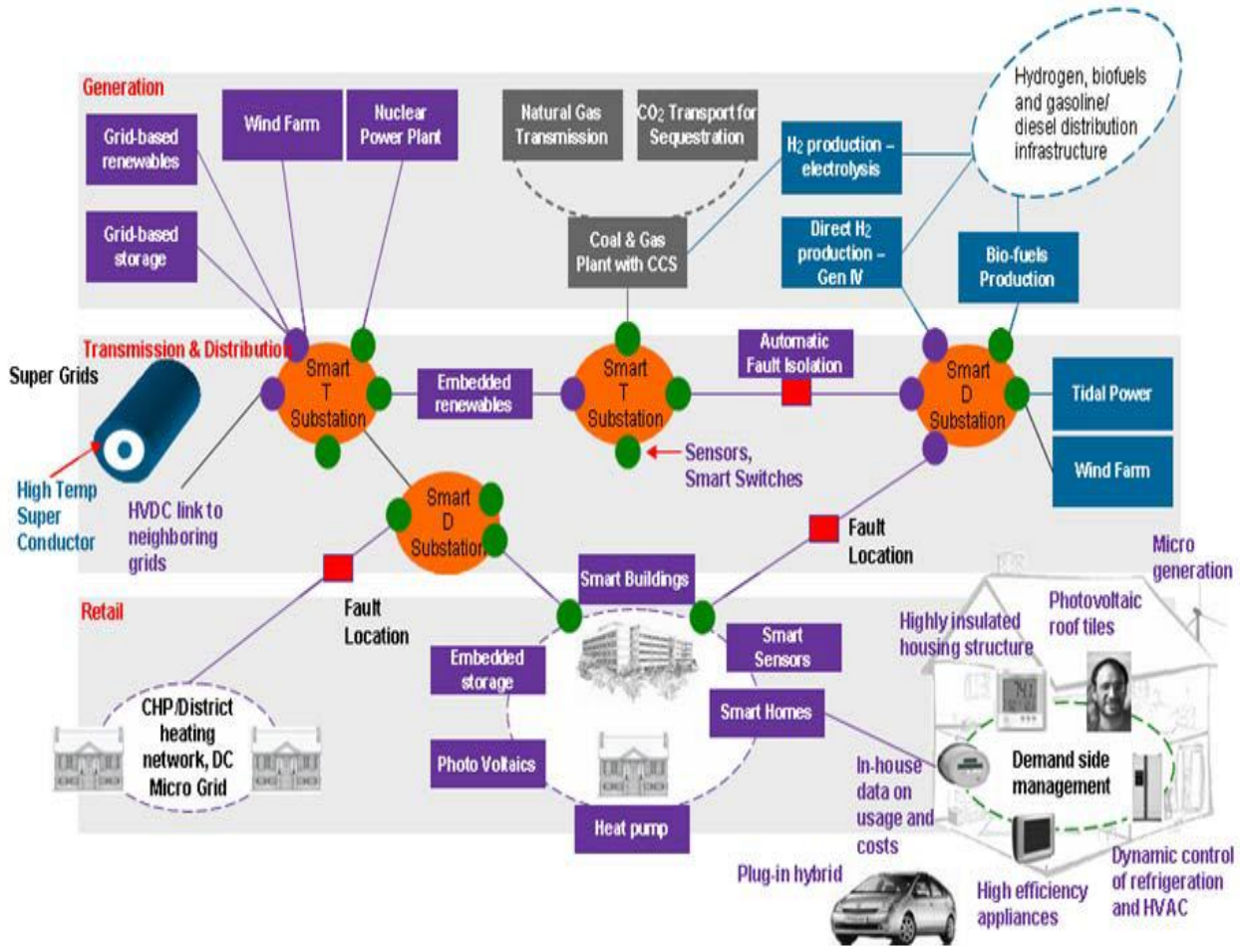
Figure of Smart City concept

Source: IBM(2009), 'A vision of smarter cities'

2. 'Smart City' implementation model

The implementation model of Smart Cities can be developed based on the intelligent network.

2.1 Intelligent Network



Source: Accenture

2.2 Components of Smart City implementation model

Mobility

- Fossil fuel vehicles minimize and electric vehicles continue introduction

Energy

- Energy demand response using real-time data

Water

- The water supply through the optimal pressure and minimizes leakage

Waste

- Provide incentives for recycling

Public Safety

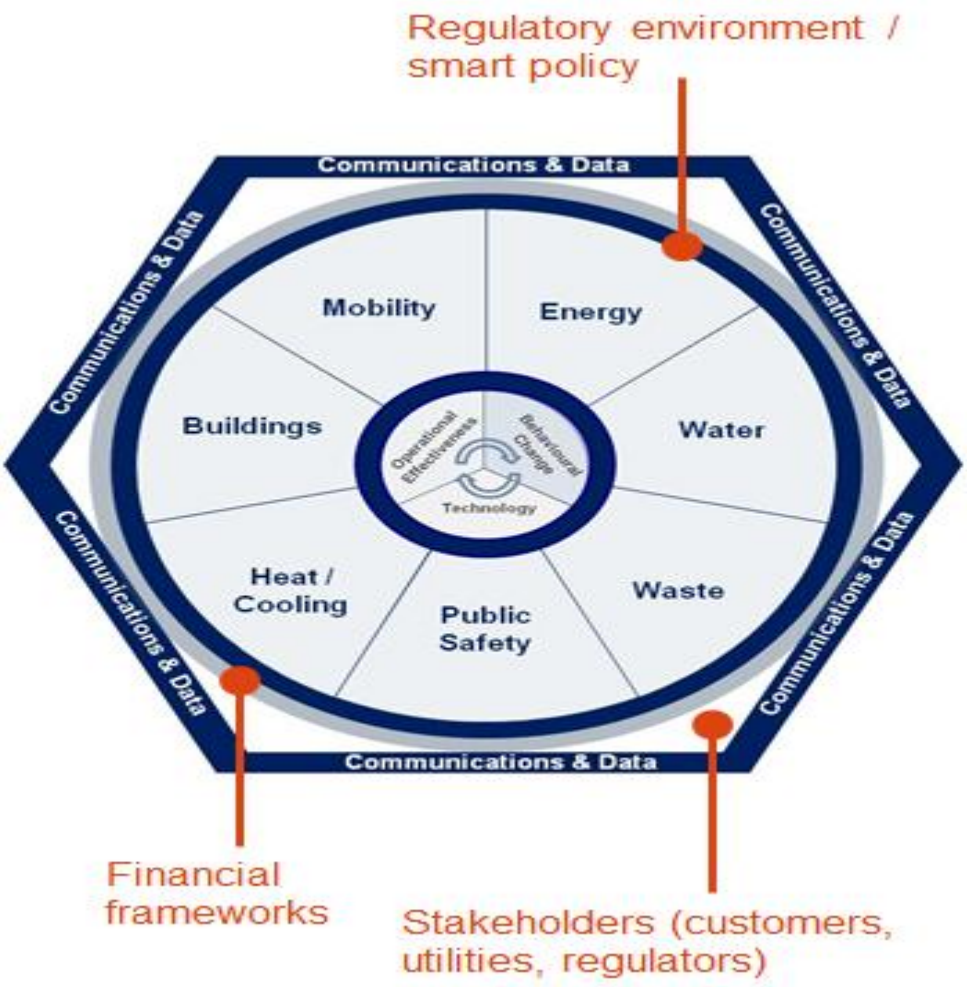
- Real-time access to information and ensure reliable security

Heat / Cooling

- High-efficiency air-conditioning system expansion

Building

- Intelligent buildings expansion and the use of solar energy



M3. Smart Cities and urban sustainability

A1. Smart Cities and the importance of urban planning

1. Cities Keep Changing

In 1900, the city population was a mere 13% of the world's population.
However, in 2008, the ratio is surpassed 50%,
in 2050, the proportion of the urban population is expected to reach 70%.

Each year approximately 60 million people move to the city and its surrounding area, this means more than 1 million people move to cities every week.
This change is unstoppable, and according to this, it made the result of the global problems such as the massive urbanization, city infrastructure burden increased, economic crisis and environmental pollution.

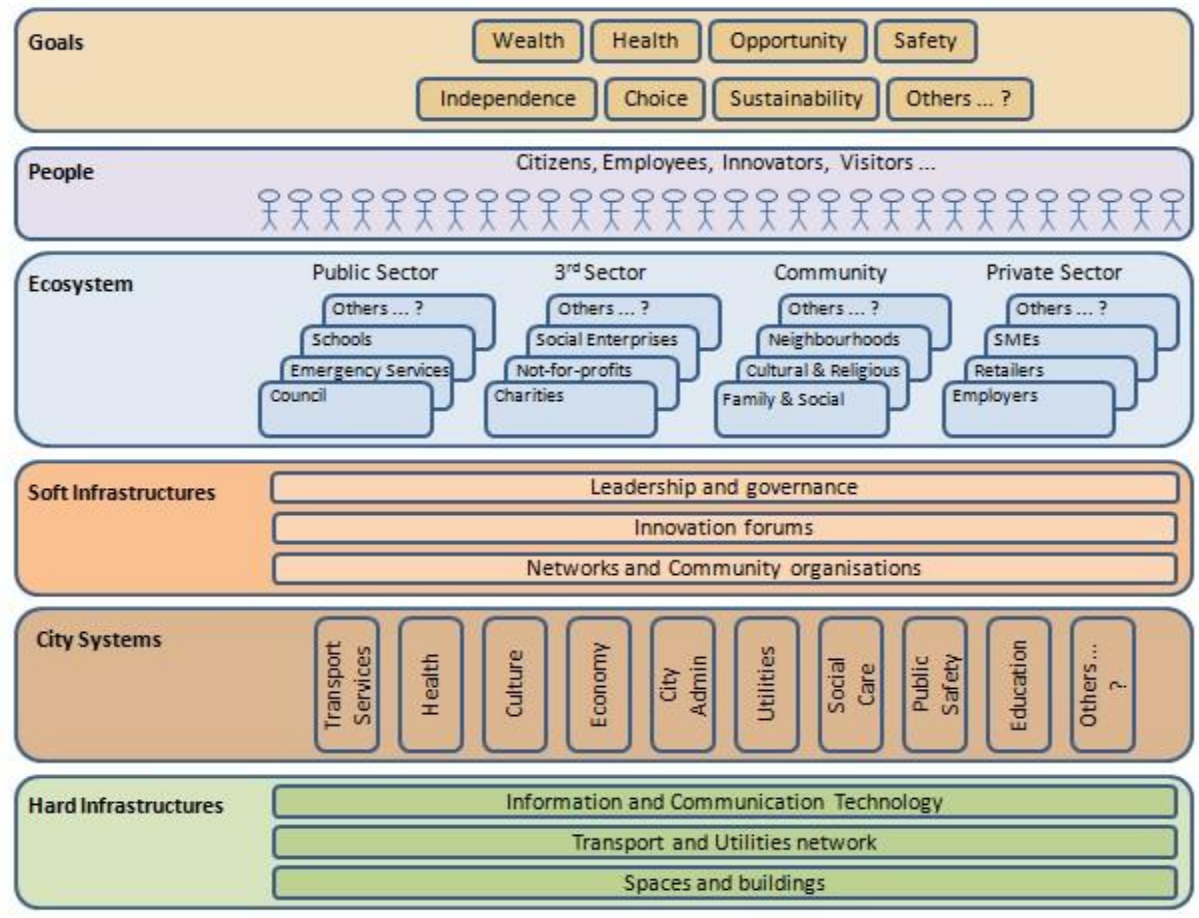
Under the "sustainable city" banner, city administrators are applying the effectively controllable intelligent system to city's transportation, security, environmental, and energy management to alternative for it.
This is not a solution to increase the intensity or to improve the efficiency about only one problem of cities, but this is a smart operation by integrated control through cross-linked and intelligent urban infrastructure.
This is 'Smart Cities' applied ICT from the city's planning stages to the stages of design, implementation and operation.

Arguably the biggest buzzword in urbanism right now is the ‘Smart City’.
But what exactly are 'Smart Cities'? What benefit do they bring us? And, more importantly, how can we best implement them to secure our future?
The answer, in my opinion, lies in the hands of urban planners.

In order to gain the Smart Cities development momentum and the benefit of citizens, businesses and local governments, the urban planning and solution to mediate between the traditional area and the innovative projects are needed.

2. Smart cities structure

It's also important, though, to consider what is different about the structure and organization of city systems in a Smart City.
How does a city decide *which* technology infrastructures are required?
Which organizations will make use of them, and how?
How can they be designed and delivered so that they effectively serve individuals, communities and businesses in the city?
What other structures and processes are required to achieve this progress in a Smart City?
In order to design the infrastructures and systems of Smart Cities well, we need to design them in context – that is, with an understanding of the environment in which they will exist, and the other elements of that environment with which they will interact.
The figure below – "Components of a Smart City Architecture" – is one way of describing the context for Smart City systems and infrastructures.
It contains six layers: "Goals", "People", "Ecosystem", "Soft Infrastructures", "City Systems" and "Hard Infrastructures".



Every Smart City initiative is based on a set of goals; often they focus on sustainability, inclusivity and the creation of social and economic growth.

The challenge for the architects and designers of Smart Cities is to create infrastructures and services that can become part of the fabric and life of this ecosystem of communities and people. To do so effectively is to engage in a process of co-creative dialogue with them.
The field of Smart Cities originated in the possibilities that new technology platforms offer to transform city systems.

Those platforms include

networks such as 4G and broadband;
communication tools such as telephony, social media and video conferencing;
computational resources such as Cloud Computing;
information repositories to support Open Data or Urban Observatories;
and analytic and modeling tools that can provide deep insight into the behavior of city systems.

Tim Stonor, Managing Director of Space Syntax, offered this commentary at the “Urban Planning for City Leaders” conference :

“The place to start is with the street network. Without this you can’t lay pipes, or run trams. It’s the foundations of urbanism and, without foundations, you’re building on sand. Yes, we can have subways that cut across/beneath the street network, and data packets that travel through the airwaves over the tops of buildings, but if these aren’t serving human interactions in effectively laid out street networks, then they are to little avail.”

So when we are designing a technology solution in a Smart City context – or indeed in any physical context – we are concerned with physical space; with transport networks; with city systems; and with human interactions. All of these are related to the more obvious concerns of information technology such as user interfaces, software applications, data stores, network infrastructure, data centers, laptops and workstations, wi-fi routers and mobile connectivity.

It seems to me that whilst the responsibilities and skills of “IT Architects” and Architects are not the same, they are applied within the same context, and cannot be separated from each other in that context. So in Smart Cities we should not treat “architecture” and “IT architecture” as separable activities.

3. Urban Planning of Smart Cities

Smart Cities was focused on ICT infrastructure at the beginning time, but now the building of infrastructure has been finished in many countries, and the projects are actively promoted based on the infrastructure.
And the scale is to be enlarged with the global crazy of the keyword 'Smart' in 'Smart phone' and 'Smart work'.

Each city has various goals to solve their problems, so Smart Cities project brought diversification at the result.
Typical goals are the implementation of city's wireless network, promotion of e-government, integration of public transport using ITS, decrease of carbon emissions and waste emissions.

Urban planning is very important, so Smart Cities must be planned with considering the above-mentioned diversification based on the current national and urban environments, goals and technology.

A2. Smart Cities and sustainable development

Literally Smart City is that all the infrastructure of the city to be smartly, and ultimately improve the quality of human life in the city.
But if you create a city with a today's vision only, the city may not be sustainable.
Thus, the Smart Cities projects should be big and wide works in the national urban planning.

1. Smart Cities by Pike Research's definition

"Smart City is in its infancy, so the model in various regions of the world will take a different form.
Now pilot project is underway, and a new urban center's design templates will be provided from Asia and the Middle East, and the existing city's infrastructure system is to be smartly from Europe and North America,
But, because there is no success story of Smart Cities to support millions of people, it seems to be many challenges."

By Pike's definition, Smart Cities is that a strategic approach of sustainability, better civic life and economic development will be fused to the technology.
In this regard, emphasizes the importance of the interaction, and added that it must be able to express the diversity of each element.
Also, to gain momentum of Smart Cities development, and to increase benefits of citizens, businesses and local government, the standardization to apply to any city is needed.

2. Smart Cities and sustainable development

Looking at the development of cities in the past, those improver developments proceeded under the situation of cities unequipped with infra facilities resulted in the decline of downtown. Such decline of downtown is a global issue.

As the results from consideration of sustainable urban theories and Smart Cities related theories, it showed that high density & intensive developments had a positive effect on the social stability of citizens as well as it reduced the use of vehicles to decrease the amount of urban energy consumption and to enhance the social fairness, and also grasped that those elements such as the amount of urban energy consumption, the density of cities, the use of walk and bicycle, traffic and accessibility, development for

comprehensive utility, social fairness have close relationship each other in connection with the development of Smart Cities.

In the development of Smart Cities, the existing studies about the importance of the elements of Smart Cities project to decide on a priority item in the elements of city planning selected the ones of traffic, environment and energy as the planning elements.
In the sustainable development of cities, it requires comprehensive developments such as economic development, community development, ecological development and it needs to include social mixture and invigoration of local community related to social sustainability, realization of the self-sufficiency related to economic sustainability into city planning elements for the realization of sustainable city.

3. Development of the city of Korea

Recently in the study of urban development and management in Korea, new paradigm of urban development such as new urbanism, 'Smart growth,' and sustainable development is on the rise.
The advent of new paradigm of urban development indicates efforts for solving complicated, chronic urban problems including customary traffic jams, environmental pollution, reduction in open spaces, insufficiency in housings for the low incomer, urban decline, and indiscriminate expansion of cities in the 20th century.
It is required highly-qualified residential environment based on increase in income level, and newly-developed cities require an appropriate urban model in which both environment and health are considered on the basis of land properties of each planned city.

4. Conclusion

As the urban space expanded, residents in civic center moved to the newly developed area in suburb while the commercial and business roles of civic center were maintained and even reinforced.
Hence, there was massive decrease in the number of people in civic center and this led to the doughnut pattern.
Further, the chaotic and extensional expansion of city drove the 20 century's urban planning to fail.
To recover the failed urban plan, "Smart Cities", which is to create high-density urban space through compressing urban area.
Based on this background, each part of the world started to establish various policies and discussion on 'Smart Cities'.
In particular, as a model of sustainable urban policy, the number of case toward to Smart Cities is growing.
To implement sustainable city, the Smart Cities policy is included, applied, and conducted in city development plan, from the prioritized-plan to district plan, for realization of Smart Cities.

M4. Vision for Smart Cities

A1. The impact of ICT infrastructure in GDP

1. Introduction

Around the world, the development of ICT is impacting to the quality of personal life as well as the governmental structure.
The most of higher GDP countries are promoting the ICT industry for key industries, and many countries invest for the ICT promotion continuously.

Meanwhile, each country has different cultural and environmental factors, and also the level of computerization is different. Therefore, different approaches with considering the country's characteristics are needed.
In OECD countries, the variables of ICT services, ICT related regal system and ICT infrastructure are appeared to influence on the national economy.

2. Summary of researching

The overall result of analyzing the effect of ICT infrastructure impacted the national economy and quality of life can be summarized as the followings:
First, the promotion of ICT infrastructure positively influence to the governmental effect and the quality of life.
Specifically, in terms of the government effectiveness the policies, deregulation, ICT human resource and ICT investment gave a positive impact, and in terms of life of people policies, PC supplies, ICT human resource and ICT investment gave a positive influence.
Second, the variables of ICT infrastructure and ICT service gave a very significant impact to the national economy and the quality of people life.
The variable of ICT regulation has something different according to the importance of variables, but ICT infrastructure and ICT service have a significant impact regardless of the dependent variable.
Third, the impact of ICT infrastructure to the national economy and life of people is appeared the different result between OECD countries and non-OECD countries.

The data used in this research are attached to the Appendix.

3. Conclusion

The results of this research has several important implications as followings in the national policy level.
First, 'ICT infrastructure contributes to the national economy and quality of life' is verified by this research, and this can be an important basis of ICT policy legitimacy and ICT policy implementation.
Second, by verifying what kind of factors among the sub-components of ICT infrastructure give a greater impact to the national economy, this can be used as basic data of ICT policy priorities.
The policy information disclosure, expansion of ICT staffs, ICT investment and ICT business deregulation are needed In order to improve the national economy.
And ICT staffs expansion, online civil service improvement, ICT investment and PC supplies are needed to improve the quality of people life.

A2. The impact of ICT investment in GDP

1. Introduction

Improved application of information technology (IT) may be the key factor in an organization gaining competitive advantage (Kohli & Devaraj, 2004: Poter & Millar, 1985). With greater attention by executives to the tengible benefits of IT investment, the more researchers become interested in the benefit of IT investment.

However, while a number of studies have focused on the effects of IT investment, there has been a long-running debate on the relationship between IT investment and firm performance. Research about the relationship between IT investment and firm performance can be classified into three categories.

First, several researcher have asserted that there is no relationship between IT investment and organizational performance. Rather, they argue IT investment could have a negative impact on the productivity of an organization because of inefficient allocation of management resources.

The elasticities of other management activities (e.g. marketing, research and development, advertising) and similar capital targeting on improving firm performance, and greater then the elasticity of IT capital. In the worst case, as firms invest more in IT there is greater need for coordination between different activities and information systems across all functional areas of the organization.

The second research group has asserted that there is a significant positive relationship between IT investment and organizational performance. If firms invest more in IT, their performances correspondingly increase.

Suggesting that further discussions are needed on the limitations of the studies, they have used various techniques and data to explain a positive relationship between IT investment and organizational performance.

Identifying explicit empirical evidence regarding the benefits derived from IT investment is a key area of the study. To support direction and give greater exploratory focus, our research questions are:

1) What is a relationship, either positive or no relationship, between IT investment and firm performance?
2) What is a relationship when consideration is given to a time lag and the infoermation-intensity of the industry?
3) Does the magnitude of any IT effect vary according to the information-intensity of the industry? Moreover, do the characteristics of the time lag have a connection with the information-intensity of the industry?
4) Which effect of IT investment on firm performance is larger: an immediate effect or lagged effects?

2. Positive relationship between ICT investment and Performance

There are more studies suggesting an empirically positive consequence of IT investment than studies that have concluded no relationship between IT investment and economic performance exists.

While research that asserted no effects of IT investment is conducted at the industry level in general, other research has found both a positive effect of IT investment and mixed (both positive and negative effects) results: the latter are mostly firm-level analyses.

Bender (1986) tries to find an economic effect of IT investment using the rate of information processing expense to total general expense and the ratio of total general expense to total premium income. Futhermore, after dividing the sample by the information processing cost to several groups, he performed comparison analysis of performance among groups.

Since few variables are statistically significant in spite of the inclusion of many variables in the model, his positive result might be just partial. Furthermore, it is difficult to explain the result that H/W expense is related to the performance, but S/W expense is not related to the performance.

Li and Ye (1999) suggest that IT investment affects organizational performance, and the size of the effect varies depending on the context of organizational characteristics.

The intermediary variables such as environmental dynamism, firm strategy and IT strategy integration should be included in the analysis of relations between IT investment and organizational performance.

IT investment appears to have a strong positive impact on financial performance when there are greater environmental changes, a more proactive company strategy, and closer chief executive officer (CEO) / chief information officer (CIO) ties in an organization. Though the limitation suggested by the authors come from data and performance variables.

An IT expenditure ratio variable affects on long-term firm performance, based on such measurements as Tobin's q, have been seen with hierarchical regression analysis (Bharadwaj et al., 1999). Because the size of the IT investment's effect varies depending on sample period, we cannot know the degree of IT effect on organizational performance in any specific year.

Mahmood and Mann (1993a) analyzed the impact of IT investment on firm performance, with IT value, IT budget, the percentage of IT budget for training, the percentage of IT budget spend on IT staff, total PCs, and PCs per an employee as independent variables, and return on investment (ROI), return on sales (ROS), sales to an employee, sales to total assets, and market value to book value as dependent variables.

There are positive relationships between some IT investment variables and their performances, but the coefficient values of independent variables are not reported. According to research by Sircar, Turnbow, and Bordoloi (2000), IT investment does not relate to profit-related measures, but is related to other performance variables excluding the profit. They try to explain the reason why IT investment does not relate with profitability using a trend graph for all variables.

To study the effect of the IS budget on firm performance, Rai et al. (1996) divided firm performance into aggregated performance and intermediate performance. The traditional measure such as return on assets (ROA), ROE, sales, and market share are used to gauge aggregate performance.

Intermediate variables, such as an asset turnover and labor productivity, are utilized in research with conversion effectiveness such as IS dependent efficiency (sales per IS employee, income per IS employee). They could not find a statistically significant result in ROA and ROE, that might mean there is a lag effect of IT investment, but did discover a statistically significant result in sales and market share that were the growth measure of a firm, and labor productivity.

However, a moderating effect of IS dependent efficiency was not found. As limitations the data used in their study are cross-sectional in nature, and this prevents the modeling of the lagged effect of IT investment (Rai et al., 1996). In order to convert the increasing of market share to profits, it is necessary to consider the time lag between IT investment and its effect.

3. Result of the effectiveness of ICT investment

Table 1 shows the number of firms in the sample by each industry. Over 50% in the sample belonged to the manufacturing industry. Transport, communication, utilities industry is composed of over 20%. In contract, agriculture industry and healthcare, legal, education industry is not included in the sample. In table 2, we can find an industrial distribution of firms in the sample by the information-intensity of the industry.

[Table 1] Firms in Sample, by Industry

SIC code (1-digit)	Division	Number of observations in sample	Percent of observations in sample
0	Agriculture	0	0.0%
1	Mining, Construction	9	5.2%
2	Manufacturing	40	23.0%
3	Manufacturing	48	27.6%
4	Transport, Communications, Utilities	35	20.1%
5	Wholesale and Retail Trade	10	5.7%
6	FIRE (Finance, Insurance, and Real Estate)	30	17.2%
7	Services	2	1.2%
8	Healthcare, Legal, Education	0	0.0%
	Total	174	100.0%

[Table 2] Firms in Sample, by the Information-Intensity of the Industry

Information -intensity	Major Group (2-digit)	U.S. SIC Description	Number of observations in sample	
High information -intensive industry	27	Printing, publishing, and allied industries	2	
	32	Stone, clay, glass, and concrete products	3	
	35	Industrial and commercial machinery and computer equipment	20	
	36	Electric and other electrical equipment and components, except computer equipment	3	
	38	Measuring, analyzing, and controlling instruments; photographic, medical optical goods; watches and clocks	5	
	5	Wholesale and retail trade	10	
	6	Finance, insurance, and real estate	30	
	7, 8	Services	2	
		Subtotal		75 (43.1%)
Low information -intensive industry	Others	The remaining industries		99 (56.9%)

4. Conclusion

When they evaluate the payoffs from IT investment, they have to consider not only the immediate effect of IT investment but also the lagged effect. We might find the possible answer to solve the IT productivity paradox. If a firm only invests in IT and just waits for the payoffs, will the payoffs be realized? Through some users change cathode ray tube (CRT) monitors to liquid crystal display (LCD) monitors, which the price is over two times higher than the CRT monitor's price, their productivity may be related to IT productivity paradox. In IT investment, the efforts to plant trees and to grow them are needed. Many huge IT projects about enterprise-wide information systems have been implemented, are progressing, and will be started. Though many IS projects have been finished, a major portion of implemented IS cannot be operated with initial plans (Webster, 2000).

When firms overcome the resource barriers, knowledge barriers, and usage barriers that may be hindering conversion from potential payoffs to realized payoffs, and when firms overcome industry barriers and organizational barriers such as in the study of Chircu and Kauffman (2000), firms invested in IT can get realized performances. Our results show that IT investment in firms has a positive impact on organizational performance with immediacy and a time lag simultaneously. However, we have to say that when firms' managers who accepted our results decide to invest in IT as strategic weapon to complete with competitors, they should pay attention to the interpretation of our results. If they just wait for the payoffs after IT investment, they cannot get any benefits. Because IT investment is not a sufficient condition but a necessary condition, organizational performances are not automatically increased with increasing IT investment. When firms have superior capability to convert from IT investment to realized performance and increase their IT investment, their performances can be really increased.

In the future research, other equation forms, such as finite lag distribution (e.g. polynomial distributed lag (PDL)), can be studied. Second, we can try to get new data source (e.g. Korea for cross-country studies (Dedrick et al. 2003)). Finally, it is necessary for IT business value to consider organizational resources (Melvitle et al. 2004) complementary to IT, categories of which include non-IT physical resources, non-IT human resources, and organizational resources, including organizational structure, policies and rules, workplace practices, culture, etc.

A3. Smart Cities and productivity

1. Introduction – Preparing the future

All countries in the world have a huge cost of social conflict.
A lot of effort and social trust are wasted for these conflict. By reducing these social conflict costs, national GDP can be increasing.
The primary key of these topics is to prepare for the future.
The key of preparing for the future is depends on forward-looking and country's future strategies. To prepare the future, you must pre-know the large flow of the social changes. According to the outlook of global futurists, the future society is going to be changed to Smart society soon.
So first I would like to say about the importance of forward-looking and national competitiveness. The most famous poem is Robert Frost's "The Road not Taken".
As can be seen in this poem, the most important thing is what kind of outcome would be connected from the current decision.
Also the country's fate will be determined by the current decision. So according to the usage direction of taxes, the policy will be changed and the country's fate will be changed.
This content is just talking about the importance of the future prediction. In conclusion, the future prediction is to choice of better policy options for the better future. So a desirable future will be made by the creation, not just coming itself.
Also historically the future prediction was very important. Portugal and Spain was outer area countries in the 15th century in Europe. But how emerged as strong nations of the world suddenly? The answer is just right the leadership which is focused the future prediction. Prince Henrique of Portugal established the maritime expansion strategy through forward-looking for 200 years, and opened Age of Discovery.
Also Spain had a same history. Queen Isabel led the discovery of new continental and the construction of overseas colonies through the forward-looking.
Consequently, the future prediction and the future ability will become the competitiveness of the country and city. The preparation for the future will be the smart society.

2. Smart Society

We now live in an age of speed. Humanity lived in an agricultural society during around 6-7000 years. And it was an industrial society during 250 years, and an information society during 50 years. Since the information society, now new society is coming.
This new era is named the smart era. Smart era is made by globalization, complexity, convergence of technologies and services. The rate of change during 6-7000 years in the past was less than one year's pace now. We now live in a sudden change era.

This social change is taking new revolution, via agricultural, industrial and information revolutions.
It is named the smart revolution.

Eventually future society is "a era that is expanding and changing rapidly of the time, space and knowledge relationship by the combination of Smart technology and Smart value".

3. Smart Infra

The era of Work Smart should come instead of Work Hard.
Internet population is now 2.2 billion people since the Alpanet was coming.
Almost all the people of the earth can be connected to the Internet. This kind of technology is making the convergence between industry, network, human and ICT.
This change is making new environment by taking the change of all sectors with the advent of smart devices. And this change the concept of office, urban space, and the flow of traffic.
Eventually Smart City is created for a new city design environment.
And the Smart Citizen that is the key of Smart Society create a new power together.
Smart Society will make the Smart Infra through the Service Infra and Social Infra.
The key of Smart Infra is made by conjunction of ICT and the existing road, water, gas, electricity and communication. In particular, the intelligent future network will be Service Infrastructure to go Smart Society.

4. Conclusion - Smart Cities

Several countries in the world are planning the domestic economy activation and the national development through promoting the urbanization. The key of most of the planning is "Develop various sized cities evenly among all, but consider both of the speed and quality of the urbanization".

The actual key is not the speed, is the quality of urbanization.

The best solution is the Smart City.

In the future, more than half of the economic growth may be explained by the effect of Smart Cities. Depending on the promotion of smart city, various industries will be facilitated. Transportation infrastructure, building interiors, energy saving, environmental protection, intelligent transportation, health care and retail are expected to be a positive impact.

Smart City aims to improve both of the quantity and quality of the city.

The effect of Smart City will appear over a very wide range.

The process of the expansion of various infrastructures, the expansion of the public services, purchasing power rising by increased urban population, modernization of the rural reconstruction, industry relocation for regions, distinctive development by each city will lead just like a domino.

The effects of economic growth of Smart City are the expenditure for the provision of public services, the increase of income and consumption by the influx of population, and so on, in addition to the investment cause.
That is, the city that "Money, Products, Talents are going to stretch out into the world, and Money, Products, Talents will come into the city".

The 20th century was the era of country, but the 21st century is the era of city.

According to this contemporary flow, every countries in the world are competing "Smart City". The productivity in the 21st century will be dominated by the Smart City.

Appendix 1. Average of country-specific variables

Country - Variable	Effec	Qual	EPar	Aval	Tran	Law	Regu	PC	Empl	Inve
Australia	1.86	9.40	0.72	4.94	6.92	5.51	28.75	68.48	7.92	5.66
Austria	1.75	9.49	0.37	5.13	6.13	4.89	26.50	62.13	8.31	5.89
Belgium	1.65	8.63	0.45	4.06	4.27	4.34	27.25	54.68	7.84	5.37
Canada	1.86	9.19	0.80	5.85	5.87	4.93	36.00	71.83	8.52	6.79
Chile	1.26	6.52	0.55	4.47	5.74	4.53	36.00	30.60	8.06	4.77
Czech	0.88	6.67	0.22	2.93	3.62	4.17	28.25	34.05	7.54	8.08
Denmark	2.11	8.87	0.72	5.61	7.45	5.62	34.00	81.83	8.46	5.17
Finland	2.09	8.67	0.46	4.60	7.36	5.69	32.00	65.47	8.96	7.17
France	1.68	8.07	0.61	4.78	5.04	5.09	29.75	54.52	7.80	5.47
Germany	1.49	8.65	0.46	4.56	4.40	5.24	30.00	71.44	7.89	5.73
Greece	0.82	6.26	0.11	3.07	3.53	3.43	39.00	33.68	6.33	4.64
Hungary	0.92	5.08	0.32	3.42	3.81	3.81	33.00	40.52	7.75	9.90
Ireland	1.60	7.88	0.31	4.74	5.77	4.70	21.25	53.47	7.47	4.79
Israel	1.10	6.28	0.33	4.70	4.84	4.72	35.75	61.19	8.86	5.95
Italy	0.73	6.83	0.29	3.56	3.24	4.07	41.00	49.25	6.31	5.17
Japan	1.30	6.58	0.45	4.25	3.58	4.65	30.00	80.65	7.65	6.68
Korea(South)	1.03	5.56	0.78	4.58	4.03	10.36	35.00	78.83	7.95	9.18
Mexico	0.12	4.22	0.72	4.01	4.61	3.65	38.00	19.71	5.96	4.67
Netherlands	1.88	8.53	0.67	4.03	5.76	4.74	25.00	77.66	8.01	6.74
NewZealand	1.81	8.74	0.76	4.67	6.71	5.17	30.00	67.03	7.28	5.71
Norway	1.90	9.12	0.41	4.36	6.44	5.18	33.00	75.64	8.39	4.11
Poland	0.56	3.29	0.32	2.27	2.74	3.69	38.00	40.00	6.10	5.90
Portugal	1.14	5.85	0.28	4.14	4.49	4.19	35.50	42.98	6.74	6.10
Slovak	0.84	5.14	0.14	2.98	4.35	3.87	30.75	46.28	6.72	5.26
Slovenia	1.09	6.32	0.24	3.37	3.87	4.65	32.00	59.78	6.33	4.11
Spain	1.41	7.84	0.16	3.67	4.84	4.33	39.75	54.39	6.46	5.16
Sweden	1.96	8.35	0.60	5.11	5.94	5.23	30.00	80.03	8.88	6.10
Switzerland	1.94	9.38	0.40	4.02	6.82	4.84	31.75	74.15	8.00	7.58
Turkey	0.18	4.55	0.23	3.85	4.15	3.18	36.50	17.24	7.35	4.26
U.K.	1.74	7.28	0.86	4.97	4.47	5.43	30.00	69.12	7.28	6.25
U.S.A.	1.61	8.31	0.95	6.06	5.58	5.39	32.75	66.06	8.70	7.35
OECD Averg.	1.37	7.28	0.47	4.28	5.04	4.81	32.47	57.50	7.61	5.99
Argentina	-0.18	3.31	0.39	3.82	1.35	3.05	36.00	31.91	7.19	4.67
Brazil	0.10	4.23	0.39	3.60	4.13	4.04	45.50	20.31	6.98	5.71
China	-0.05	4.13	0.20	4.13	4.50	3.74	34.75	22.78	4.96	7.35
Colombia	-0.07	4.31	0.45	2.77	6.02	3.87	34.75	15.25	7.13	4.43
India	-0.03	4.79	0.20	3.38	4.19	4.27	46.00	2.23	8.65	3.85
Indonesia	-0.39	3.52	0.21	2.85	2.68	3.73	39.00	4.06	4.90	3.28
Jordan	0.21	5.22	0.20	2.62	5.23	4.03	39.00	26.38	7.46	9.54
Malaysia	1.08	7.32	0.18	4.45	5.57	5.30	30.00	31.59	7.36	12.01
Philippines	-0.08	4.02	0.45	3.42	2.79	3.77	37.00	11.78	7.98	5.62
Romania	-0.07	2.93	0.16	3.17	3.64	3.78	31.75	21.58	5.35	4.88
Russia	-0.27	2.64	0.12	2.67	2.95	3.13	37.00	19.50	6.99	4.13
SouthAfrica	0.72	5.03	0.23	3.62	5.44	4.67	30.00	12.98	6.21	8.81
Thailand	0.97	5.77	0.22	3.71	4.61	3.91	35.00	14.10	6.08	6.08
Venezuela	-0.99	2.25	0.30	2.92	0.72	3.39	29.00	11.29	7.03	3.38
NoOECDAverg.	0.07	4.25	0.26	3.37	3.84	3.91	36.05	17.55	6.73	5.98
Total Averg.	0.96	6.33	0.41	4.00	4.67	4.53	33.58	45.08	7.34	5.99

Appendix 1. Average of country-specific variables (Continue)

Country-Averg.	Poli	GDP	Edu	Den	OLD
Australia	9.54	34.186	224.10	0.266	12.98
Austria	9.03	38.234	96.19	9.965	16.27
Belgium	6.87	36.945	118.35	34.664	17.24
Canada	9.24	34.610	106.76	0.355	13.15
Chile	8.77	6.998	84.97	2.191	8.13
Czech	7.15	13.142	92.02	13.294	14.21
Denmark	9.25	48.598	128.10	12.785	15.23
Finland	9.33	38.954	130.01	1.724	15.93
France	8.56	35.207	112.27	11.131	16.46
Germany	8.37	35.233	98.19	23.629	18.76
Greece	8.03	22.892	99.32	8.617	17.86
Hungary	6.51	11.189	96.70	11.260	15.66
Ireland	9.19	48.407	122.29	6.042	5.52
Israel	5.44	20.857	108.91	32.044	10.07
Italy	5.62	31.145	95.79	19.907	19.60
Japan	7.18	35.765	101.34	35.045	19.90
Korea(South)	4.86	16.298	93.70	49.729	9.28
Mexico	5.65	8.215	57.37	5.305	5.80
Netherlands	8.30	40.709	108.44	48.336	14.19
NewZealand	8.94	25.235	136.55	1.543	12.17
Norway	8.82	66.379	127.07	1.524	14.59
Poland	3.50	8.529	101.59	12.503	13.16
Portugal	7.70	18.722	88.62	11.507	17.05
Slovak	5.96	12.128	90.06	11.203	11.70
Slovenia	6.62	19.057	102.51	9.949	15.44
Spain	7.81	26.635	119.18	8.698	16.83
Sweden	8.94	42.340	117.85	2.205	17.25
Switzerland	9.41	52.299	80.87	18.633	16.04
Turkey	5.03	6.655	75.05	9.247	5.65
U.K.	8.52	37.310	104.17	24.912	16.11
U.S.A.	8.68	42.062	87.19	3.230	12.43
OECD Averg.	7.64	29.514	106.63	14.240	14.02
Argentina	3.22	5.080	69.60	1.416	10.34
Brazil	6.89	4.982	91.73	2.197	6.17
China	6.04	1.977	47.75	13.972	7.56
Colombia	6.13	3.459	63.89	3.880	5.09
India	6.54	0.765	40.66	36.818	11.71
Indonesia	3.30	1.459	51.56	12.098	4.59
Jordan	7.06	2.593	75.55	6.142	3.44
Malaysia	7.99	5.751	52.39	7.802	4.35
Philippines	3.19	1.251	68.36	28.683	3.86
Romania	5.23	5.023	78.25	9.412	14.66
Russia	4.27	6.041	93.03	0.876	13.52
SouthAfrica	6.38	4.811	90.19	3.886	4.07
Thailand	6.43	2.850	55.57	12.876	7.09
Venezuela	0.72	6.049	56.80	3.013	5.00
NoOECD Averg.	5.24	3.721	66.81	10.219	7.24
Total Averg.	6.89	21.489	94.24	12.989	11.91

Appendix 2. Effects of ICT infrastructure to the quality of life

Division	Pooled OLS	FE	RE	GEE
	Regression coefficients (The standard error)			
Online participate in policy	−0.369 (0.315)	0.030 (0.247)	0.053 (0.261)	0.067 (0.241)
Online civil service	0.257*** (0.084)	0.037 (0.060)	0.079 (0.064)	0.067 (0.059)
Policy information disclosure	0.145* (0.077)	−0.061 (0.061)	0.046 (0.065)	0.023 (0.060)
ICT related laws	−0.022 (0.085)	−0.069 (0.139)	0.002 (0.115)	0.012 (0.112)
Business regulation	−0.020 (0.015)	−0.026 (0.080)	−0.043 (0.029)	−0.050 (0.031)
PC supplies	0.005 (0.007)	0.007 (0.007)	0.015** (0.007)	0.015** (0.006)
ICT manpower	0.170** (0.071)	0.014 (0.081)	0.155** (0.079)	0.136* (0.075)
ICT investment	0.064 (0.042)	0.084 (0.067)	0.144*** (0.055)	0.145*** (0.055)
Political stability	0.324*** (0.059)	0.070* (0.042)	0.141*** (0.046)	0.123*** (0.042)
Economic level	0.039*** (0.008)	0.000 (0.009)	0.021** (0.009)	0.017** (0.008)
Education level	0.006** (0.003)	−0.000 (0.004)	0.008** (0.004)	0.007** (0.003)
The population density	0.012* (0.006)	0.318*** (0.104)	−0.001 (0.011)	−0.001 (0.013)
Rate of population aged 65 and over	0.013 (0.021)	0.181 (0.125)	0.056* (0.034)	0.069* (0.036)
Constant	−0.158 (0.782)	0.055 (3.470)	1.821 (1.352)	2.405* (1.445)
Number of observations	180	180	180	180
R^2	0.865			
Adjusted R^2	0.855			
R^2(within)		0.254	0.132	
R^2(between)		0.053	0.833	
R^2(over)		0.053	0.808	
Ref) ***p<0.01, **p<0.05, *p<0.1				

Appendix 3. Effects of ICT infrastructure to the national GDP by country group

Division	OECD	Non- OECD
Online participate in policy	0.066 (0.097)	-0.207 (0.229)
Online civil service	-0.033 (0.025)	0.111** (0.045)
Policy information disclosure	0.090*** (0.026)	0.045 (0.039)
ICT related laws	0.042 (0.035)	0.355*** (0.087)
Business regulation	-0.030*** (0.009)	-0.016** (0.008)
PC supplies	0.004* (0.002)	0.009** (0.005)
ICT manpower	0.076** (0.030)	0.020 (0.028)
ICT investment	0.019 (0.026)	0.005 (0.026)
Political stability	0.059*** (0.020)	0.058* (0.031)
Economic level	-0.002 (0.003)	-0.046** (0.021)
Education level	0.002* (0.001)	0.005** (0.002)
The population density	-0.003 (0.003)	0.001 (0.004)
Rate of population aged 65 and over	0.033*** (0.011)	0.002 (0.011)
Constant	-0.180 (0.459)	-2.129*** (0.400)
Number of observations	124	56
R^2(within)	0.090	0.150
R^2(between)	0.911	0.925
R^2(over)	0.861	0.881
Ref) ***p<0.01, **p<0.05, *p<0.1		

Appendix 4. Effects of ICT infrastructure to the quality of life by country group

Division	OECD	Non- OECD
Online participate in policy	−0.068 (0.268)	−0.095 (0.907)
Online civil service	0.036 (0.068)	0.432** (0.177)
Policy information disclosure	0.109 (0.070)	−0.002 (0.157)
ICT related laws	−0.023 (0.110)	0.545 (0.344)
Business regulation	−0.076** (0.033)	0.030 (0.032)
PC supplies	0.020*** (0.007)	−0.009 (0.018)
ICT manpower	0.172** (0.085)	0.143 (0.112)
ICT investment	0.020 (0.086)	0.153 (0.104)
Political stability	0.132** (0.053)	0.187 (0.124)
Economic level	0.012 (0.009)	0.015 (0.084)
Education level	0.004 (0.003)	−0.015* (0.009)
The population density	−0.018 (0.012)	−0.006 (0.017)
Rate of population aged 65 and over	0.078** (0.038)	−0.054 (0.042)
Constant	4.050*** (1.570)	−1.578 (1.586)
Number of observations	124	56
R^2(within)	0.215	0.039
R^2(between)	0.839	0.881
R^2(over)	0.810	0.784

Ref) ***p<0.01, **p<0.05, *p<0.1

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M5. Public Policies for Smart Cities implementation

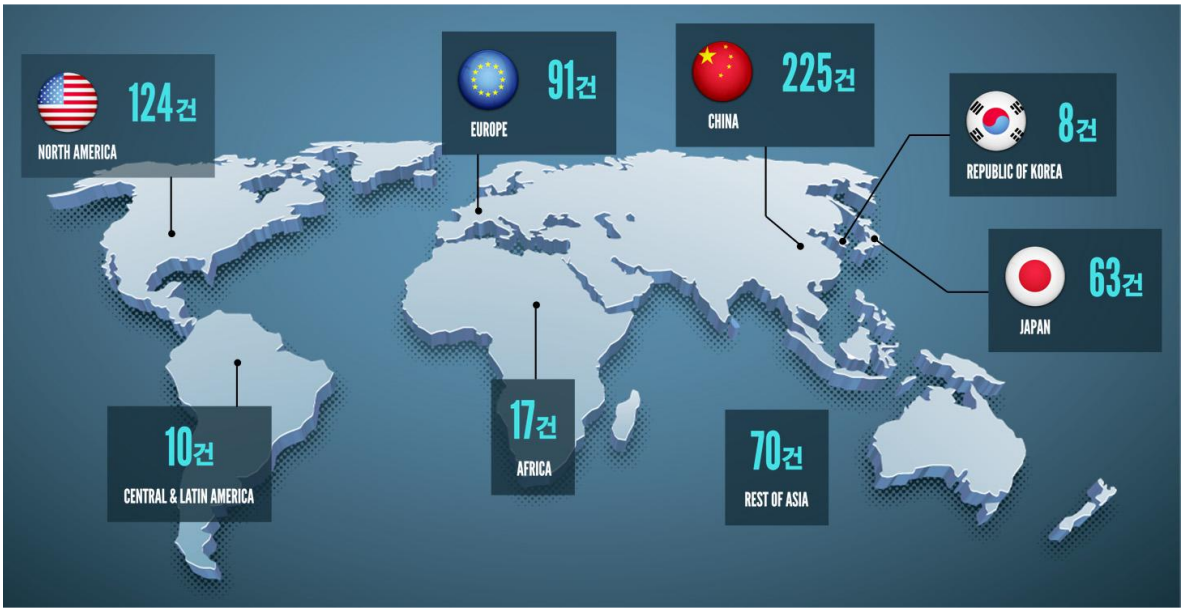
A1. Five best international practices for public policies regarding Smart Cities

1. Introduction

- Smart cities, it maximizes the efficiency by graft of ICT skill to the existing cities, because it is impossible to expand the urban infrastructure for the population increase caused by of the resource constraint.

- Features of Smart cities by country
  - Korea : New town development, Fostering new growth power
  - Japan : Energy security, Disaster recovery
  - China : Economic growth, Urbanization
  - USA : Electric, Medical infrastructure improvement, Stimulate economic status
  - Europe : Energy saving, Competitiveness

- Distribution of Smart City project in the world



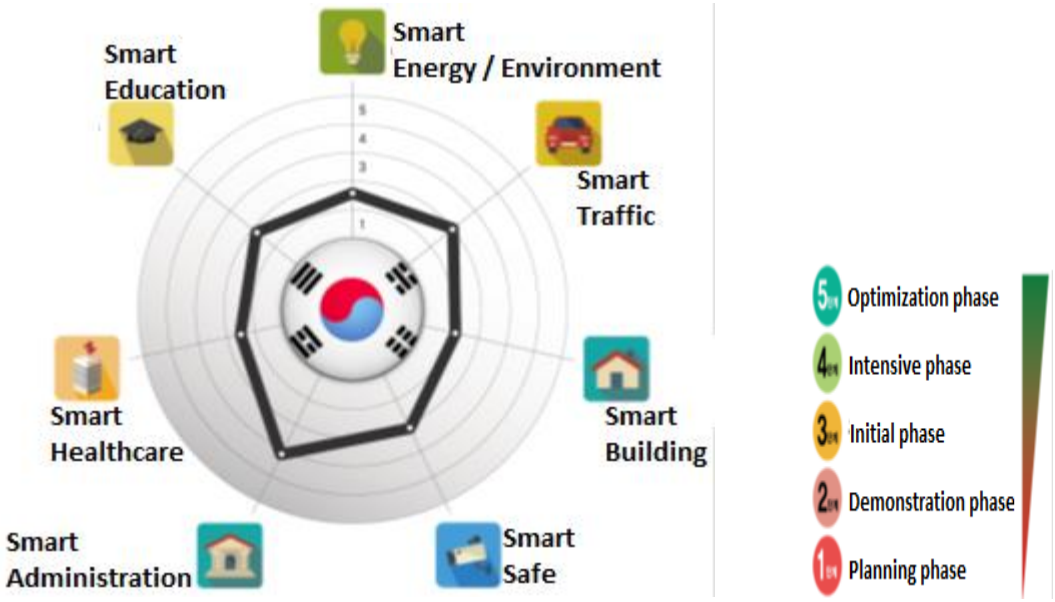
Resource : Japan Economy

2. Smart cities policy review by country

- Korea

  - December 2006, Ministry of Information and Communication made 'u-City master plan'.
  - The goal of Smart cities is 'Promotion of the quality of citizens life and the city competitiveness'.

  - Korea Smart City Maturity Model



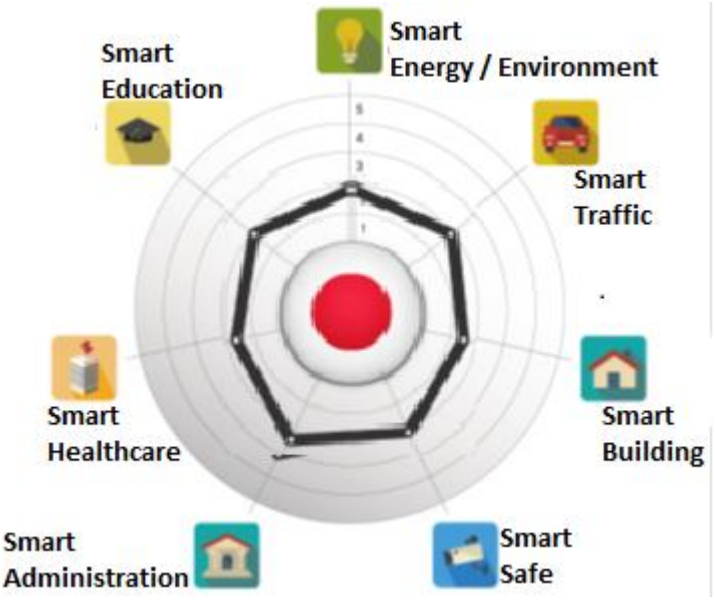
  - Business description by government departments
    Ministry of Land :
    Promoting the 'ubiquitous city master plan'
    Service range of Smart cities policy : Administration, Traffic, Health welfare, Environment, Security, Facilities management, Education, Culture, Tourist, Sports, Logistics, Employment

  - Ministry of Public Administration and Security
    'u-service support program'
    The goal : Improvement of public services, Resolve current national issues

- Japan

  - Japan promoted the Smart City project in earnest after the Great East Japan Earthquake in 2011.
  - Japan national issues : Energy crisis, Disaster prevention, Aging society, Low fertility, New market creation.

  - Japan Smart City Maturity Model



  - Like as other countries, Japan Smart cities projects are promoted by the government.

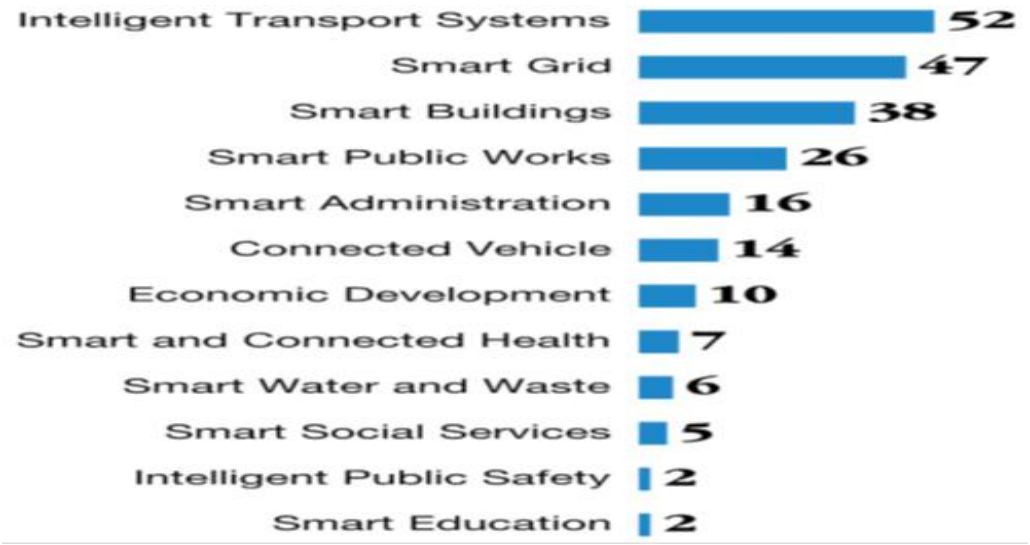
- China

  - Promotion background : Acceleration of urbanization, Lack of energy, Industry restructuring.
  - Local government promoted Smart cities projects individually until 2012.
  - Since 2013, Central government is promoting directly the projects.
  - Tianjin Eco-City :
    The first national-level Smart City
    Began to build in November 2007
    20% of the required energy : Solar, Wind, Geothermal
    Improve the main facilities for Public transport and bike
    Provide the facilities for waste prevention, recycling
    Utilizing ICT : Smart Home service can control Air conditioning, Humidifier, Air purifier, Curtain and TV.

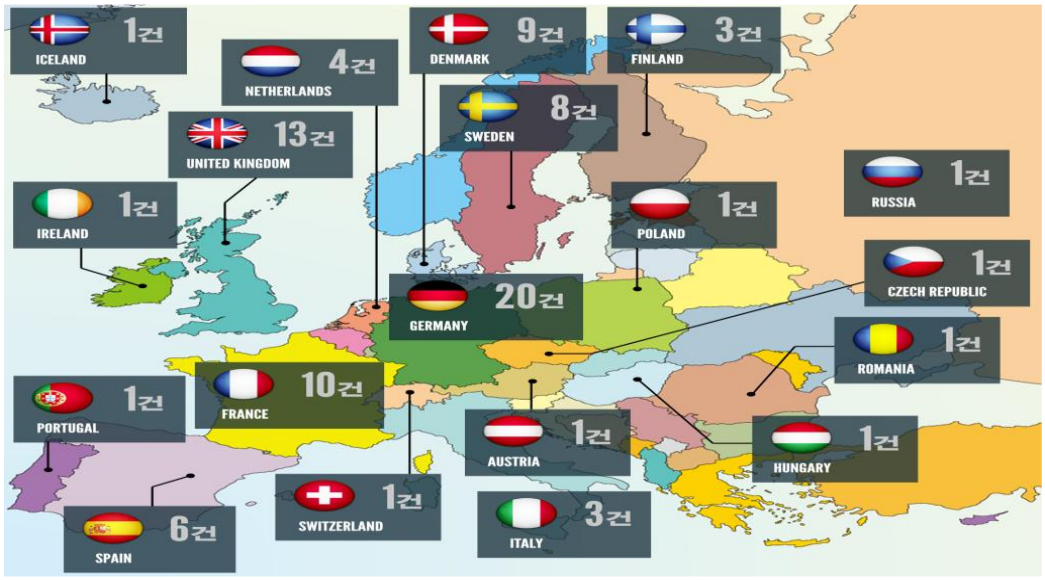
- Spain

  - EU-wide focus on Energy and Transport policies
  - Countries and cities promote the specific projects individually

  - The number of the European Smart Cities project by type



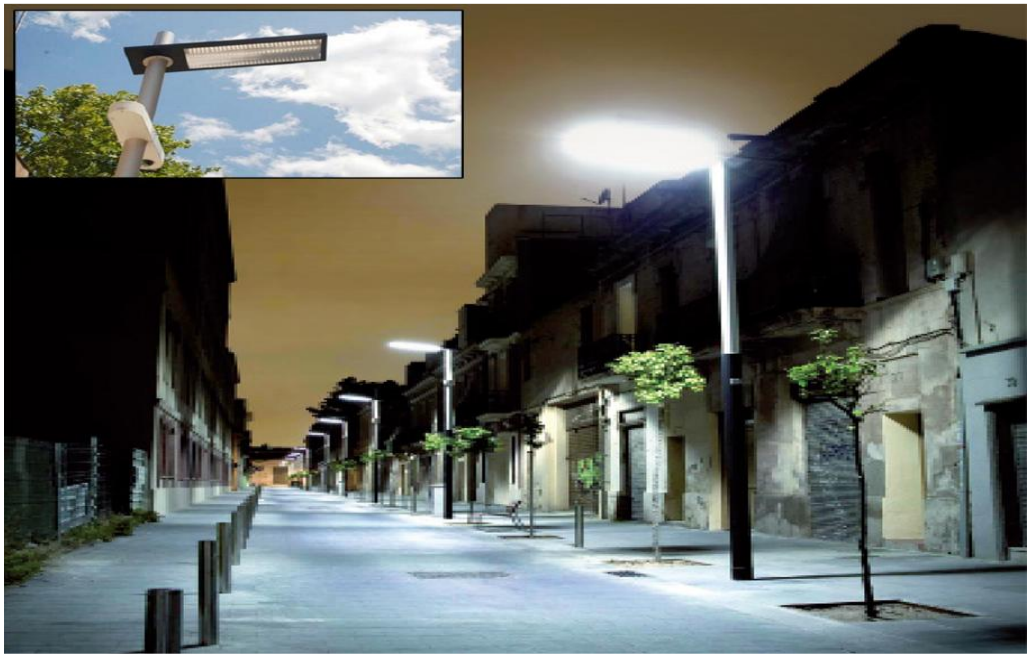
- European Regional projects of Smart City by country



Resource : IDC, Nkkei BP

- Barcelona Smart City project

  Five core businesses: telecommunications, media, design, energy, medical technology
  Creation of a global knowledge-intensive innovation clusters
  Housing, culture, education, manufacturing, leisure are coexisted in the City, aims to be a compact and smart city
  Utilizing ICT, Smart street lights using LED lighting sensor, and it can grasp Noise levels, Air pollution and Population density.
  In addition, WiFi internet access via a smart street lights is also available.



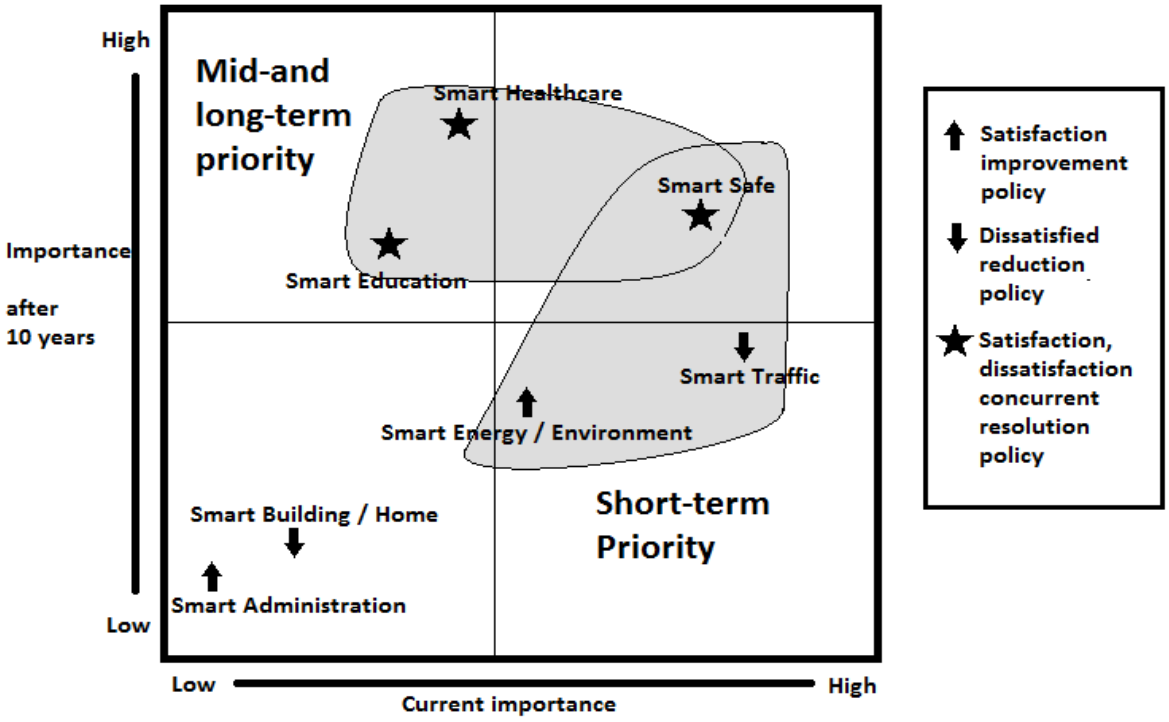
Smart street lights

3. Common national policy considerations

- If only look Smart Cities in terms of government, it does not reflect the opinion of the consumer. So, the mismatch between supply and demand occurs.
- When distinguish the Smart Cities infrastructure largely by 'Hardware infrastructure' and 'Software infrastructure', the 'Software infrastructure' is more important to the consumers.
- Presenting the 7 elements of Smart Cities to consumers, and asking what factors are most important currently, then the result is in order of 'Smart Transportation', 'Smart Security', 'Smart Energy / Environment'.
  And they replied that 'Smart Health', 'Smart Safe' and 'Smart Education' will be the most important after the next 10 years.

4. Conclusion

- Cities should be evolved from the convenient 'Ubiquitous cities' to the sustainable 'Smart cities'.
- A public-oriented Smart Cities project is fundamentally limited the sustainable growth.
- Smart Cities project should be emphasis put on solving the current city's issues than the introduction of the latest technology.
  - The sustainability of Smart Cities will be depend on the understanding and effort between governments and citizens, cities and citizens.
- It's necessary to develop the balanced blend of Smart Cities between New town and Old town.
  - Most of Smart Cities project being promoted in Europe including Amsterdam and Barcelona are building the Smart Cities on the existing cities, it is so-called Old Town redevelopment (Brownfield).
- The development of the unique smart city business model is needed.
  - A creative project is needed to solve the current regional issues, to improve the regional strong points and characteristics.
- There is a difference of the importance and priority in the Smart Cities services, therefore, the wisdom of the strategic choice to grasp the importance and priority should be needed than the investment to all Smart Cities fields.



Importance, priorities and the solving methods

A2. International benchmarking for Smart Cities implementation

1. Smart Seoul

Officially “Seoul Special City”, Seoul is the capital of South Korea and the country’s largest metropolis with a population of over 10 million people.
Seoul is however best known as one of the most tech-savvy cities in the world, retaining its No.1 ranking in the UN e-Government Survey.

In 2004, Korea initiated the u-City project whereby ubiquitous computing technologies were applied to strengthen cities’ competitiveness.
The smart city achievable today differs fundamentally however, in that today there are ways to simultaneously enhance a city’s sustainability, competitiveness and citizen happiness.

A smart city emphasizes the continued maintenance, protection, reinforcement and regeneration of its attractiveness in the future no less than it prioritizes its short-term competitive edge.
Smart Seoul 2015 was adopted to overcome the limitations of u-Seoul which applied ICTs only to existing ‘traditional’ city infrastructure.
Smart Seoul 2015 is a more people-oriented or human-centric project; and Seoul now aims to implement as many smart technologies as possible, but also to create a more collaborative relationship between the city and its citizens.

The three pillars of Smart Seoul

Cities set out their own unique priorities when planning a smart city, but all smart cities must display three essential traits:

- **ICT Infrastructure**: Securing next-generation ICT infrastructure is critical to the success of emerging smart-city services. Efforts to develop ICT infrastructure must anticipate future service demands, rather than respond only to those most apparent.
- **Integrated City-management Framework**: A well-defined ‘integrated city-management framework’ is essential. The many integrated subsystems, meta-systems and individual, building-block systems of a smart city will work in harmony only through the strictest adherence to common standards.
- **Smart Users**: ICTs are the tools to enable a smart city, but are of no use without smart-tech users able to interact with smart services. Increasing access to smart devices and education on their use, across income levels and age groups, must remain one of a smart city’s highest priorities.

2. Smart Seoul Infrastructure

Smart Seoul Infrastructure refers to the functional ICT framework essential to the provision of Smart Seoul's services. The development of Smart Seoul's services has to date been led by Seoul's Metropolitan Government, and Seoul is currently transferring a larger portion of this task to its citizens through the publication of the city's administrative information and the creation of open-source app-development models.

Smart Devices for All

A smart city relies on an inclusive network of smart device users, with the city's inhabitants demanding or creating the services they most value. The inclusive network in Seoul encompasses high-speed broadband optical wire and wireless networks (including Wi-Fi, NFC technology, etc.). All citizens' voices should be heard in this effort, and a key pillar of Smart Seoul 2015 is to increase access to smart devices and to educate new users on their operation.

u-Seoul Net

Establishing a communication network dedicated to smart services has been a priority to Smart Seoul. An administrative optical network called "e-Seoul Net" was established in 2003, embedding fiber-optic cable along Seoul's subway tunnels to connect the city's main public buildings, its affiliated offices and municipalities.
However, e-Seoul Net is not equipped to support new smart services, as it was specifically designed to connect only public offices in the interest of administrative data exchange. Citizens have no access to this network at all, and it is not equipped to support the massive volumes of data flowing over a smart-city network.
With u-Seoul Net citizens have access to administrative services anytime, anywhere.
u-Seoul Net is divided into three communications sub-networks:
a Wi-Fi network used to serve administrative functions;
a CCTV network enabling the exchange of video data generated by Seoul's 30,000 CCTV installations;
and the u-service network, which connects the websites of all the public offices under the Seoul Metropolitan Government, allowing citizens to bypass internet service-provider networks, and instead access u-Seoul Net for free information on city services.
In the future, Seoul plans to utilize u-Seoul Net in areas such as children's safety and vehicle-emissions control systems able to reduce the city's energy costs.

Smart Work Center

Seoul Metropolitan Government is piloting a "Smart Work Center" project, allowing the government's employees to work from 10 offices – Smart Work Centers – located much closer to their homes.
As employees check-in to a Smart Work Center for their shifts they are permitted access to sophisticated groupware and teleconferencing systems, ensuring their absence from City Hall in no way impedes their job performance.

Community Mapping

Seoul's open governance model seeks to extend citizens the opportunity to participate in the administration of the city, and "Community Mapping" was born with this pursuit in mind. Using ICTs such as geographical-information systems, the m.Seoul platform and social networks, citizens will be able to raise the issues of greatest concern to their neighborhood or community.

Community Mapping relies on P2P (peer-to-peer) communication among citizens and is a big step up from the one-way communication of road-repair requests on the city website's FixMyStreet board. It was very successful in its initial application, where physically disabled people marked streets or shopping malls without wheelchair access on a map shared by a community of smart device users. Seoul sees great potential in the system and is focusing on applying Community Mapping to a wider range of citizens' concerns, empowering citizens to develop solutions to these concerns in collaboration with their peers.

Smart Metering Project

Seoul's Smart Metering Project aims to reduce the city's total energy use by 10 per cent, and in 2012, Seoul is piloting a program installing smart meters in 1,000 households.

Smart meters provide home, office and factory owners with real-time reports of their electricity, water and gas consumption. This information is presented in monetary units, and is accompanied by detailed information on a household's energy-consumption patterns and means of adjusting those patterns to reduce energy costs.

u-Seoul Safety Service

u-Seoul Safety Service has been in operation since April 2008, utilizing state-of-the-art Location Based Services and CCTV technologies to notify authorities and family members of emergencies involving children, the disabled, the elderly, and those suffering from Alzheimer's disease. Seoul has developed a smart device dedicated to this purpose and when its holder leaves a designated safe zone or pushes its emergency button, an emergency alert is sent to guardians, police, fire departments and CCTV Control Centers.

To make use of the u-Seoul Safety Service, citizens are required to register with mobile carriers specifically designed for this purpose. Supporting low-income households and especially vulnerable groups, Seoul often provides emergency-alert devices free of charge or at significant discounts, aiming to reach 50,000 registered users by 2014.

3. Government/Municipal-developed Services

Mobile Seoul (m.Seoul)

Mobile Seoul (m.Seoul) makes use of Mobile Web technology and mobile applications to provide Seoul's citizens with 62 unique services over 11 types of mobile device. A wide range of public information is available over the Mobile Web,

but the inconvenience of navigating is averted by mobile apps concentrating on the provision of the most commonly-demanded information.
m.Seoul apps support location-based services pinpointing nearby public offices, restrooms, hospitals, supermarkets or bus stations. Other services include live real-estate listings, daily job-search updates, and notifications of free cultural events. Apps also enable citizens to suggest actions to improve the city, participate in yes/no votes, and freely exchange city information over social networks; and another service, “Staying Safe in Seoul”, alerts citizens of emergency situations brought on by heavy rain, snow, typhoons or fires.

CMS-based Homepage
In March 2012, the website of Seoul Metropolitan Government completed its migration to a state-of-the-art content management system (CMS), more openly sharing public information and strengthening the city-citizen relationship. The new website consolidates over 70 specialized websites previously maintained by government branches, offering a single platform through which citizens can access information on all possible public services – information easily scrapbooked to users’ websites or social networks.

Promoting Open Governance 2.0
The importance of sharing government information with the private sector cannot be emphasized enough.
The public information made available to the private sector enables it to produce innovative solutions to basic public needs, with a familiar example being the disclosure of a city’s bus schedule or road-condition information leading to privately-developed mobile-navigation apps.
Recognizing the socioeconomic value of public information, Seoul aims to make all administrative information available to its citizens. In line with similar Government 2.0 strategies of Europe or the USA,
Seoul’s open governance 2.0 strategy encourages transparent city governance and open communication between the city’s government and its citizens.

Developing Public Applications and Its Current Status
More than 75 per cent of Seoul’s mobile phone users are smart device users, and Seoul aims to profit from the innovation of the competitive private sector, as well as leverage users’ brand loyalties to accelerate the adoption of public apps.
Seoul Metropolitan Government discloses all its administrative information and rewards the best private sector or citizen use of this information in a Public Application Contest, which began in 2010.

Online Reservation System for Public Services
Seoul’s next-generation online reservation system allows citizens to search for, book and pay for public services instantly. The one-stop, integrated reservation system lists over 150 services under categories such as education, infrastructure, cultural tourism, commodities and medical treatment.

Seoul Metropolitan Government and its affiliates offer over 30,000 public services, from education courses to reserving public sporting or cultural facilities, using gymnasiums or registering at day-care centers. Of these 30,000-plus services, 17,000 offer online reservation. However, around 1,500 core services are linked to the integrated reservation system, and Seoul plans to complete the inclusion of all 30,000 by the close of 2012.

3-Dimensional Spatial Information

Since 2001, Seoul Metropolitan Government has been increasing the capabilities of its 3-dimensional (3D) spatial information system40: a mapping application providing 3D street information and enabling the provision of new smart services.

The system supported the launch of three new services:

1) “Geographical Information”, which allows users to view streets as if standing upon them;

2) “Tour with a Theme Information”, which highlights tourist attractions, offering its users a virtual tour of Seoul;

3) “Urban Planning”, an application allowing city planners to simulate infrastructure development or renovation.

u-Shelter: State-of-the-art Bus Stops

Introduced in 2009, Seoul’s u-Shelter bus stops incorporate state-of-the-art ICTs to offer citizens a variety of smart services. In 2011, each u-Shelter interacted with an average of 2,518 people each day with Bus Route Guide the most-frequently used service at 1,427 times per day, followed by Digital Map (764), Destination Search (135), Traffic Broadcasting Station (65) and Weather Forecast (59).

4. Citizen-developed Services

NFC-based Mobile Payment

The NFC (near field communication)-based Mobile Payment system is a product of public-private collaboration, and is a service accessible to anyone with a smart device or mobile card. People making a purchase at a store select credit-card payment or mobile-card payment, and pay for their purchase simply by touching their smart phones to a specialized reader capturing information essential to the transaction.

Seoul’s citizens today possess roughly 7 million smart phones with built-in NFC chips, and Mobile Payment services are currently available in over 22,000 stores including super markets, convenience stores, gas stations, coffee shops and department stores.

Virtual Store

Virtual Store is an example of B2B and B2C utilization of smart devices and social networks.

Virtual Stores are found on street billboards, with each item possessing a unique barcode or Quick Response (QR) code. A smart phone’s barcode or QR code reader

allows consumers to purchase goods while on the move, receiving delivery at their homes later that day.

School Newsletter Application

The citizen-developed School Newsletter Application connects schools with pupils' parents, instantly notifying parents of changes in academic schedules or the items students are required to bring to school for the following day's lessons. This is achieved by way of an online 'school board' alerting parents of changes to its content whenever it is updated. 100 elementary schools currently make use of this service, and more are encouraged to do so via "I am school".

5. Conclusion

Many of the world's major cities have embarked on smart city projects, including Seoul, New York, Tokyo, Shanghai, Singapore, Amsterdam, Cairo, Dubai, Kochi and Malaga. Smart cities may still be viewed as cities of the future, but considering today's rate of innovation it is highly likely that smart city models will over the coming decade become very feasible and certainly very popular strategies for cities' development.

A smart city has been defined as a 'knowledge', 'digital', 'cyber' or 'eco' city; representing a concept open to a variety of interpretations, depending on the goals set out by a smart city's planners. We might refer to a smart city as an improvement on today's city both functionally and structurally, using ICT as an infrastructure.

Smart cities demand careful planning and, at an early stage, it is essential that national and municipal governments, citizens and all other stakeholders agree on the smart city definition they aim to fulfill. A clear definition or strategy must address two key factors: the city's desired 'functions' and 'purposes', with its 'functions' referring to the appearance and operation of a city, and its 'purposes' to the benefits promised by a smart city model.

Looking at its functions as well as its purposes, a smart city can perhaps be defined as "a city that strategically utilizes many smart factors such as ICT to increase the city's sustainable growth and strengthen city functions, while guaranteeing citizens' happiness and wellness."

A human-centric smart city thus relies on an advanced ICT infrastructure and continued urban development, always taking environmental and economic sustainability into account.

A3. International standards and regulations for Smart Cities technological implementation

The rapid evolution of the telecommunication/information and communication technology (ICT) environment requires related technology foresight and immediate action in order to propose ITU T standardization activities as early as possible.
ITU-T Technology Watch surveys the ICT landscape to capture new topics for standardization activities.

Technology Watch Reports assess new technologies with regard to existing standards inside and outside ITU-T and their likely impact on future standardization.

The concept of the smart city as the next stage in the process of urbanization is high on the political agenda throughout the world. Smart Cities are underpinned by an ICT infrastructure and its integration with the services that a city delivers.

Weather information could be combined with traffic sensors to anticipate congestion and keep traffic moving. Leaks in water networks would be detected automatically; pumping stations would adapt flexibly to patterns of use detected by smart meters, reducing energy consumption and costs to the consumer.

This will call for new ICT standards, infrastructure and solutions to ensure that this vision becomes a reality.

Some areas where standardization activities are currently focusing are:

• The definitions and blueprints of smart city infrastructure.
• Building the architectural ICT framework to enable the harmonized operation of a smart city's constituent technologies: high-speed optical, sensor, wired and wireless networks necessary to enable Intelligent Transport Systems (ITS), Smart Grid, Home Networking, etc.
• Best-practice methodologies for national and municipal smart city planning.
• Evaluation mechanisms to assess the health and success of a smart city; through statistical feedback on the use and value of smart services deployed within a city.
• Remove complexity of smart factors
• Open evaluation methodology for smart factors

The International Standardization Organization (ISO) is looking at smart city standards through a group focused on "Smart Community infrastructures metrics" (ISO, TC 268/SC 1).
ITU-T has established a new Focus Group on Smart Sustainable Cities42 to assess the standardization requirements of cities aiming to boost their social, economic and

environmental sustainability through the integration of ICTs in their infrastructures and operations.
ITU-T Study Group 5 – Environment and climate change43 – agreed the formation of the new Focus Group at its meeting in Geneva, 29 January to 7 February 2013.

The creation of the Focus Group answers a Call to Action44 proposed in September 2012 at ITU's 2nd Green Standards Week in Paris. "Smart Sustainable Cities'' is also the theme of ITU's 3rd Green ICT Application Challenge45.

The Focus Group will act as an open platform for smart city stakeholders – such as municipalities; academic and research institutes; non-governmental organizations (NGOs); and ICT organizations, industry forums and consortia – to exchange knowledge in the interests of identifying the standardized frameworks needed to support the integration of ICT services in smart cities.

References

ICT Insight – The trend of Smart Cities implementation in the around the world
ITU 2013 – Smart City Seoul

M6. Smart Cities and future considerations

A1. The implementation of m-government and its importance for the ICT industry development

1. Foreword

Mobile phones are becoming the most rapidly adopted technology in history and the most popular and widespread personal technology in the world. Additionally, they play an increasingly important role in providing access to the Internet. Access to mobile networks is available to 90% of the world population, and to 80% of the population living in rural areas.
Given this unparalleled advancement of mobile communication technologies, governments are turning to m-government to realize the value of mobile technologies for responsive governance and measurable improvements to social and economic development, public service delivery, operational efficiencies and active citizen engagement. The interoperability of mobile applications, which support quick access to integrated data and location-based services, paves the way for innovative public sector governance models – also called mobile governance or m-governance – based on the use of mobile technology in support of public services and information delivery.

In the past decade, the mobile communication technologies revolution and the growth of high-speed broadband and wireless access have begun to make a considerable impact on economic and social development worldwide, reinforced by the expansion of the public sector's capacity to leverage the use of ICTs to improve its internal functioning, as well as its interactions with citizens and businesses.
By creating new and expanded communication channels, mobile technologies provide access in areas where the infrastructure required for Internet or wired phone service is not a viable option. The development of mobile communication technologies has not only created a new venue for governments to reach out to a much greater number of people than ever, but it has also brought citizens previously unimaginable opportunities to communicate with each other conveniently, and to access both public and private information and services, with diminishing time and space boundaries and limits.
M-Government – the adoption of mobile technologies to support and enhance government performance and foster a more connected society – can help improve government performance and strengthen public good governance provided that the emphasis is not placed on the "m".

2. Towards the next generation of public services

From e-government to m-government

The strategic importance of mobile technologies is becoming more evident, as the wireless and mobile technology explosion increasingly affects how public institutions function and deliver services in both developing and developed countries. “Enabled mobility” offers new opportunities to provide more responsive public services through mobile applications and solutions.
Just as the decision to embark on electronic government (e-government) was an important step taken decades ago by many governments worldwide, the adoption of mobile government (m-government) to support and enhance government performance and a more connected society is now inevitable.

There are some fundamental differences between e- and m-government service delivery. E-government involves the electronic provision of information to geographically diverse but technologically homogenous ICTs (such as personal computers or information kiosks). In contrast, m-government involves interaction in which the use contexts are unknown, where accessing government services might be one of several activities being undertaken, and where the physical constraints of interacting with mobile devices limit the amount and type of information that might be located and accessed.

3. Benefits and outcomes of m-government

Mobile technology is significantly expanding governments’ capacity to produce benefits and deliver outcomes for governments, citizens, businesses, and to impact positively national overall economic growth. The most notable progress will be in developing countries which have been historically limited by poor or non-existent communications infrastructure that, in turn, have constrained economic development and social improvements. However, m-government development will also provide countries with more developed e-government and the opportunity to tackle a number of issues - such as those related to the digital-divide - which remain a critical factor in the levels of e-government services take-up which are lower-than expected in many countries. By enabling the development of a whole new set of G2C, G2G, G2B and G2E applications and services, m-government affords, for instance, a powerful and transformational capacity to extend access to existing services, to expand the delivery of new services, to increase active citizen participation in government operations and to change the way of working within the public sector.

4. Understanding m-government adoption

M-Government is not just a series of single initiatives; rather, it is becoming a strategic and inherent way of doing government business. Government adoption of mobile technologies is propelled by a number of factors, such as policies, standards, cultural trends, availability and costs. When analyzing the potential of m-government within an agency, and the modality for its adoption, it is important for the governments to examine a number of elements. These include the value chain, which is created by the various entities that provide the products and services required in the process of constructing a mobile solution, the key players and stakeholders across the value chain, as well as the stakeholders' partnerships and collaborations.

5. Prerequisites for agility and ubiquity

E-Government services are increasingly required to be platform-independent and constantly available. Therefore, concepts such as mobile government and one-stop shops have gained priority. As governments are trying to foster their capacity to be agile and ubiquitous, they are slowly evolving service delivery towards mobile wireless. This reality requires careful analysis, prototyping and evaluation of services to investigate whether any change leading to new forms of information or service delivery, and/or access, will be accepted by citizens; if changes in user acceptance and cultural adaption are needed; and whether the needed critical mass of "digital natives" exists to fully reap the benefits of the new investments.
The analysis may identify a number of different challenges which will have to be surmounted, i.e. technical, governance, policy, financial, economic, organizational and institutional, legal and regulatory.

6. Technology options for mobile solutions

Mobile solutions can be constructed in a variety of ways, with diverse choices in terms of networks, channels (e.g. voice channels, signaling channels, data channels) back-end information systems and enterprise architecture, devices and applications.
In order to effectively identify and deploy affordable, successful and sustainable mobile solutions, it is critical to have a clear focus on the targeted policy and service delivery goals, and a sound appraisal of available technology options. Technical issues, problems related to security, identity management, broadband connectivity and the integration and interoperability of systems and applications, are all matters that need to be discussed and addressed. Likewise, the development of location based services, the impact of new trends on the mobile market and of social networking on mobile service delivery, i.e. "Mobile Web 2.0", will require adequate attention and will be at the core of policy makers' discussions in the upcoming years.

Introduction

Mobile solutions can be constructed in a variety of ways, with diverse choices in networks, channels, back-end systems, devices and applications.
With a focus on clearly defined service goals, understanding technology options is central to effectively identify and deploy affordable, successful and sustainable mobile solutions.

Voice channel

Although there is much focus on texting, mobile applications and the mobile web, voice remains an important function for mobile communications for many reasons: voice works on all telephony networks and all phones; it has greater capacity for information exchange; voice systems do not require literacy; voice is a familiar and trusted communication channel; and voice systems can be developed easily in multiple or local languages not supported on all handsets.

Signaling channel

SMS – With its relative simplicity and ease of use, SMS continues to grow in popularity, especially with people aged 15 to 25 and for NGOs and grassroots organizations. Bypassing email and Instant Messaging, text messaging has become an integral part of daily lives across the world. Many communication applications have embedded direct-to-SMS functionality. Governments and NGOs actively use SMS for citizen notifications and engagement, news and weather updates, emergency alerts, healthcare and business support services, and to bridge back to websites.
USSD – Created specifically for standard GSM devices, Unstructured Supplementary Service Data (USSD) messages are transferred directly over network signaling channels. This is unlike MMS messaging, which is transferred via a wireless data connection. USSD is free, simple, logical, inexpensive and accessible, with great potential for mobile banking, accessing news services, submission services, feedback, voting, and directories. With interactive navigation, USSD is fast and allows for mass usage. However, messages cannot be saved or forwarded, the codes may be difficult to remember, and usage is not always reliable due to session-based timeouts.
WAP – WAP (wireless application protocol) is an open, global specification that empowers mobile users with wireless devices to easily and instantly access information and services, and to interact with government. Small mobile devices commonly use a WAP browser, which accesses websites written in or converted to Wireless Markup Language (WML).
Devices that will use WAP include mobile phones, pagers, two-way radios, smartphones and communicators, from low-end to high-end. WAP provides service interoperability even between different device families.

Data channel: Mobile messaging categories

There are three predominant categories of mobile messaging:

- A2P (application-to-person) - whereby content is pushed to the mobile phone (popular in both the SMS and MMS domain).

- P2A (person-to-application) - also known as “person-to-content”, where the mobile phone user uploads content to the network/Web or sends a message to another application.
- P2P (person-to-person) - the exchange of a message between two mobile phone subscribers.

MMS – Multimedia Messaging Service is mobile messaging similar to SMS for data transfer, but with additional functionality for rich text, video and audio attachments using Wireless Application Protocol (WAP) to access and display the content.
MMS allows for easy bulk-messaging and, combined with mobile Internet connectivity, can be used to drive an audience to social media or a website.
Data applications and mobile web – Data service involves the transfer of data to or from the mobile telephone, now enhanced by the power and speed of 3G and 4G technologies.

Back-end information systems and enterprise architecture
Implementing mobile solutions within an organization can be viewed as extending enterprise applications to mobile devices. This requires understanding what information can be obtained from which applications, and how it can all be integrated and tailored seamlessly for citizens and for the mobile workforce.

Technical issues
The effectiveness of m-government depends upon the capacities of technology, which include the features and functionality of mobile technologies (e.g. screen sizes, storage space, processor power, input and output devices); supporting physical infrastructure (e.g. technology, equipment and networks); software, applications and systems; and related standards and protocols. The availability of multiple channels can raise issues of interoperability, data quality and transparency of delivery across systems. Essential to technology processes are the security, privacy, and policy structures that guide them.
Governments should also ensure that websites (and website content) are accessible from all possible devices, and to all users. As citizens’ use of mobile phones to access the Internet will very rapidly exceed the use of PCs to access the Internet, this fact will have consequences for the way websites are developed, as websites and their content will have to be available on different devices, including mobile phones. According to the World Wide Web consortium (W3C), which is responsible for web standards and web accessibility, there is a significant overlap between making a website and making its content accessible for mobile devices and people with disabilities

Security and identity management
The growth of mobile usage brings with it concerns about security issues.
As the extension to mobile devices increases an organization’s security risks, mobile solutions must effectively balance information access and information protection. Security and identity management are strategically important and should include mobile device security policies, asset discovery and inventory, information security, encryption and authentication, secure coding processes for mobile applications, and ongoing risk assessment, security testing and threat monitoring. Most governments integrate mobile

security policies, standards and protocols into their existing information technology policies. Many of the same techniques that help secure wired devices can be applied to portable and wireless technology. With the rapid expansion of Internet-connected devices, security is becoming as important a foundational element as energy-efficient performance and connectivity to define computing requirements.

Broadband connectivity

In the early 2000s, 3G networks brought more clarity, faster transfer speed, broadband multimedia applications and seamless global roaming. Fourth generation mobile technologies, beginning in 2006, offer all-IP packet-switched networks for mobile ultra broadband Internet access, multi-carrier access, and significant enhancements for multi-media access. Each generation of mobile communications has been based on a dominant technology, which has significantly improved spectrum capacity.

3G networks – With speeds from 144Kbps to 2.4Mbps, roughly from three times a 56 K dial-up modem to near cable-modem speed, 3G cellular technology brings wireless broadband data services to mobile phones and a web experience similar to a computer broadband connection.

LTE – Long Term Evolution is the next step for many already on the GSM technology curve and for others, such as CDMA operators. LTE-Advanced extends the technological principles behind LTE into a further step change for faster mobile broadband and additional innovations.

Integration

M-Government can complement existing e-government applications, or provide new and unique features and functionality to government services.

Both efforts require co-ordination and integration at some level.

Primary challenges for integration with existing e-government solutions are how to pull data from a server-side system and how to represent it on the mobile device. This challenge is compounded in older systems. Key considerations include requirements for connectivity, security, data integrity, and devices.

Many governments in developed countries have centralized knowledge bases, CRMs, work management systems, and interfaced enterprise systems to support their customer contact center operations, web-based services, asset management and performance reporting. As system providers have become less proprietary, governments have moved to open source systems.

New mobile application developers are joining the market and mobile web toolkits become readily available, integrating mobile applications technology is becoming less challenging.

Interoperability

The concept of interoperability has different meanings. The technical definition of interoperability is the ability of software and hardware on different machines from different vendors to share data. A more general definition of interoperability is the ability of two or more systems or components to exchange information and to use the information that has been exchanged. Not only is the ability to share data required, but also the capacity to use the data as relevant information. Both definitions are quite

narrow, as they are limited to communication. A broader definition, relevant for m-government and public administration, extends beyond just communication. M-cooperation requires not only technical interoperability (as defined above), but also semantic interoperability: the partners in the co-operation have to give the same meaning to the terms used. In other words, a common framework allowing data to be shared and re-used across applications and institutional and community boundaries is needed, and it must establish syntactic structures for describing data to allow its automated processing. Furthermore, organizational interoperability (the shared information must fit the organizational routines of the participants) and institutional interoperability (the shared information systems must fit into the legal, cultural and professional codes of all participating parties) are also necessary. The requirements of all these kinds of interoperability have to be fulfilled for a successful co-operative deployment of ICT applications.

Accessibility

Around 10% of the world population lives with disability problems and many more have functional impairments which limit their capability to use mobile phones. These situations are particularly frequent among senior citizens. In order to avoid the creation of new forms of digital exclusion, it is therefore indispensable to adopt solutions that ensure that all users have equal access to m-government services.

Since the percentage of persons with disabilities is often underestimated, it is essential to ensure that proper demographic analysis is conducted in the country27 before proceeding with the development of any m-government service. When accessible, mobile services are in fact more useful to persons with disabilities than to any other segment of the population: often, persons with disabilities are isolated due to mobility related limitations

Location-based services

Location-based services, leveraging GPS chips, are emerging as a significant aspect of mobile systems. Mobile industry insiders indicate that enhanced location and location-related APIs will become core offerings of major platforms, whether it is iPhone, Android, BlackBerry or the Web. Eventually, all apps will have location-based functionality built in, as location-based ads become main stream and brands start to use location-based apps to drive sales and marketing.

Social networking

Social networking sites on mobile devices and mobile broadband-based PCs now account for a large percentage of mobile data traffic. For example, over 200 mobile operators in 60 countries are deploying and promoting Facebook mobile products, with over 100 million active users accessing Facebook through their mobile devices.

The trend described as “Mobile Web 2.0” or simply “Mobile 2.0” – services that integrate the social web with the core aspects of mobility – is a key underlying factor for m-government services. A basic aspect of m-government devices is that they, in principle, do not approach groups, but individuals.

Open source

Mobile applications present unique usability challenge, and developers should follow best practices. Builders of mobile applications selecting from a range of platforms should determine the target audience, required technology power and the future of the platform. As mobile applications become more competitive and fragmented, some developers are turning to cross-platform open source development solutions.

Next trends on the mobile market

It is becoming evident that smartphones and the associated applications are revolutionizing the entire mobile market in a number of ways. Linking the hardware device, the smartphone, to a content delivery platform enables a powerful hardware/content combination. This type of initiative can remove one of the main conundrums within the industry: how to generate revenue out of content. A good example is the US government, which launched a selection of applications that allow smartphone users to access its services while on the move. Accessible through a dedicated website (apps.usa.gov), mobile apps offer a variety of useful tools, from finding the nearest post office to figuring out the UV index in a given city. Most are available as mobile websites, but the government has also been building apps for other major smartphone platforms (i.e. Android and BlackBerry).

In addition to this, software trends (like the advent of the open source mobile operating systems), hardware trends, and trends related to touch screens, battery, display, operating systems, the user interface, and design will have an important impact on the development of the smartphone market.

Successful advances in hardware may spread rapidly to all smartphone manufacturers. For example, battery life is an issue for everyone, but will be a more serious issue in developing countries where there is little to no electricity, for which reason they will need to rely on solar powered battery chargers.

7. M-Vision and conclusion

As citizens across the world increasingly turn to mobile technology as their main source for news, information and connecting with others, m-government is expected to continuously expand. Governments understandably want to reach out to citizens in innovative ways in order to streamline administrative processes, facilitate accessibility and improve the quality of services in a number of areas such as finance, banking, weather emergencies and citizen engagement. The checklist in this chapter provides a preliminary guide to orient governments and help them improve their understanding on how to translate the new trends in the m-government field into a valuable tool to improve their performance, both internally and vis-a-vis the interaction with citizens and businesses.

Reaching the critical mass

As citizens across the world increasingly turn to mobile technology as their main source for news, information and connecting with others, m-government certainly will continue to expand. Governments understandably want to reach out to citizens in innovative ways in order to streamline the administrative process. Despite all the excitement with

m-government, one fact is certain: no one purchases mobile devices so they can receive the benefits of mobile government. Entertainment (in the form of games, movies, and audio/video clips), family communications, and commercial applications will remain the main drivers, with governments taking advantage of the evolving trends.
Today there are no less than three types of mobile apps:
* apps that utilize text messaging and perhaps voice-guided prompts;
* apps that are maximized to take advantage of mobile device web browsers;
* apps that are designed specifically for mobile devices, usually in the language of the device operating system.

Examples of m-government application in policy areas

Finance and banking

For some time now, online banking has been very popular in many countries. People can pay bills wherever they are by just pushing buttons and either paying by credit card or debiting their personal or business checking accounts.
While industry players are focused on providing new financial services to consumers, the role of government need not be limited to regulating these new services.
Governments themselves have an essential role in helping drive demand for new mobile financial services through their own programs, with a special emphasis on Government-to-Persons Payments (G2P), including social transfers (e.g. social benefits, conditional cash transfers, vouchers or conditional aid, payments of salaries, pension). Governments can become the largest payer in the country, driving the scaling up of m-services to outreach the critical mass. Delivering these payments via mobile phones would have a significant impact on the daily life of people and on the evolution of the mobile financial services sector, as it would help expand the user base, stimulate collaboration to deal with security and business model challenges, and bring in new revenues for mobile operators, financial institutions and others involved to cover their network, application and service investments.

The device as the payment medium: Near Field Communications (NFC)

One of the newest technologies is called near field communications, or NFC.
Many mobile devices already are coming to market with NFC chips installed.
This technology will provide citizens with the ability to use their mobile device much the way they use a credit card. This will be particularly useful with transportation systems, where a passenger merely passes his or her mobile device by a small terminal and the payment transaction is made. NFC can also be used for identification purposes, such as substituting for a physical security card.

Augmented reality

Just as many video games have embraced virtual reality, “augmented reality” is now being used as a commercial layer that sits upon a digitized map. Augmented reality apps used in business applications might include a picture of a street or landmark where signs and active directions are superimposed, letting one know where the nearest metro stop, or nearest coffeehouse or bank, might be.

Location-based mapping

As so many new mobile devices include built-in GPS chips, finding a location or knowing where one is located, is becoming a vitally important process. People are spending far less time getting lost and more productive time getting to where they intend

to be. Users now have choices of directions for walking, driving, or taking public transportation from one point to another.

Weather and emergencies

From police activities to earthquakes and fires, mobile devices are being used more and more as primary information platforms for micro blogs like Twitter, social networks like Facebook, or other outbound communication applications. Government agencies have taken a lead in storm and forecasting alerts, such as flooding, forest fires, tsunamis, and other natural disasters. So far, the impact of m-government applications is strongest when it comes to utilizing social and civic media applications to broadcast information, letting citizens know what to do, or where to go for shelter and help

Citizen engagement

For many countries, citizen engagement has become a new means of communicating with citizens for multiple purposes via multiple channels.

Examples of citizen engagement are applications in which citizens are encouraged to report on garbage pickup shortcomings, street potholes, flooding, tree removal, graffiti, and other services citizens would have previously had to call or write about. Thousands of new mobile applications have been designed to enable someone to simply pull up a form and fill in the required information – and perhaps add a photo taken with the mobile device too.

Translation

While still somewhat futuristic, a number of translation apps have been developed which suggests that, in the very near future, citizens will be able to type in words and have them instantly translated. What's more, it is only a matter of time for people to be able to speak into their mobile device in one language and have it instantly translated into speech for someone to actually hear and comprehend. This can be of great benefit to public safety agencies

that must often deal in real-time emergencies with language barriers and, in general, as global business transactions and interactions expand rapidly.

Crowd sourcing

Crowd sourcing is described as taking a basic task usually assigned to an employee or department, and instead posting either questions or tasks online for a group to respond to, allowing them to provide shared responses, solutions or simply feedback en masse.. Some local governments are experimenting with this type of technology in order to gain greater citizen participation

Authentication

Reliable identification has never been more of a challenge, especially regarding authenticity and balancing the rights of citizen privacy with the need for government to know who people say they are. Identification documents such as passports, driver's licenses, library cards, institutional ID's, and badges all have some weaknesses. Many governmental bodies have begun to experiment with m-government-designed devices that take advantage of biometrics, iris detection, bar coding, RFID, NFC, where the mobile device serves as the principal form of identification. Advantages include:

- real-time processing, authentication and updating;
- ability to rescind or reject in real-time environments;
- ability for real-time updating;
- reduced overall costs in processing ID cards, etc.

Open data

Open data is becoming a key component of citizen demand and government efforts for transparency, accountability and efficiency. This means greater collaboration with citizens, businesses and other agencies to ensure that shared data is current, accurate and accessible. Mobile platforms, especially with better location precision, are facilitating this transformation. Open data empowers citizens to hold governments accountable for the use of taxpayer money, provides access to important business development information, enables governments to both provide and obtain specific and current information in emergencies, and assists in targeting relevant data for diverse citizen needs, interests and geographic locations. Tracking the use of open data helps governments to identify the priorities of the people and groups they serve, improving decision making and service delivery through better analytics. For maximum effectiveness, the evolving process for open data should allow governments to focus on what is most beneficial for social and economic development, rather than what is easiest to implement from a technological perspective.

Planning ahead

M-Government offers a new world of opportunities to build smarter and more open governments. This report is intended to identify the most promising avenues ahead, as well as to define a vision for the mobile and ubiquitous government of the future. This requires thinking beyond some of the traditional intellectual boundaries. Government officials examining the fast-moving m-government environment should begin the planning process by asking “why” before asking “how”. Each governmental unit may have unique needs, opportunities, limitations and perhaps restrictions. Some limitations may be technical, while others may be administrative or political.

Some m-government applications may work in one setting but not in another.

Taking stock of recent experiences, this publication is intended to share best practices and provide some lines of reference, and possible guidance, to stimulate ideas and solutions, and help governments address the challenges associated with m-government development. The checklist below offers a preliminary guide to orient governments and help them to improve their understanding of these most recent trends, and make the most of the new available opportunities to deliver better services to their citizens and businesses. The checklist invites policy makers to focus on four key areas through a set of 17 actions.

A checklist for the future

Better monitoring of m-government development

- Research, evaluate and understand regularly the latest trends regarding new mobile devices, features, and adoption.
  - How many people are using which types of devices?
  - How well do these devices operate, under what conditions?
- Constantly monitor, evaluate and report on the latest trends in new mobile devices, technological advancements and social and civic media applications, in order to prepare a road map for future m-government applications.
  - What are the basic usage trends?
  - What do we know about the people who are most likely to use them?

- How do they match the government communication goals?

- Begin and continue to experiment with new m-government applications to continuously foster innovation.
- Be aware of and optimize the use of technological innovations that will make it easier and less expensive to deploy new m-government services; and consider interoperability of new mobile public services at legal, organizational, semantic and technical levels.
- Analyze, prototype and evaluate m-government services to understand whether any changes leading to new forms of information or service delivery, and/or access, will be accepted by citizens.

Strengthening the public sector's capacity and enabling an environment favorable to m-government

- Strengthening the public sector's capacities and strategic planning skills. Often, high-level public officials worldwide express concern with the fact that not all civil servants may embrace e-government and/or m-government. Some see these new developments as a threat to their jobs. Governments are concerned with the need to:

  - Develop civil servants' capacity to familiarize with, and effectively manage, m-government applications.

  - Improve internal communications between and among government units in order to better integrate m-government applications.

  - Provide rewards and incentives to increase civil servants' buy-in and adoption of m-government.
- Adopt relevant policies and procedures for the use of the new tools (e.g. social media site standards, how these will be used and monitored, what and how performance metrics will be tracked). Without policies and procedures, there is no way to know if a particular program or service is working or not, or if it is being used as intended.
- Ensure continuous updating of the legal and regulatory framework to make it suitable to m-government (e.g. including social and civic media, digital signatures, security, authentication, identity, content, payments, privacy, terms of service). For instance, as many of the new m-government applications are accepting payments, personal information and legal documents, the need increases to ensure that such efforts are covered and supported by national laws and regulations.
- Provide clear guidance to government departments on issues related to privacy and security. From a technology perspective, as the use of wireless communications to access government services for both citizens and public servants will increase, privacy and access to information will be an important challenge and additional security will be required (e.g. user authentication is an important challenge to address fraud in the case of lost or stolen mobile devices).

Seizing the potential of m-government to foster open, responsive and transparent government and citizen engagement

- Secure government agencies' responsiveness to citizens' expectations in terms of accountability, transparency, and improved delivery of public services. This implies adopting policies and procedures for managing citizen expectations.

Citizens using the latest mobile devices and gadgets have high expectations for service availability and responsiveness. This would certainly extend to any new m-government offering. Any m-government service should be planned fully and tested well in advance to ensure that the system works as it is supposed to.

- As m-government is now becoming firmly entrenched into an increasing array of government business and administrative functionalities, more is needed by way of research, best practices, training, and mutual peer learning. Identifying, reviewing and disseminating best practices for citizen engagement applications will help civil servants and policy makers to spot what other agencies are doing, what works and what doesn't work, and why it is beneficial in determining innovative and relevant applications. There is a need for international organizations such as the ITU, OECD and DESA to continue to collect and disseminate best practices from countries worldwide.
- Expand and implement citizen engagement opportunities through web based applications, which will benefit governments and citizens.
- Continue researching the topic to identify best practices regarding technology applications, training and citizen satisfaction.
- When building a new website ensure it is accessible to citizens from a technical standpoint and in terms of content.

Developing and adopting broader strategies

- Leverage the increased use of smartphones and other mobile devices throughout society, as this will produce a significant impact on m-government.
- Be aware of the need to adopt different strategies (i.e. an infrastructure strategy, a service delivery strategy – based on users' needs assessment – and an organizational change strategy).
- Continue to innovate and experiment with new mobile applications.
- Ensure that the input of a few, however well-intentioned, does not replace the will of the many. Systems and safeguards will need to ensure that a "digital mob scene" does not substitute for democratic values and institutions. Regardless of m-government adoption rates, there will remain a significant part of any given population that will not have the resources or understanding and will thus require alternate ways to communicate with government. M-Government policy actions should therefore try to avoid widening the digital gap.
- Raise national awareness of the need to invest in the development of broadband availability and emerging technologies.
- Strengthen public-private partnerships in line with the trends that have emerged in many countries worldwide, where government agencies are working with private companies to develop applications that will have market appeal to be sold and adopted by others. Partnerships with global mobile suppliers/providers are key to the success of m-government for functionality and cost reduction/funding. The main advantages of this type of relationship are:
  - Upfront start-up costs can be amortized among a larger pool of users;
  - Governments lacking in technology application development expertise can turn to those who do have the expertise and can be held accountable for their work.

A2. About "Ubiquitous Cities"

1. Introduce

In these days, international Ubiquitous cities are being developed in many places, and their settings, aims, designs, organizations, and functionality differ among many different kinds of solutions and systems.
Even thought Ubiquitous city generally conceived as local information infrastructure and as a means for enhancing democratic participation, users primarily appreciate it as a too for communication.
We also observed among others, how cyberspace reproduces the dynamics of established and outsiders, which inclines us to think that virtual public is not as open as is often claimed.
However, Ubiquitous cities will always offer you more comfortable life than ever from now on.

2. Research of Ubiquitous cities construction in the world

The need for Ubiquitous cities

The reason why ubiquitous cities are needed is the basic needs to improve the quality of life, and the core technology of future industry is ubiquitous technology.
That is, the city we now live is asking new technology and paradigm that is worthy to new world.

Challenges of Ubiquitous cities construction

In order to build Ubiquitous cities, there are tasks that must be predetermined.
First, new technologies related to Ubiquitous must be pre-developed, and also all of the infrastructure to take advantage of them must be built.
And it is necessary to make new services that uses the full networking using those.

When any one country establish the plan to construct Ubiquitous city, it must be considered both of Ubiquitous technology and construction at the same time.
In other words, by applying ubiquitous solutions to roads, railways, ports, airports, public buildings, housing and public accommodation, the ubiquitous networking must be able connect with transportation, public safety, and environment.

3. u-city construction issues and future direction

u-City is an intelligent city that is based on new ICT so called ubiquitous computing, therefore issues for ICT may be occur.

The u-City can be said a society that can be the dialogue between human and human, human and objects, objects and objects, by being intelligent and networked of all objects.
Thus, an personnel information security, legal and policy will can be issues with each other.
In order to resolve it, all intelligent chip (RFID, sensor, etc.) is must to be environment, not the tool.

u-City has characteristics of the relaxed city, joyful city, pleasant city and futuristic city that combines human (anyone), time (anytime), space (anywhere) and things (any devices).
So, the future direction of u-City as a complex functions city is,
First, improving the quality of life of citizens should be promoted by cooperation with the existing cities.
Second, must be promoted to the direction to contribute the development of ICT industry in the city, and to protect the private information.
Third, must promoted to active the economy of the city through promoting of the information sharing and standardization.

4. Conclusion

By ubiquitous technology, using the telephone or Internet, anyone can control the boiler in home and the machine in the other place from their place.
Ubiquitous means the ICT environment to communicate between users and objects putting computer to variety devices and objects.
The future service fields in u-City will be the mobile Internet, satellite and terrestrial DMB, home network, RFID, W-CDMA, terrestrial digital TV and internet phone.
Also, the broadband convergence network, USN and IPv6 will be the three of infrastructures.
Therefore, the next-generation mobile communication, digital TV, home network, IT SoC, embeded SW, state-of-the-art digital content, telematics and intelligent service robots will be the leading technologies and products for the u-City. In order to prepare u-City, the development of these leading technologies and products for the 21st century must be done the best.
Currently u-City projects in the world have directions of globalization in some parts, but the other places are staying at the localization.
Eventually, it is needed that create the funding for the ongoing services of the project and internet from the market, finally only the hard work and research will allow to predict the good result in order to create a plan and completion of u-City.

M7. e-Services in Ecuador

A1. E-Services implemented nationally by the public sector

1. Foreword

To complete e-services implemented nationally by public sector, the contents listed below should be made specify and progressive.

- ICT based public services
- WEB access improving
- Information gap survey
- ICT training for civil
- Online ICT training
- Information culture Policy
- ICT talent excavation
- International ICT Cooperation Center building
- National DB establish and utilizing
- Country ICT projects investment management system
- Country ICT Promotion Performance Diagnostics
- Telecommunication Quality evaluation
- Establish a national development strategy for the knowledge and information society
- Wireless Internet diffusion-based composition
- E-Government Diffusion
- E-government cooperation center operations
- Construction of e-government standardization system
- Government videoconferencing utilizing
- ICT national certification system established

2. Implementation

After complete the contents mentioned above, implement e-services of all of the public services step-by-step with following ideas.

- The priority for citizens and the city
- The impact to citizens and the city
- The effect to citizens and the city
- Distinguish specific e-services by the type of city – mountainous region, Amazonian area, costal area, urban area or rural area.

A2. E-Services implemented nationally by the private sector

1. Foreword

Contents to complete the e-services of the private sector are as followings;

- ICT ancillary equipment development, dissemination
- PC dissemination
- ICT training for citizens - online, offline
- Internet network spread
- Information Privacy
- Public data open and use
- School ICT enhanced education

2. Implementation

To implement private e-services, the government must develop all of the services with the national policy at the first time.

- Make a plan to develop for the services mentioned above.
- Make a policy to suit the city and country.
- Always check the feedback of the developed services.
- Discuss with citizens, public workers and developers before you make a plan and policy

A3. Recommendation to improve local e-Services

1. Foreword

All of the administrative services must be changed to computerize, because it will be more comfortable, rapid, and productive.
These are already provided in all of developed countries.

Then, what is the best e-service implemented nationally?
The answer is to suit citizens need.

To find the citizens needs correctly, you must have the exact information about the followings;

- How much is the population of the city?
- How many is the Internet connected households?
- How many is the PC penetration?
- How many people hold Smart devices?
- How many rate of internet access?

- What are the government Internet services citizens want?
- What are the key policies of the city?
- What are the characteristics of the city?
- What are the main sources of income of the city?
- What is the city's main industry?
- The degree of the average education of the citizens?
- How is the rate of population growth in the city?
- The status of infrastructure of the city?
- The city's ICT Infrastructure?
- How many ICT staffs work in the City Hall?
- How many staffs have ICT majors?

- What are the current problems of urban public sector?
- What are the current problems of urban private sector?

All of the information will be the basic source to make a policy of e-services.
So, research all about the target city in detail and rapidly, and make a document to verify and analyze.
After that, make a development plan and priority policy according to the document.

2. Promotion model of Ecuador's e-services

Indicator	Stage 1	Stage 2	Stage 3	Stage 4
Core Value	Higher productivity inside the city	Higher productivity cross central	Collaboration with citizens	Partnership with private sector
Goal/Sector	Digitization	Clustering/G2G	Service/G2C, G2B	Value / All2All
Service	Provider driven	Provider driven (pseudo citizen-centric)	Citizen centric	Citizen driven
	Information	City's Portal	Customized	Intelligent
	Publishing/ download	Interacting	Transacting/Web self-service	Value portal on the value-network
	Wire-connected	Wire-connected	Wireless/semi-ubiquitous	ubiquitous
Information Sharing	Isolated from other agencies	Partially integrated in a cluster	Fully integrated in a cluster	value-networked among cluster
Process Innovation	No process Innovation	Internal BPR	Cross-agency BPR	Value-chain creation
Participation	Offline (N:0)	Web bulletin board (N:1)	Service transaction based (1:1)	Multiple transaction based (1:N)
ICT	Local computing	Web computing	Analytical computing	Ubiquitous computing

3. Conclusion to improve local e-services

According to the above information, you can make the priority of civil services.
Finally, you have to change all of the civil services to the computerization, and internet access.
But there are some problems with the infrastructure, manpower and budget.
So, you can achieve them step by step according to the priority.

You have to consider as followings at first;

1. Current ICT infrastructure
2. Technical industry and manpower status
3. Budget schedule

Next, make a schedule to develop;

1. E-services priority
2. Public Infrastructure increasing plan – Broadband, Internet network, WIFI
3. Private infrastructure increasing plan – PC, Smart devices
4. Citizens ICT skill training plan - Software
5. ICT staffs training plan – Software, hardware

And, develop e-services step by step;

1. Computerize civil services according to the priority
2. Survey feedback for the developed services
3. Make the maintenance plan
4. Modify the services according to the result of survey
5. Upgrade the services using advanced technologies

Finally, connect to central e-government;

1. Connect to the database of central e-government
2. Make share all information with central e-government
3. Serve governmental information through local e-government system
4. Place a computational technician to maintain the system of e-services.