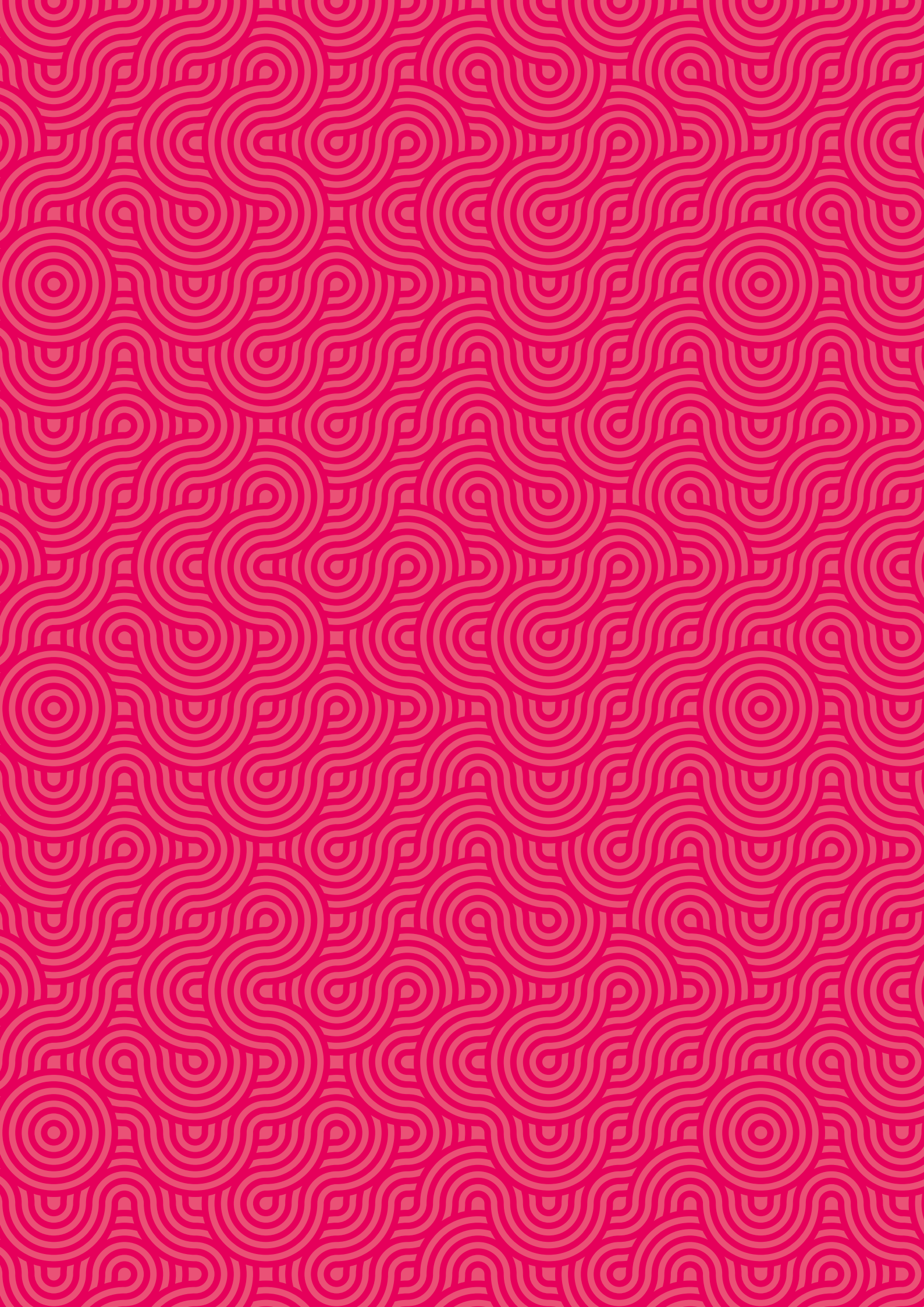




Smart Cities and Data Privacy Concerns in Japan

Muneo Kaigo, University of Tsukuba
Natalie Pang, National University of Singapore



Preface	2
Summary	4
Introduction	6
Key Stakeholders for Smart Cities	9
Perception of Innovation and Data Controllers in Japan	10
Implications of This Survey	14
Introduction to Toyota’s Smart City Project	15
Case Study	
Toyota’s “Woven City” and Smart City Development in Japan	15
Dialogue between Stakeholders	16
Challenges: Inconvenience Caused by Smart City	18
Data Cultures	19
Laws and Regulations	22
Conclusion	24
References	25
Appendix	27
Sample of Questions	27
Methodology	27
Authors	28

Data fuels digital change. It forms the basis for numerous new products and services and can bring about specific advantages such as personalised medicine, autonomous driving, or more efficient administration. While data may be indispensable for the generation of new knowledge and may aid rational decision-making in the spheres of politics, society, and the economy, it brings with it an element of fear stemming from issues such as vulnerable consumers, privacy concerns, and the possibility of algorithm-based decisions being executed independent of human control.

The ability to collect and process ever-increasing amounts of data is a **key to innovation and growth**. For states such as Germany with a globally networked and high-tech economy, this presents enormous opportunities – especially due to the increasing amount of non-personal data made available through industrial processes as well as public sources. However, neither Germany nor Europe is fully exploiting the innovative potential of data for the benefit of society, the economy, science, and the state. The collection and analysis of data does not have to be in conflict with the **European approach to data protection, which marks an important standard for the responsible handling of data** in the global context.

Numerous US and Chinese companies have occupied central strategic positions in the digital economy in recent years. These include cloud systems, digital payment systems, online trading, and Artificial Intelligence (AI). **Despite some notable successes, Europe and Germany still lack a comprehensive vision for the “age of data”.** Nevertheless, in the spring of 2020, the European Commission launched its roadmap for digital policy – a “Data Act” to create a single European data market is planned for 2021.

Against this background, it is worth taking a **comparative look at the Asia-Pacific region** as it is generally considered the region that currently leads in both global innovation and economic growth.

Hence the Konrad Adenauer Foundation’s regional programme “Political Dialogue” based in Singapore started a large-scale study in September 2019 on *Data and Innovation in Asia-Pacific*. We want to turn our gaze away from Silicon Valley to other important “data nations” in order to investigate the ambiguous and not-at-all-clear **connection between the use of digital data and the innovative capacity of economic and social systems**. However, we will not limit our analysis to technical and economic issues as the exploration of this ambiguous connection inevitably involves the fundamental political question concerning the *systemic competition* between liberal-democratic societies and authoritarian development models – in particular, that of the People’s Republic of China – with regard to the manner in which data is attained and used. To put it more pointedly, the question is: in times of omnipresent data generation and its use by increasingly AI-based systems, is the ability to innovate only to be had at the price of the complete disclosure of private data to governments and corporate actors? Or can an alternative approach, one balancing both the protection of basic rights and promotion of innovation, be found?

The study was carried out in collaboration with the National University of Singapore (NUS) and was supported by the country offices of the Konrad-Adenauer-Stiftung in Asia-Pacific. We selected **Hong Kong SAR, India, Japan, the People’s Republic of China, Singapore, South Korea, and Taiwan** as the contexts to be examined. We

looked at the areas of **transport, finance, administration, health, and Industry 4.0** to understand how added value for society and the economy can be created through modern data use.

We aim to contribute to the discussion on how to balance data usage and data protection in order to promote innovation in this digital age.

The following questions guided us in this study:

Narratives

How do companies, state actors, and civil society understand the handling of data – especially personal data – and the ethical assessment of such use? What are the prevailing narratives in each country?

Legal Bases

What are the laws and regulations that apply to the collection, use, storage, provision, disclosure, retention, and disposal of personal and non-personal data? What is the status of the development of legislation for these matters and how do different stakeholders deal with the issues of data protection and data portability between different (private and public) systems?

Ecosystem

Data is part of a larger “innovation ecosystem”. Its potential can only be realised through interaction with other innovation-promoting elements. What specific legal, technological, infrastructural, cultural, and economic aspects of a country shape the respective ecosystems and determine performance?

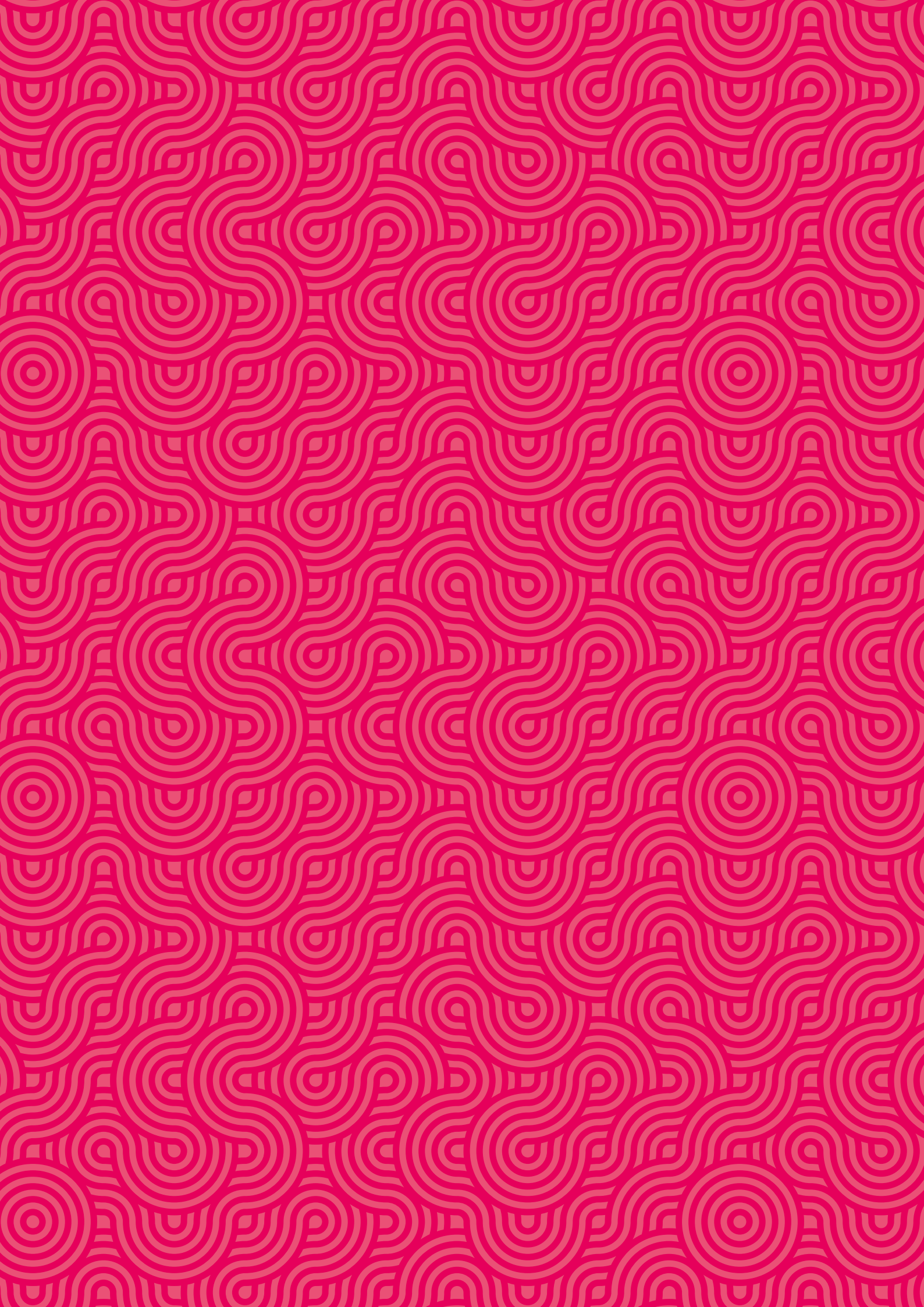
In Singapore, Japan, and Taiwan, the study is also supplemented by a representative population survey on data culture.

We hope that the diverse pictures presented on the subject of data and innovation in Asia will provide food for thought in Germany, Europe, and Asia itself.

Dr. Peter Hefele

Director Asia and the Pacific

1. **Digital transformation (DX) in Society 5.0 is the current vision for Japan's IT policy strategy.** Society 5.0 branches into multiple ministries and agencies. One major frontier is the building of smart cities.
2. Toyota Motor Corporation has initiated construction for the **Woven City, an experimental smart city near Mt. Fuji in Japan, in cooperation with business partners and public administrators.**
3. The Woven City aims to **infuse technology and data innovations into everyday life**, satisfy social needs, and drive business and economic growth.
4. Its development in Japan is driven by policymakers, corporations, technocrats and engineers, which has, however, led to the **sidelining of ethical and citizen concerns, most notably over the collection, use and protection of personal data.**
5. **Citizen distrust in the government and digitalization of personal data has undermined the potential for data innovations.** In particular, digital surveillance technology adopted to cope with COVID-19 among other Asian nations, together with highly risks of public breaches of data privacy, have led to increased concern among Japanese citizens over data security issues.
6. While laws and ordinances are in place to protect personal information, they are disaggregated across national and local levels of government.
7. To overcome these challenges, expert interviews recommended an **"Ethical Principles for Smart Cities" framework** to protect civil liberties and articulate consensual ethical principles that would inform smart city development as well as improve consensus-building among government, businesses, and the citizenry.
8. In the post-coronavirus era, ethical and legal deliberations are needed as to what extent citizen data privacy should be given up in exchange for certain public (and private) benefits, and how governments can better articulate their own values in adopting data innovations.
9. The success of a smart city depends as much on its ability to exploit data and technology effectively, as its acceptance, trust and high regard by the people for whom it is intended.



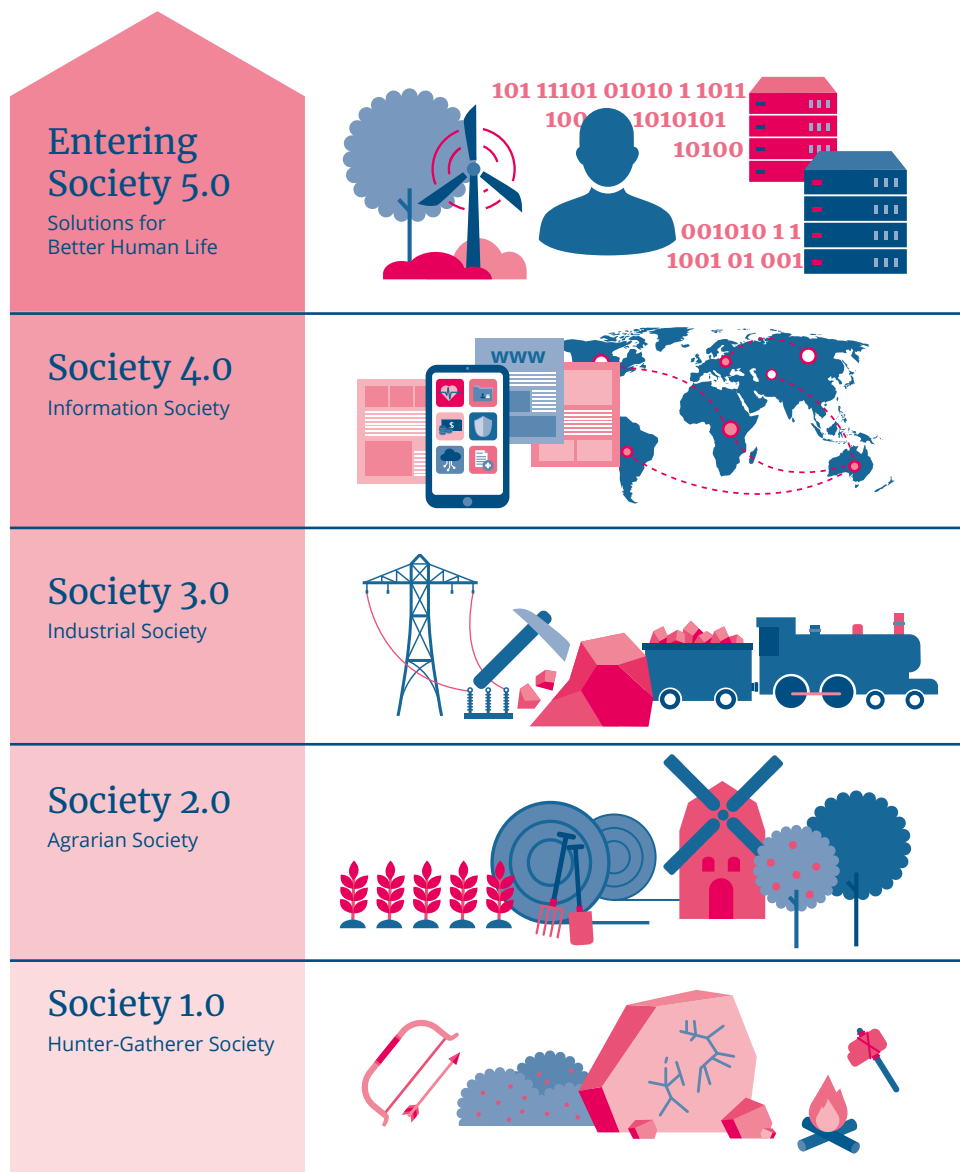
Since the 1980s, Japan has had a reputation for being a global leader in technological development and innovation for having advanced digital infrastructure. It ranked third in the Asian Digital Transformation Index 2018 for factors such as its extensive fiber network (67% take-up among buildings), broadband usage (133% take-up in the population – implying on average, 1.33 mobile broadband subscription for every person in Japan), industry AI strategy development and technology absorption in firms (Economist Intelligence Unit, 2018). However, systems and cultural factors in Japan have hindered the process of digital transformation. For example, internet access is not always affordable, and the traditions of using fax machines and *hanko* (personal seals on printed documents) instead of soft-copy documents remains pervasive in day-to-day affairs. (Soble, 2020; Harding, Inagaki and Lewis, 2020). Furthermore, although internet access is widely available, adoption rates are lower in rural areas and among the older generation (Nishida, Pick and Sarkar, 2014; Onitsuka and Hoshino, 2018), causing a huge digital divide between the youth and elderly population.

Since 1995, the country's digital transformation has been guided by a series of Science and Technology Basic Plans (STBP) published every five years by the Cabinet Office. These plans set out goals and budgets for different sectors related to science and technology. The Fifth STBP covered the period from 2016 to 2020, and noted that science and technology is one of Japan's "fundamental strengths" but that the country's international standing in this field has been declining (Government of Japan, 2016). Thus, targets and recommendations have been set to foster open innovation, encourage talent development, and promote international relevance through standardisation of processes, and international research networks.

The Fifth STBP covered the period from 2016 to 2020, and noted that science and technology is one of Japan's "fundamental strengths" but that the country's international standing in this field has been declining.

One of the key strategies is to encourage cooperation across the private and public sectors. The plan encourages research collaboration between firms and public research institutions, and mobility of researchers across institutions. In addition, Japan ranks 8th in the most recent Open Data Barometer (2017), which evaluates the availability, quality and usefulness of open government data in 115 countries. This shows that the government understands the importance of data and is committed to making its data accessible to researchers and firms to encourage innovation.

Figure 1: Concept of Society 5.0



At the same time, the plan introduced the concept of **Society 5.0**. Taking a linear, progressive view of history, Society 5.0 is said to be distinguished from four earlier types of societies: the hunter-gatherer society, agricultural society, industrial society, and **information society, by being a “super-smart”, human-centered society which resolves its problems using technological solutions**. Issues outlined in the plan include food security, natural disaster response, social inequality and public health. The rhetoric of technological solutions seems to treat social and environmental problems mainly as issues of resource distribution, aiming to be “capable of providing the necessary goods and services to the people who need them at the required time and in just the right amount”, echoing the model of *Kanban*, or “just-in-time” manufacturing management system which originated in Japan (Government of Japan, 2016).

The discourse of “smart cities” started to become pertinent in Japan around 2010, and the early 2010s saw a proliferation of smart city projects across the country (Ministry of Land, Infrastructure, Transport and Tourism, 2018). This began with four cities identified as test-beds for smart city development as part of the “Next Generation Energy and Social System Demonstration” scheme: Yokohama, Toyota City, Kitakyushu and Keihanna Science City. There was an initial drive to catch up with technological innovation and industrial development in other countries, but this was overtaken by a focus on environmental and social issues including sustainable energy and natural disaster response, after the “triple disasters” caused by the Great East Japan Earthquake in March 2011 (Murray, 2012; Kaneko, 2012).¹ Many smart city or smart community projects have a focus on energy-related technology, leading to these four cities sometimes being referred to as “environmental cities” as well.

It is expected that smart cities will continue to evolve and drive innovations in Japan, with data innovations forming the backbone of Japan’s growth. In this regard, this report aims to deepen insights on Japanese smart cities to address the possibilities and problems of data security, privacy and innovation. Part one of this paper summarizes the data survey, which was carried out in 2020, to understand the perception of technological innovation, data privacy, data controllers and regulations among the general population. Part two is the case study of “Woven City”, which highlights the possibilities of a futuristic Japanese smart city being planned by Toyota Motor Corporation near Mt. Fuji and summarizes the content of interviews and discussions among legal, political and social studies academics to consider the ethical, legal and social problems that accompany the development of a smart city in Japan.

It is expected that smart cities will continue to evolve and drive innovations in Japan, with data innovations forming the backbone of Japan’s growth. In this regard, this report aims to deepen insights on Japanese smart cities to address the possibilities and problems of data security, privacy and innovation.

¹ The ‘triple disasters’ refer to: 1) The earthquake itself, 2) the tsunami triggered as a result of the earthquake, and the 3) Fukushima Daiichi Nuclear Power Plant accident, which was caused by the tsunami.

Key Stakeholders for Smart Cities

The **Cabinet Office** manages and plans smart city projects across disciplines and ministries, for example, designating cities for smart city technology implementation. Other agencies engage with businesses and initiate or support projects related to specific domains of interest. For example:

- The **Ministry of Economy, Trade and Industry (METI)** and the **Ministry of the Environment** promote many projects related to sustainable energy.
- The **Ministry of Land, Infrastructure, Transport and Tourism (MLIT)** supports projects related to urban space, including smart urban mobility and low-carbon city planning
- The **Ministry of Internal Affairs and Communications** seeks to improve communications through the use of data and the Internet of Things (IoT).

Private companies, such as Toyota and NTT (the largest telecommunication provider in Japan), play a major role in developing smart city technology and infrastructure, and partnering with local governments to run smart community projects. Other organisations involved in smart city development in Japan include:

- **Smart City Planning Co. Ltd.**, a joint investment project of nine companies which incubates new businesses, providing investment, resources and negotiation with public agencies and business partners.
- **Japan Smart Community Alliance**, established by METI and comprising 287 companies.
- The **Centre for the Fourth Industrial Revolution (C4IR) Japan** is the first Centre for the Fourth Industrial Revolution outside the US, established by the World Economic Forum in partnership with METI. One of the three key portfolios of C4IR Japan pertains to smart cities and the Internet of Things (IoT), along with smart mobility and health data policy.

Perception of Innovation and Data Controllers in Japan

As mentioned before, Society 5.0 aims to improve people's livelihoods by resolving problems using technological solutions. These solutions cannot be developed without analysing data collected from different aspects. Therefore, it requires support from the general population and the willingness of the people to share personal and private data. In this regard, it is important to understand how the general population perceives and deals with data and digitalisation.

From June to October 2020, a survey has been carried out in Singapore, Taiwan and Japan to understand perceptions of technological innovation, data privacy, data controllers and regulations in these 3 countries.² This section provides an overview of relevant findings obtained from 1,020 respondents from Japan.

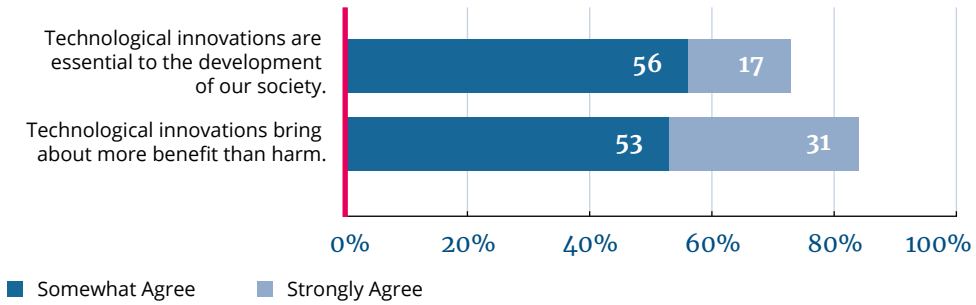
Broadly speaking, most Japanese perception towards technology is positive. As Figure 2 shows, **most respondents agreed that technological innovation is essential to societal development (84%), and brings more benefit than harm (73%)**. Nevertheless, **Japanese have the least enthusiasm towards technology** when compared to Singaporean (27%) and Taiwanese (31%), as only 17% agreeing strongly it brings more benefits. This suggests that Japanese still have some hesitation towards technology.

² The survey report "Data Security, Privacy and Innovation Capability in Asia: Findings from a representative survey in Japan, Singapore and Taiwan" by Jochen Roose and Natalie Pang can be downloaded at KAS website. <https://www.kas.de/en/web/politikdialog-asien/single-title/-/content/data-security-privacy-and-innovation-capability-in-asia>

Figure 2: Outcome of Technological Innovation

“Next, I am going to read a few statements. For each of them, please tell me, whether you strongly disagree, somewhat disagree, somewhat agree or strongly agree.”

- “Technological innovations are essential to the development of our society.”
- “Technological innovations bring about more benefit than harm.”



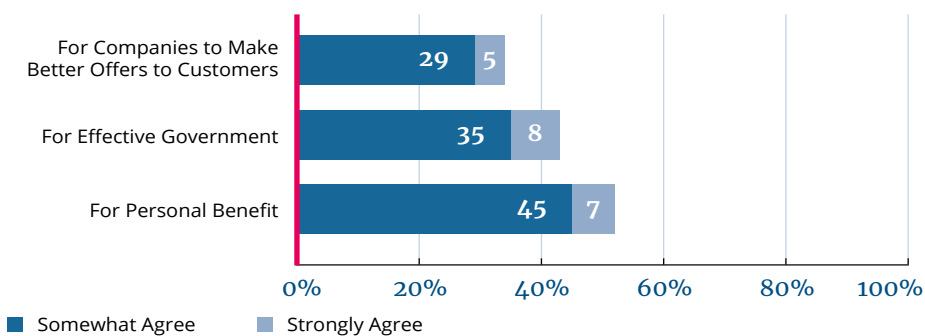
Source: Survey by Konrad-Adenauer-Stiftung e.V. Missing to 100%: Strongly disagree/somewhat disagree/don't know/no answer.

In terms of sharing data, Japanese people are sceptical about the benefit except better offers by companies. Only a few respondents in Japan agreed that sharing personal data would lead to personal benefits (34%) or contribute to effective governance (43%). Slightly more than half agreed that sharing personal data would allow companies to make better offers to customers (52%). This is depicted in Figure 3.

Figure 3: Benefits of Sharing Personal Data

“Thinking about the collection of personal data by different parties, please tell me for each of the following statements, whether you strongly disagree, somewhat disagree, somewhat agree or strongly agree.”

- “When I share personal information for using an app, I benefit.”
- “A government with detailed personal data about its citizens is more effective.”
- “Collecting data about consumers enables companies to make better offers to their customers.”



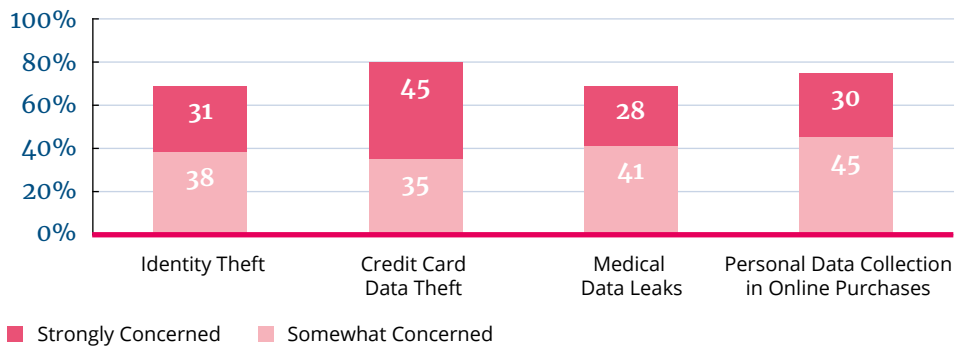
Source: Survey by Konrad-Adenauer-Stiftung e.V. 3,060 respondents 1,020 per country.

Most respondents expressed concern over personal data misconduct. Figure 4 depicts the proportion of respondents who were concerned about being asked for personal information when performing online registrations of purchases (75%), unauthorised retrieval of medical data (69%), having one's credit card details stolen (80%) and identity theft (69%).

Figure 4: Concerns About Personal Data Misconduct

“I would like to understand your concerns, if any, about data privacy when performing online activities. For each, please tell me if you are not concerned at all, not really concerned, somewhat concerned or very concerned. How concerned are you with ...?”

- Identity theft: “Your identity being used by somebody else.”
- Credit card data theft: “The stealing of your credit card details when making online purchases.”
- Medical data leaks: “Someone who might access your medical records electronically.”
- Personal data collection in online purchases: “Being asked for your personal information when registering or making online purchases.”



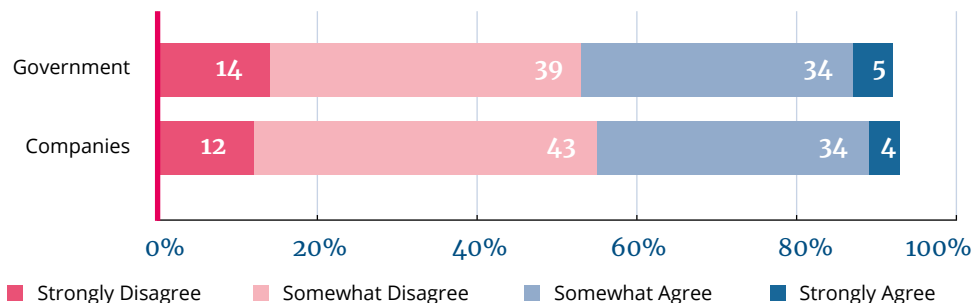
Source: Survey by Konrad-Adenauer-Stiftung e.V. 3,060 respondents 1,020 per country. Missing to 100%: don't know/no answer.

In terms of trust in the appropriate handling of data, most respondents reported distrust in the government’s handling of personal data (53%) as well as that of private companies (57%), as depicted in Figure 5.

Figure 5: Trust in Appropriate Handling of Data

“I am going to read out a few statements, please tell me if you strongly disagree, somewhat disagree, somewhat agree or strongly agree.”

- “I trust that my personal data is collected used appropriately by my government.”
- “I trust that my personal data is collected used appropriately by private companies.”

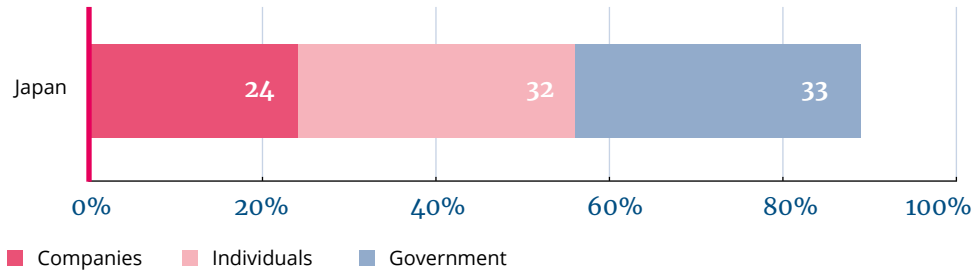


Source: Survey by Konrad-Adenauer-Stiftung e.V. 3,060 respondents 1,020 per country. Missing to 100%: don't know/no answer.

When asked about who should bear primary responsibility for ensuring data confidentiality, nearly a third of respondents in Japan felt that the government (33%) or individuals (32%) should be mainly responsible. Some also felt companies should be mainly responsible (24%). Figure 6 illustrates these results.

Figure 6: Responsibility for Data Protection

“In your opinion, who has the primary responsibility to ensure that personal data is kept confidential? Is it the government, the company or individuals?”

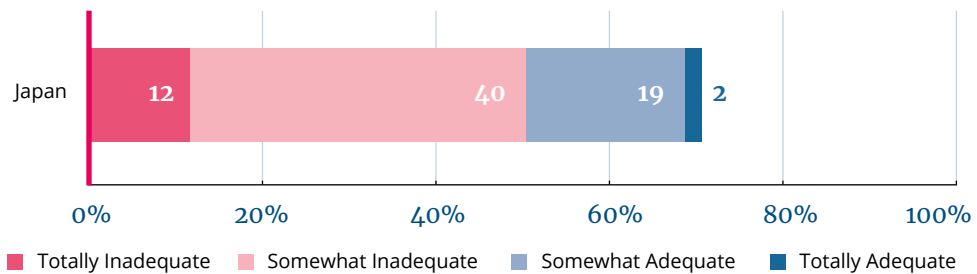


Source: Survey by Konrad-Adenauer-Stiftung e.V. Missing to 100%: don't know/no answer.

The study also measured the perceptions of respondents in Japan towards data protection regulations in the country. Most felt they were inadequate (52%), as seen in Figure 7.

Figure 7: Perceived Adequacy of Data Privacy Regulations

“Would you say that the existing regulations in Japan for protecting your personal data privacy and security are totally inadequate, somewhat inadequate, somewhat adequate, or fully adequate?”



Source: Survey by Konrad-Adenauer-Stiftung e.V. 3,060 respondents 1,020 per country. Missing to 100%: don't know/no answer.

Implications of This Survey

As reflected by the survey result above, although most Japanese believe that innovation can bring more benefit than harm and is essential for the development of society, **most Japanese are still sceptical that government and private companies would handle their data appropriately.** Less than half of the population believe that data sharing can lead to better governance and very few of them believe that they can benefit personally by doing so. Furthermore, more than half of the respondents think that data protection regulations are not adequate. This lack of trust towards the government might hinder the development of smart cities and data innovation in Japan, as it relies greatly on the collection and analysis of mass data from citizens and their devices for the use of better urban planning and public services.

Although most Japanese believe that innovation can bring more benefit than harm and is essential for the development of society, most Japanese are still sceptical that government and private companies would handle their data appropriately.

This challenge will be discussed further in the chapter “Data Culture” after the case study of Toyota’s ‘Woven City’.

Case Study

Toyota's "Woven City" and Smart City Development in Japan

Much of the details of Toyota's plan to create a smart city are yet to be revealed at the time of this report, including the digital infrastructure. What is anticipated is that many of its facets will feature new concepts and that the innovative features will bring about development. Digital literacy, especially among the elderly in Japan continues to be low, and especially among the rural areas as digital literacy need not be a prerequisite, due to the very slow roll out of e-services in the nation in comparison to other countries or regions.

Introduction to Toyota's Smart City Project

Toyota Motor Corporation, as one of the largest automobile manufacturers in the world, has been an iconic Japanese brand since the postwar period. Thanks to its automobile production, Toyota play a leading role in contributing economic growth throughout Japan's post-World War II economic recovery and development. The company has been an important agent of change in transforming Japanese society through motorization and other technologies. The economic development of central Honshu and Aichi Prefecture where Toyota has its headquarters has thrived and the area has become an industrial hub, with reverberating influences on neighbouring prefectures such as Shizuoka Prefecture. With changes in its corporate functions as well as manufacturing and procurement locations, Toyota has had plans to transform and concentrate its existing plants for many years, relocating its main manufacturing operations to northern Honshu. The closing down of one of its plants in particular, at the foot of Mt. Fuji, Toyota Motor East Japan's Higashi-Fuji Plant in Susono City in Shizuoka Prefecture, was quickly followed by the surprise announcement of plans to build a "a prototype town of the future" (Toyota Motor Corporation, 2020), an experimental city that would demonstrate the connection of all the goods and services supporting residents' everyday lives.



Dialogue between Stakeholders

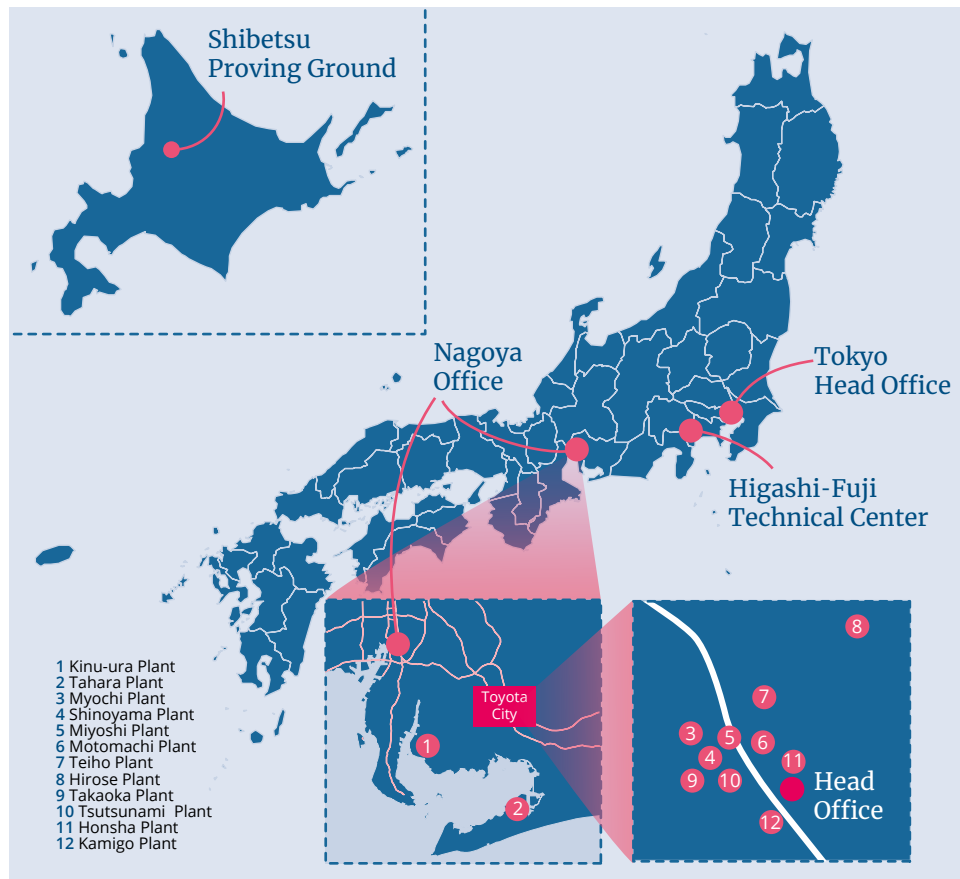
The project has begun as of 23 February 2020 on the site of the former plant, and the city is estimated to span 175 acres of land (approximately 708,000 sq. meters), with Toyota and its partner companies such as Nippon Telegraph and Telephone (NTT), and several researchers, expected to be in collaboration. In March 2020, Toyota entered a business and capital alliance with NTT that would enable the commercialization of smart city operations. **The two companies will jointly build and operate a “smart city platform” that will serve as the core infrastructure for smart cities in general.** Bjarke Ingels, the renowned Danish architect and founder and creative director of the Bjarke Ingels Group (BIG), will be responsible for the urban design and other aspects of the project. BIG has worked on many high-profile projects so far, including the new Second World Trade Center in New York City and Google’s new headquarters in California.

Toyota has dubbed the city the ‘Woven City’, based on the way its streets weave together like a web. The city is expected to be home to around 2,000 residents at the start, including Toyota employees and others involved in the project. The Woven City will divide the roads through the city into three categories, one each for fast vehicular traffic, micro-mobile vehicles such as bicycles and scooters, and pedestrians, and weave them together throughout the city. Roads will be dedicated to vehicles such as the Toyota e-Palette, which are fully autonomous, zero-emission electric vehicles. The city’s buildings will be made primarily of carbon-neutral wood, and solar panels will be installed on the roofs to ensure harmony with the environment and sustainability. All of the city’s infrastructure will be installed underground, including fuel cell power generation.

Toyota has dubbed the city the ‘Woven City’, based on the way its streets weave together like a web. The city is expected to be home to around 2,000 residents at the start, including Toyota employees and others involved in the project.

Susono City, where the Woven City is to be located, formulated the Susono Digital Creative City (SDCC) concept in March 2020. The SDCC established the Susono City Data Utilization Promotion Headquarters in 2018 and has been working on its digital transformation for Society 5.0. In April 2020, the Susono City Future City Promotion Headquarters was established to strengthen collaboration with the Woven City and accelerate efforts for the Susono Digital Creative City concept. As of December 2020, 70 companies are participating in the Susono Digital Creative City consortium for building a smart city, and advisors include the Higashi Fuji Research Institute of Toyota Motor Corporation and the Sekimoto Laboratory of the Institute of Industrial Science, University of Tokyo. **This major urban development project is led by the private sector, but cooperation with the local government is essential,** as the Susono city municipality and Toyota will coordinate with the Woven City.

Figure 8: The Woven City will be situated by the Higashi-Fuji Technical Center

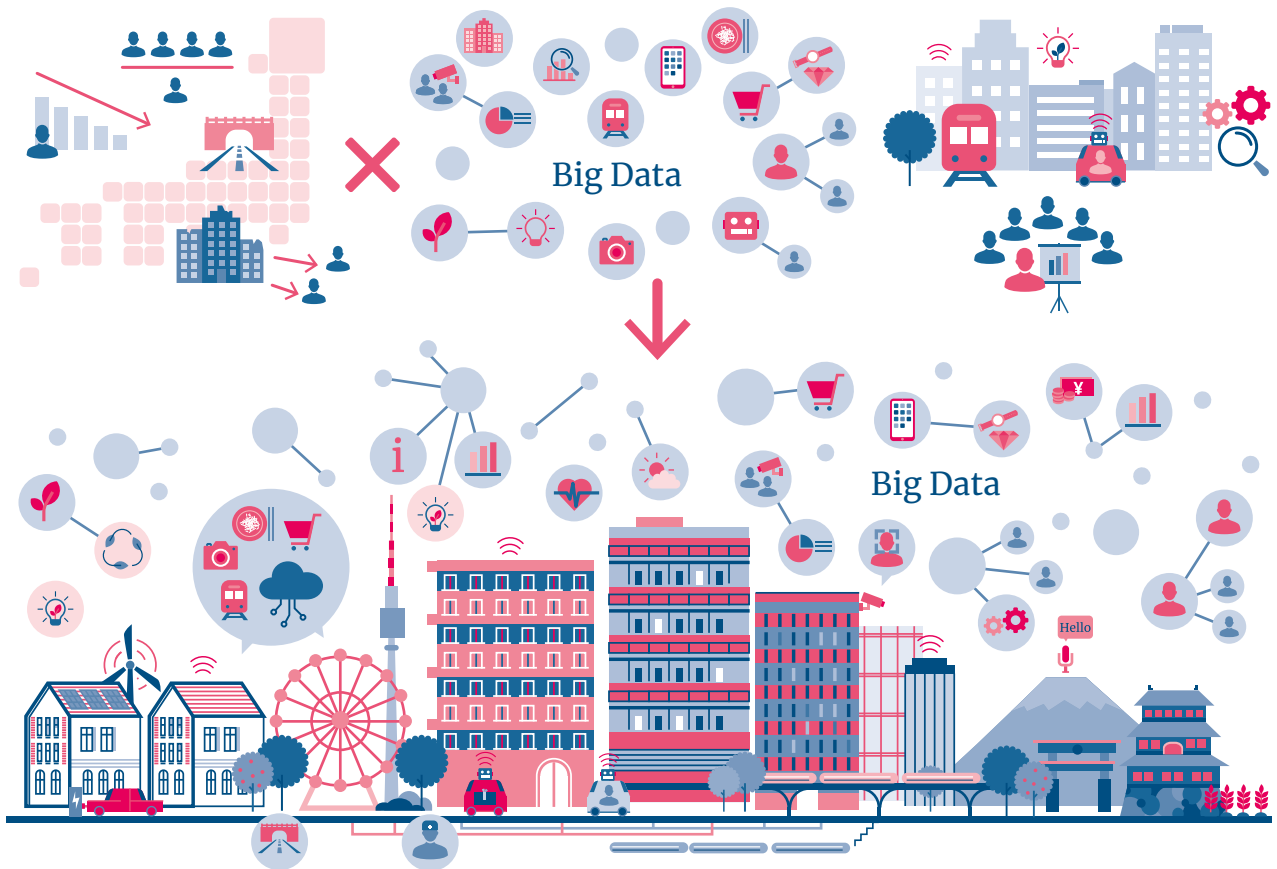


Source: Toyota website, https://www.toyota-global.com/company/history_of_toyota/75years/data/conditions/facilities/office/japanese.html

Key in the Woven City's initial social impact is that residents will be able to test new technologies such as indoor robots and smart AI technologies which utilize sensor data to monitor health, helping them in their daily lives. Toyota announced in July 2020 that the Toyota Research Institute Advanced Development (TRI-AD), which conducts research and development of advanced technologies such as automated driving, would be re-structured into Woven Planet Holdings, a holding company for two new operating companies: Woven Core, which would be responsible for the development, implementation and market introduction of automated driving technologies, and Woven Alpha, which will explore business opportunities to create new value beyond existing business domains.

To promote public and private sector collaboration into smart city initiatives, Japan also set up the Smart City Public-Private Partnership Platform in August 2019, with more than 100 cities and more than 300 companies and research institutions registered. The platform supports smart city projects through knowledge exchange, business matching, and initiatives to establish closer ties between public, private and academia.

Figure 9: An illustration of the Smart City Public-Private Partnership Platform



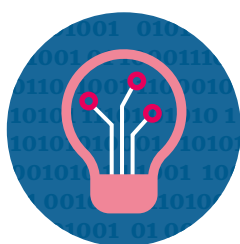
Source: <https://www.mlit.go.jp/scpf>

Challenges: Inconvenience Caused by Smart City

In conceptualizing a smart city, with the digital, spatial and urban innovation that it implies, one also needs to ensure that everyone is fully and equally included. One example pertains to the expectation that smart cities are expected to greatly increase transportation friendliness, i.e. mobility and accessibility for people with disabilities and the elderly. Yet, previous examples in New York City and Saitama City have reported that the lack of participation of service users themselves, in decision-making processes and institutional design for the introduction of new technologies can create new accessibility problems. The increasing ubiquity of touch-screen interfaces or self-service terminals also often disadvantages wheelchair users, or those with hand and arm disabilities (Woyke, 2019).

Indeed, when decision-makers fail to consider the perspectives and experiences of diverse social groups, and if the latter do not participate in relevant decision-making processes, this may render smart cities “un-smart” or inconvenient to use. In this regard, discussions with experts for this project revealed the need to develop a decision-making framework which better captures diverse considerations and agreements that would ensure no one is left behind.

Japan's elderly population is a major example of social groups that have been left behind in the ongoing digital transformation. **At 28.7% of the population, Japan has the largest percentage of those aged over 65 in the world, with 14.9% of those aged over 75 years old.** To grapple with its ageing population, ensuring that smart cities and infrastructure are accessible to and benefit seniors is important, such as the application of AI and robotics in eldercare or accessibility infrastructure. At the same time, as smart city technologies will depend on the collection of personal data, relevant issues of consent and privacy will also have to be carefully negotiated addressed together with seniors, many of whom rightfully express anxieties about digitization and digitalization in general.



Data Cultures

Value Creation in Smart City: Viewed as a Test-Bed for New Urban Technologies

Within the Woven City, data is indispensable in the development of new urban technologies: Automated driving, mobility-as-a-service (MaaS), personal mobility, robotics, smart home technology and artificial intelligence (AI) technologies are examples of data-driven innovations which may be introduced and tested among the city's residents. In this way, the Woven City can also create new value and business models by rapidly rotating the cycle of development and demonstration of technologies and services in this city, towards a vision where all the goods and services that support people's lives are connected by data and information flows. As new technologies are tested, they should also meet various social needs, be it those already faced by social groups such as families and the elderly, but also new issues that arise from smart city living. This vision of the Woven City thus encapsulates the observed intent of data innovations in tandem with Japanese culture: the infusion of data into everyday life, with the aims of meeting specific social needs, and driving business and economic growth.

Need for Ethical Principles

In interviews and discussions with academics for this project, **concerns were raised over the industry-driven nature of innovation development in Japan.** Incumbent discourse on the Woven City has largely been an idealized and business-centered view of the project's intents and purposes, with much less on problems that may inadvertently or advertently arise. Specifically, business, economics and engineering considerations have tended to be the main preoccupations and driving forces, with ethical or citizen perspectives and concerns overlooked, or only briefly mentioned.

Research on citizen awareness of data privacy and regulatory issues remains relatively scarce. One rare example comes from a survey of close to 1,200 individuals by Nikkei Research in January 2021, which found a 10% increase in adoption of two-factor authentication (nearly 70%) compared to 2020 survey data. Consciousness towards spyware was also high at 78%, suggesting heightened awareness towards spyware threats. In one other example, the survey accompanying this study reported that 71% of Japanese respondents claimed to know of data privacy and security regulations, though the vast majority among them (61%) reported being aware only of their existence and not any specific details; only the remaining 10% perceived knowing spe-

cific details as well. However, the recent reporting of several high-profile incidents may serve to increase public awareness of data privacy and authentication concerns. With one noteworthy incident being in September 2020, when NTT Docomo, Japan's largest mobile carrier, had to suspend its 'Docomo Koza' e-money service due to illicit withdrawals and irregular transactions by cybercriminals and hackers (The Asahi Shimbun, 2020). This security breach served to be a public and highly visible incident, and an eye-opener for many Japanese concerning data authentication and data privacy habits.

In discussing smart city development in Japan, experts interviewed surfaced the necessity of establishing ethical standards for smart cities, which would include provisions for

1. guaranteeing citizens' autonomy and choice, and providing the information necessary for decision-making in an easy-to-understand manner;
2. protecting citizens' interests such as privacy and data security; and
3. applying ethical standards fairly and equitably to all citizens.

An example of ethical principles exists at the local level in in Tsukuba City (City of Tsukuba, 2020), which was one of the first to declare smart city ethical principles in Japan: It outlines respect for autonomy, nonmaleficence, beneficence and justice as broad principles, with specific initiatives to realise them.

Ethical standards need to consider, encompass and apply equally to all citizens. However, certain social groups may be disadvantaged because of gender, age, disability, educational level or economic disadvantage. For example, **while the increasing use of electronic-based information improves the accessibility of information for some citizens, others may not have access to such information due to gaps in information and digital literacy and access to hardware and software.** Indeed, the interests and views of a wider range of people must be taken into account when considering the implementation of smart cities.

One interviewee cautioned that other existing ethical frameworks would also need to be updated as well, in particular those on bioethics. This is in light of advanced technologies such as IoT which have made it possible to collect and use a wide array of citizen and personal data to guide public administration or make everyday living more convenient. Such capabilities also pose real concerns over data security and invasion of privacy. The use of surveillance cameras, for example, could curtail activities of civil society to speak about issues on the ground, and reduce the capacity, capability and voice of citizens in general. Where surveillance cameras also process citizen data, the possibility of abuse of people's information by public authorities or some private actors cannot be ruled out as well, with consequences on basic civil liberties. Indeed, a major scandal emerged when it was found that Chinese engineers had been accessing the data of Japanese LINE users, apparently without their knowledge, including names, telephone numbers and email addresses (Kelly, Umekawa and Kim, 2021). The accompanying survey found that most in Japan (52%) do not regard existing privacy regulations as adequate, and distrust both the government (53%) or companies (57%) to adequately handle and use personal data. Some forms of personal data mishandling that most respondents expressed concern over include being asked for personal information when performing online registrations of purchases (75%), unauthorised retrieval of medical data (69%), having one's credit card details stolen (80%) and identity theft (69%).

Data-related concerns have been pronounced during the COVID-19 pandemic, where Japan and many other countries justified the collection and monitoring of citizens' personal data to curb the spread of the virus. In Japan, examples include the use of contact-tracing technologies and requesting data on the location, search history and behavioural data of users of major digital platforms such as Google, Yahoo Japan and Amazon (Ohara and Nakao, 2020). In March 2020, the Japanese government requested major mobile carriers and tech firms to hand over voluntarily user data with the intention of reducing the spread of the pandemic (Goto and Miyazaki, 2020).

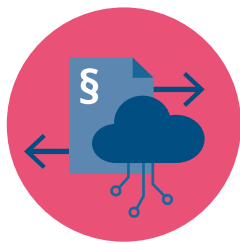
Japanese citizens have been circumspect in response to the government's attempts to digitize and utilise citizen data to suppress transmission of the virus. One example is the use of social security or national identification numbers, which are used by many nations outside of Japan as centralized digital identifiers to access citizen information. Japan's version of this is the My Number Card, which provides unique numerical identification (a 12-digit number) to registered Japanese residents. Less than 50% of Japanese have obtained the card to date despite certain conveniences offered by the My Number Card, and monetary incentives from the Japanese government to obtain the card during the COVID-19 pandemic. Many refused to do so due to low trust towards the government and doubts about how their information would be used; in the accompanying survey, which was conducted during the pandemic, few respondents reported having trust in the government (22%), Parliament (18%), political parties (17%) as well as public administrative institutions (31%). Most respondents also expressed distrust in the government's handling of personal data (53%); the majority (57%) also do not perceive that data sharing necessarily contributes to effective governance.

From an innovation perspective, the absence of such a centralized source of comprehensive information about citizens has discernible implications on data innovations, which rely on trustworthy and standardized data in order to bear fruit. The reluctance of Japanese citizens to digitalise personal data may also reflect a lack of effective citizen engagement on part of the Japanese government in this regard. Consensus-building and sustained dialogue are necessary between technological developers, policy makers in government and other sectors, and the general public. At present, though, such citizen-level trust-building initiatives, and discussions appear rare; discussions continue to be dominated by business, economic and engineering-related issues.

From an innovation perspective, the absence of such a centralized source of comprehensive information about citizens has discernible implications on data innovations, which rely on trustworthy and standardized data in order to bear fruit.

In order to engage citizens and be more inclusive during the decision-making process, some local municipalities in Japan are bringing residents together in face-to-face meetings so that they can articulate issues of urban development that directly affect their livelihoods. One example of such meetings is being held in Tokai Village of Ibaraki Prefecture, which houses a nuclear power plant facility. Named *Jibungoto Kaigi* ("Meetings that involve myself"), these meetings aim to surface participants' views about local developments and to raise concerns and inputs through these efforts, realistic, considerate and practicable solutions may be created that would allow an equitable existence alongside advanced technology development.

From a demographic perspective, continued regulation of the movement of people may require us to consider supporting the livelihoods of immigrants in smart cities. Japan has had a passive policy towards immigration until now, and as of writing, borders are still closed during the COVID-19 pandemic, strong regulation over the movement of people in and out of Japan has affected agriculture and other industries requiring labor. A labor shortage in various sectors has occurred during 2020 and 2021 and continues during the writing of this report. If COVID-19 level pandemics are to become the new norm, Japan will be facing many challenges due to its aging population, dwindling birth rate and youth hesitant in joining agriculture and other manual labor. This may force changes in immigration policy in Japan or require quick adoption of AI and robotics in all areas of Japanese society. However, such crises could also be an opportunity to promote innovative research on today's challenges and thus produce clear directions. As seen throughout 2020, the introduction of new ICT to society is necessary to deal with the new coronavirus. In the midst of such social implementation, the creation of the Smart City Ethical Principles is expected to be significant. In addition, domestic and international collaboration in the implementation of such principles may lead a path for the possibility of development of global ethical standards in smart cities as well as local standards that consider Japan's unique characteristics. Protecting individual rights and livelihoods of people during the pandemic is a great challenge, however, it will be one that will eventually need to be addressed.



Laws and Regulations

The main regulation for personal data in Japan is the **Act on the Protection of Personal Information (APPI)**, which came into force in 2003 and was amended in 2015. There are further regulations pertaining to different public bodies as well as sectoral and regional regulations. The **Personal Information Protection**

Commission (PPC) is an independent supervisory authority established in 2016, which governs personal data protection according to the APPI. In 2019, the European Commission found that data protection standards in Japan were equivalent to those of the General Data Protection Regulation (GDPR) [Commission Implementing Decision (EU) 2019/419]. Japan also recognises the GDPR as providing an adequate standard of data protection for EU citizens, which facilitates personal data transfers between Japan and EU member states.

Aside from the central Japanese government that is overseen by policymakers and ministries, Japan functions at the prefectural level led by governors, and municipalities that are led by mayors, each having their own cabinets and representatives. Separate APPIs have thus also been enacted for what has been legally termed administrative organs (i.e. **APPI Held by Administrative Organs**) and independent administrative agencies (i.e. **APPI Held by Independent Administrative Agencies**). Local regulations (*jyourei*) are also enacted by local governments. The central government did not immediately create regulations for protecting personal information at the time, **hence each level of government was required to create their own separate law or ordinance, resulting in approximately 2000 separate laws or ordinances on personal information protection across Japan.** These disparate laws will have to be streamlined.

Municipalities exceptionally allow the use of data that is likely to lead to the identification of individuals if it is “necessary for the protection of life.” In light of the increased frequency of big data applications in smart cities, the concept of “necessity” in the provisions of the many Personal Information Protection Ordinances may need to be redefined. Legal questions will also need to be answered about the nature of data collected (personal data, environmental data collected by sensors), data storage and access protocols, the value of data, and what data will be used for as well as insights generated from the collected data. For a start, consensus between government officials belonging to the Personal Information Protection Commission, and those involved in the non-profit organization on information security, the Information Disclosure Clearinghouse, needs to be established to shed light on the legal issues in the smart city. Policymakers would also need to analyse the variety of test scenarios and theoretical issues associated with the respective Personal Information Protection Ordinances.

In light of the increased frequency of big data applications in smart cities, the concept of “necessity” in the provisions of the many Personal Information Protection Ordinances may need to be redefined.

It would also be helpful for Japan to consider international standards such as the Sustainable Development Goals (SDGs; 2015) and the International Standard for Smart Cities (ISO 37153), and how they can contribute to the Japanese version of smart cities and smart city development. Relevant stakeholders include the Ministry of Economy, Trade and Industry (METI), the Japanese Standards Association (JSA), Hitachi, Fujitsu, among many others. Such stakeholders may also benefit from looking into the United Nations Human Settlements Programme.

On the one hand, one should attempt to clarify the ethical guidelines for the adoption of governance technologies and technologies, and to establish obligations in regulations regarding the handling of post-analytical data, depending on the purpose and method of data use. On the other hand, legislative analysis will provide recommendations for national legal issues. For example, as a solution to the problem of the wide variation in the degree of protection of personal information caused by the proliferation of personal information protection ordinances in Japan, it has been suggested that a “Municipal Personal Information Protection Law” be enacted. A legislative proposal on this point, taking into account the philosophy of local autonomy and the relationship with the autonomy of local governments may be effective.

This report examined the digital transformation of Japan in terms of the Woven City, a smart city near Mt. Fuji in central Japan and an urban innovation spearheaded by the private sector, in particular the iconic Toyota Motor Corporation. Toyota is in cooperation with partners such as NTT Docomo and the Bjarke Ingels Group, and construction has been initiated as of February 2021. Toyota maintains a cooperative relationship with the local municipal government, and hopes that the smart city will serve as a scaffold for future smart cities, and as a regional test-bed for inventions that utilize AI, sensors and zero-emission vehicles among many other digital innovations.

As seen in Toyota's vision for the Woven City, smart city development in Japan is being driven by policymakers, corporations, technocrats and engineers. This has contributed to a gap in ethical and citizen discourses – areas fertile for legal scholarship, philosophical debate and participation by political science and sociologists, at least. Social science and humanities scholars interviewed for this report recommended developing an ethical framework for smart cities as a first step in overcoming these challenges. While the Woven City is expected to become a successful experiment for technologies of greater autonomy, robotics, personal mobility and smarter homes, solving some incumbent social problems and potentially contributing to quality of life, Japan also needs to quickly formulate ethical principles to ensure that no one is left behind. Such a framework would also be useful in addressing major ethical questions borne from digital innovation, which would contribute to consensus-building among diverse stakeholders spanning government, businesses, and citizens based on similar ethical principles. At the time of writing, this framework has yet to materialize and remains as work that needs to be done in the future.

Ethical concerns also matter in deliberating data security and privacy concerns, which have been more pronounced since the COVID-19 pandemic. A major breach among Japanese financial institutions and its largest telecommunication giant NTT Docomo in 2020 has resulted in greater awareness of digital security in Japan. Personal information protection in Japan continues to be a serious matter, and citizens continue to resist adopting social security numbers or national identity numbers, which will impede diffusion of faster and more efficient governmental services in the near future. Such is further exacerbated by the approximately 2000 laws and ordinances that currently exist through the many municipalities and prefectures of Japan, which create widespread and diverse legal variations which need to be streamlined.

In the (post-)coronavirus era, there is a need to provide ethical and legal guidelines for the collection and use of data, and for what purpose. Two points stand out in this regard. **The first is an assessment of the ethics of the adoption of governing technologies and technologies in smart cities.** For example, what kind of constraints on individual freedoms and rights (e.g., surveillance and freedom of movement restrictions) are justified in an emergency situation? Such questions should be posed against research in the philosophy of human rights in moral, political, and legal philosophy. **Secondly, one should also identify the guiding values of administrative and governance systems that use data governance technologies,** as in the use of big data in cities and city management. Through the surfacing of these values, one can then move to investigate citizens' attitudes and deliberations as to these values by means of social research. Investigating fundamental values such as human rights, and citizen trust in the government, are necessary for a smart city to be called such. After all, the ultimate goal of smart cities is to uphold human resilience and wellbeing.

- C City of Tsukuba** (2020, September 9). Tsukuba Smart City Ethical Principles. Retrieved from <https://www.city.tsukuba.lg.jp/shisei/oshirase/1008536.html>.
- Commission Implementing Decision (EU) 2019/419** (2019). *Official Journal of the European Union*, C/2019/304, pp.1–58.
- E Economist Intelligence Unit** (2018). *The Asian Digital Transformation Index 2018*. Retrieved from <https://connectedfuture.economist.com/wp-content/uploads/2018/12/ADTI-whitepaper.pdf>.
- G Goto, T., & Miyazaki, T.** (2020, April 1). Concerns over privacy as Japan gov't asks tech firms for user data to combat coronavirus. *Mainichi Japan*. Retrieved from <https://mainichi.jp/english/articles/20200401/p2a/00m/0na/019000c>
- Government of Japan.** (2016). *Fifth Science and Technology Basic Plan (Provisional Translation)* Retrieved from https://www8.cao.go.jp/cstp/kihonkeikaku/5basicplan_en.pdf.
- H Harding, R., Inagaki, K. & Lewis, L.** (2020, November 23). Japan to ditch 'hanko' seal in drive to digitise bureaucracy. *Financial Times*. Retrieved from <https://www.ft.com/content/e05b0e61-1aa6-4e96-822b-538f1a33d806>.
- J Jochen Roose, Natalie Pang** (2020). Data Security, Privacy and Innovation Capability in Asia: Findings from a representative survey in Japan, Singapore and Taiwan, Konrad-Adenauer-Stiftung.
- K Kaneko, M.** (2012, August 23). Efficient 'smart cities' gain traction after disasters. *Japan Times*. Retrieved from <https://www.japantimes.co.jp/news/2012/08/23/national/efficient-smart-cities-gain-traction-after-disasters/>.
- Kelly, T., Umekawa, T., & Kim, C.-R.** (2021, March 17). Japan to probe Line after reports it let Chinese engineers access user data. *Reuters*. Retrieved from <https://www.reuters.com/article/us-japan-line-access-idUSKBN2B901E>.
- M Ministry of Land, Infrastructure, Transport and Tourism** (2018). スマートシティの実現に向けて (中間とりまとめ) [Towards the realization of smart cities (interim report)]. Retrieved from <https://www.mlit.go.jp/common/001249775.pdf>.
- Murray, S.** (2012, December 4). Smart cities: Tsunami brings rethink on sustainability. *Financial Times*. Retrieved from <https://www.ft.com/content/83f9a8b6-3947-11e2-8881-00144feabdc0>.
- N Nishida, T., Pick, J.B. & Sarkar, A.** (2014). Japan's prefectural digital divide: A multivariate and spatial analysis. *Telecommunications Policy*, 38(11), pp. 992–1010.
- O Ohara, J., & Nakao, T.** (2020, April 15). Privacy vs public health: data protection in Japan during COVID-19. *Freshfields Bruckhaus Deringer*. Retrieved from <https://digital.freshfields.com/post/102g4nl/privacy-vs-public-health-data-protection-in-japan-during-covid-19>.

Onitsuka, K. & Hoshino, S. (2018). Inter-community networks of rural leaders and key people: Case study on a rural revitalization program in Kyoto Prefecture, Japan. *Journal of Rural Studies*, 61, pp.123–136.

Open Data Barometer (2017). *Open Data Barometer Global Report: 4th Edition*. World Wide Web Foundation.

- S Soble, J.** (2020, August 2). It's time to reset Japan's digital infrastructure. *The Japan Times*. Retrieved from <https://www.japantimes.co.jp/opinion/2020/08/02/commentary/japan-commentary/digital-infrastructure-reset/>.
- T The Asahi Shimbun** (2020, September 9). Docomo halts e-payment system to local banks after thefts. *The Asahi Shimbun*. Retrieved from <http://www.asahi.com/ajw/articles/13711367>.
- Toyota Motor Corporation** (2020, January 7). ""Woven City", a prototype city where people, buildings, and vehicles are connected through data and sensors." Retrieved from <https://global.toyota/en/newsroom/corporate/31221914.html>.
- Toyota Woven City Website, Retrieved from <https://www.woven-city.global/>**
- World Economic Forum** (2019). *Centre for the Fourth Industrial Revolution Japan Brochure*. Retrieved from http://www3.weforum.org/docs/WEF_C4IR_Japan_Brochure_ENG.pdf.
- W Woyke, E.** (2019, January 23). スマートシティは不便すぎて使えない [Smart cities could be lousy to live in if you have a disability]. Retrieved from <https://www.technologyreview.jp/s/120992/smart-cities-could-be-lousy-to-live-in-if-you-have-a-disability>.

Sample of Questions

Semi-structured interviews were conducted with questions broadly aligned with three themes:

1. How the regulation of data affects innovative capacities
2. Data cultures, or perceptions around data and innovation
3. How data creates value or values

A sample of questions for each theme follows:

Regulation	<ul style="list-style-type: none"> • To what extent do you think the laws and regulations around data protection have been helping or hindering the innovation capabilities of firms and organisations? • Do you see the legal landscape, as in the laws and regulations in specific, or the legal framework, changing in the next few years? • How can the current laws and regulations, including the legal framework, be improved so that the innovation capabilities of organisations can be further enhanced?
Data cultures	<ul style="list-style-type: none"> • How is personal data seen in Japan? For example, do people see it as something that they need to protect? Or as byproducts of economic transactions? • How might perceptions of personal data and privacy have an impact on innovation? For example, what types of data would be considered taboo to share, and in what contexts?
Data and value creation	<ul style="list-style-type: none"> • What do you think is the value that organisations bring when they are successful in managing their data, including analysing, storing, protecting, and sharing their data? • How do you think frameworks like the GDPR affect domestic and trans-border operations, and to what extent do you think a similar framework would be feasible in Japan?

Methodology

This project adopted a case study approach, with data collected from semi-structured expert interviews and published documents. Various interviews were conducted with various experts, ranging from academics, lawyers and representatives from internet companies. A content analysis on selected documents such as press releases and public consultation papers was also conducted, where the documents were coded according to themes such as value associated with data, principles of data governance and partnerships in data sharing.

Muneo Kaigo is a professor of communication and media at the University of Tsukuba and has been Director for the Institute for Comparative Research in Human and Social Sciences of the University of Tsukuba since 2018. He specializes in e-democracy, social media and civil society in Japan and the network society.

Dr Natalie Pang is a scholar of digital humanities, specializing in socio-technical studies of technology including social media and civil society, and the convergence of data and AI in urban cities.

Editors

Christian Echle
Director Regional Programme
Political Dialogue Asia
christian.echle@kas.de

Ming Yin Ho
Programme Manager for Digital
Transformation
mingyin.ho@kas.de

Konrad-Adenauer-Stiftung e. V.
Regional Programme
Political Dialogue Asia
Arc 380
380 Jalan Besar, #11-01
Singapore 209000
www.kas.de/singapore

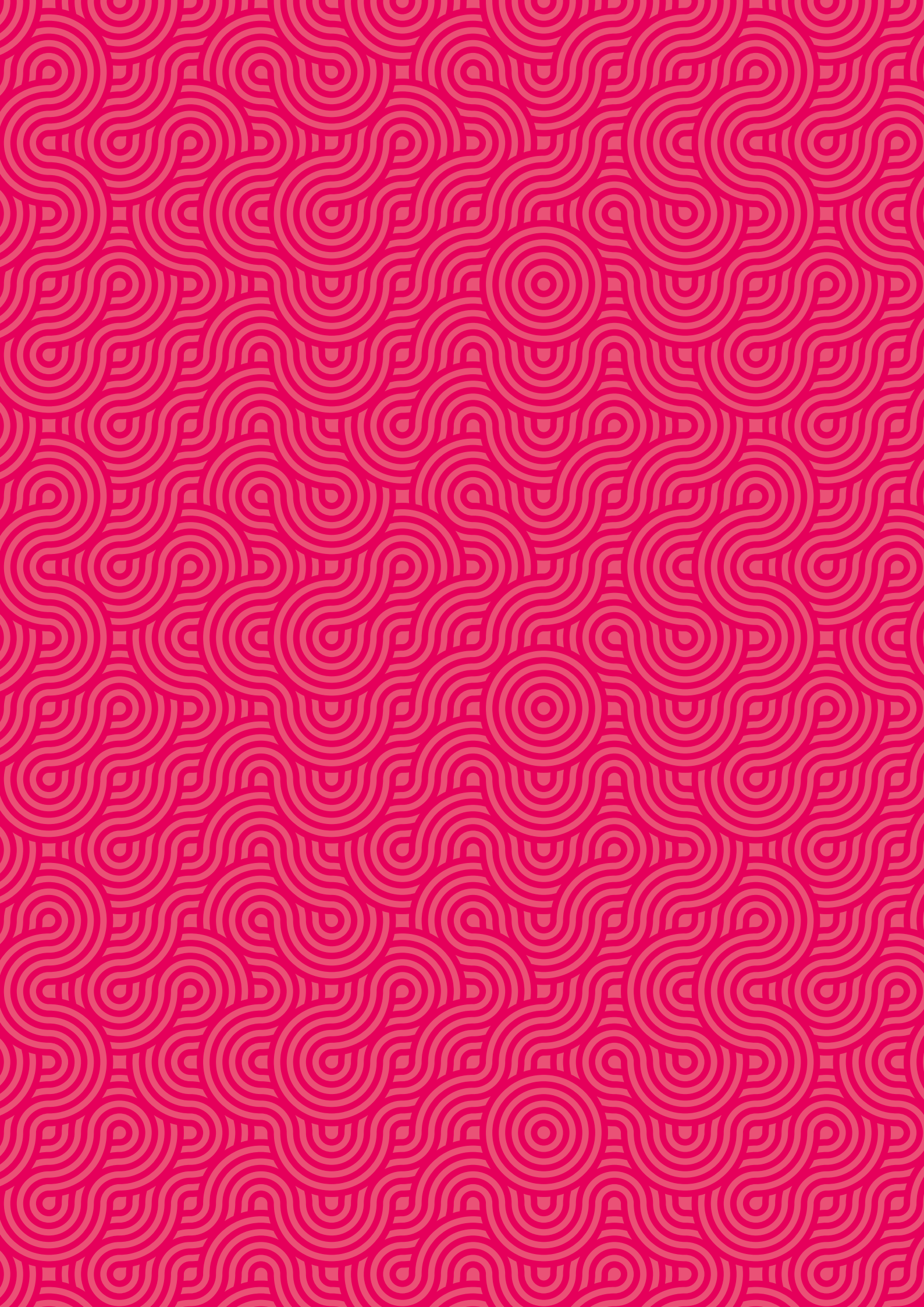
Imprint


Published by:
Konrad Adenauer Stiftung Regional Programme
Political Dialogue Asia, Singapore, 2021

Design and typesetting: yellow too Pasiek Horntrich GbR
Pattern: iStock by Getty Images/rarrarorro

Printed with financial support from the German Federal Government.

ISBN 978-981-18-4822-3





Data fuels digital change. The ability to collect, process, and make available ever-increasing amounts of data is a key to innovation and growth.

This report is one of the series surveying seven different Asian territories to deepen understandings of innovation and data policies, and contribute to debates about data governance and data protection. The study was carried out in collaboration with the National University of Singapore (NUS). We selected Hong Kong SAR, India, Japan, the People's Republic of China, Singapore, South Korea, and Taiwan as the contexts to be examined. We looked at the areas of transport, finance, administration, health and smart cities to understand how innovation is driven in the context of relationships among key stakeholders such as citizens, civil societies, government agencies, private sectors and research institutions.

This report aims to deepen insights on Japanese smart cities to address the possibilities and problems of data security, privacy and innovation, with the help of case study of Woven City, which highlights the opportunities of a futuristic Japanese smart city being planned by Toyota Motor Corporation.