



Policy Brief

SMART CITIES, STANDARDIZATION AND DX CHALLENGE FOR DIGITAL GOVERNMENT

Task Force 2

Meaningful Digital Connectivity, Cyber
Security, Empowerment

Venkatachalam Anbumozhi, Economic Research Institute for ASEAN and East Asia (ERIA)

Arry Akhmad Arman, Institute of Technology Bandung, Indonesia

Hendra Sandhi Firmansyah, STMIK Jabar, Indonesia

Irma Rizkia, Institute of Technology Bandung

Santi Novani, Institute of Technology Bandung

Suhono Harso Supangkat, Institute of Technology Bandung

Toshio Obi, Waseda University

Abstract

Cities are where problems and solutions meet. Smart cities that leverage the latest in technology and connectivity to make better decisions, offer high potential to achieve the aspirations of citizens and realign local economies toward sustainable communities. There is an increasing realization that the application of digitized Information, instrumentation, communication technologies, and artificial intelligence systems can result in improved service delivery of transport, energy, water, and waste management. The G20 should champion a holistic approach to smart cities that help address social, economic, and environmental challenges. This policy brief explores the benefit of establishment of an integrated smart city framework, examines the existing standards, and recommends a governance mechanism to ensure decision makers have the agility and ability to keep pace with emerging technologies and data flows (digital government) and harness innovations that promise greater sustainability returns.

Challenges

Cities are complex, organic, self-organizing, and nonlinear systems, and this is why they evolve and change rapidly. Contemporary cities can be considered as a large number of interconnected citizens, businesses, transport and communication networks, services, and utilities. Urban challenges, such as planning, economic development, resilient water supply, integrated data and security systems, responsive transport networks, environmental protection, sustainable resource management, risk management, sustainable waste management, energy management, emission control, education, social care and support, provision of local services, are putting immense pressure on the cities, its infrastructure and governance. Traditional operating models for a city have been based around functionality oriented service providers who operate on unconnected vertical silos, which are often not built around user needs (Cohen, 2015). Smart cities need to develop new operating models that drive innovation and collaboration across these silos to offer among others smart education, smart energy, smart environment, smart housing, and smart economy, which require data sharing platforms.

Community expectations for smart city governance have also changed from managing the physical infrastructure and collection of taxes to tackling more significant issues like sustainability, resilience, and inclusion (Galati, 2018). At a project level, the smart city impact also covers the complete life cycle of assets, processes, and operations from ideation to design and building maintenance. The key enablers of data and technology do not exist in isolation but are supported by a range of other enablers, such as a data platform, policy, and regulations. In short, the scope and operational definition of a smart city are very broad and affect every aspect of service delivery and investments. The key challenge is to develop citizen centric agile models, harmonized standards across silo governance. Around the world, different models such as Gauruda smart city model, the international organization for standardization (ISO), are making efforts to develop smart city-related standards. They need coordination and collaboration under the G20. However, there is a lack of discussion at the global level on the use of international standards in implementing smart cities, particularly in developing countries (Anbumozhi, 2020). With standards, data assets, and technologies swiftly evolving, many cities need to avoid getting locked into one vendor's integrated solutions, which makes it more difficult for the city to share data with citizens, developers, and other cities.

Digital Government employs digital technology and data to increase efficiencies, economic development, sustainability and living standards for citizens in urban areas. It is imperative that digital government, which is the catalyst for efficient administrative and financial reform, contributes to significant cost reductions and administrative DX as well as effective online

services. Full-scale promotion and development are indispensable as a starting point for economic growth and innovation strategies and strengthening international competitiveness. With the world rapidly urbanizing, mega cities will only grow in importance, adding 2 billion city dwellers by 2050, with the overwhelming majority concentrated in Asia (UN Environment, 2018).

There have been many challenges in implementing smart cities since the concept was born in the mid 1990s. Starting from its definition, implementation and into the different typical cities' conditions in different countries, especially developed countries. Although the existing conditions of cities vary considerably, the ultimate goal of cities should be the same: achieving a better quality of life for its citizens.

Proposals for G20

1. The G20 should identify and encourage countries to share experiences in smart city development and develop Unified Smart city framework and Model

Many cities in G20 countries have valuable and unique experiences in transforming cities into smart cities through specialized programs and projects. This experience will be very valuable if it can be shared among G20 cities. Although these cities started from different initial conditions and were developed in different economic, social, and cultural environments, they would enrich common understanding toward better G20 cities in the future.

Sharing experiences will be more valuable if it goes beyond a collection of case studies. Instead, these experiences should be systematically formulated into a G20 smart city development framework. In the future, this framework can be a reference for various cities in countries outside of G20 members.

This is important because the G20 is a forum whose country members have a large population, strong economic influence, and varying conditions. This is representative of the diversity of cities around the world, and therefore a joint framework based on the experience of developing smart cities in various G20 countries will be very valuable as a reference.

Currently, several frameworks, models, and concepts have been developed by various G20 countries, including Indonesia. This can be a starting point that can facilitate the development of the G20 smart city framework. Indonesia, among other countries, has developed a framework and model to be adopted as a reference for a common framework. Indonesia also has experience in measuring smart cities in Indonesian cities on a regular basis. The first figure in Appendix A shows the architecture and components of Garuda Smart City Framework. The next figure in Appendix A shows a model of smart city based on the framework. These resources can be further improved to enable the creation of smart city services. The framework should be developed further to contain definitions, models, digital government concepts, development strategies, standards, service concepts, and measurement methods

2. G20 should support the creation of a common standards for smart cities to unlock the innovation potentials and investment opportunities

Smart cities employ digital technology and data to increase efficiencies, economic development, sustainability, and living standards for citizens in urban areas. This is evident in ASEAN smart city Network (ASCN), which defines a smart city as a policy space harnessing technological and digital solutions as well as innovative non-technological means to address current challenges, continuously improving people's lives and creating new opportunities. In reality, the impact of smart city implementation goes beyond improving service delivery. Data and technology are the

two constituents of a smart city that have enabled various innovative solutions to existing and emerging problems, and importantly provided opportunities to innovate highly novel products and services.

Digital governance is defined as the use of technology to provide government services to the public. The goal of digital governance is to improve the government service delivery methods and enhance citizens' involvement in public services. From that perspective, it stipulates smart cities making advances in data acquisition and digital technologies that have the potential to unlock new, more cost-effective, and productive ways for cities to undertake existing tasks. International standards are best practices established by global experts, which can be used to benchmark the functional and technical performance of smart cities.

The smart city is indeed an ambitious concept, but it should be officially recognized by national authorities, international investors, and community organizations to promote societal advancement, technology absorption, and financing of new infrastructure investments. Standards can ensure that technologies deployed in cities are efficient, safe, and well-integrated into the vision and goals of a smart city. This policy brief reviews the evolving standards and technical standards that are important for smart city implementation. Hence, there is a need for standards to help the regulators and communities in assessing how smart cities function and contribute to strategic goals. The consensus within the smart city community is that so far there is limited use of existing and emerging standards that support smart cities' agenda and that are inclusive of a new digital governance architecture.

The following proposal is a three-step standardization process proposed for policy coordination at G20. First, the G20 smart city alliance in collaboration with industry should promote the principles of citizen-centric and trust by design framework by developing a Global Smart City Assurance Framework that builds on existing smart cities frameworks and policies. This includes data sharing and security standards as part of the foundation for building future smart cities, leveraging those International Standardization Organisation (ISO) and International Electro Technical Commission (IEC) standards as illustrated in Appendix C.

Second: to establish a national Smart cities Advisory group to provide G20 smart city alliance to build synergies and minimize the economic costs of transition, and to prioritize smart cities standard initiatives including overseeing the implementation of international and national initiatives.

Third: improve digital governance architecture focusing on data accessibility and interoperability. In situations where key data at the city level are generated to different standards, or where devices or systems include different code labels, accessibility and interoperability are extremely difficult to achieve. Furthermore, foundational data labeling, storage, and quality requirements for future analytics should be established. Careful consideration of privacy and

ethical use of data sharing, different platforms, and data from vendors will be included in the new digital governance framework to guide future cities to develop their smart city vision and policy agenda.

3. The G20 should promote an effective digital governance system to accelerate the transformation

The next generation Digital Government

The next 5th generation Digital Government should be encouraged to implement innovative concepts centered on emerging technologies such as AI, 5G (6G) technologies, IoT, Big Data, blockchains, and digital twins in order to achieve the G20 themes “recover together, recover stronger” and “smart together”. It should be fully considered that the convergence of digital society, climate change and aging society will be inevitable post Covid-19. Furthermore, the following new Digital Government for new society is highly recommended. The 10 indicators by Waseda University-IAC World Digital Government Ranking for 16 years since 2005 is as follows:

- Network Preparedness/Infrastructure (NIP)
- Management Optimization/ Efficiency (MO)
- Online Services / Functioning Applications (OS)
- National Portal/Homepage (NPR)
- Government CIO (GCIO)
- D-Government Promotion (EPRO)
- E-Participation/Digital Inclusion (EPAR)
- DX and Open Government (DXOG)
- Cyber Security (CYB)
- The use of Emerging ICT (EMG)

Citizen-centric government

We are proposing Digital Transformation (DX) for the next Digital Government model with the following 8 factors:

1. AI Innovative Government
2. Big Data, Blockchain-Digital Twin for Government
3. 5G/6G mobile government
4. Digital Government for SDGs
5. Citizen Centric and Social Inclusion
6. Data driven and Open Innovation
7. Emergency action for crises
8. Global network and Standardization

It will improve citizen's quality of life through infrastructure, applications, and other means. Governments should heed the digital gap between urban areas and rural areas, and between large companies and SMEs. These disparities became more apparent during the global pandemic. The world is entering an era of further disparity due to the Covid-19 disaster, which shows no signs of equalizing. It will become a major global socio-economic issue. Therefore, the G20 should create productive harmony between digital government and smart city/villages with all stakeholders. Active participation of civil society should also be encouraged. The biggest challenge for cities is not only how to establish digital government and smart city solutions but also how digital government and smart city can solve basic urban problems. As a result, many cities have adopted smart solutions on urbanization, and sharing experiences between the stakeholders of the governments in different countries are expected to expand solutions for all public sectors in G20 member countries. Yet, even today there is no substantial universal framework available. On the other hand, there are many governments worldwide that are still struggling to solve basic urban/rural/village problems.

Coordination between Digital Government and Smart City

There is the need to harmonize disjointed central and local governments' DX and as well as digital capabilities. Also, to address current and future urban issues including aging societies, there must be a renewed focus and reorganization of governance centered to encourage innovative solutions. Harmonization of creating common infrastructures, platforms, and between Digital Government and Smart City as well as their joint activities is extremely important to reduce any duplication of investment for digital infrastructure and accelerate economic growth. To promote coordination for all important stakeholders, it is necessary to organize the World Summit on Digital Government-Smart City coalition.

Conclusion

The framework for smart cities that we propose has a high relevance to the activities of the G20. Sharing experiences in building smart cities from various cities within the G20 countries is necessary for cities with different conditions to exchange experiences; cities that have implemented solutions that work can share their experience on how to do so effectively.

This policy brief will aid the G20 Indonesia presidency to advance global policy norms to help accelerate best practices, mitigate potential risks with data use, and foster greater openness and public trust.

References

- Anbumozhi V (2020). Enhancing the readiness of ASEAN smart Cities, in Comprehensive Asia Development Plan 3.0, Economic Research Institute for ASEAN and East Asia, Jakarta
- Arman, A. A., Supangkat, S.H., et al, Garuda Smart City Framework, SCCIC Internal Report, 2017
- SCCIC Team, The Report of Indonesia Smart City Rating 2022, SCCIC Internal Report, 2022.
- Arman, A. A., Supangkat, S.H., et al, Garuda Digital Transformation Framework, SCCIC Internal Report, 2019
- Aleverdyan D. Kucera F., Horak. M. 2018. Implementation Of The Smart City Concept In The Eu: Importance Of Cluster Initiatives And Best Practice Cases. International Journal of Entrepreneur Knowledge
- Cohen J D (2015). The 3 Generations of Smart Cities, Rowman and Little Field, London
- Glati S R (2018). Funding a Smart City: From Concept to Actuality. Springer pp 17-19
- Firmansyah, H.S., Supangkat, Arman, A.A., Giabbanelli, P.J., Identifying the Components and Interrelationships of Smart Cities in Indonesia: Supporting Policymaking via Fuzzy Cognitive Systems, IEEE Access 7, 6287639, pp. 46136-46151
- Lim SB., Malek AM., Yussof Md., Yigitcanlar T. Understanding and acceptance of smart city policies; Practitioners Perspectives on the Malaysian Smart City Frameworks. Sustainability Journal. 2021
- Saiya, A.A., Arman, A.A., Indonesian Enterprise Architecture Framework: A Platform for Integrated and Connected Government, Proceeding - 2018 International Conference on ICT for Smart Society: Innovation Toward Smart Society and Society 5.0, ICISS 2018
- Su Y., Miao Z. Wang C. The Experience and Enlightenment of Asian Smart City Development—A Comparative Study of China and Japan. 2022
- Tay, K.-C.K.C., Supangkat, S.H., Cornelius, G., Arman, A.A., The SMART Initiative and the Garuda Smart City Framework for the Development of Smart Cities, Proceeding - 2018 International Conference on ICT for Smart Society: Innovation Toward Smart Society and Society 5.0, ICISS 2018
- Yu W., and Cu C. 2018. Developing Smart Cities in China: an Empirical Analysis. International Journal of Public Administrations in the Digital Age. Volume 5. Issues 3
- Obi Toshio , JP Auffret and Naoko IWASAKI, "A ageing society and ICT" IOS press, 2013, pp.99-127,
- Obi Toshio and Iwasaki Naoko ,16th Waseda World Digital Government Ranking 2021 ,Institute of Digital Government - Waseda University (idg-waseda.jp/ranking)
- Tokyo metropolitan office <https://www.metro.tokyo.lg.jp/tosei/hodohappyo/press/2021/>
- Bannister, Frank and Denise Leahy. "Different Divisions: A Taxonomy and Examination of the Role of E-Government in the Digital Divide. 2014
-

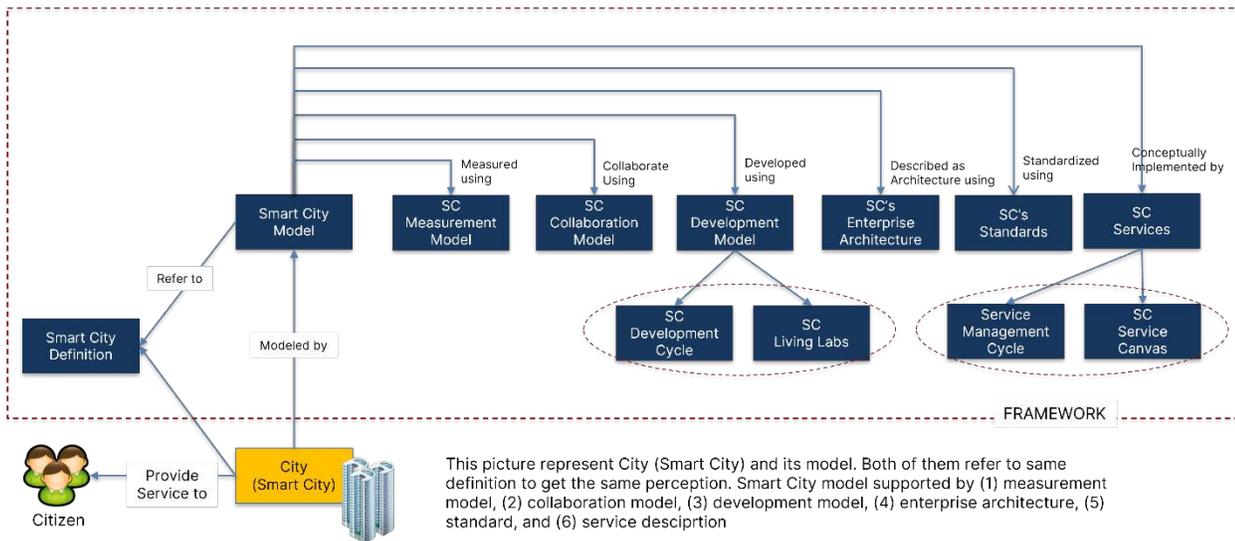
- In Scott Baum and Arum Mahiznan, eds. E-Governance and Social Inclusion: Concepts and Cases. Hershey, PA: IGI Global, pp. 10-24.
- Kate Boeding, Jonah Czerwinski, and Richard McConkie (2018). 3 POTENTIAL BENEFITS OF BLOCKCHAIN FOR GOVERNMENT from <https://www.boozallen.com/s/insight/blog/3-potential-benefits-of-government-blockchain.html>
- Obi Toshio and Naoko Iwasaki, ed. (2015). A Decade of World E-Government Rankings. Amsterdam: IOS Press.
- Obi Toshio (2014) , “Survey on the e-local government for middle-class executives in 131 districts in Japan” in July, in Tachikawa, Tokyo.
- UNEP (2018). The weight of the Cities: Resouce Requirements of Future Urbanizations. United Nations Environment Program, Nairobi

Appendix

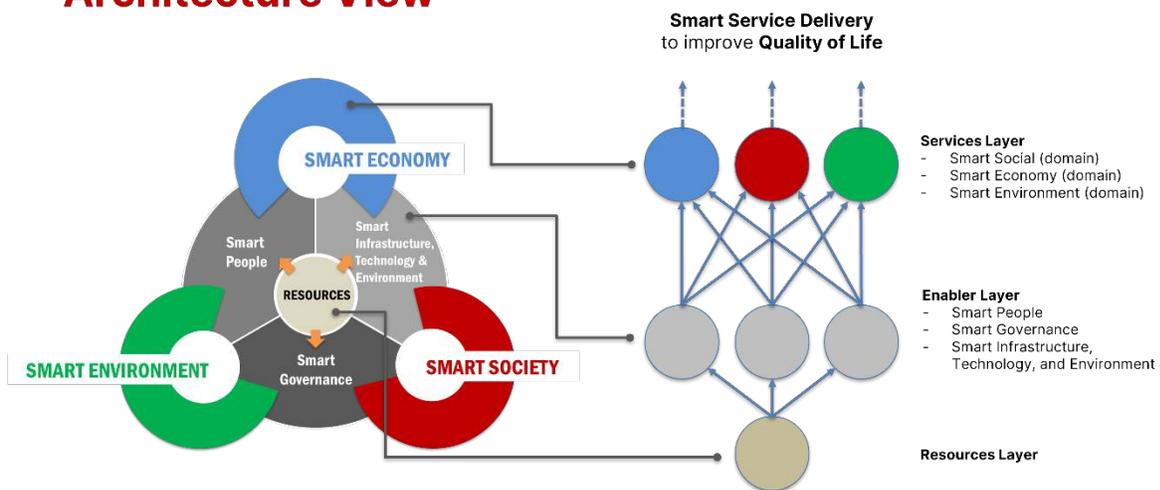
APPENDIX A

GARUDA SMART CITY FRAMEWORK and SMART CITY MODEL

Architecture of GSC Framework 5.0



Smart City Model Architecture View



APPENDIX B

Highlights of 10 Major Global Issues on Digital Government

1. Digital Inclusion, Citizen centric and ID

◆ Advance digital ID

The spread of applications for digital national ID systems is a major trend in 2021. In Singapore, facial recognition technology was introduced to the national ID "Sing Pass" starting in 2021. The registered person's face enables recognition of administrative and banking procedures without using a traditional card. Sing-pass also supports digital signatures of legal documents.

In India, the penetration rate of the biometric national ID "Aardar" system reached 99% in June 2021. Aardar uses multi-path biometrics that combine fingerprint, iris, and facial recognition technology. Aardar uses equipment from NEC, a Japanese company, for biometric authentication. In Thailand, the Ministry of Digital Economy and Society, is working on planning and promotion in the digital economy and society and has drafted AI ethical guidelines. The purpose of creating the guidelines is to improve the competitiveness of Thailand based on the 20-year National Strategic Plan (2018-37).

On December 13, 2018, a seminar was held at Thammasat University on the theme of digital innovation co-sponsored by the Electronic Government Agency (EGA), the Faculty of Innovation, Thammasat University, and the International Academy of CIO. One of the speakers, EGA President Sack said: "Regarding the De-Government Project from 2016 to 2021, 80% of the current 400 government agencies will be digitized during the five years of the project period, and various registration and tax payment procedures can be done with a digital ID. The Digital ID was distributed in 2018. It was used initially in the financial field. A Digital ID can be used to open an account, and banks can check customers in the government database. The utilization of open data will also be started as part of the project. Also, Utilization of data analysis by AI for policies, plans, budgets has started. The goal is to promote paperless and cashless in 5 years and strengthen business competitiveness. EGA is considering the use of AI as the next step. In terms of legislation, the aim is to enforce digital government law in the near future, simplify data exchange between ministries, and increase transparency. Also, in 2018 DGA built the Government Secure Intranet to strengthen network security within the government. "

A year later, on January 30, 2019, President Sack of DGA at the Office of the Prime Minister's cabinet office shifted from EGA to the MICT in Bangkok. DGA is promoting the digitization of administrative documents ahead of the enactment of the "Government Digital Act" in March 2019. Currently, copying administrative service documents costs 1 billion baht per year, and 151 government agencies have already practiced the need to submit copies, providing information to citizens via mobile apps and business licenses via the web. That could be expected to reduce the budget by 3 billion baht.

Digital national IDs and online real estate registration are also planned. Over the next three years, they aim to further promote paperless operations and move up to 20th place in the World Bank's business environment ranking. Blockchain technology will be used to exchange digital documents among government agencies. The DGA plans to integrate these data and analyze them with AI and set up an AI committee to formulate its strategy. President Supot Tirawut introduced a new scheme for IoT-Big Data-AI linkage for DX.

2. Privacy protection

◆ Amazon will be subject to maximum fines after EU GDPR enforcement

The EU currently has the strictest regulations on personal protection in the world. The General Data Protection Regulation (GDPR) came into effect in 2018. Personal information protection laws that follow the GDPR are being developed and discussed in various countries around the world. In recent months, two important sanctions have been imposed on US companies.

In July, Amazon was fined € 746 million by the Luxembourg data protection authorities for violating the General Data Protection Regulation (GDPR). Amazon's European headquarters are located in Luxembourg. This is the highest GDPR fine to date as of 2021. The highest amount prior to this was a € 50 million fine imposed on Google by French data protection authorities in December 2019.

Amazon suggests a policy challenge. Amazon may have violated privacy regulations for consumers who use online shopping. Second, it is possible that the Amazon's products were given preferential treatment over outside vendors that sell on the marketplace.

WhatsApp is famous for its messaging app, but in September 2020 the Irish Data Protection Commission (DPC) decided to impose a fine of € 225 million for violating the GDPR. DPC found WhatsApp violated GDPR by not properly informing users how WhatsApp shares personal information with its parent company Facebook. WhatsApp suggests a policy to file a complaint.

Under the GDPR, data protection authorities can impose fines up to 4% of global annual sales for companies that mishandle data. The fine on Amazon is equivalent to 0.2% of Amazon's 2020 sales.

◆ World movement

In the United States, although federal-level regulation is sluggish, state-level regulation is moving forward in some Democratic states. There are moves to strengthen privacy protection in New York, where large companies are gathered, and in Washington State, where Microsoft and Amazon are headquartered. Among those states that have adopted privacy legislation, the state that first enforced the privacy protection law is California. The California Consumer Privacy Act (CCPA) came into force in January 2020, and the amendment was passed in November 2020. The California Privacy Rights Act (CPRA) will come into force in January 2023.

In Japan as well, a bill to amend the Personal Information Protection Law was passed during the 2020 ordinary Diet session. The Personal Information Protection Law is less strict than either the GDPR or CCPA.

In China, the Personal Information Protection Bill was passed in August 2021. The Personal Information Protection Law will come into effect in November 2021. When a company collects personal information, the law requires that in order to obtain biometric information, medical data, financial accounts, location information, etc. a company must obtain the individual's explicit consent. This law restricts the transfer of information abroad. Therefore, when foreign companies handle personal information of Chinese citizens, it is necessary to comply with new regulations. The new law requires representatives to be assigned within China to report information gathering to regulators.

The new legislation in China has three purposes. First, the government protects consumers by tightening regulations on businesses. Consumers can now turn off targeted advertising themselves. Strengthening supervision is a recent trend in China. In August, the city of Beijing filed a lawsuit against Tencent over gathering information on the WeChat app.

Second, it appeals to the world that the Chinese government is active in protecting personal information. There has long been suspicion that Chinese apps are fraudulently stealing personal information. The Chinese government's enforcement of strict personal information protection laws will increase the reliability of Chinese-made apps.

Third, China can take advantage of new regulations to foster domestic high-tech companies. It will be possible to overlook Chinese companies and crack down on foreign companies.

In Southeast Asia, Singapore enacted the revised Personal Information Protection Law in 2020. In Malaysia, the Personal Information Protection Law enacted in 2010 complies with the GDPR. In Thailand, the Personal Information Protection Law is scheduled to be fully enforced from June 2022. A personal information protection bill is under deliberation in Indonesia. No legislation has been put in place in Vietnam, but a government ordinance is scheduled to come into effect in December 2021.

3. Silver Innovation ICT / Digital Contribution to Improve Ageing Society

◆ Usage status of information and communication equipment for the elderly

The 2021 White Paper on Aging Society in Japan published the "International Comparative Survey on the Life and Awareness of the Elderly". The survey clarified usage status of information and communication equipment by the elderly. The usage rate of smartphones, tablets and PCs by the elderly in Japan is much lower than in the United States, Germany and Sweden. 14.9% of the elderly in Japan use personal computer e-mail, which is lower than in other countries. In addition, the online banking and government procedures utilization rate of elderly people in Japan is less than 10%. This is compared to the 70% rate in Sweden for elderly use of online banking. One in three seniors in the United States and Sweden use online national and government procedures.

Regarding the reasons for not using information and communication equipment, many elderly people in each country answered, "I don't know how to use it, so it's troublesome" and "I don't feel the need." In Japan, the number of people who answered "I don't feel the need" decreased from 70.4% to 49.2%, and the number of people who answered "I don't know how to use it, so it's troublesome" increased from 26.8% to 50.3% compared to the survey five years ago.

Elderly people in Japan are feeling the need for information and communication equipment more than before. However, many don't know how to use it, and therefore think it's troublesome. Operating smartphones and personal computers can be a major hurdle for the elderly. Going forward, it is important to increase the IT literacy of the elderly.

Information and communication equipment that elderly people usually use (multiple answers)				
	Japan	U.S.	Germany	Sweden
TV	80.20%	80.70%	92.00%	79.90%
Smartphone	44.50%	62.60%	65.20%	58.80%
Tablet	10.60%	40.40%	27.70%	43.30%
PCs	31.10%	62.90%	43.90%	53.00%

2021 White Paper on Aging Society

From December 2020 to January 2021, a survey was conducted on men and women over the age of 60 (1,367 in Japan, 1,006 in the United States, 1,043 in Germany, and 1,528 in Sweden).

Details of use of information and communication equipment (multiple answers)				
	Japan	U.S.	Germany	Sweden
Contact us via computer e-mail	14.90%	63.40%	41.20%	49.60%
Collecting information and shopping on the Internet	31.70%	64.30%	56.90%	67.90%
Net banking and financial transactions	7.70%	47.60%	33.10%	72.40%
Internet-like national and administrative procedures	6.70%	34.40%	19.40%	34.50%

2021 White Paper on Aging Society (Japan)

◆ ICT services for the elderly

Services that exist to connect the elderly and ICT include services in which the main target is a senior who lives with a family member or a long-term care provider, and services in which the main target is the elderly. Examples of the former are watching services and nursing care robots that use ICT equipment. Examples of the latter include home-based telemedicine services, online supermarkets, and meal delivery.

The Japanese government will promote DX support for long-term care providers. Long-term care providers who have introduced ICT equipment are given preferential treatment with long-term care fees. Examples of ICT equipment are watching equipment, income, and long-term

care recording software. Although deregulation was carried out in 2021, the introduction is not progressing much because the system still requires strict operating conditions. More thorough deregulation is expected to promote Silver DX.

◆ Measures for the elderly in China

In China, as a measure for the elderly, consideration will be given to people who cannot use digital devices and smartphone use will be promoted. For Cashless payments, which are widespread in China, the Chinese government requires retailers to also accept cash payments. This considers people who cannot use smartphones.

A volunteer system will be established for teaching how to use smart devices to the elderly. Manned counters and telephone reservations are maintained at tourist destinations and exhibition facilities. Face-to-face and cash payments are maintained in housekeeping and long-term care services.

As a measure to promote digital devices, the Ministry of Industry and Information Technology instructed application developers to develop designs that are easy for the elderly to use and versions for the elderly in November 2020. It covers 43 apps and 115 sites. In addition, some public facilities, including public toilets, require users to present a QR code that indicates their health status. There was created a digital divide because those without smartphones could not use the facilities. Currently, public facilities have also begun to accommodate people who do not have smartphones.

At the National People's Congress in March 2021, Prime Minister Li Keqiang addressed those smart devices should not interfere with the daily lives of the elderly. The Internet usage rate of middle-aged and older people in China is lower than that of Japan. Measures for the elderly will become more important over time.

4. Booming environment-friendly smart digital city

◆ New Boom for Smart city

In Japan, one of the local governments aiming for a super city is "Smart City AiCT" in Aizuwakamatsu City. AiCT has 36 companies in the office. The office, which opened in April 2019, was fully booked in September 2021. Accenture, which has previously conducted a project with Aizuwakamatsu City, will play a central role. Aizuwakamatsu City will develop various citizen services by utilizing the urban OS developed by Accenture. Aizuwakamatsu City has adopted an opt-in method in which data is provided only to the citizens who agree. Aizuwakamatsu City positions healthcare as a priority field and promotes shortening of hospital stay time and extension of healthy life expectancy. The entire region is regarded as a virtual institution responsible for health management, medical care, and long-term care. The facility will have latest digital technologies such as health management / status monitoring, AI family doctors, and AI hospitals will be utilized.

◆ Smart city development progresses in ASEAN and other Asian countries

In ASEAN, the ASEAN Smart City Network was launched in 2018. Select cities from member countries and focus on smart cities. In Vietnam, Hanoi, Ho Chi Minh and Da Nang were chosen. Vinhomes, a subsidiary of Vingroup, the largest conglomerate in the country, is developing smart cities in Hanoi and Ho Chi Minh City. A camera with a face recognition function equipped with AI will be installed in the area. An intelligent disaster prevention system and an air pollution environment pollution warning system will be installed. In connection with the development of smart cities in Southeast Asia, Japan, China, and South Korea will each sign a memorandum of understanding with ASEAN to promote their own smart city technology.

The Smart city project implementation countries are India, Uganda, Cambodia, Thailand, Vietnam and Mauritius. For example, Vietnam will introduce a water quality information provision app, and Thailand will verify the feasibility of utilizing AI technology in tap water channel management. Mauritius will use the urban operating system developed by Accenture to centrally manage multidimensional data on disasters. By combining various data acquired for disaster prevention purposes with urban infrastructure data, it is possible to formulate disaster prevention plans more efficiently.

Based on the US-ASEAN Smart City Partnership, the United States will promote the involvement of the US private sector and support research and development. In August 2021, US Vice President Harris visited Singapore and published her fact sheet. In the section on expanding collaboration in smart cities, it was stated that a green building program would be established to promote green building standards. In the field of cyber security, the Ministry of Finance, the Ministry of Defense, and the Cyber Security Department of both countries have signed a memorandum of understanding for bilateral cooperation.

◆ Challenges of smart cities

Here are two issues for smart city development. First, it is important for residents to reach consensus. Since smart cities use a large amount of data about residents, residents of smart cities need to provide various personal information. When a new smart city is built, it is possible to move in residents who have agreed in advance. On the other hand, when an existing city becomes a smart city, residents who are positive about providing personal information and residents who are cautious about providing personal information coexist in that city. Residents' understanding of the provision of personal information is essential for the promotion of smart cities.

Third, we must aim for smart city development that can achieve the SDGs. Development that promotes global warming and environmental destruction should not be allowed in return for new urban development. Placing a lot of foliage is not just environmentally friendly. Analysis and evaluation based on strict environmental standards are required at the construction, maintenance, and demolition stages of smart cities.

5. New Generation Digital Government- A new government model that makes full use of 5G

According to Ericsson's announcement, the number of 5G subscription contracts worldwide for 5G compatible devices increased by 70 million in the first quarter of 2021, reaching

about 290 million. The number of contracts will increase to 580 million by the end of 2021 and is expected to reach 1 billion by the end of 2022. 5G is gaining widespread adoption at a faster pace than 4G. 5G population coverage is projected to reach 25% in 2021 and reach 60% in 2026. However, population coverage does not mean that one can always connect with 5G within a 5G area. It is highly likely that the mainstream connection method in the first half of the 2020s will be 4G. Considering the prediction that 6G will be put into practical use around 2030 and will not spread worldwide, 5G will become the mainstream connection method from the latter half of the 2020s to the 2030s.

◆ 5G development in Asia

In some Asian nations, the government is deeply involved in 5G strategies.

In Vietnam, the military-affiliated telecommunications company Viettel has developed 5G telecommunications equipment. Four major domestic companies share Viettel's 5G equipment. Viettel provided Vietnam's first 5G communication service in December 2020. Domestic production of 5G equipment is important in national security. In addition, Viettel is eager to export 5G equipment.

China aims for the rapid spread of 5G networks. According to the announcement by the Chinese government, as of the end of March 2021, the number of 5G base stations in China was 891,000, accounting for 70% of the world total. By 2025, China's 5G-related investment is projected to reach around 1.2 trillion yuan, and IT-related consumption is projected to reach 8 trillion yuan.

Malaysia made a major shift in its 5G policy in 2021. In the past, domestic telecommunications companies were planning to develop their own 5G networks. However, due to the government's policy change, each telecommunications company will share the 5G network built by the government. The Malaysian government announced a contract with Ericsson in July 2021. Building a 5G network led by the government is a method like that used in Vietnam. This policy change has two major implications. First, telecommunications companies can reduce the cost of investing in 5G infrastructure, allowing consumers to use 5G at a lower rate. The second is to curb China's influence on 5G networks. Malaysia's four major mobile companies had contracts with Huawei and ZTE for 5G infrastructure development. There are considerable efforts to keep Chinese companies out of the 5G network in Europe and the United States. The United States is pressing countries around the world to eliminate connections to Chinese companies. Among them, it was a security risk that 5G infrastructure was mostly made by Chinese companies.

Currently, there are few options for 5G communication equipment manufacturers. By developing technology that combines products from multiple companies, telecommunications companies can disperse various risks.

6. Spread of new technologies-blockchain and quantum computers

◆ Blockchain

Investment in blockchain technology is increasing in China, the United States, and the EU. The Chinese government will promote policies with the aim of making the blockchain industry part of the world's top industries by 2025. In June 2021, the Ministry of Industry and Information Technology (MIIT) announced a roadmap for the spread of blockchain. By 2025, the Chinese government will develop three to five internationally competitive companies and innovation leaders. Blockchain clusters are formed by these companies. In 2030, the technology will be further improved, and the scale of the industry will be expanded. Blockchain technology will strengthen manufacturing and support the digital economy. In order to strengthen the blockchain industry, it is important to strengthen the real economy through "supply chain management," "product traceability," and "data sharing." Blockchain technology will be used for applications in smart cities and for building data sharing platforms for government services.

In the United States, major financial institutions such as Morgan, Citi, Wells Fargo, and US Bancorp use blockchain technology. Other financial institutions will also consider cryptocurrency transactions. According to a survey by a major bank, Bank of America, 21% of banks have somehow incorporated blockchain technology into their operations. Many politicians and experts point out that legislation is inadequate for virtual currency transactions, which are typical financial transactions using blockchain technology. Democratic Senator Elizabeth Warren says investors face risks in the uncertain crypto market. She argues that the US Securities and Exchange Commission (SEC) should strengthen its authority.

In the EU, "INATBATA", an international standardization organization for blockchain, was launched in 2019. INATBATA aims to provide a global forum for blockchain developers and users to further promote the social application of blockchain.

In addition, the blockchain technical support project "TruBlo" will be held under the initiative of the European Commission, the Next Generation Internet (NGI). To promote blockchain technology research, TruBlo will provide partial and full funding for selected projects for three years from 2021. From 2021 to 2022, the EU will invest € 62 million to support top Internet innovators in the areas of Internet trust and data sovereignty. These policies are based on the EU R & D support framework "Horizon Europe" adopted in 2020. It will invest 80.9 billion euros in the seven years from 2021 to 2027. Support projects will be implemented in fields such as AI / robotics, next-generation Internet, quantum computers, and big data.

◆ Quantum computer

Regarding quantum computers, the United States, EU, and China will take the lead in supporting research and development. The US will spend up to \$ 1.3 billion over the five years from 2019. The EU will spend about 1 billion euros in 10 years from 2018. China will implement a research plan of about 7 billion yuan over five years from 2016.

Japan formulated a quantum technology innovation strategy in January 2020. It will spend 55 billion yen in two years from 2020. The strategy proposed the formation of a quantum technology innovation hub (international hub) and the establishment of a council on quantum technology. In line with this strategy, the "New Industry Creation Council by Quantum Technology (Q-STAR)" was established in September 2021 with the participation of 24 companies including Toyota, Toshiba, and NEC.

7. How D-Government will Change with Covid and Post-Covid

◆ The role of D-government in the Covid-19 disaster

With reference to the case of Japan, there are two points about the role of D-government in the corona disaster.

First, various support systems will go online. The economy was severely damaged by lockdowns in other countries, requests for temporary closure of Japanese companies, and requests for citizens to refrain from going out. Therefore, various support systems such as subsidies, benefits, and interest-free loan services have been expanded. Online procedures are essential for the efficient operation of the support system. Unfortunately, Japan has failed to bring such benefit procedures online. The data sent was incompatible with the databases, requiring staff to re-enter the data. Some municipalities have requested mailing procedures instead of online procedures. This is because the mailing process is ended up being faster than the online procedure. The system must be redesigned for more efficient online procedures. This is a national level policy, not a municipal level.

Second, new innovations have been created to combat Covid-19. Corona-infected person tracking apps have been developed around the world. Gov-Tech is expected to grow in the market. It will be the role of the government to foster Gov-Tech companies and sell them overseas.

◆ With Corona

In Europe and the United States, the movement to regain daily life is becoming active. The United Kingdom implemented a complete deregulation on July 19, 2021. By September 2021, the number of infected people has not increased sharply, but it tends to increase slightly. As of August 13, 76% of the population had completed the second vaccination. However, the average number of infected people per day is 30,000 and the average number of deaths is 100, which is a number that cannot be optimistic. Nevertheless, the British government has indicated that it will proceed with its reopening policies.

The number of infected people in the United States shows a clear upward trend. In early September, the average number of infected people was 150,000 per day, and the average number of deaths was 1,500 per day. There are 90 million unvaccinated people in the United States. To combat this, vaccination or proof of testing are emphasized. New York City regulations from August 16, 2021 require users and employees to certify vaccination when entering indoor restaurants, fitness gyms, and indoor recreational facilities. Vaccination proof is also required for classical concerts with a quiet audience. Proof methods include New York City's Coronavirus Safety App, Excelsior Pass (New York City's electronic proof), and a CBC-issued vaccine card.

8. Relationship between global warming, climate change and disasters and government measures

◆ Disaster prevention DX

In the disaster prevention DX, there is an effort to convert the management of stored food to DX. Most of the emergency food stockpiled by the local government is hard food that can be stored for a long time, such as hard bread and biscuits. Such foods are difficult for the vulnerable infants and the elderly to eat.

In the future, by sharing various data such as the place where residents live, the distance of evacuation shelters, and road conditions with other local governments, Yoichi Town will be evacuated to the safest evacuation shelter regardless of the boundaries of the city. The aim is to create a mechanism by which this can be done. The introduction of a stockpiled food management system and the accommodation of evacuation shelters and food between local governments are important components of the disaster prevention DX efforts.

9. DX (Digital Transformation) The actual situation of digital transformation

◆ Digitization of regional economy

There is a trend of "digital regionalism" that connects the local economy and digitalization. A community-based platform has been created to meet the demand for local production for local consumption. One of the reasons is that the corona restrictions made it difficult to go out, and there was a demand to support local shops and businesses. For example, in Quebec, Canada, there are e-commerce sites that handle local products, as well as carpooling services, bartering, and apps that support local projects.

◆ Educational DX

DX in education has made great progress due to the corona virus. Online classes are offered in China, the United States, and other countries around the world.

In Japan, universities and private schools started online classes in 2020. In public schools, many municipal schools that have declared a state of emergency and will offer real-time online lessons to students who are worried about attending school from the second semester of 2021. Many public schools were unable to prepare real-time online lessons during the school closure last spring due to problems with the communication environment and terminals. Instead, the school distributed lesson videos taken by teachers to video sites and school board servers.

◆ Inauguration of the Digital Agency of Japan

In Japan, the Digital Agency was established on September 1st, 2021. The Digital Agency has about 600 employees, 200 of whom were hired from the private sector. Regarding the establishment of the Digital Agency, the appointment of engineers at the forefront of technology was emphasized. Some workers continue to work part-time in the private sector or part-time at the Digital Agency. The Digital Agency referred to Singapore's Gov-Tech, the UK's Cabinet Office Digital Service (GDS), and the Danish Digital Agency for inspiration.

The Digital Agency has set the goal of "realizing a digital society where no one is left behind." This is similar to the idea of UN SDGs. There is a strong need to help men and women of all ages benefit from DX and access digital content.

10. United Nations SDGs and the role of the government

◆ SDGs and ICT

The goals set out in the SDGs are compatible with ICT. For example, in order to solve food shortages, it is necessary to improve efficiency and productivity through agriculture using ICT. One of the support mechanisms is to provide medical opportunities using a telemedicine system for the spread of medical care. An advanced disaster prevention system using AI and IoT should be built to respond to natural disasters. In addition to reducing the burden of housework on women, one of the solutions is build or upgrade to smart homes through the spread of AI and IoT appliances. It is important for the government to support the implementation of various projects that combine SDGs and ICT both at home and abroad. Ten fields are envisioned as to complete the project. Infrastructure, agriculture and food, medical care, education, urban areas, basic living, finance, disaster prevention environment, tourist exchange, and finally freedom from gender barriers.

In Japan, "Society 5.0" was proposed in the government's 5th Science and Technology Basic Plan. Society5.0 is defined as a human-centric society that achieves both economic development and resolution of social issues through a system that highly integrates cyberspace and physical space. Society 5.0 is positioned as a new form of society following the hunting society (Society 1.0), agricultural society (Society 2.0), industrial society (Society 3.0), and information society (Society 4.0).

Appendix C

List of Evolving Standards for Smart Cities

1. The IEEE SA Foundational Technologies Practice is committed to smart cities standardization and offers a portfolio of standards and programs to address key aspects of the smart cities' framework
2. IEEE P1951.1 Standard for Smart City Component Systems Discovery and Semantic Exchange of Objectives – This project is focused on solving the discovery of the systems deployed in a smart city and enabling the sharing of objectives between these smart city systems to make them work towards a common goal.
3. IEEE P1950.1 Standard for Communications Architectural Functional Framework for Smart Cities – This standard specifies the architectural and functional framework for smart cities aiming to enable communications within and across smart city ecosystems.
4. IEEE P2413.1 Standard for a Reference Architecture for Smart City (RASC)IEEE P2850 Standard for an Architectural Framework for Intelligent Cities Operation System – This standard defines an architecture framework for a computational operation system, which is designed to enable intelligent cities.
5. IEEE P2784 Guide for the Technology and Process Framework for Planning a Smart City – This guide provides a framework that outlines technologies and the processes for planning the evolution of a smart city.
6. IEEE P2872 Standard for Interoperable and Secure Wireless Local Area Network (WLAN) Infrastructure and Architecture – This standard describes a protocol that enables interoperable, semantically compatible connections between connected hardware (e.g. autonomous drones, sensors, smart devices, robots) and software (e.g. services, platforms, applications, AIS).
7. IEEE SA Industry Connection Program on AI-Driven Innovation for Cities and People – This program is focused on providing cities a governance mechanism to support responsible artificial intelligence systems (AIS).
8. IEEE SA Industry Connection Program on Alliance for Best Practices and Standards in Smart Cities – This program aims to develop close collaboration between the technology industry and city leaders and stakeholders towards smart city solutions across cities and regions.
9. ISO 37120 , 37121 , 37122 – Non-Governmental Independent Global organization – minimize diversity in technical definitions- IT Security, Energy Management, environmental management
10. IEC – International Electro-Technical Commission – Agreement on the technical description and international standards

11. ITU – International Technological Union –backed by the United Nations – has identified 1800 standards; ICT standards consist of four layers Vz application & support layer, data layer, communication layer, and sensing layer