1. Process & Achievements: Seoul's e-Government

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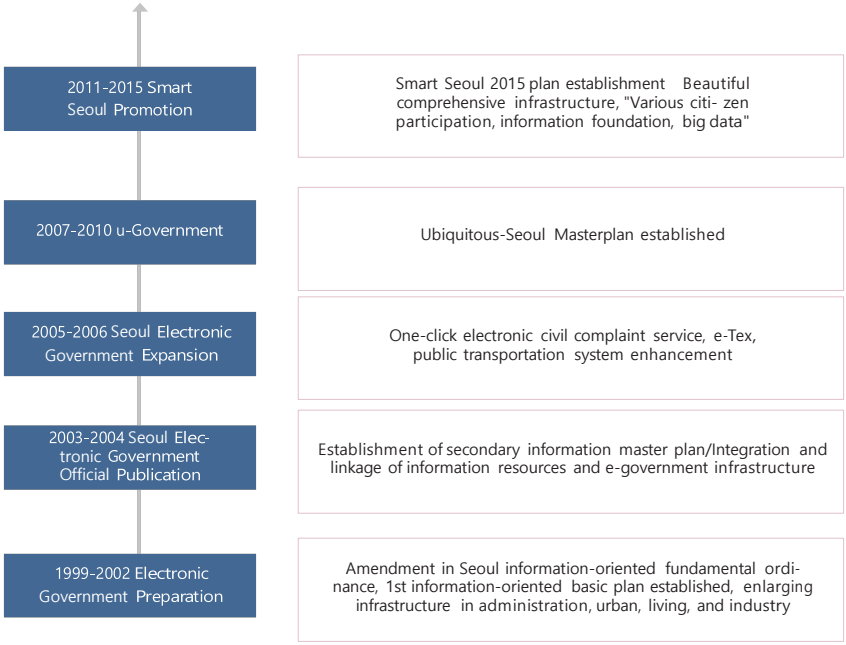
Policy Area: e-Government

Overview

Since the 1990s, Seoul has continually pursued its ICT (Information and Communication Technology) plans to build an efficient, IT-based city government able to provide a convenient information service to the public, systematically manage administrative information, and ensure transparency. Out of these goals, the city's e-Government was born. In the early days, the city's efforts were centered on computerization and automation of administrative duties such as management of taxes, human resources, finances, and geographic information, etc. Automation was further driven by introduction of the electronic signature to assist document control. This move significantly enhanced efficiency in administration, providing a platform on which signed documents could be shared. Of course, prior to that, the Internet made administrative services faster and easier.

In 1999, the City of Seoul Ordinance on Information was passed, forming the legal basis to implement plans and programs to make the city and its administration "smarter". This was a turning point in Seoul's administrative service, a new engine to drive e-Government forward. On March 15, 1999, the Smart Seoul Planning Group was founded to oversee the e-Government program, and an outside expert was invited to be its CIO (Chief Information Officer) and then to head it as a way of giving the system authority. The city now had an environment where its e-Government plan could take flight, embracing a wide spectrum from computerizing administrative duties and providing service to the public, to involving the public in assuring e-democracy. Thanks to the rapidly advancing ICT, Seoul was able to take its first step as an e-Government and strengthen its capabilities for digital administration and digital democracy.

Figure 1 - Progress of Seoul's e-Government



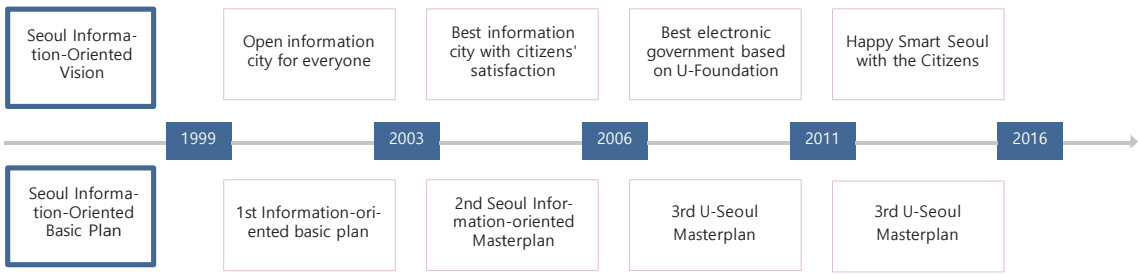
From 1999, Seoul's ICT plan revolved around the 4-Phase Basic Strategic Plan for Informatization of Metropolitan Seoul. Phase 1 (1999 – 2002) was a period of preparation for e-Government, promoting the introduction of ICT in the administration, urban structure, living, and industrial sectors and building the infrastructure for e-Government.

Phase 2 (2003 – 2005) was a period for introduction of e-Government. To keep this introduction systematic, an e-Government roadmap was developed. This included linking and integrating the ever-growing administrative information service and information resources. As a result, Seoul's e-Government began to take its form as a proper electronic framework.

During Phase 3 (2006 – 2010), the u-Seoul Plan was pursued. The city's e-Government was connected to m702 mobile portal to grant people the ability to access and participate from anywhere and at anytime. For u-Seoul, the wireless infrastructure was built on a trial basis. The open Web 2.0 was also introduced to encourage people to participate and share, and GIS (Geographic Information System)-based administrative service and intelligent urban management were incorporated in the plans to build a safer city.

In accordance with Phase 4 (2011 – 2015), Smart Seoul 2015 was undertaken to enable the open e-Government, linked with Seoul City 2.0. Based on the wired and wireless infrastructure, communication and participation was more actively promoted by disclosing public information, providing services tailored to resident needs, and analyzing big data. The public sector worked with the private on big data analysis to address the night bus routes and other urban issues. Documents and content data were disclosed to residents, and Seoul's open, shared data and space information were used by the private sector to develop diverse applications and services.

Figure 2 - Basic Strategic Plan for Informatization of Metropolitan Seoul & Vision

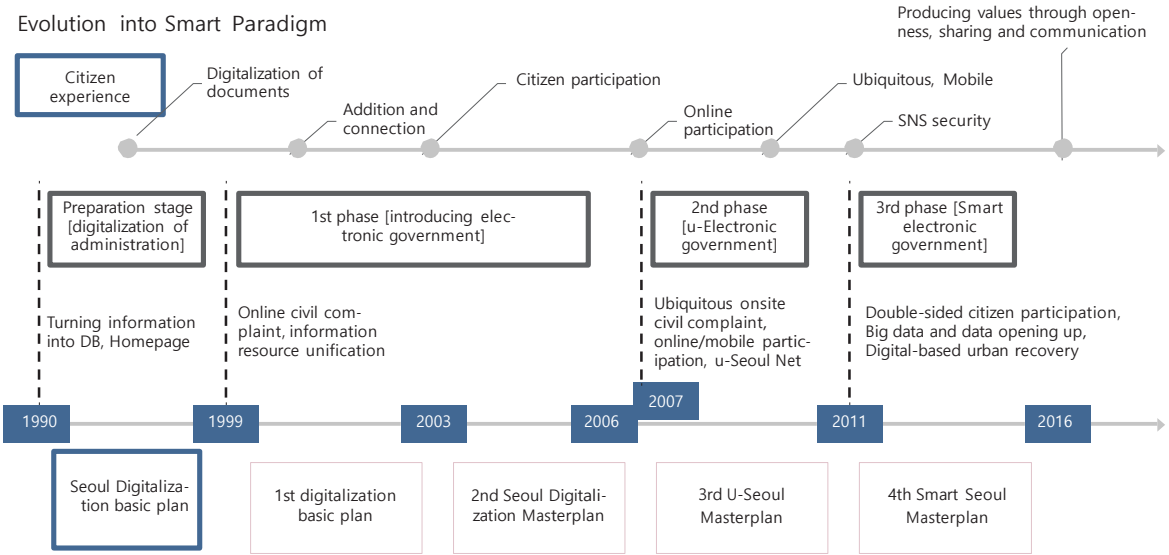


Progress

Seoul's e-Government was launched in earnest in 1999 when the city developed its Basic Strategic Plan for Informatization. The vision for the first Basic Strategic Plan was to create "an open information city at the fingertips". In cooperation with the University of Seoul, the 10-year plan was drafted to advance the 4 sectors of administration, urban infrastructure, living, and industry through information and sharpen the competitive edge of the information system.

With the first Basic Strategic Plan, the administrative information system spread extensively, paving the way toward the launch of e-Government. The public adjusted to the online administrative service system, and attempts were made to initiate a knowledge-based administration. The information system was opened up to advance the infrastructure. An ultra high-speed fiber optics network called e-Seoul Net was constructed and began to reinforce the infrastructure that would enable the shift from a computerized administrative system to an e-Government system.

Figure 3 - Progress of Seoul's e-Government Plan



As a result, Seoul's administrative information services experienced dramatic quantitative growth in 2002. However, this was accompanied by redundant investment in IT resources, inadequate IT service links, and lack of information sharing between the IT systems. To update and improve what had been accomplished during the first Basic Strategic Plan, the Smart Seoul Planning Group tasks were developed in 2003 to establish the second Basic Strategic Plan called the Seoul ICT Master Plan. The Seoul ICT Master Plan was then divided into 2 phases: i) the first phase (2003 – 2004) involving integration of information resources with a vision to create an "information city that people love"; and ii) the second phase (2005 – 2006) involving information service advancement.

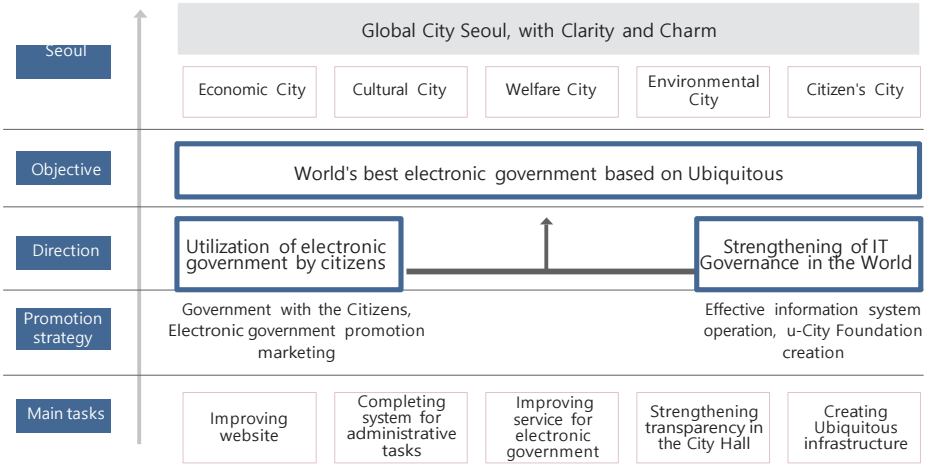
The first phase was about upgrading and integrating the information services and resources that had been individually developed. Many websites were integrated under a single user-friendly interface which was opened on February 24, 2004, and named the Data Center. As for communication infrastructure, Seoul was the first city in the world to have a network such as the e-Seoul Net, which connected the city to 35 major institutions through a 183 km-long high-speed fiber optics cable which allowed e-Government services to be provided without restricting overall network capacity.

Such accomplishments were soon acknowledged: Seoul ranked first of the top 100 performers in the United Nations e-Government Survey conducted by Rutgers University (USA) and Sungkyunkwan University (South Korea) and sponsored by the UN and the American Society for Public Administration, in 2003. It served as an opportunity to export Seoul's e-Government model to other countries.

In 2005 and 2006, the second phase began. Based on the information infrastructure built in the previous phase, policies and procedures were adopted to facilitate the e-Government plan in a more effective and efficient manner. It was also during this period that Seoul's EA (Enterprise Architecture)-based project methodology was completed and an integrated information protection system developed to protect the e-Government infrastructure from security threats. Electronic reporting and meeting systems were introduced for internal administrative work while residents received greater benefit from the e-Government service through introduction of the One-Click Civil Service, e-Tax, upgraded digital administrative services and improvements to the mass transit system.

In 2005, the third Basic Strategic Plan was established, and was a mid- to long-term plan from 2006 to 2010 during which the u-Seoul Master Plan was developed with the aid of ubiquitous technology. With an aim to create the world's best "ubiquitous e-Government", the plan sought to encourage people to make more use of e-Government services and reinforce the IT governance system.

Figure 4 - Vision & Goals for the Third Basic Strategic Plan



In 2007 and 2008, e-Government targeted providing customized and safe services. Open Web 2.0 was introduced as a platform for residents to participate in the development of e-Government, and the One-Click Civil Service was upgraded for user convenience. "Seoul Oasis" (where residents share their ideas on city management), "Cyber Policy Forum", and "Online Policy Voting System" were offered, providing broader opportunities for people to take part online in the decision-making process. In fact, the success of these programs was what helped Seoul win the UN Public Service Awards in 2008. Efforts were also made to expand the foundation for u-City and to build the m702 mobile portal allowing 24/7 access to online information and booking services.

Seoul targeted the e-Government system to make the city a safe place. For this, the accuracy of data warehouse and underground facilities data was improved based on spatial information, and an online road management system was rebuilt. As a way to enhance the safety of the IT infrastructure, an integrated information protection system was built in accordance with international standards for information security management (ISO27001) while fully monitoring access to personal information for increased IT security.

During the period of 2009 and 2010, u-Seoul was initiated in earnest. U-Citizen services were broadened in the u-Seoul plan, and a smart u-Urban Management system was added for environment, traffic, and disaster management. U-Infrastructure and u-Service were scaled up, while u-Healthcare and u-Seoul Safety Zone were piloted, all of which were covered by TIME magazine and on the UN website.

Digital administrative services also took a leap forward. Developed by the Ministry of Public Administration & Security, the Onnara e-document system was improved to start Seoul's unique business process system, which includes systematic document control, sharing, and electronic approvals. The Clean Finance information system was built, and 4 state-assisted institutions adopted the ERP system to make every aspect of financial management as transparent as possible, adding to the pioneering and creative nature of digital administrative services.

To ensure that e-Government remains secure, an integrated security and safety management system was introduced to bring together information security resources scattered among the city and gu district offices. The city also became the first local government to build a security control center, which is linked with the security control centers of the Ministry of Public Administration & Security and the National Intelligence Service. The center dramatically improved its round-the-clock responsiveness to cyber attacks.

Seoul's e-Government also put much effort into global cooperation. Since 2004, the city has continued its global marketing strategies for e-Government while expanding its collaborative network with major global cities. In 2009, the city hosted the World Cities CIO Forum and planned a working-level meeting for the establishment of World e-Government (WeGO). In September 2010, the first assembly of WeGO was held in Seoul, reminding the world of the city's global presence and IT leadership.

In 2010, the Smart Seoul Master Plan – the fourth Basic Strategic Plan (2011 – 2015) – was developed. With a vision of creating a "Smart Seoul" with its residents, the Master Plan set its sights on reforming its information services in accordance with the paradigm shift of administrative services being open and engaging.

In accordance with this, public content and data were opened for improved public access and an enhanced user environment. Seoul also upgraded its mobile services to allow easy access from various types of smart devices. Services were further boosted by the public Wi-Fi and wireless infrastructure.

To make Seoul a Green City, a CCTV integrated control center was installed, providing its service to some 2,500 children from low-income households for the prevention of crimes. In the meantime, the city has been working on integration of the information resources infrastructure.

2012 was the starting year of Seoul's smart e-Government, and the city was the first local government in South Korea to open a "Communication Plaza" and an "Open Data Plaza" for people to access the city's public documents and other data. To further promote access to this data, the city held a contest for smart phone applications and sponsored camps on private/public data use.

People without easy access to information were also engaged so that they could enjoy the associated benefits. The "PC of Love" program was designed for welfare beneficiaries, the disabled, single parents, and multicultural families. Consultations, preventive training and ICT education programs were also offered to minimize any adverse effects from going online.

The ICT plan was also promoted by setting up a governance structure. Based on budgetary feasibility reviews conducted since 2008, ICT program governance was established in 2012 to review all of Seoul's ICT programs for redundancy and budgetary feasibility. When overlapping programs were found, they were integrated or their budgets adjusted to enhance program efficiency. The administrative services were also made smarter by instituting a culture of sharing and collaboration. The ICT plans pursued by different departments were reviewed for feasibility, after which the departments were encouraged to share their work and cooperate if applicable. At the same time, the need for security was emphasized to assure the public of the security and reliability of the information system.

Seoul's e-Government continued to advance. By 2013, Seoul renamed the Smart Seoul Planning Group the "Smart Seoul Group" and shifted its focus from building the e-Government platform to utilizing it. In the meantime, the city continued to stimulate innovation with useful, user-friendly e-Government services.

Thanks to its open platform of big data, mobile, and spatial information as well as its global collaboration through the city network of WeGO, Seoul was able to announce the launch of a fully collaborative e-Government in 2013. Enabled by the open, engaging and sharing City Government 2.0 and the open, sharing, communicative and collaborative City Government 3.0, Seoul's e-Government platform was able to provide a valuable example to other cities around the world.

One example is the Night Owl bus, chosen as the most loved policy in Seoul and used by 2.7 million people annually. It was launched based on big data (including public data) collected from enhanced communication with residents, and aided by private-public collaboration and problem-solving administrative efforts. The data disclosed and used in the process is accessed more than 860,000 times a day and has become one of the most popular city services. The m-Voting mobile service also boosted communication and policy sharing by the city, and has been introduced by the city across many fields, attracting more users over time.

In the meantime, the GIS service engaged people and helped create jobs. It helped the city to chart its policy map and provide a 3D interior space modeling service, a visual guide to policies and their outcomes. It also provided services useful in daily life and enabled a spatial information forum that helped create jobs for young talent. Aimed to make Seoul a safer place, the GIS service won the SAG (Special Achievement in GIS) award from ESRI (USA) in 2011 as well as the Future GOV e-Government grand prize.

In terms of infrastructure development, Seoul upped its responsiveness to cyber threats to make its e-Government a safer institution while working to help its Data Center become greener with the introduction of cloud computing. The Data Center was certified as eco-friendly as it enhanced the efficient use of IT resources and cut energy costs.

Programs by Phase

- Preparation for e-Government (First Basic Strategic Plan, 1999 – 2002)

The City of Seoul Ordinance on Information was enacted and the Smart Seoul Planning Group was founded in 1999. During the period 1999-2002, the focus was on ① providing a user-friendly administrative service; ② enabling the online administrative system; ③ enabling knowledge-based administration; ④ revitalizing the local economy through ICT; and ⑤ building and advancing the information infrastructure. Plans were developed across the 4 sectors of administration, urban infrastructure, living, and industry, and the administrative information system spread rapidly. Introduction of the open system, cyber customer center, and the open online civil service system were successful and these programs were selected as outstanding examples at the International Anti-Corruption Conference and OECD high-level policy seminar.

- Seoul ICT Master Plan (Second Basic Strategic Plan – Phase 1, 2003-2004)

During this period, emphasis was on ① integrating rapidly expanding information resources to maximize efficiency; and ② upgrading the e-Government infrastructure. Integration was conducted from the perspectives of i) the administrative system; ii) service to residents; and iii) IT resources.

Integration of the services to residents was website-based. Websites for each service were brought together into one user-friendly interface. For this job, the One-Click Civil Service was opened and the Cyber Policy Forum began to listen to resident input.

Integration of the administrative information system was initiated through introduction of a new document control system and an integrated city/gu district information system program. Opening of the Data Center on February 4, 2004 coincided with integration of information resources and IT infrastructure, with the Data Center playing a central role. In addition, Seoul's high-speed fiber optics network called e-Seoul Net (183 km) was opened, propelling the e-Government plans without restricting network capacity.

The integration of resources and the involvement of residents were what helped Seoul to rank first in the

United Nations e-Government Survey of the top 100 performers, conducted by Rutgers University (USA) and Sungkyunkwan University e-Government research institute (South Korea) and sponsored by the UN and the American Society for Public Administration, in 2003, and is evidence that Seoul's model has been acknowledged by the world for its excellence.

- Seoul ICT Master Plan – (Second Basic Strategic Plan – Phase 2, 2005 – 2006)

In 2005 and 2006, the information security system was the key to ① encouraging people to use the e-Government service; ② building the e-Government management platform; and ③ ensuring the stability and reliability of e-Government.

To promote use of the e-Government service, a satisfaction survey was conducted to improve service quality, and further projects involved the public in implementation. Besides website integration, content, video, and GIS portals were used to invite more people to access the service. Other ways to involve more people included the assistance to the Cyber Policy Forum and community activities; cyber education to help people become more familiar with ICT and narrow the information gap; and distribution of free computers to the marginalized.

The integrated and efficiently upgraded e-Government infrastructure allowed the city to revamp its policies and procedures to push ahead with its e-Government plans. The EA project methodology was used to introduce electronic reporting and meeting features in the internal work procedure. With increased resident participation, the digital administration became more mature and widespread.

Seoul introduced the integrated system and advanced management methods to protect the e-Government system from outside threats. It obtained BS7799 accreditation, thereby enhancing the stability and reliability of e-Government.

- Customized e-Government (Third Basic Strategic Plan, 2007 – 2008)

This was a stage where the e-Government service was tailored based on the integrated system so that civil services can be accessed by anyone at anytime and from anywhere.

The introduction of Web 2.0 and the upgraded One-Click Civil Service offered better, easier services while the online idea-sharing "Seoul Oasis" and "Cyber Policy Forum" invited more people to participate in running the city. In 2008, their success was what helped Seoul to win the UN Public Service Awards.

The information system continued to expand. The Clean Finance, civil service, automobile and benefits information systems were added to the new system, and a dedicated team was created to support integration.

To build the u-City platform, the m702 mobile portal was built to allow access to online civil, traffic, environment, cultural activities and booking services from computer or mobile phone. Technology was also applied for urban safety, with the u-Children program as a good example. Moreover, GIS-based data warehouse, underground facilities, and road management systems were rebuilt, and mobile GIS platform and business models were identified to reinforce the safety of e-Government.

- u-Seoul (Third Basic Strategic Plan, 2009 – 2010)

For u-Seoul, ① the u-Service and ② the u-Infrastructure were broadened. Wireless infrastructure was built for the city, and Euljiro-2-ga was turned into "Ubiquitous Street". The u-Seoul children's safety system and u-TOPIS were also installed. The u-Safety and u-Healthcare systems (both from u-Seoul) were featured in TIME magazine and on the UN website.

Digital administration continued, and Seoul built its own business processing system, such as the document control and electronic approval systems. Developed by the Ministry Of Public Administration & Security, the Onnara e-document system was improved to take document control and sharing systems to the next level. In addition, the Clean Finance information system was built, and 4 state-assisted institutions adopted the ERP system to make every aspect of financial management transparent, aiding the digital administrative services to become more pioneering and creative.

To ensure that e-Government remains secure, an integrated security and safety management system was introduced to bring together information security resources scattered among the city and gu district offices. The city also became the first local government to build a security control center, which is linked with the security control centers of the Ministry Of Public Administration & Security and the National Intelligence Service. The center dramatically improved round-the-clock responsiveness to cyber attacks. A wireless control system for 119 emergency directives was built, as was the u-Seoul information security system, to continually ensure security of the e-Government system.

Seoul put much effort into global cooperation, sharing its achievements and experience with e-Government with other cities around the world. Based on these efforts, Seoul established WeGO in September 2010 and held the first assembly in Seoul, reminding the world of the city's global presence and IT leadership.

- Launch of "Smart Seoul" (Fourth Basic Strategic Plan, 2011 – 2015)

With a vision to create a "Smart Seoul for and by Everyone", Seoul's new Basic Strategic Plan "Smart Seoul 2015" was launched in 2011. It pursued plans in 4 areas: ① smart, communicative government; ② smart, sustainable living; ③ smart green spaces; and ④ smart, creative global economy. The new plan took Seoul's e-Government one step closer to a smarter paradigm.

For a "smart, communicative government", the city revolutionized its information service in line with the new "open, sharing and engaging" paradigm. Public content and data were open to the public, and resident accessibility was improved to enable full use. The mobile service for smart devices was upgraded, and further boosted by the public Wi-Fi and wireless infrastructure.

In 2012, the "open, sharing and engaging" City Government 2.0 was pursued, enabled by the Communication Plaza and the Open Data Plaza, a city first in South Korea, thereby giving open access to public information and data. It became a strong platform for e-Government, which supports the "communicative, open, engaging and sharing" City Government 2.0 and the "open, sharing, communicative and collaborative" City Government 3.0.

Thanks to its open platform of big data, mobile, and spatial information as well as its global collaboration based on the city network of WeGO, Seoul was able to announce the launch of a fully collaborative e-Government in 2013. The m-Voting-based mobile service boosted communication with residents and sharing of policy. Users of the mobile service, introduced in the early stages in 2012, more than doubled by 2014.

In 2014, the city attempted to enhance communication with residents and resolve administrative issues through the use of big data and public data collected by way of private-public collaboration. One example is the Night Owl bus, chosen as the most loved policy in Seoul and used by 2.7 million people annually. The data disclosed and used in the process is accessed more than 860,000 times a day, making it one of the most popular city services.

Those citizens who do not have easy access to information were also engaged to allow access to the benefits of the city's sustainable welfare programs. The "PC of Love" program was provided to welfare beneficiaries, the disabled, single parents, and families from multicultural backgrounds. ICT education programs were also offered, and in 2012 alone, some 16,371 people completed training courses. Consultations and online safety education were also offered to minimize potential adverse effects from going online, attracting 150,000 people.

To make Seoul a Green City, the CCTV network and CCTV integrated control center were installed, and the u-Seoul Safety service was provided to some 2,500 children from low-income households for the prevention of crime. In the meantime, Seoul Guardian, a mobile safety system, was linked to the 120 complaint service to push disaster and incident alerts and otherwise protect people from danger.

In terms of creativity, budgetary feasibility reviews were utilized to make the digital administrative service smarter and more collaborative. ICT plans pursued by different departments were reviewed for feasibility, after which the departments were encouraged to share their work and cooperate if applicable. At the same time, the need for security was emphasized to assure the public of the security and reliability of the information system.

In terms of infrastructure development, Seoul upped its responsiveness to cyber threats to make its e-Government a more secure institution while working to help its Data Center become greener with the introduction of cloud computing. The Data Center was certified as eco-friendly, as it enhanced efficient use of IT resources and cut energy costs.

Programs were also launched to vitalize the smart industry. Construction of an IT complex is underway, scheduled to be completed in 2016. Other programs include the Seoul App Center and Gaepo Digital Innovation Park. The GIS service was expanded to cover the city's policy map and the 3D interior space modeling service, used to develop major policies and use as performance indicators. Young talented minds took part in GIS development, creating new jobs in the market. It also expanded in scope to be used as a platform to provide services useful in daily life.

Major Achievements

- Integration of Administrative Information Services & Resources, and Seoul's Data Center

As part of the 4-phase Basic Strategic Plan, Seoul now has a strong administrative information system comprised of some 490 different sub-types. Some 78% – 385 types – of the total was developed by the city itself to satisfy specific needs in providing administrative services. Seoul's 144 teams and departments have independent systems optimized to their responsibilities. With these systems in place, they are able to provide civil services in the most effective way and to ensure transparency and efficiency, encouraging more people to take interest.

Since the first Basic Strategic Plan, the administrative information systems have continued to grow and expand. In 2003, information resources that had been scattered across institutions and sectors were brought together as one system. On February 24, 2004, the Data Center was opened and began operating around the clock. In 2014, the Data Center was upgraded for better efficiency and environmental-friendliness and was certified as a "green" center. Thanks to the center, service interruptions were reduced by 76% on monthly average and the services are provided non-stop 24 hours a day all year round. It also allowed for a strong and efficient e-Government platform that ensures quality of the services provided.

While physical resources were integrated by the Data Center, integration of the information systems and applications were completed by Enterprise Architecture.

By ensuring the interactive operability of the information systems comprising 4 layers – technology, data, application, and business – and integrating varied resources, information can be managed in a coherent manner, paving the way for an enterprise-wide IT management system.

- e-Seoul Net and u-Seoul Net

For the first global city, Seoul opened its 183 km-long high-speed fiber optics cable network called e-Seoul Net, connecting itself to 35 major institutions. With this network, Seoul was able to expand e-Government services without restricting network capacity or being limited by budget. When it was first opened in 2003, it was the 2 Gbps backbone network. In 2009, it was upgraded to 20 Gbps, allowing the e-Government system to use and process large data.

In 2011, u-Seoul Net was opened to transmit audio, video and multimedia (e.g., traffic, CCTV data). U-Seoul Net uses fiber optics as well as Wi-Fi, Wibro, USN, and CCTV sensors to allow for diversified service communications, and for people to access useful services related to prevention of disasters, incidents, crime, and even illegal dumping.

Figure 7 - e-Seoul Net Organization

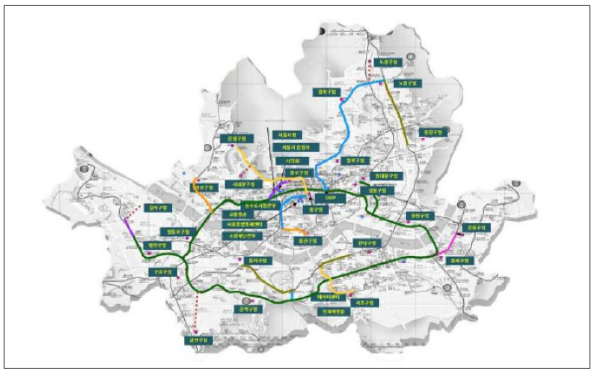


Figure 8 - u-Seoul Net Organization

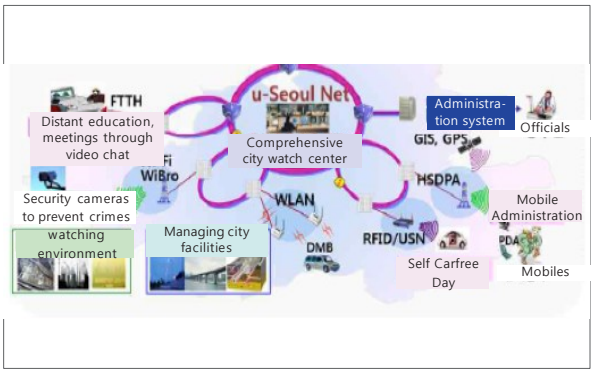
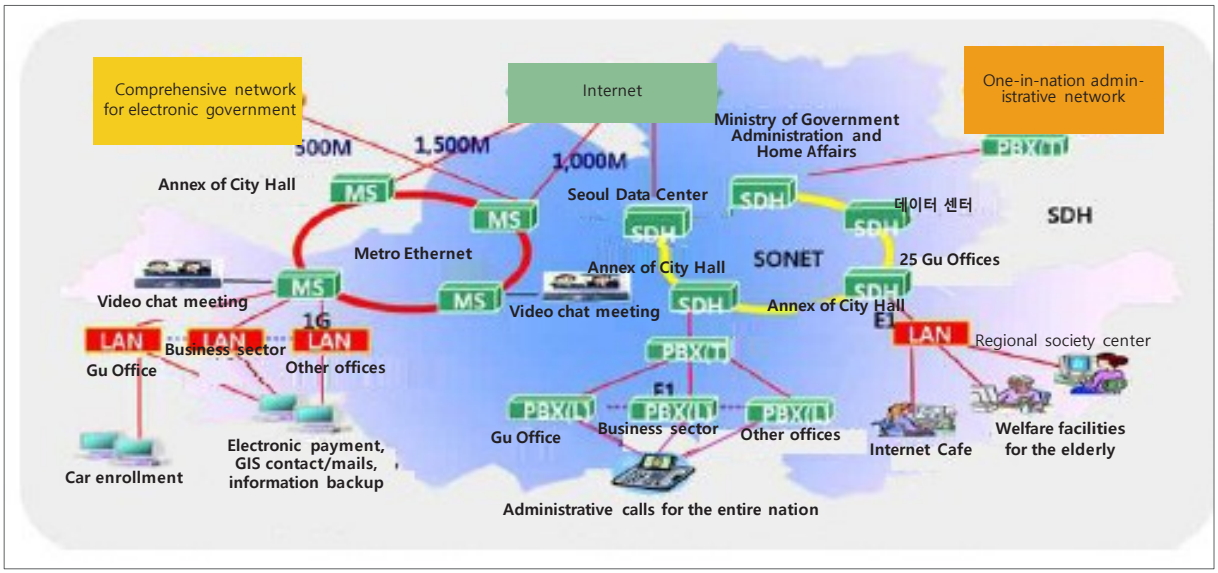


Figure 9 - e-Seoul Net Organization



- Ranking First in the UN e-Government Survey for 6 Consecutive Years

In 2003, under the sponsorship of the UN and the American Society for Public Administration, Rutgers University (New Jersey, USA) and Sungkyunkwan University (South Korea) conducted the e-Government Survey to identify the top 100 performers. In the first survey, Seoul was selected as the top performer.

In the e-Governance survey by Rutgers University, there are 2 categories – digital governance in the evaluation of the public service and digital democracy in the evaluation of citizen participation. The evaluation considers not only the presence of an e-Government service but also the quality of the service, exploring the aspect of citizen participation and digital democracy. The survey offers a comprehensive view of the quality of the IT, e-Government service, and citizen engagement.

Table 10 - Top 20 cities for electronic government inspection in '13 and '14

Rank	City	Overall	Prhaey	Usability	Content	Services	CS Engage-ment
1	Seoul	85.80	16.30	16.57	17.46	16.72	18.75
2	New York	66.15	13.34	14.38	14.45	15.25	8.75
3	Hong Kong	60.32	13.33	14.07	12.22	12.79	7.92
4	Singapore	59.82	7.41	15.00	13.65	12.30	11.46
5	Yerevan	59.61	3.70	17.82	14.92	12.13	11.04
6	Bratislava	58.31	11.11	16.88	11.43	9.51	9.38
7	Toronto	58.05	8.52	16.57	16.19	11.15	5.63
8	Shanghai	56.02	4.44	15.32	11.27	15.41	9.58
9	Dubai	55.89	13.71	15.47	7.94	13.77	5.00
10	Prague	54.88	14.07	15.63	9.84	9.51	5.83
11	Vilnius	53.82	15.56	11.57	12.23	7.38	7.09
12	Viena	53.40	8.89	15.94	10.16	8.20	10.21
13	Oslo	52.52	14.07	15.00	13.97	6.56	2.92
14	Stockholm	52.25	8.15	11.88	16.19	13.11	2.92
15	London	51.90	11.48	15.00	11.91	7.05	6.46
16	Helsinki	51.27	13.70	12.19	8.26	9.84	7.29
17	Macao	48.69	11.11	14.69	11.43	7.71	3.75
18	Mexico City	47.01	4.44	15.01	13.18	9.18	5.21
19	Kuala Lum-pur	46.16	9.63	13.13	7.94	12.13	3.33
20	Zurich	45.36	7.41	16.57	11.11	5.90	4.38

The first evaluation in 2003 looked at 5 categories – Privacy & Security, Usability, Content, Online Services, and Citizen Participation. Seoul earned a total score of 73.48, much higher than the second-ranking Hong Kong (66.57).

Since 2003, Seoul has ranked first 6 times in the last 11 years (2005, 2007, 2009, 2012, and 2014). The latest evaluation in 2014 showed that Seoul's e-Government was excellent in all categories – Privacy & Security, Usability, Content, Services, and Citizen Participation. In the last category, Seoul's score was more than double that of New York, Hong Kong, and Singapore, demonstrating that Seoul's e-Government is particularly unique in citizen participation. It is a crucial platform that supports the 4-year plan of the city's 6th government elected by popular vote in 2014, as expressed in the motto – "Together, Seoul". It can be seen that the city's administrative services were designed with citizen participation in mind.

- World e-Government (WeGO)

In 2008, Seoul hosted the Seoul World Mayors Forum and proposed creation of the World e-Government. In 2009, the World Cities CIO Forum was hosted in Barcelona in 2009, with working-level negotiations held to establish WeGO.

As a result, representatives from 50 cities around the world assembled in Seoul to officially launch the World e-Governments Organization of Cities & Local Governments, the international council of organization in Seoul, in September 2010. Seoul was selected as the chair city, and its mayor the chairman. After the first meeting in Seoul in 2010, the second meeting was held in Barcelona in 2012, and the third one in Chengdu, China, in 2014. Starting with 50 members, WeGO had 82 members at its third meeting in November 2014, growing as one of the most influential international organizations in the city e-Government sector.

With an aim to improve the quality of life for urban dwellers around the world, WeGO is involved in diverse activities, including: improving public administration using ICT; identifying e-Governance success stories; sharing cases and experience in practical application; providing e-Government tool kits and framework; and connecting cities with the potential to develop an e-Government system.

- Communication & Big Data, Open City Government 2.0

From 2007 to 2011, Seoul reviewed the Night Owl bus program, and by the end of 2012, city buses ran for an extra 2 hours for 19 days. The program was received positively and suggestions made to operate some city bus routes 24 hours a day. In early 2013, a university student sent a proposal via social networking to the mayor of Seoul about the night bus program.

The city began to analyze big data. It signed a business agreement with KT and analyzed 3 billion calls during the night when the buses were in operation and 5 million pieces of data on taxi travel in Seoul. To identify the distribution of floating population across Seoul and verify the demand for travel, Seoul was divided into 1,252 hexagons (with a radius of 500 m), which was the assumed distance to and from a bus stop that people would be willing to walk at night. Seoul then established and analyzed the big data model to identify the floating population and their desired destinations at night. As a result, the locations where bus travelers usually gather as well as their travel patterns were identified, based on which optimized bus routes were charted.

Figure 10 - Big data problem definition

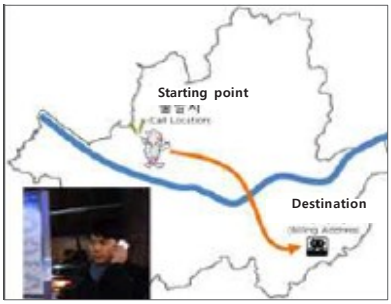


Figure 11 - Modeling

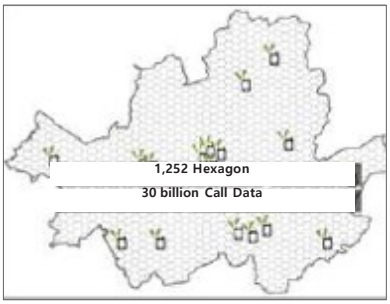


Figure 12 - Floating population

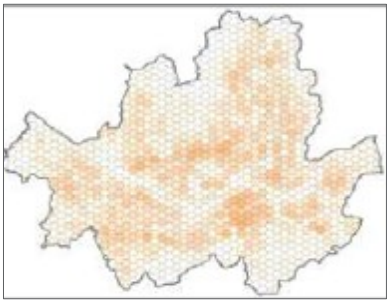


Figure 13 - Night bus routes

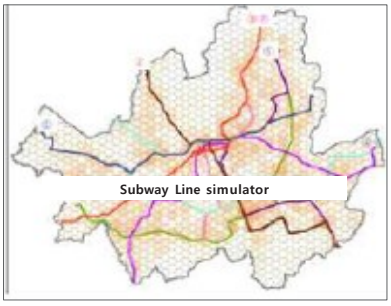


Figure 14 - Routes optimization

Figure 15 - Optimization cases

Considering the nature of a night bus, resources (buses, manpower, etc.) were rather limited. Compared to daytime buses however, the night bus routes optimized by big data analysis were more efficient than was expected:

- Complaints from route changes due to night bus optimization were reduced by data analysis;
- After optimization, the number of passengers increased by up to 10%; and
- Nine night bus routes were able to provide the desired services to 42% of the nighttime bus travelers.
- Other indirect benefits included:
- With the new bus service as an alternative, the rate at which taxis refused to serve customers was reduced by 8.9%;
- The number of women out at night increased by 11.8%; and
- Nighttime safety improved.

With its success with big data analysis, Seoul conducted another analysis in 7 areas related to daily life in 2013 and 2014. Examples include: ① matching analysis of annual travel and empty running data (amounting to some 180 billion pieces of data) of 70,000 taxis in Seoul; ② location optimization analysis for the city's promotional materials; ③ identifying ideal location for the Seoul Seniors Center; ④ identifying ideal locations for senior recreational and welfare facilities; ⑤ analysis of traffic accidents; ⑥ analysis of wait time for call taxis for the disabled; ⑦ analysis of official document issuing machines; and ⑧ analysis of the floating foreign tourist population. With the successful big data analysis cases used to resolve traffic issues and select ideal locations, Seoul applied the methodology in 2015 to resolving issues in 4 major areas of safety, welfare, economy and environment/culture/tourism as well as in the daily issues that residents encounter. Big data analysis is expanding in application; it was also used in commercial district analysis to provide scientifically-proven and effective data-based administrative services.

Towards ensuring an "open, sharing and engaging" paradigm and to enhance communication, in 2012 the city became the first administrative institution in the nation to open its administrative documents and data to the public with an aim to narrow the information gap. As of the end of 2014, residents had access to 3 million documents and 3,600 pieces of data. In 2015, 25 local districts will be ready to disclose their data. The scope of disclosure is steadily growing.

- Interactive Citizen Participation & Digital Democracy

One of the major defining aspects of Seoul's e-Government is that it actively engages citizens in an interactive way. People take an active part in policy development, or propose ideas or offer opinions online, part of the evidence of an improved digital democracy. Cyber Forum, Seoul Oasis, citizen proposals, online communities, electronic voting and other channels are now open to the public. Cyber Forum and Seoul Oasis won the UN Public Service Awards in 2008 and 2009 respectively, proving e-Government excellence in citizen participation.

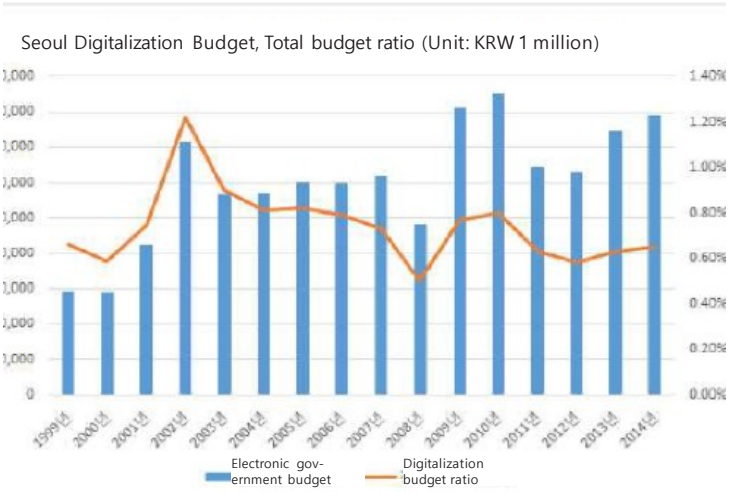
Residents now have more channels of participation. In 2007, the mobile portal called mSeoul702 was built, providing mobile services in traffic, environment, culture and booking, along with an e-poll by which citizens can have their say. Since 2013, people have been able to have a greater part in deciding issues by suggesting specific areas to vote on, thanks to the interactive mobile communication tool called mVoting service. These types of mobile tools encourage more citizens to participate in shaping the city. By 2014, the number of city website users had more than doubled over 2012 levels.

Scheduled to open in 2016, an IT complex is planned in the Sangam DMC, and will be a place where people can share their ideas and where e-Government can be used to test the new ICT and support the ICT industry. Resident participation was designed and instituted by ICT experts and residents through the ICT Committee. Comprised of 30 e-Government experts from companies, research centers, and universities, the Committee developed and reviewed basic plans for e-Government, cementing the governance framework that ensures resident and expert participation in e-Government.

Investment Trends

Pursuant to the Basic Strategic Plan phases, Seoul's ICT budget has been executed in a strategic manner. Since 2002, the ICT budget has accounted for 0.5 – 1% of the city's total budget. The year 2002 was when the first outcome of the first phase was to be revealed, and it can be seen that the size of investment in 2002 (the year of preparation for e-Government), 2009 and 2010 (the years when the results of u-Seoul were out), and 2013 and 2014 (the period of implementing the Smart Seoul 2015) were relatively high.

Figure 16 - Seoul City Digitalization Expected Future



Phase 1 of the Basic Strategic Plan for Informatization pursuant to the City of Seoul Ordinance on Information in 1999, Seoul's ICT budget was KRW 58.4 billion, only 0.66% of the total budget (KRW 8.87 trillion). By 2002, when Phase 1 plans were nearing finalization, investment increased by a significant margin, to KRW 142.9 billion (1.22%) of the total budget (KRW 11.67 trillion). During the introduction of e-Government, the major focus was on tasks designed to enhance government efficiency, such as computerizing all administrative duties, introducing the online civil service system, integrating all computerized resources, and building the Data Center. Through these efforts, the online civil service, integration of information resources, and e-Seoul Net were realized.

From 2003 to 2008, investment remained between KRW 110 billion and 120 billion. Between 2009 and 2010, investment expanded to cover the later part of the u-Seoul plan – Phase 3 of the Basic Strategic Plan. In 2010 alone, KRW 170.4 billion – 0.8% of Seoul's total budget of KRW 21.25 trillion – was invested, establishing the foundation for development of the u-Seoul infrastructure, u-Seoul Net, a ubiquitous onsite civil service system, and the online/mobile infrastructure for citizen participation. The "ubiquitous" infrastructure was particularly helpful in launching urban safety projects such as u-Healthcare and u-Children Safety. It also enabled 24/7 joint cyber threat response and cooperation between all institutions in Seoul and the National Intelligence Service's security control center, significantly expanding the u-Infrastructure platform and enhancing

the response to cyber incidents.

In 2014, during Phase 4 of the Basic Strategic Plan (Smart Seoul Master Plan), Seoul invested KRW 158.2 billion (0.65% of the total budget of KRW 25.4 trillion). The main programs included: resolution of traffic and safety issue with big data and the disclosure of public data, all of which were praised as outstanding examples of digital and scientific administration. In South Korea, Seoul was the first public institution to adopt such a framework. Moreover, the mobile-based interactive communication tool – mVoting service – was also provided. Scheduled to be completed in 2016, the IT Complex in Sangam DMC will be the hub of interactive communication between people and government agencies, boosting the digital-based economy. It will serve as a platform on which a smart, digital government can communicate and share information with residents.

Direction of Development for Seoul's e-Government

Since establishing Phase 1 of the Basic Strategic Plan in 1999, Seoul went on to develop 3 other phases, the fourth Smart Seoul Master Plan as the last, between 2011 and 2015. The city has been able to build the foundation for its e-Government and operate a globally leading e-Government system. In 2015, the Smart Seoul Master Plan developed in 2010 will be completed, with new ones to be established every 5 years pursuant to the City of Seoul Ordinance on Information.

Amidst the rapidly changing and developing ICT environment, the role of digital technology in the public sector has been to provide innovative and pioneering infrastructure across various fields such as economics, industry, culture and society. The importance of an urban digital infrastructure is growing by the day as it helps the city to respond to new technologies and environments (e.g., 3D printers, augmented reality, virtual reality, wearables). By connecting to the digital convergence environment via the Internet of things, cloud, and 4G and 5G wireless networks, the concept and scope of openness, communication and collaboration have broadened even more, as more people remain connected to the things, which in turn are connected to other things. Against this background, digital administration and the digital industry will encourage people to participate more aggressively in the process of policy-making.

The fast-changing digital environment will take South Korea into the era of super-connectivity between 2016 and 2020. During this period, advanced digital technologies will be used to connect people to people, and people to things, while utilizing data-based communication and convergence innovation to provide scientific administrative services and resolve urban issues. To be able to adapt to environmental changes and maintain a leading e-Government system, Seoul will need a new digital urban infrastructure.

Seoul plans to develop ICT plans that will help the city to respond to environmental changes and maintain its digital leadership and presence in the world. Its plans will be diverse, encompassing generation, distribution, storage, analysis, utilization, and safety of the data which constitutes the core of a digital city, aided by de-

tailed and phased strategic and management plans.

In the new Seoul Digital Basic Plan 2020, Seoul will come up with integrated digital governance that will connect both tangible and intangible resources of the city (e.g., citizens, infrastructure, and culture) on a digital foundation. So as to keep its global leadership in the new digital paradigm and respond aggressively to the changing urban environment and the latest ICT, Seoul will endeavor to develop the Plan as a digital blueprint that will include practical application and actionable plans.

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