GOVERNANCE INNOVATION

Ver.2

A Guide to Designing and Implementing Agile Governance

Ver.2.1 EN

CONTENTS

Introduction

Japan is aiming to achieve "Society 5.0", which is a human-centered society where high integration of cyberspace and physical space can promote economic development and solve societal issues. In order to accelerate innovation while ensuring governance in a complex and fast-changing digital society, we will need a horizontal multi-stakeholder governance model which focuses on solving issues (goals), instead of a governance model where the government single-handedly undertake the functions of rule-making, monitoring and enforcement on an industry level.

Based on an awareness of these issues, the Study Group on New Governance Models in Society 5.0 (hereinafter referred to as the "Study Group"), which was established under the Japanese Ministry of Economy, Trade and Industry (METI) in 2019, discussed a new governance model designed to achieve three goals: (1) Governance for Innovation, (2) Governance of Innovation, and (3) Governance by Innovation. The outcome of the discussion was compiled in a report titled "Governance Innovation: Redesigning Law and Architecture for Society 5.0" (hereinafter referred to as the "First Report"), which was released in July 2020.

The First Report sought to depict a new governance model from the perspectives of the processes (rule-making, compliance, monitoring and enforcement) and stakeholders (government, companies, individuals and communities) of governance.

The purpose of this Report is to depict a grand design for a society-wide governance reform, by considering additional points such as the "characteristics of society based on cyber-physical systems (CPS)" and the "goals of governance" while taking into account the recommendations of the First Report, and by framing the concept of "**Agile Governance**" which is needed in order to achieve Society 5.0.

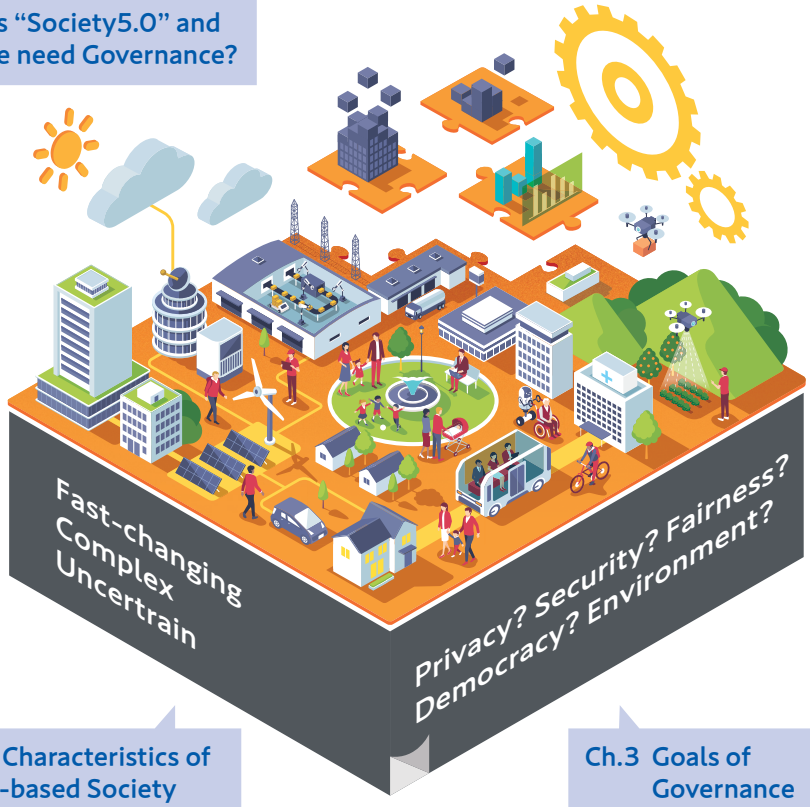
The COVID-19 pandemic has caused the digitalization of societies to accelerate rapidly in 2020, and there is no time to spare in achieving Society 5.0. In order to realize a society where the benefits brought by digital technologies are maximized and each member of society can enjoy a happier life, it is essential for the multiple stakeholders who are involved in a complex system to participate in governance. We wish that the framework presented in this Report will be a useful compass for readers who explore the vast field of innovation governance.

July 2021

Study Group on New Governance Models in Society 5.0

Structure of this Report

Ch.1 What is “Society5.0” and why we need Governance?



Ch.2 Key Characteristics of CPS-based Society

Ch.3 Goals of Governance

Ch.4 Designing and Implementing Agile Governance

The overall layout of the Report

Chapter 1: What is Society5.0 and why we need Governance?

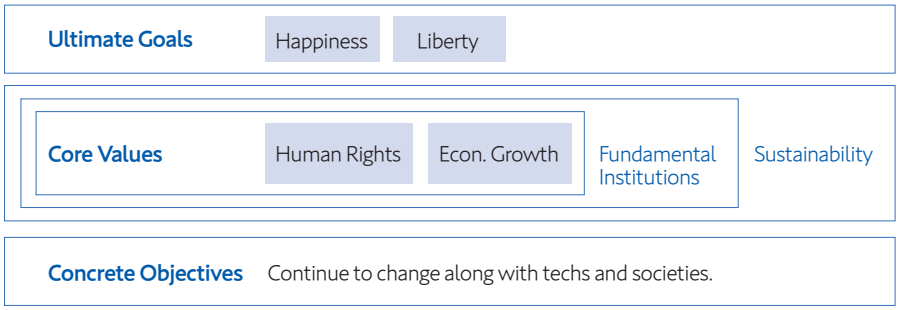
To realize Society 5.0, we will need to redesign governance for society as a whole.

Chapter 2: Key Characteristics of Society5.0 which is based on Cyber-Physical Systems

Digitalization	Analytics	Actuation
Interoperability	Augmentation	Adaptability

These qualities of CPSs—which will come to form the foundation of our societies—will bring about increasingly rapid and complex changes to societies, and make it difficult to predict and control risks.

Chapter 3: Goals of Governance

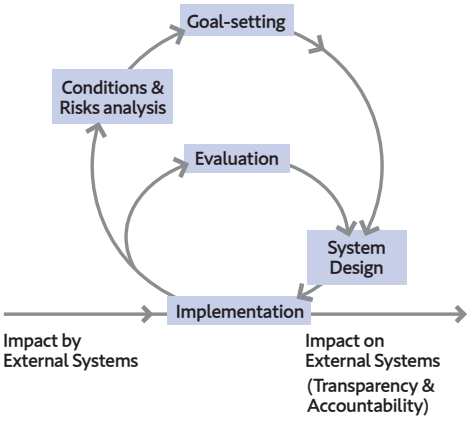


- The ultimate goal of governance will shift to "creating the 'freedom' to proactively choose, based on our individual values, the nature of technological influences under which we choose to pursue our happiness."
- The substances of "core values" or "concrete objectives" will continue to change along with changes that CPS technologies and societies undergo

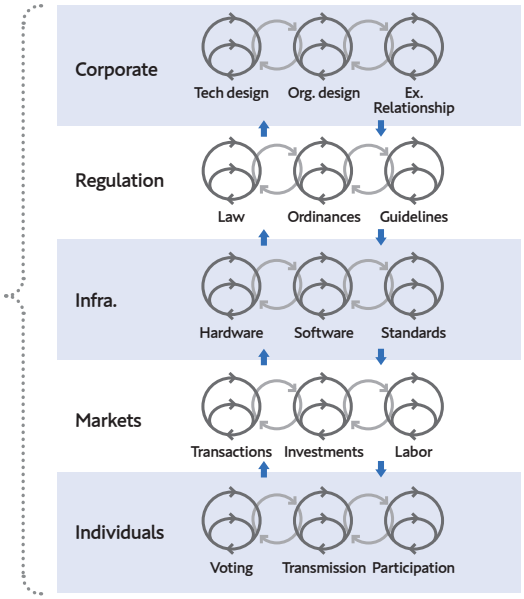
Chapter 4: Designing and Implementing Agile Governance

In order to govern our constantly-changing societies, we must implement, in various social systems, **"agile governance"** that is designed to run cycles such as for "goal setting," "system design," "operations," "explanation," "evaluation," and "improvements" on a continuous basis and at rapid rates.

Basic components of "agile governance"



Governance of Governance



and

- "Governance of governance" for organizing the overlapping layers of governance mechanisms
- International cooperation on these governance models as a whole will be critical.

Outline

In order to realize "Society 5.0"—a society where a high degree of integration between cyberspace and physical space can promote economic development and solve societal problems that societies around the world face—it is imperative to ensure appropriate governance considering the characteristics of cyber-physical systems (CPSs) (Chapter 1). Society based on CPSs is complex, change rapidly, and pose difficulties with respect to controlling their risks (Chapter 2). As such, the goals of governance will constantly change in accordance with the changes that the societies undergo (Chapter 3). For this reason, instead of implementing modes of governance where rules and procedures are defined and fixed in advance, we should implement forms of "agile governance" that are designed to continuously and rapidly run cycles of "conditions and risks analysis," "goal setting," "system design," "operations," "evaluation," and "improvements" with multi-stakeholders in various governance mechanisms, such as corporate governance, regulations, infrastructures, markets, and social norms (Chapter 4).

Executive Summary

Chapter 1 What is Society5.0 and why we need Governance?

We face a multitude of issues in the world we live in. These range from aging societies accompanied by declining birthrates, concentration of populations in urban centers and waning economic growth, to expanding income disparities, rapid climate change and environmental destruction to name but a few. In order to overcome these issues and create societies where each and every individual is able to live prosperous, independent and happy lives, we should move forward with the implementation of systems that highly integrate cyber and physical spaces (CPS: cyber-physical systems); systems such as IoT, big data, AI, and 5G telecommunication.

Japan is pursuing a human-centered society in which a high degree of integration between cyberspace and physical space can promote economic development and solve societal problems ("Society 5.0"). In this Report, we discuss how to design "governance," which is an indispensable element for realizing Society 5.0. (1.1)

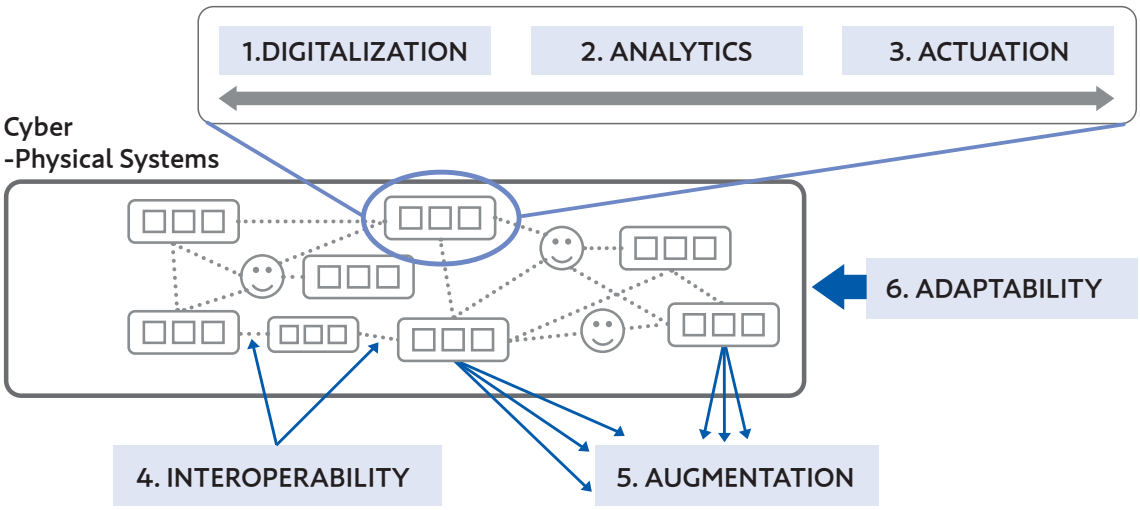
Governance-related issues for realizing Society 5.0 range far and wide, from privacy, system security and transparency to the allocation of responsibilities and cyber security. Because Society 5.0 is based on premises that are vastly different from the premises on which our traditional physical-space-centered world is based, we should make fundamental changes to existing governance mechanisms in areas such as corporate, regulatory, and markets, as opposed to relying on successive modifications within the frameworks of existing institutional systems. (1.2)

Based on this issue awareness, in this Report we analyze how Society 5.0 differs from traditional societies from a governance perspective (Chapter 2), refer to this analysis to point out that the goals of governance themselves will continue to change (Chapter 3), and propose the idea of "agile governance" that will be needed to achieve the goals of such a society (Chapter 4). "Agile governance" refers to a model where a diverse range of stakeholders, including governments, businesses, individuals, and communities carry out ongoing analysis of the social situations they find themselves in; define the goals they seek to achieve; design various systems for achieving these goals; and carry out ongoing dialogue-based assessments of outcomes to make improvements to these systems. (1.3)

Chapter 2 Key Characteristics of Society5.0 which is based on Cyber-Physical Systems

Society 5.0 will be founded on diverse and complex systems in which cyber and physical spaces are merged at an advanced level (CPS: cyber-physical systems). CPSs have the following characteristics:

<Fig. 2.1> Key characteristics of Cyber-Physical Systems (CPSs)



[1] Large-scale collection of a greater variety and scope of data (Digitalization).

In Society 5.0, we will be able to generate, distribute, and acquire data at lower costs through countless devices and sensors that are dispersed throughout physical space. Furthermore, the scale, scope, variety, and processing of data will be expanded to enable the acquisition of detailed, real-time data (2.2).

[2] Data analytics (Analytics)

Low cost analytics will enable more sophisticated data analytics algorithms based on AI or other technology. (2.3)

[3] Effects on physical space (Actuation)

Based on analytics results, machines will automatically perform administrative processes in social systems and organizations, as well as engage in the day to day lives of individuals. (2.4)

[4] Connectivity between systems equipped with a variety of different functions (Interoperability)

Multiple systems provided by multiple actors will interconnect and work together. (2.5)

[5] Augmentation to transcend geographical restraints and industry lines (Augmentation)

A diverse range of industries will transcend traditional geographical constraints and expand into other countries and areas of interest. While the influence of giant corporations will expand globally, individuals will also be able to impact societies without the intermediation of large corporations or nation states. (2.6)

[6] Systems are constantly reconfigurable (Adaptability)

The role of systems that compose CPSs continuously change and reconfigure to adapt to changing conditions of external systems. (2.7)

Based on these characteristics of CPSs, the profiles of societies are expected to undergo the following changes.

Based on these characteristics of CPSs, the profiles of societies are expected to undergo the following changes.

<Table 2.8> Key characteristics of Society5.0

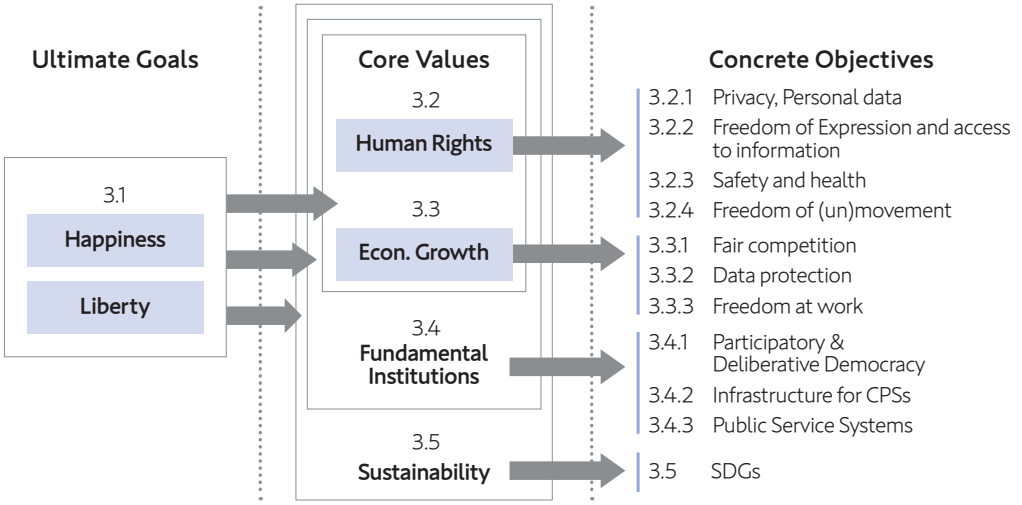
	Society 4.0 and earlier	Society 5.0
[1] Daily life and digital technology	Physical space and cyber space are separated.	Cyber space is integrated to Physical Space and becomes an indispensable foundation of lives.
[2] Object of trust	Tangible (people, things)	Intangible (data, algorithms)
[3] Acquirable data	Limited	Greater scale, scope and variety
[4] Decision-making actor	Only Humans	Humans + AI and systems
[5] System conditions	Stable	Fluid
[6] Predictability & controllability	Relatively predictable and controllable.	More areas become unpredictable and uncontrollable.
[7] Responsible actor	Easily identified	Not easily identified
[8] Concentration of control/power	Predisposed to concentration	More predisposed to concentration
[9] Geographical relationships	Local OR global	Local AND global

These characteristics—such as continuously changing social conditions, difficulty of predicting and controlling results, and difficulty of identifying responsible parties—pose difficulties for governance models based on the idea that "the objectives of governance can be accomplished by defining certain rules and procedures in advance, and by complying with these rules and procedures." Instead of models such as these, we believe it will be key in Society 5.0 to take approaches where certain goals, such as in the areas of "basic human rights," "fair competition," democracy" and "environmental conservation" are shared among stakeholders, and methods of governance that are flexible and adaptable to changing circumstances are implemented to achieve these goals.

Chapter 3 The Goals of Governance in Society 5.0

What are the goals of governance for Society 5.0? We argue that there is a hierarchy in the goals of governance, from (i) "happiness" and "liberty" as "ultimate goals", which are universally sharable but have a high degree of abstraction, (ii) "core values" and "fundamental institutions" which have a certain degree of flexibility and fluidity in their interpretation and understanding, such as "human rights" or "democracy", to (iii) "concrete goals" where approaches can vary widely among stakeholders.

<Table 3.1.3> Variety of "goals" discussed in Chapter 3



These "goals" do not exist independently from the development of technologies and the changes in social conditions that technologies bring about, and have the potential to change constantly under the influence of them. For example, "liberty" should continue to be positioned as a "ultimate goal" of governance, but the reality is that it goes beyond the traditional "negative liberty" to include "a state of being able to proactively choose, based on our individual values, the nature of technological influences under which we choose to pursue our happiness" (3.1).

These "goals" can be interpreted and understood in various ways, and in most cases, there are multiple "goals" for a single system that are in the relation of trade-off (e.g., increasing the transparency of systems that handle privacy information may increase the risk to privacy.).

Therefore, in the next chapter we will examine how to redesign the governance mechanisms — corporate governance, regulations, infrastructure, markets, and social norms — in order to constantly explore the changing and potentially controversial "goals" and find the optimal solutions to achieve them.

Chapter 4 Designing and Implementing Agile Governance for Society 5.0

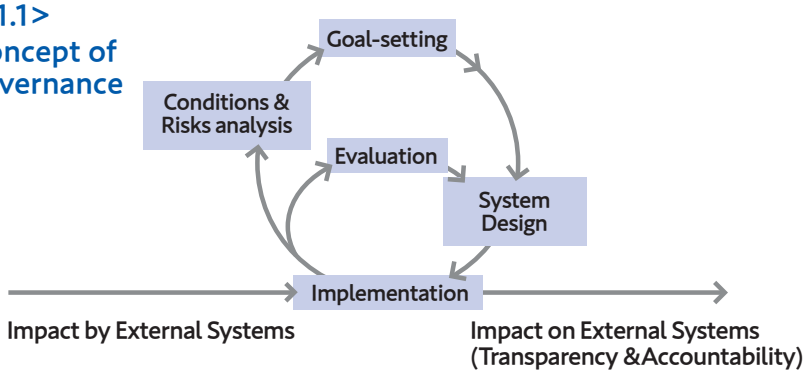
(1) The agile governance concept (4.1)

In Society 5.0, cyber-physical systems (CPS) which form our social infrastructures will undergo changes in a complex and rapid manner, making them difficult to predict and control (Chapter 2). The governing of such societies will require approaches where certain goals are shared among stakeholders, and methods of governance that are flexible and adaptable to

changing circumstances are implemented to achieve these goals, as opposed to approaches where certain rules and procedures are defined in advance. That being said, these "goals" themselves also will constantly change along with changes that technologies and societies undergo, and therefore cannot be defined unequivocally in advance. (Chapter 3).

In light of these changes that societies will undergo, the governance model for Society 5.0 must be one where solutions are constantly revised to ensure their optimality based on conditions and goals that constantly change. For this reason, we do not believe it would be appropriate to apply models of governance whose goals and procedures are fixed in advance. We believe the models of governance we should pursue for our various social systems are those that are designed to continuously and rapidly run cycles of "conditions and risks analysis," "goal setting," "system design," "operations," "evaluation," and "improvements." In this Report, we refer to this type of governance model as "agile governance." Shown below is a schematic of this idea.

<Fig. 4.1.1>
Basic concept of agile governance



This governance model has the following characteristics.

[1] Analysis of conditions and risks

As we mention in Chapter 2, Society 5.0 systems are affected by constant changes that occur in peripheral conditions (not only changes in physical conditions, but changes to rules, market conditions, and other conditions as well). Therefore, the governing actor should constantly analyze these external conditions, changes to these conditions, and the risk landscapes that result from these conditions.

[2] Goal setting

As we mention in Chapter 3, goals will undergo constant change in Society 5.0, as a result of changing conditions, including changing technologies. For this reason, the governance goals themselves should be constantly reviewed in accordance with changes in external conditions and technological impact (Note that changes in external conditions do not necessarily result in changes to goals).

[3] Designing governance systems

Governing actors design governance systems based on the defined goals. System design in this context includes, in addition to the designing of technological systems, the designing of organizational systems and their applicable rules. In carrying out such design, it is critical to satisfy the basic principles outlined in [3.1.1], which include (i) transparency and accountability, (ii) availability of appropriate quality and quantity of options, (iii) stakeholder participation, (iv) inclusiveness, (v) appropriate allocation of responsibilities, and (vi) availability of remedial measures.

[4] Operation, monitoring, and accountability of governance systems

This refers to the process of operating a designed governance system. The governing actor should continuously monitor the status of system operation based on real-time data and other input. Additionally, it is imperative that they properly disclose to stakeholders that may be affected, information on matters such as the goals of their systems, system designs used to accomplish these goals, risks that arise from these systems, their operational setup, results of operations, and remedial measures.

In light of the processes and results of these operations, the governing actor should implement **both** the evaluation and analysis described below.

[5] Governance system evaluation

The governing actor evaluates whether the initially defined goals have been accomplished. The system is re-designed if these defined goals are not being met (elliptical cycle in the bottom half).

[6] Re-analysis of conditions and risks and re-set goals

Secondly, the governance goals themselves may have to be revised as a result of effects caused by external systems (outer, circular cycle). For this reason, continuous analysis should be performed on whether there have been any changes in the conditions or risk landscape in which the governance system operates, and if there have been, whether these changes necessitate revisions to its goals.

This agile governance will be implemented in a variety of layers of society. In this Report, we discuss [1] governance by businesses (4.2), [2] governance by way of regulations (4.3), [3] governance of public infrastructures (4.4), [4] governance by market mechanisms (4.5), and [5] governance by individuals and communities (4.6). We then introduce the concept of "Governance of Governance" that will be needed for agile governance to function for each of these mechanisms.

(2) The roles of businesses in agile governance (4.2)

Businesses are the implementing and operating actors of CPSs in Society 5.0. Corporate activities are becoming increasingly sophisticated, complex, digitalized and global, making it increasingly difficult for third parties, including governments, to comprehend and monitor them in detail. As such, the question of how businesses should and will be able to practice agile governance for the services and systems they provide becomes absolutely critical.

Businesses should analyze the conditions they operate under, define the goals that their services and systems are going to accomplish, and design their technological and organizational governance systems to achieve these goals. They should then monitor the results of implementation in real-time, carry out evaluations and make improvements if any problems arise, and revise their goals accordingly if there are any changes to the conditions they operate under. With respect to this series of governance operations, which includes goal setting, system design, monitoring, evaluation and improvement, businesses will be required to provide explanations to their stakeholders that are easy to understand, in order to ensure that the whole governance process is conducted appropriately (comply and explain).

Appropriate incentives should be designed in order to encourage

businesses to implement the agile governance. To ensure this, we believe that it will be critical for stakeholders to improve disclosure systems and to provide compliance guidelines. It is also important to revise corporate sanction regimes in a way that focus on risk management and future improvement of systems, rather than on mere outcomes.

(3) Designing laws and regulations to realize agile governance (4.3)

As we discussed in detail in the previous report[1], traditional regulatory models face a variety of issues in Society 5.0, including [1] rules that are not able to keep up with changes in society, [2] difficulty in monitoring operations from the outside, [3] difficulty in determining who should be liable, and [4] limitations of effectiveness of national laws. To overcome these issues, we believe traditional regulatory models should be revised to come in line with agile governance.

To achieve this, we believe that traditional rule-based regulations, i.e., regulations that are based on prescriptive rules on a per-industry basis, should be redesigned to be based on goals on a per-function basis (goal-based regulation). Based on this, it will be important that government and the private sector work together to establish standards, guidelines and other soft laws to bolster businesses' efforts to achieve the goals provided by regulations. Furthermore, it would be important to encourage experiments that utilize the "regulatory sandbox system" and other systems to redesign laws and regulations based on findings from these tests. Additionally, laws, regulations, standards, and guidelines should be continuously evaluated based on data, and improved from the standpoints of [1] whether they are able to achieve policy goals that were defined at the outset, and [2] whether policy goals need to be revised to address changes in social conditions.

(4) Agile governance for infrastructure (4.4)

One of the key factors for the advancement of CPSs is the interoperability between systems operated by different actors. To realize Society 5.0, it is imperative that we develop its infrastructures, including hardware, software, and technical standards.

1) See "GOVERNANCE INNOVATION: Redesigning Law and Architecture for Society 5.0" (2020) https://www.meti.go.jp/english/press/2020/0713_001.html

The agile governance concept can also be applied to the governance of these infrastructures. The balancing of the multiple goals that infrastructures must achieve, and actual system designs should be carried out with participation from multiple stakeholders including providers and users who use the infrastructures. Government should promote the setting up of venues where governance is designed by multiple stakeholders.

Additionally, ongoing evaluations by stakeholders should also be carried out on matters such as whether the above goals are being achieved in the process of infrastructure operations, whether there have been any changes to conditions that affect the infrastructure, and whether any improvements or revisions need to be made based on the findings from these evaluations.

(5) Realizing agile governance in markets (4.5)

In markets, a diverse range of transacting stakeholders continuously monitor and evaluate products and services, and make choices in the form of purchases and reviews. As such, markets certainly can be said to have affinity with agile governance mechanisms. That being said, we believe the following conditions should be met for these markets to properly function as mechanisms of agile governance.

[1] Fair competition is functioning in the market and market participants have access to appropriate quantities of information of appropriate quality, and have appropriate options to choose from. Measures to ensure this may include effective application and enforcement of antimonopoly laws, more substantial information disclosure mechanisms, data portability, and data openness. We should also consider introducing mechanisms where neutral organizations are able to determine on behalf of users the accuracy of information disclosed by businesses.

[2] Rights associated with data, which constitute sources of wealth in Society 5.0, can be designed flexibly and are protected. To this end, we believe that multifaceted approaches will be required where (i) rights and obligations on data can be determined flexibly by means of contracts, while (ii) statutory protection is provided against any wrongful acquisition or usage of, or other wrongful activity regarding certain data, and at the same time, (iii) certain data can be used without the

permission or consent of the rights holder, for example, where the use of such data causes no or minimal damage to the rights holder.

[3] Infrastructures are in place that allow users to efficiently trade a variety of forms of rights and wealth, including data. For example, we can envision using the method described in (4) to build a variety of infrastructures that will be required for trading intangible assets. These may include systems for recording contracts, systems associated with payment, systems associated with personal identification, data standards and quality standards for different fields, and systems associated with data management and traceability.

[4] Dispute resolution mechanisms are in place for realizing or redressing rights that are traded on the market. To this end, it is important to bring the courts and ADRs online, and to push for the social implementation of online dispute resolution (ODR) which will enable parties to solve the dispute quickly and at low cost.

(6) Participation of individuals and communities in agile governance (4.6)

It will be more important than in the past for individuals and communities to participate as stakeholders in Society 5.0 where CPS make up the foundations of our individual lives and communities. To this end, we believe it will be important to implement in our societies mechanisms for realizing various forms of participation including [1] providing individuals and communities with appropriate information on which they can base their decision-making, [2] ensuring the participation of individuals and communities in political decision-making, and [3] ensuring the participation of individuals and communities in system design.

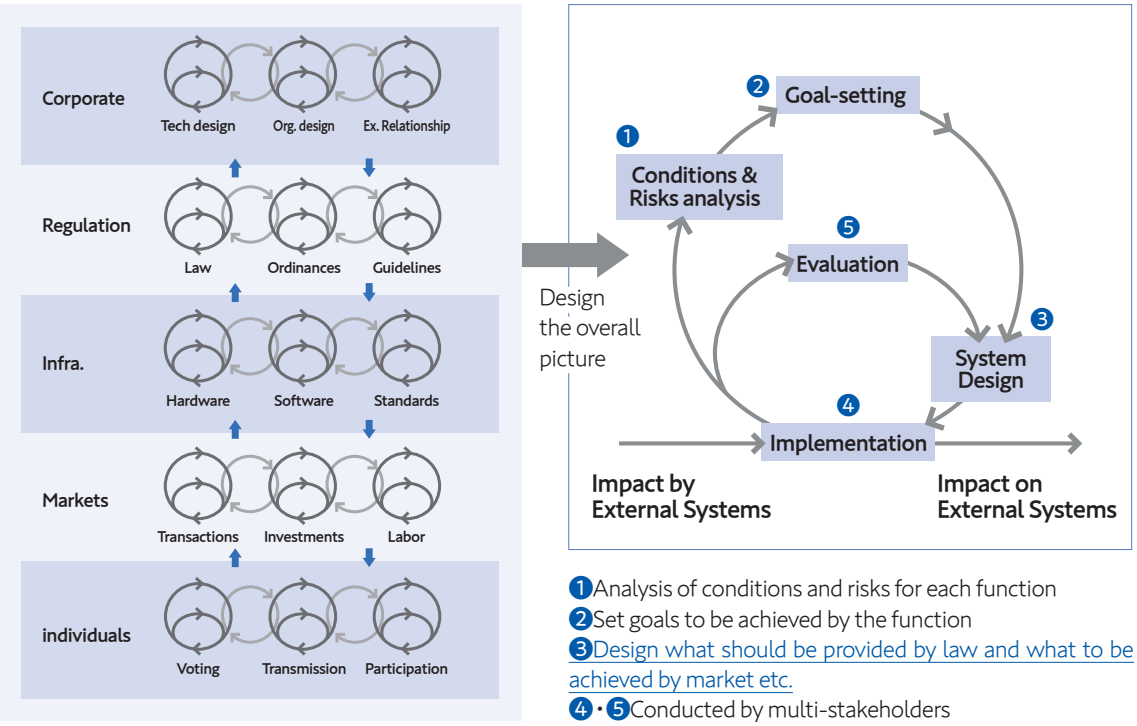
(7) Governance of governance (4.7)

As we discuss above, while agile governance should be achieved for a

variety of governance mechanisms in society, real-world governance in societies is achieved through interactions between overlapping layers of these individual governance mechanisms. The following illustration is a schematic of how these interact with each other.

<Fig. 4.7.1> Concept of "Governance of Governance"

Overall shape of governance for individual functions



1 Analysis of conditions and risks for each function
2 Set goals to be achieved by the function
3 Design what should be provided by law and what to be achieved by market etc.
4 • 5 Conducted by multi-stakeholders

In order to fulfill such goals (as we discuss in Chapter 3) for society as a whole in an environment where a variety of these governance models interrelate with each other, we should design a blueprint for governance as a whole which defines "how we are to combine multiple governance systems to achieve our goals" ("governance of governance"). Specialized knowledge on individual functions, as well as on individual governance mechanisms (corporate governance, regulation, infrastructure, market, etc.) will be required to realize these complex forms of governance. We believe it will be important to establish and operate specialized public agencies in which

experts and stakeholders from a diverse range of fields are able to participate.

(8) Realizing agile governance globally (4.8)

Ultimately, global coordination that crosses public and private sector lines on all of these governance efforts will be necessary. In this context, we can envision a variety of forms of collaboration in addition to intergovernmental efforts, including international collaboration for standards development, as well as system connectivity between private businesses.

To summarize, in order to maximize the positive impacts from innovation in CPS-based Society5.0, we need appropriate governance mechanisms (Chapter 1). When designing such governance mechanisms, we should consider that the world we live will change fast and become more complex and uncertain, which makes it difficult to control risks in advance (Chapter 2). Likewise, the goals of governance will continue to change along with the change of technologies and societies (Chapter 3). Therefore, we should implement "agile governance" approaches that are designed to continuously and rapidly run cycles of "conditions and risks analysis," "goal setting," "system design," "operations," "evaluation," and "improvements" in a diverse range of technological, organizational, and social systems (Chapter 4).

These governance reforms cannot be achieved by specific actors alone, such as governments and large corporations, and can only be realized through cooperation between a diverse range of domestic and foreign stakeholders, including SMEs, individuals, and communities. To this end, going forward, we believe dialogues for redesigning models of governance based on shared visions need to be carried out in a variety of different fields.

While there will be no end in these transformative times to the efforts required in the area of agile governance—through which we continue to explore the ideal shape of human happiness—we believe methodologies do exist for achieving this. Our hope is that this Report will serve as a starting point for discussions on how such methodology can be established.

End of summary

Chapter 1

What is Society5.0 and why we need Governance?

1.1 The Need for Governance in Achieving Society 5.0

1.1.1 The Purpose of the Report

In the world we live in, we are facing various issues such as the declining birthrate and aging population, concentration of population in urban areas, widening of income disparities, rapidly changing climate and environmental destruction, etc. Furthermore, the COVID-19 pandemic which struck the world in 2020 highlighted the difficulty of balancing economic activities and public health.

For us to overcome these issues and realize a society where each person can proactively live a more fulfilling and happier life, we need to maximize the use of innovative digital technologies.

This modern age is said to be the era of the Fourth Industrial Revolution[2], which is supported by advanced digital technologies. Cutting-edge technologies such as IoT, Big Data, AI and 5G communication, have the potential to help us overcome various issues faced by the human race and create a more fulfilling and happier society. For example, by matching the demand and supply for flows of people and goods in the society through the use of Big Data and AI, we will be able to realize mobility which is environment-friendly and economically efficient, and capable of catering to each individual's needs. If a system for flows of people and goods using autonomous vehicles and autopilot drones is implemented, people, including the elderly whose means of transportation are limited due to rural depopulation, will be able to use highly convenient services at any time. If real-time health data and data held by medical institutions are linked, it will be possible to identify abnormal physical changes at an early stage, provide

2) Klaus Schwab, "The Fourth Industrial Revolution" (Currency, 2017) and "Shaping the Fourth Industrial Revolution" (World Economic Forum, 2018), etc.

online medical care or swiftly direct the patient to the best suited medical institutions, based on the patient's existing medical condition and geographical location. Even those services that presuppose physical presence will be provided instantly online using remote-controlled robots and 3D printers in not-so-distant future. Also, if we can replace humans with machines to conduct inspection work for plant equipment, etc., which has been traditionally done by humans, humans will be freed from physical risks.

As such, Japan has defined "Society 5.0" as a human-centered society where high integration of cyberspace (virtual space) and physical space (real space) can promote economic development and solve social issues, and it has been putting its efforts to achieve such a society[3].

The purpose of the Report is to examine the modalities of "governance" that are indispensable for the realization of the aforementioned Society 5.0, and to contribute to the future development and happiness of human societies that are founded on digital technologies.

Column 1

Economic impacts of Society 5.0 and the current situation of Japan

Various figures that have been released indicate the potential economic impacts related to Society 5.0. For example, in 2030, the economic effect bought about by IoT and AI is expected to be a contribution of 132 trillion yen to real GDP in Japan[4]. Furthermore, an estimate shows that AI may enable a 15.7 trillion dollar-increase in global GDP in 2030[5]. By sector, various forecasts have been published, such as the impact of autonomous vehicles on the global passenger economy reaching 7 trillion dollars by 2050[6], the market size of Japan's drone business reaching 642.7 billion yen by 2025[7], and the impact of the digitalization of administrative procedures on Japan's GDP reaching 1.3 trillion yen[8]. In all cases the forecasts indicate that digital technologies will enable exponential development of the economy in Japan and other countries.

3) The 5th Science and Technology Basic Plan (2016). Here, hunter gatherer societies are defined as Society 1.0, agrarian societies as Society 2.0, industrial societies as Society 3.0, and information societies as Society 4.0.
4) The Ministry of Internal Affairs and Communications, "Report on Research and Study on Issues Related to ICT Economy in the Age of IoT" (2017) https://www.soumu.go.jp/johotsusintokei/linkdata/h29_04_houkoku.pdf
5) PwC "The macroeconomic impact of artificial intelligence" (2018) https://www.pwc.co.uk/economic-services/assets/macroeconomic-impact-of-ai-technical-report-feb-18.pdf
6) Strategy Analytics 2017 "Accelerating the Future: The Economic Impact of the Emerging Passenger Economy" (2017) https://newsroom.intel.com/newsroom/wp-content/uploads/sites/11/2017/05/passenger-economy.pdf
7) Haruhara Hisanori, Yusuke Aoyama and Impress Sogo Kenkyujo, "Drone Business Research Report 2020" (Impress, 2020) https://research.impress.co.jp/report/list/drone/500869
8) Mikio Mizobata, "How Much Productivity Will Be Enhanced through Regulatory/Administrative Reforms" (Quarterly Research Report by Daiwa Institute of Research), pp.4-19. https://www.dir.co.jp/report/research/economics/japan/20180723_030007.pdf

Nevertheless, how about the reality? In the "IMD World Digital Competitiveness Ranking 2020"[9] published by the International Institute for Management Development (IMD), Japan is ranked 27th out of 63 economies that are mostly made up of developed countries. The lagging rank is due to the following reasons among others: the slow progress on the structural reform of social systems which have been in place since the period of high economic growth, delayed response to the sophistication of talent[10] and agility of business, and the rigid regulatory framework. In addition, according to a report released by the OECD in 2019, the intensity of ICT use at work in Japan is below the average of the OECD member countries. Overall, we can say that the use and application of ICT at work in Japan is not as advanced as in other leading countries in the world[11].

The explosive spread of COVID-19 which struck the world in 2020 has forced Japan to re-examine the stagnated digitalization as mentioned earlier. In Japan, regulatory reforms toward the utilization of digital technologies are moving forward, as the government is abolishing paper documents, hanko seals and face-to-face interactions in administrative procedures and contracts, allowing initial consultation as part of online medical care, and promoting online education. However, this only represents the achievement of "Society 4.0", where individual human actions are replaced by digital means. The central theme of this Report is that, in order to achieve Society 5.0 by going beyond individual digitalization and connecting every system and data, a bold transformation is required to make the governance model that is in place much more flexible and effective.

9) The ranking analyzes 63 economies and ranks the extent to which countries adopt and explore digital technologies leading to transformation in government practices, business models and societies in general. IMD (2020), 'IMD World Digital Competitiveness Ranking 2020' https://www.imd.org/wcc/world-competitiveness-center-rankings/world-digital-competitiveness-rankings-2020/

10) A report published by the Organization for Economic Co-operation and Development (OECD) "Job Creation and Local Economic Development 2020" (2020) points out the following on page 3 in the chapter for Japan (http://www.oecd.org/cfe/leed/Japan.pdf): "Following general OECD patterns, in Japan, all regions saw the share of middle-skill jobs decrease between 2009 and 2018. The share of middle-skill jobs decreased by 12 percentage points or more in all regions. In Tohoku and Tokai, it decreased by over 14 percentage points, which represents a net loss of over 600,000 and 900,000 middle-skill jobs, respectively. Unlike trends in most OECD countries, decreasing shares of middle-skill jobs were predominantly offset by increasing shares of low-skill jobs in all regions."

11) A research report published by the OECD in 2019 quantified the member countries' ICT intensity of workers, such as reading and writing emails and using spreadsheet software and a programming language, with a scale of 0 to 1 (it is close to 1 when the job is more ICT-intensive), and Japan was 0.50. The average of the OECD member countries was 0.51, while the ICT intensity of developed countries including Singapore, the U.K., and the U.S were between 0.60 and 0.75. OECD (2019), "OECD Skills Outlook 2019: Thriving in a digital world" (https://abdigm.meb.gov.tr/meb_iys_dosyalar/2019_06/13161241_OECD_SKILLS_OUTLOOK_2019.pdf)

1.1.2 The importance of governance in achieving Society 5.0

In Society 5.0, various governance issues will arise. Examples of such issues are listed below:

① In order to achieve Society 5.0, an enormous amount of data needs to be collected and analyzed. How will we protect data privacy and trade secrets? Also, how will we ensure the accuracy and reliability of the data that will be in circulation?

② In Society 5.0, autonomous decisions made by advanced algorithms such as in AI will have a big impact on society. However, it is difficult to predict the behavior of AI in advance or explain it afterward with the current technologies we have. How will we manage the impact AI has on the decision-making and physical safety of humans?

③ In Society 5.0, various systems that are provided by multiple entities will be interoperated. How will we ensure the reliability and safety of the services provided through such systems? How will we determine responsibility in the case of an accident?

④ How will we manage risks so that we can prepare for cyber-attacks which are becoming more advanced / sophisticated / organized, and malfunction of hardware or failure of software?

The above are only a few examples of diverse issues related to the actual practice of governance. Even with the advancement of technology, we will not be able to achieve Society 5.0 if we cannot overcome various governance issues arising from such technological advancement.

Column 2

Cases where governance became an issue when implementing innovative technologies in societies

There are more than a few cases where the implementation of innovative technologies resulted in governance issues. Here are some examples:

(a) Urban development plan for Toronto, "IDEA"

In October 2017, Sidewalk Labs, which is owned by Google's parent company Alphabet, announced its plan to launch "IDEA (Innovative Development and Economic Acceleration)", which was a smart city project designed to create a city of the future in Toronto, Canada. However, as the project came under criticism from the media and protests from local residents, the plan was called off in May 2020.

In this plan, different cutting-edge technologies such as modular green buildings and autonomous vehicles were to be utilized, and it included an innovative plan to collect various data related to the lives of the public and to use such data in most advanced services. However, citizens of Toronto and interested organizations expressed strong concerns over the collection and management of citizens' data. This is believed to be the reason for the termination of the plan. The issue was that, while it was a new system where a private company manages a city, the management company was unable to fully present a reliable governance model to stakeholders.

(b) Use of data sets for facial recognition

In recent years, facial recognition technologies are attracting attention. These technologies are used to determine the gender, age, race of a person or identify individuals using image data containing human faces Since a great amount of facial image data is required to enhance the accuracy of this technology, a number of companies and research institutions are releasing data sets containing facial data.

In January 2019, U.S.-based IBM released a data set called "Diversity in Faces (DiF)" which contains the facial images of 1 million diverse individuals. However, it was found that photographs on "Flickr", which is a photo-sharing community website, were used for DiF's facial image data, and some Flicker users claimed they did not consent to having their photos used in the data set.

While IBM pushed back against this, arguing that the use of photographs did not pose a problem because it only used images tagged with a "creative commons (CC)" public copyright license which usually has less-than-usual limitations related to copyright, it became clear that there was a gap in understanding between the company and general users, and that consensus building for the use of the photographs was insufficient.

One of the challenges is to ensure governance that is based on a substantive agreement instead of a formal agreement on the use of publicly available image data for AI learning in facial recognition technologies as well as the use of software based on such technologies.

(c) Autonomous driving technologies

Autonomous driving technologies are also attracting much attention as means of realizing the future society, however, there are a number of challenges related to its practical applications. In particular, after a fatal accident caused by an Uber autonomous vehicle during a driving test on a public road in 2018, not only Uber but also Toyota and NVIDIA suspended their driving tests.

In Japan, level 3 autonomous vehicles are now allowed to run on public roads following the revision of the Road Traffic Act in 2020, however, in order to achieve autonomous driving for level 4 and above, international consensus on matters such as the definition of a driver needs to be reached, which has not been achieved so far. Especially, an international consensus has not been established over matters such as whether an autonomous driving system can be considered a "driver" if vehicles operated by an autonomous driving system are allowed to run on roads, while the existing law defines a driver as a "person." Further, no clear consensus has been reached on matters such as who would be responsible for an accident involving a vehicle run by an autonomous driving system Will it be an individual, the transport company or the system development company?

(d) Drones

In recent years, the emergence of a market for new services by drone has also become an area with high expectations toward the realization of the future society, and therefore the easing of various regulations is expected[12]. However, unlike an airplane, a drone can be flown by an individual, and there are no control systems for drones, therefore risks related to crashes, collisions and invasion of privacy are becoming issues of concern. After the incident of a drone landing on the Japanese prime minister's office in April 2015, drone flights became subject to strict regulations based on the Civil Aeronautics Act. Such regulated flights are those "in densely populated areas", "beyond visual range", or "over third parties", and flights in those environments are prohibited in principle and require permission from the Civil Aviation Bureau.

One of the upcoming challenges is to have a governance structure in place that will enable (1) adoption of remote ID to identify in-flight drones in real time, (2) implementation of automated UTM (Unmanned Traffic Management) which is capable of reviewing and accepting the flight plans of a vast number of drones in advance and controlling the air traffic, and (3) elimination of illegal drones.

(e) System suspension of critical infrastructure

In recent years, there have been cases where critical power/financial/aviation infrastructures or plants were suspended due to problems related to governance of

12) For example, the "FAA AEROSPACE FORCAST 2018-2038" published by the U.S. Federal Aviation Administration (FAA) in March 2018 estimates that if regulations on night flights, beyond visual range flights and one-pilot one-drone are eased, the growth of the commercial drone market will be more than 10% higher than the existing regulatory environment. https://www.faa.gov/data_research/aviation/aerospace_forecasts/media/FAA_Aerospace_Forecasts_FY_2018-2038.pdf

system security or hardware. According to a report by published the U.S. ICS-CERT in 2015, approximately 10% of cyber-attacks in the U.S. reached the physical systems (control systems) of critical infrastructures, and in fact, incidents are occurring all over the world. In 2015, a serious incident occurred in a power supply company in western Ukraine. Someone sent an e-mail containing malware (unauthorized software which exfiltrates information and destabilizes systems) to the power supply company, and remote-controlled the power supply system, causing a power outage for several hours in an area where more than 1 million residents live. In 2017, computers of leading automobile companies in France, UK, and Japan were infected with malware called WannaCry, causing their plants to shut down operation for several days. In 2018, an incident occurred where a computer used in the control system of a waterworks company in Europe was infected with cryptocurrency mining malware through an advertisement displayed on a browser, causing the performance of the system which controlled the waterworks equipment to deteriorate. Further, Japan experienced system outage incidents caused by hardware failures in 2020. A hardware failure caused the trading system of a stock exchange to shut down for an entire day and investors were unable to make trades, while another incident occurred in an air traffic control system which was temporarily suspended due to a hardware failure[13].

1.2 The Aim of This Report

The challenges in governance as a means to achieve Society 5.0 encompass a broad range of issues as mentioned above, including privacy, system security, transparency, allocation of responsibility, and cybersecurity, etc. At the same time, various sectoral forums have been held in Japan and overseas to discuss how to address these challenges.

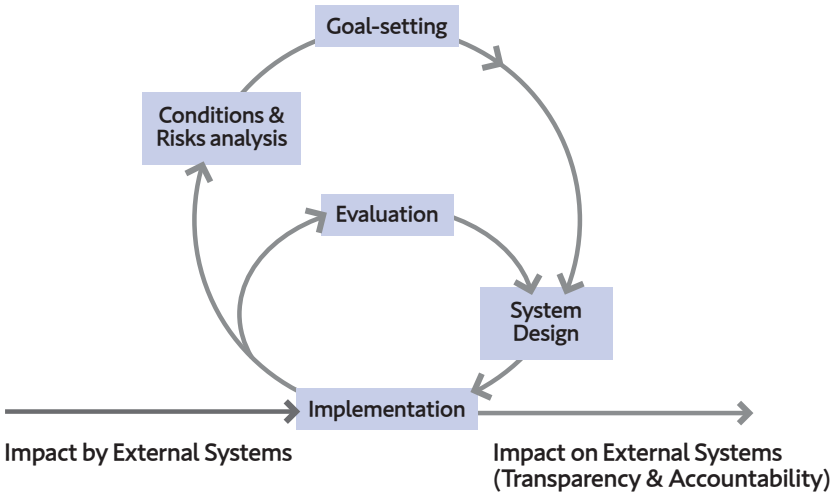
However, if we take into account the fact that assumptions in Society 5.0, which integrates cyberspace and physical space, significantly differ from those in a society centered on conventional physical space, we believe it is necessary to fundamentally review the mechanism of governance which involves various factors including businesses, regulation, and markets when discussing modalities of governance, instead making changes sequentially

13) Satoshi Fukuhara/Hiroko Okamoto “Information security for control systems - Threats of cyber-attacks against social infrastructure and factories, and measures against them” (Information-technology Promotion Agency (IPA), 2019) https://www.ipa.go.jp/files/000073863.pdf, METI, “Cybersecurity policy for industrial fields” (material for the first meeting of the Study Group for Industrial Cybersecurity, 2017) https://www.meti.go.jp/shingikai/mono_info_service/sangyo_cyber/pdf/001_05_00.pdf, Yuki Furukawa/Vlad Savov, “Tokyo Stock Exchange Outage Puts Spotlight on Fujitsu System—backup system did not work -” (Bloomberg, October 1, 2020) https://www.bloomberg.co.jp/news/articles/2020-10-01/QHIAMZT0G1KW01, etc.

within the existing systems and frameworks.

Based on an awareness of these issues, this Report analyzes how Society 5.0 differs from current society from a governance perspective (Chapter 2), explains how the goals to be achieved through governance will change (Chapter 3), and proposes a governance model designed to achieve the goal in such a society (Chapter 4). If we jump to the conclusion, what we are suggesting in this Report is a model for "Agile Governance" which ensures the continuous involvement of multiple stakeholders in governance. In other words, we are proposing a governance model that enables a continuous and quick cycle of "environment/risk analysis", "goal setting", "system design", "implementation", "evaluation" and "improvement".

[Figure 1.2] The Basic Concept of Agile Governance



By proposing such a governance model, this Report is intended to serve the following purposes (the changes in the role of stakeholders such as the government, businesses and communities/individuals are discussed in Chapter 6 of the First Report):

1.2.1 Re-designing the legislature, executive and judiciary functions

In order to achieve Society 5.0, we believe that a fundamental review of the concept of traditional and rigid laws and regulations, the role of the public authority which applies and enforces such laws and regulations, and the role of the judiciary as a remedy system for violation of rights is required.

In the face of rapid technological innovation and social changes, it is

becoming more difficult to maintain a model in which the law uniformly stipulates obligations, or in which the regulatory authority oversees every action taken by businesses. We believe it is necessary to break away from a model in which the state single-handedly undertakes governance functions such as the rule-making, monitoring, enforcement and remedy, and achieve multi-stakeholder governance undertaken by businesses and users.

Further, the role the government is expected to play is not only the formulation and enforcement of laws and regulations. It is more wide-ranging than before, such as the establishment of infrastructure in which the services of multiple entities may be inter-operated, the setting of market rules, the ensuring of a competitive environment, and the facilitation of dialogue among stakeholders to discuss the designing of these systems and rules.

In addition, as models of ex-ante regulations will face difficulties in an increasingly complex and uncertain environment, the role of the judicial function as ex-post remedy will become increasingly important. A specialized and speedy remedy mechanism based on increasingly complex social systems is becoming essential.

In this Report, we will discuss these diversifying roles to be played by public bodies in Society 5.0, and what types of reforms are needed to enable such roles.

1.2.2 Enhancement of industrial competitiveness of businesses

In order for businesses to gain competitiveness in Society 5.0, it is needless to emphasize the importance of actively utilizing innovative technologies. However, new technologies always pose new risks. For example, matters such as how to protect the privacy of users, how to address security concerns, or to what extent a company should take responsibility in cases of an accident, are important matters to consider in business decision-making. Approaches on how to address these issues are not necessarily guided by the law in a uniform manner, and there are more than a few cases where a project fell through or the enterprise value of a company was impaired because it could not gain the trust of users even though its action was not deemed illegal (refer to Column 2 above). On the other hand, in this modern age where uncertainty is rising, businesses cannot innovate if they insist solely on "zero risk".

As such, this Report discusses how businesses should set their goals, assess the risks of systems they build, explain such risks externally, and obtain the trust of users and society, in an era where both "innovation" and

"governance" are required.

1.2.3 Achieving international data governance

In Society 5.0 with cyberspace as a starting point, corporate activities can easily cross borders. Sharing of various data across borders will lead to the promotion of innovation on a global level, and therefore contributing to the resolution of social issues and achievement of the SDGs worldwide.

In the Davos meeting held in January 2019, then-Prime Minister Abe proposed the concept of "Data Free Flow with Trust (DFFT)." As the word "Trust" suggests, in order to facilitate international data flow, the transparency of data handling in destination countries must be ensured, and appropriate governance for privacy, security, and intellectual property must be in place[14].

However, in reality, stances on data governance differ by country. For example, if data governance is left entirely to the hands of the market, there is a risk that some businesses which have become giant companies by monopolizing customer touchpoints may fence in large amount of data, making it difficult for newcomers to enter various markets. If a state controls all data, public entities will know the behavior, character, political stance, and/or thoughts and beliefs of people, creating risks to human rights and democracy. On the other hand, an attempt to control risks through strict regulations will inflate compliance costs for data governance, potentially making it difficult to boost the use and application of data or to achieve advanced innovation.

With the globalization of activities of businesses and individuals, the influence of governance by a single state is becoming more and more limited. It is necessary to achieve a truly innovative and prosperous global economy by sharing a governance model within the international community and establishing a common ground for the formulation and implementation of rules in each country.

14) Subsequently, Japan has confirmed in the First Summary of the Data Strategy Task Force its policy to materialize the following: establishment of the discipline of data governance and an environment for the use and application of data; personal data flow with trust; ensuring of security; a foundation of trust; and next-generation data infrastructure.

In comparison with other governance models, the “Agile Governance” proposed in the Report can be characterized as follows:

(1) As various stakeholders decentrally conduct governance in Agile Governance, it differs from a governance model in which a state and some large companies manage all data and systems.

(2) As Agile Governance ensures stakeholders' effective choice by enhancing transparency and accountability and ensuring fair competition, it strengthens the governance functions of markets and social norms.

(3) As Agile Governance flexibly replaces the designs of goals and systems while constantly reviewing the environment and risks, it overcomes the limitations of a rigid rule-based governance model based on laws and regulations.

1.3 The Structure of the Report

To achieve above mentioned aims, the Report proposes a new governance model in the following manner.

First, **Chapter 2** introduces the characteristics of a cyber-physical system (CPS) which is the foundation of Society 5.0, and describes related governance challenges. It explains the governance challenges, including continuous change of state, uncertainty, difficulty in prediction and control, difficulty in identifying responsible entities, concentration of controlling power, and globalization and agendas, which will arise as a result of the inter-operation of processes, such as data collection through devices and sensors, autonomous decision-making by AI and other algorithms and feedback to the physical space, as well as cyber-physical systems.

In Society 5.0 as described above, it will be difficult to take a governance approach where a certain set of rules is established in advance and implemented. What will become important in place of this approach is an approach by which stakeholders share “goals”, and each constituent designs, implements, evaluates and improves its system in a flexible manner to achieve that goal.

For this reason, in **Chapter 3**, we will sort out the “goals” to be achieved through governance. The chapter explains that the content of the various

goals such as happiness, liberty, fundamental human rights, fair competition and democracy change relatively depending on the situations surrounding technology and societies, and the values of individuals, therefore they need to be constantly reviewed.

In **Chapter 4** of the Report, we will discuss the characteristics of the aforementioned CPS and how a society as a whole should build a governance model in line with the constantly-changing goal. The chapter indicates that it is desirable that various governance mechanisms such as businesses, laws and regulations, infrastructure, the market and social norms are inter-linked to achieve the governance goal based on the concept of "Agile Governance", where each constituent constantly updates goals and systems in response to changes in the surrounding environment.

The structure of the Report described above is illustrated in Figure 1.3.

[Figure 1.3] The overall layout of the Report

Chapter 1: What is Society5.0 and why we need Governance?

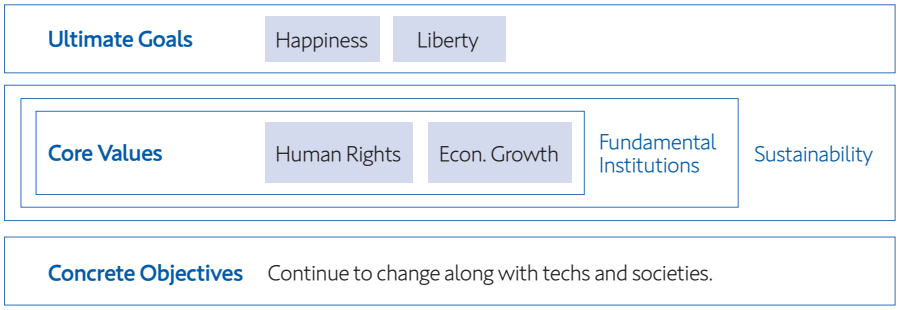
To realize Society 5.0, we will need to redesign governance for society as a whole.

Chapter 2: Key Characteristics of Society5.0 which is based on Cyber-Physical Systems

Digitalization	Analytics	Actuation
Interoperability	Augmentation	Adaptability

These qualities of CPSs—which will come to form the foundation of our societies—will bring about increasingly rapid and complex changes to societies, and make it difficult to predict and control risks.

Chapter 3: Goals of Governance

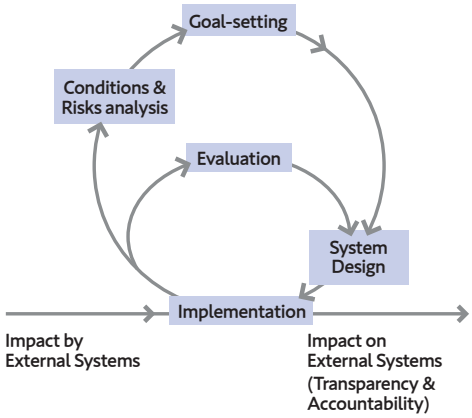


- The ultimate goal of governance will shift to "creating the 'freedom' to proactively choose, based on our individual values, the nature of technological influences under which we choose to pursue our happiness."
- The substances of "core values" or "concrete objectives" will continue to change along with changes that CPS technologies and societies undergo

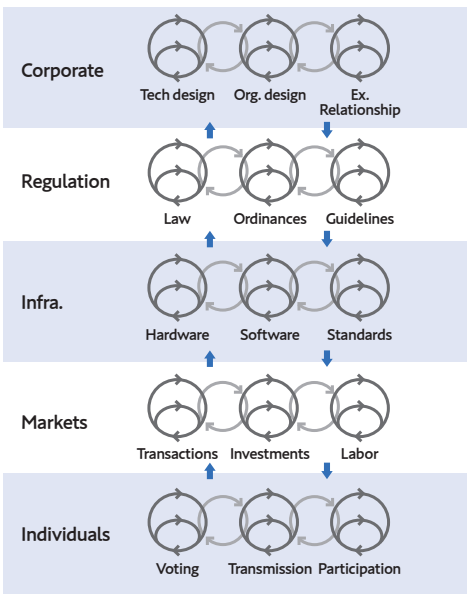
Chapter 4: Designing and Implementing Agile Governance

In order to govern our constantly-changing societies, we must implement, in various social systems, **"agile governance"** that is designed to run cycles such as for "goal setting," "system design," "operations," "explanation," "evaluation," and "improvements" on a continuous basis and at rapid rates.

Basic components of "agile governance"



Governance of Governance



and

- "Governance of governance" for organizing the overlapping layers of governance mechanisms
- International cooperation on these governance models as a whole will be critical.

Column 3

The positioning of "governance innovation" in digital governance

These days, governance is discussed from various perspectives such as "AI governance", "privacy governance" and "data governance". This Report forms the basis for governance from various perspectives. These relationships are summarized below.

- We can say that "AI governance" means governance from the perspective of technology. AI is one of the key components of CPS – its characteristics and governance-related issues are discussed in Chapter 2 of the Report in detail (Refer to 2.2 for data for AI learning, and 2.3 for AI arithmetic processing). Then, the impacts associated with the technical characteristics of AI on various goals including privacy, fairness, and physical safety are analyzed in Chapter 3. In addition, the modalities of governance designed to achieve those goals are discussed in Chapter 4.
- "Privacy governance" can be interpreted as governance from the perspective of privacy as a "goal". As discussed in Chapter 3, there are different kinds of goals other than privacy, such as freedom of expression, safety of life and physical safety, fair competition, and democracy. These goals are affected by various technical characteristics which are discussed in Chapter 2. Further, methodologies designed to achieve the privacy "goal", which is affected by such characteristics, are discussed in Chapter 4.
- While "data governance" is rather an abstract term, if we interpret it as "governance 'related to' data", we can say that "data governance" is discussed throughout this Report. On the other hand, the term "data governance" can be interpreted as governance related to "data privacy" and/or "data security" in a narrow sense, therefore we did not use the term in this Report to avoid any confusion.

1.4 The Definition of Governance in the Report

As a starting point of this Report, we present the definition of "Governance" discussed in this Report.

The Report defines governance in Society 5.0 as "design and implementation of technical, organizational, and social systems by stakeholders, with an aim to manage risks in a society based on systems which integrates cyberspace and physical space (CPS: Cyber-Physical System) at an acceptable level, while maximizing the positive impact arising from the system. The description of each element is shown below:

(1) Target of governance: Society based on systems that integrate cyberspace and physical space (CPS)

Society 5.0 is built with a complex system integrating cyberspace and

physical space (CPS: Cyber-Physical System) as its foundation. Because CPS changes rapidly and is complex and unpredictable, and systems of various constituents are connected, it is difficult to clarify where responsibility lies. As a result, there are a number of factors that make governance difficult. For example, the risks of CPS are directly linked to the risks in physical space. The technical characteristics of CPS and the resulting governance issues are discussed in **Chapter 2** in detail.

(2) Purpose of governance (i): Risk management at a level acceptable to stakeholders

Risks arising from new technologies and business models are expected to be managed at a level acceptable to stakeholders who are affected by those risks[15]. Here, "stakeholders" include a wide range of people who are directly or indirectly affected by a system. For example, stakeholders include not only system administrators/designers, direct users, but also those who are exposed to unilateral and potential risks such as passersby captured by security cameras, and pedestrians crossing in front of autonomous vehicles, as well as public entities such as regulatory authorities.

Next, a "risk" means the possibility of the occurrence of harm multiplied by the extent for such harm[16].

Based on that, risks "acceptable" to stakeholders means that it is procedurally and substantively justifiable for stakeholders to take a certain level of risk. It is practically impossible to reduce risks related to CPS that are hard to predict in Society 5.0 to zero, and therefore the purpose of governance is not necessarily to reduce to risks to zero. A key process of governance is to determine what kind of procedural rationale (e.g., disclosure of information, consent of the person concerned, decision-making based on dialogues with stakeholders, etc.) and substantive rationale (e.g., The risks are minor, the benefits which will be achieved outweigh the risks, appropriate compensation will be paid) will ensure the acceptability, while taking into account the nature and extent of the risks as well as the scope of the stakeholders.

15) This corresponds to the concept of "safety" under international standards. Shigeru Kanemoto/Naoshi Yomiya and others, "Safety design guide based on system technology" (Dempa Publications, Inc), p.17
16) Kanemoto/Yomiya and others, "Safety design guide based on system technology", p.20

(3) Purpose of governance (ii): Maximization of the positive impact for stakeholders

The "risk management" mentioned above is a necessary condition for the governance of Society 5.0 but not a sufficient condition. What is truly important in achieving Society 5.0 is to create various positive impacts such as the achievement of the pursuit of happiness by individuals and the resolution of social issues.

The purposes of governance described above, i.e., "Risk management" and "Maximization of the positive impact", are referred to as the "goals" in this Report. Specific elements of the "goals" are discussed in **Chapter 3**.

(4) Actors of governance: Stakeholders

Because Society 5.0 is complex and rapidly-changing, it is impossible to maintain a model in which obligations are uniformly stipulated by law, and every action taken by businesses are overseen by the regulatory authority. It is important that different stakeholders including companies that develop individual systems, their users, market participants and relevant individuals/communities participate in governance, instead of deploying a model in which the state single-handedly undertakes governance functions such as the rule-making, monitoring, enforcement and remedy. Establishment of a governance system requires the formation of governance which enables cross-check and checks and balances to function at all times with the participation of stakeholders.

(5) Aspects of governance: Design and implementation of technical, organizational and social systems

Governance entails the creation and implementation of a mechanism to achieve above mentioned goals. There are at least (1) Technical methods, (2) Organizational methods, and (3) Social methods.

(1) Examples of technical methods are encryption technology for data protection, an automated anomaly detection system using AI, and embedding of code that cannot select certain actions, etc.

(2) Organizational methods can be interpreted as corporate governance conducted by a company or governance of a governmental organization as a system operator, etc.

(3) Social methods include governance through approaches such as the law, the market and social norms[17]. The purposes of governance are to be achieved by posing a threat of being punished by the law, through the market's function to adjust stock prices, prices of products/services and demand and supply, and by denunciation by communities when social norms are violated.

The design and implementation of these governance systems will not be carried out by a single entity but through the interaction of various stakeholders. For example, even if it is considered possible to achieve the goal through a technical method, we could devise a way to continuously confirm if such method achieved the goal by having opportunities to review and evaluate it through organizational and social methods. While it is realistically impossible to involve all stakeholders in governance, what will be crucially important in governance of Society 5.0 is how to ensure the involvement of stakeholders and adjust their rights and responsibilities in the course of governance. The modalities of a governance model designed to achieve these goals are discussed in **Chapter 4**.

17) A U.S. constitutional scholar Lawrence Lessig suggests four forces that constrain our actions: "architecture, the law, the market, and social norms", and with this framework in mind, this Report essentially considers "architecture" as a method of technical governance and "the law, the market and social norms" as methods of societal governance. Lawlence Lessig "Code and other laws of cyberspace: version 2.0" (2006) pp.120-125

Column 4

Characteristics of "Governance" in the Report

There is no single definition for "Governance". For example, the Cambridge Dictionary defines governance as "The way that organizations or countries are managed at the highest level, and the systems for doing this"[18]. In general, governance of companies is referred to as "corporate governance" and the entity which conducts governance of a country is called the "government".

The definition of "governance" in this Report aligns with the general definition and terminology mentioned above in essence. However, the definition of governance in this Report has the following characteristics.

(1) The subject of governance is Society5.0 which is based on CPSs

(2) The definition is not limited to governance by certain stakeholders (such as the government and businesses). It refers to governance by various stakeholders (multi-stakeholders).

(3) Methods of governance are not limited to management of organizations and having systems in place. Rather, they extensively include technical, organizational, and social systems.

In that sense, we can say that "governance" in this Report has a multi-dimensional meaning which comprehensively covers various modalities of governance such as government, corporate governance and technology governance.

18) "The way that organizations or countries are managed at the highest level, and the systems for doing this"

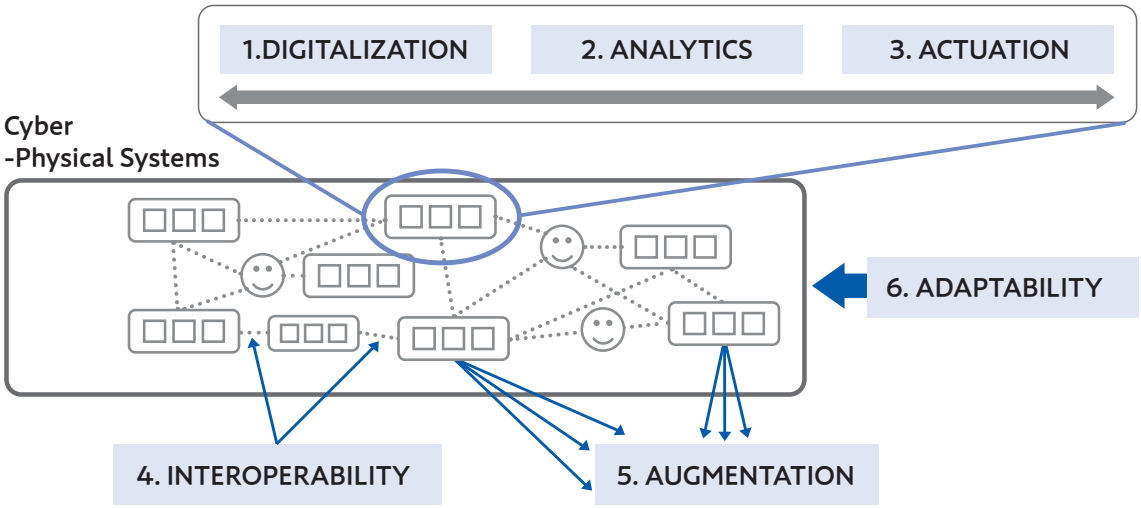
Chapter 2

Key Characteristics of Society5.0 which is based on Cyber-Physical Systems

2.1 What is CPS in the Context of Society 5.0?

Society 5.0 is founded on diverse and complex systems in which cyber and physical spaces are highly integrated (CPS: cyber-physical systems). In this Chapter, we discuss the systemic characteristics of CPSs and the governance issues that they entail[19]. Specifically, we perform analysis based on the following perspectives.

[Figure 2.1] Key characteristics of cyber-physical systems



[1] Large-scale collection of a greater variety and scope of data (Digitalization).

In Society 5.0, we will be able to generate, distribute, and acquire data at lower cost through countless devices and sensors that are dispersed

19) Note that the technologies discussed here are models that have been simplified for the purpose of organizing the governance issues at hand, and the actual technologies will be more complex. Furthermore, actual issues will often be related to the multiple technologies that we discuss in this Chapter. As such, the classification of issues in this Chapter are based on technologies that these issues are believed to be most related to.

throughout physical space. Furthermore, the scale, scope, variety, and processing of data will be expanded to enable the acquisition of detailed, real-time data (2.2).

[2] Data analytics (Analytics)

Low cost analytics will enable more sophisticated data analytics algorithms based on AI or other technology. (2.3)

[3] Effects on physical space (Actuation)

Based on analytics results, machines will automatically perform administrative tasks and processes in social systems and organizations, as well as engage in the day to day lives of individuals. (2.4)

[4] Connectivity between systems equipped with a variety of different functions (Interoperability)

Multiple systems provided by multiple actors interconnect and work together. (2.5)

[5] Augmentation to transcend geographical restraints and industrial sectors (Augmentation)

A diverse range of industries will transcend traditional geographical constraints and expand into other countries and industrial sectors. While the influence of giant corporations will expand globally, individuals will also be able to impact societies without the intermediation of large corporations or nation states. (2.6)

[6] Constantly reconfigurable systems (Adaptability)

The roles of individual systems in CPS constantly undergo change and are redefined according to the status of peripheral systems and acquired data. (2.7)

The separation of these elements is strictly a practical means of classification. In reality, these characteristics come together as a single entity to make up cyber-physical systems. Figure 2.1 shows a schematic of the relationships between these elements.

We would like to discuss these one by one below.

Column 5

Technological characteristics of CPS

In this Chapter, while we will be analyzing the characteristics of CPS in the context of Society 5.0 primarily from a governance perspective, from a technological perspective, we believe CPSs have the following characteristics.

In CPSs, sensors, microphones, and cameras installed on things digitize on-site information, and computers monitor and make decisions with respect to these data in real-time, as well as gather, accumulate, and analyze these data to learn and predict trends. And based on the results from these processes, CPSs are able to autonomously control objects according to predefined rules.

Essentially everything will be equipped with a communication function, and these things will be equipped to send, receive and share digitized data to, from and with computers around the world via the Internet and other communication services. Information processing —from monitoring and making decisions on data, to data gathering, accumulation and analysis, as well as learning and making predictions from data—will be able to be run not only on devices equipped with sensors or cameras, but at essentially any arbitrary location by installing software on devices referred to as edge computers placed near these devices, or on remote servers, or on cloud servers in overseas data centers.

These devices and software programs will not necessarily be developed, provided, or managed by the same operator. As such, systems will likely be put together by combining, via networks, devices that were developed, provided, and managed by a diverse range of businesses and individuals around the world—devices and programs based on different standards and specifications—and these systems will expand as needed.

The software programs that make up these systems may come in the form of programs that are designed, manufactured and tested by a corporate engineer with specialized expertise, or open source software developed and continually upgraded by volunteer engineers working together from around the world, or programs made by beginners on easy-to-use software development tools, or software that is automatically designed, manufactured, tested and autonomously tuned by software programs that are designed to develop software (AI).

Methods for enabling AI and robots to learn the right solutions will become increasingly sophisticated and automated. These AI and robots are expected to become capable of autonomously collecting information from cyber and physical spaces, and automatically carrying out trial and error to achieve machine learning without the need for humans to manually prepare the data to learn and store in memory.

We can also expect to see advancements in telecommunication technologies as represented by the widespread implementation of mobile telecommunication network services referred to as 5G and 6G which provide high speed, large bandwidth, more simultaneous connections, and less latency. The functions of these services will be controlled by software that automatically optimizes various configurations and communication paths, as well as implements cyber security countermeasures. We can also

expect to see mechanisms that automatically expand bandwidths to accommodate increases in data communication volumes, and automatically expand computer resources to meet increases in the amount of data being stored and processed.

Hardware design and manufacturing technologies will also evolve alongside the advancements in software. Systems will be able to simulate the many variations of materials, shapes, constructions, and functions of hardware, and perform repeated durability tests in short amounts of time on software in cyberspace. They will then autonomously design and select optimum specifications for hardware that meet the requirements, and automatically manufacture the hardware by 3D printing or other means. We will also likely be able to manufacture ultra-small machines at low cost that can be remotely controlled via network connection. We expect these machines to be networked and have the capability to systematically collect and analyze data.

Furthermore, by combining components such as store-bought IoT device assembly kits, cameras and sensors, or by forming parts using 3D printers, everyone—and not necessarily only engineers with specialized expertise—will be able to easily create hardware with advanced functions, connect these to networks, and interlock them with various other software and hardware around the world to incorporate them into a global CPS.

So along these lines, in addition to controlled systems that are systematically designed, manufactured and centrally managed by specialized engineers employed at any one of the many operators, we can expect to see a multitude of random devices, data, software and networks created by a diverse range of people and software worldwide, connecting autonomously and self-propagating through trial and error to give rise to unfettered systems, which eventually become mish-mashed with cyberspace and physical space, and come to make up components of key functions of our societies. (Satoshi Sakaino)

2.2 Large-scale collection of a greater variety and scope of data (Digitalization).

2.2.1 Networking all people and things, and converting their attributes to data

In Society 5.0, not only PCs and smartphones, but essentially all things, including facilities such as appliances, automobiles, robots, drones, residential homes, buildings and factories, as well as critical infrastructure systems for finance, credit, air flights, airports, railways, electric power, gas, government administration, waterworks, healthcare, logistics, chemistry and petroleum will be interoperated via a variety of wired or wireless communication networks, and autonomously communicate with each other much like on the Internet (Internet of Things: IoT). In the following section, we discuss issues that arise from converting our physical spaces into data.

2.2.2 Issues that arise from converting attributes of our physical spaces into data

(1) Authenticating the actor (ID)

In Society 5.0, where essentially all people and things in our physical space are connected to the network, it becomes critical to ensure the reliability of the connection between the actual existence of people and things in physical space, and actors in cyberspace. To this end, the widespread availability of simple and low-cost approach by which identification can be completed online, in addition to official ID documents, will be key. We will need an ID infrastructure that will function reliably as one of our social infrastructures[20] which is easy to implement, and covers all privacy and security issues[21].

(2) Reliability of data content

Because any erroneous data in cyberspace can lead to significant damage in physical space in societies where decisions made in cyberspace are directly connected to operations in physical space, the reliability of data content must be assured to a greater degree than it has been traditionally. Accuracy must be ensured in the conversion of physical space events to data, and appropriate governance for data storage, processing, and sharing will be required depending on different data content and applications. In order to achieve this, we can expect to see the implementation of a variety of mechanisms including ways to ensure data traceability, and the granting of trust anchor status based on third-party audits and guarantees.

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20) The "Report on reviews of how to organize methods of identification in online services" from the Ministry of Economy, Trade and Industry (March 2020) points out that counterparty "reliability" is becoming increasingly important as more and more online services operate on the presumption that these actual persons exist, and that it is therefore essential that their actual existence can be verified. And based on this understanding, the report points out the importance of providing indices for determining business risks associated with the need for personal identification, and the importance of the widespread availability of simple, low-cost and medium-strength options for personal identification that can be completed online.

21) In 2020, payment settlement companies in Japan were victims of a fraud where unknown parties opened falsified accounts, connected their accounts to bank accounts, and made illicit withdrawals from users who did not possess Internet banking accounts. In response to this issue, security measures associated with connecting IDs became a major issue, with the Financial Services Agency revising their monitoring guidelines for fund transfer operators, and voluntary regulatory bodies publishing new voluntary regulations. In order to prevent such events, we must design architectures that ensure the reliability of IDs based on the assumption that they will be connected.

2.3 Advanced and autonomous data analytics (Analytics)

2.3.1 Creating new value from big data and AI

AI (Artificial Intelligence) technology—capable of instantly analyzing complex data, and performing highly intellectual tasks and making decisions that only humans were traditionally able to—will be at the core of Society 5.0. AI technology has dramatically advanced since 2010 building on big data collected through IoT and other means, and significant improvements in computer processing power enabled thanks to advancements in semiconductor technology. AI has undergone explosive innovation in areas where good data are easier to gather, such as stock trading, recommending products or content, analyzing personal relationships between SNS users, forecasting crowd traffic and the weather, as well as natural language translation to name a few.

While a variety definitions have been given for AI[22], for the purpose of this Report, we define AI as "systems that use deep learning," i.e., "systems that, of the [1] machine learning technologies that use data to learn the processes that connect input and output, uses [2] functions that have a 'deep' layer."[23] Firstly, this is because the ability to express a variety of complex and non-linear input/output relationships using deep learning certainly is the key to realizing Society 5.0, a society that will be decisively different from previous societies. And secondly, because characteristics of deep learning such as it being "difficult to predict" and "difficult to explain" will give rise to governance issues that were nonexistent in previous societies.

22) There is no unified definition of AI at this time. The Cabinet Office Council for Integrated Innovation Strategy in its "Social Principles of Human-centric AI" report of 2019 quotes the definition given in the European Commission High Level Expert Group Report which says, "Artificial intelligence (AI) refers to systems that display intelligent behavior by analyzing their environment and taking actions – with some degree of autonomy," and J. Nilsson's definition, "Artificial intelligence refers to intelligent machines, [snip] and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment." The Council nonetheless maintains that these definitions are ambiguous, and concludes "We do not believe that it is appropriate at this time to make special efforts to strictly define [snip] what constitutes 'AI' or 'AI technology.'" Cabinet Office Council for Integrated Innovation Strategy "Social Principles of Human-centric AI" (2019), p. 1 https://www8.cao.go.jp/cstp/aigensoku.pdf, P.1

23) Keita Nishiyama, Yutaka Matsuo, and Keiichiro Kobayashi "Relativization of Intelligence: How Artificial Intelligence Will Change Our View of the World" (Nihon Hyoronsha, 2020) p.3. "Deep" in this context refers to using multiple functions, mutually connecting the inputs and outputs of each of these functions, connecting these into linear form, and handling these as single functions.

Column 6

Technological characteristics of AI

Machine learning technologies that derive formulas by statistically processing (learning) data were already commercially available by at least 1990. Web searches, recommendation systems, and advertising and marketing operations based on data have been highly profitable for the many Internet companies that grew dramatically in the 1990s and onward[24]. Early machine learning models were "shallow," that is, they either lacked multiple layer structures altogether or had only a small number of layers (For example, in order to forecast beverage sales (y) in a particular store, the correlations between data (feature values) such as "weather (x1)," "temperature (x2)," "humidity (x3)," and "day of week (x4)" would be investigated to arrive at formulas such as "y=ax1+bx2+cx3+dx4").

These "shallow" models of machine learning were capable of learning where relationships, such as that between x and y given above, were relatively simple. However, they were limited in expressing complex formulas for image recognition and natural language processing. In contrast to this, in deep learning, functions are embedded deeply into multiple layers making it possible to write extremely complex functions efficiently. Based on this, the technology can often make highly accurate decisions by coming up with feature values that are intuitively incomprehensible to humans (This is sometimes referred to as "autonomous" AI decision-making).

In recent years, machines have gained the ability to operate interactively according to their surrounding conditions through what is called "deep reinforcement learning" technology, or the technology to learn, through trial and error, actions that lead to favorable results under various different conditions[25].

2.3.2 Governance issues that arise from AI

(1) Difficulty of setting goals

Traditional programs were built deductively based on specifications that were defined ahead of time. Therefore, we were able to say that "correct actions" were those actions that met the requirements in the specifications. AI, however, in contrast to traditional programs, are programs that are functionally generated based on data. Therefore, it becomes difficult to define what "correct action" is[26].

24) Nishiyama, Matsuo, and Kobayashi "Relativization of Intelligence"

25) For example, traditional processes in robot control involved estimating environmental conditions using some form of observation data, plan the robot's actions, and convert this into control signals. In deep learning, however, robots carry out the sought actions by learning from data by way of a neural network that receives observation data as input and then outputs control signals.

26) For example, in the 2020 amendment of the Installment Sales Law, the previous requirement to use a standard calculation formula for reviewing allowable credit amounts to make credit decisions on credit card customers was revised to a scheme where licensed operators will be monitored based on the degree of fulfillment and other factors based on self-declared delay rates.

(2) Difficulty of making predictions and providing explanations

AI (deep learning) is a technology that is capable of making non-linear and complex decisions at high levels of precision based on data that it receives. However, because of their complexity, these technologies entail governance issues that previous machine learning technologies did not. The issue is that they are difficult to predict and explain.

Processes such as optimizing tens of thousands to hundreds of millions of parameters based on thousands to millions of pieces of sample data are typical in deep learning. And because these are configured in "deep" layers, it is difficult for humans to predict the output that might result from any particular input. Also, once a certain output is obtained, it would be difficult for humans to explain, after the fact, which of the feature values contributed and the degree to which they contributed to the output result[27]. Therefore, it becomes difficult to guarantee in advance that an AI system will meet its functional requirements (e.g., safety).

Additionally, this characteristic of AI where after-the-fact explanations are difficult to give makes it difficult to verify whether an unfavorable output (output that conflicts with the requirements), if one were to occur, was a result of the algorithm or the data entered. This characteristic entails difficult issues for assigning liability should an accident occur as a result of AI behavior.

(3) Impact on autonomous human decision-making

While there are countless pieces of information in the world, much of the information or content that we are able to access day to day as operators or consumers have all been selected by AI from out of huge amounts of information. In that, out of vast amounts of information that go beyond the limits of our cognitive abilities, AIs select information that is relevant to us, they enable us to access information that we would not have otherwise come to know and therefore enhance our autonomous decision-making.

On the other hand, the fact that information is being selected by AI means that it would be difficult to explain the rationale of these selections.

27) In contrast to this, in simple machine learning models, it is relatively easy to explain which of the feature values had an impact on the output and the nature of their impact. In simple machine learning models used to forecast beverage sales for example, because the impacts that different explanation variables such as "weather (x1)," "temperature (x2)," "humidity (x3)," and "day of week (x4)" have on sales (y) are expressed in formulas such as "y=ax1+bx2+cx3+dx4," predictions such as "Sales will be higher on days that are hotter and more humid" can be made, and for instances where sales was actually high, explanations such as "Because the day was hot and humid" can be provided.

Furthermore, we cannot rule out the possibility of data and algorithms being arbitrarily manipulated. We must examine how we should reconsider the idea of "autonomous decision-making" in a society where human decision-making is significantly impacted by information obtained through processes that are difficult to explain.

(4) Fairness and integrity

Another issue has to do with whether the decisions made by AI are fair. For example, data used as the basis of profiling performed by AI for determining lines of credit or employment in a company may include racial or gender biases[28]. Even if efforts are made to make decisions based on data that have been removed of their "race" and "gender" information, unjust past treatment stemming from race or gender may be reflected in the data through correlated factors such as educational history or past annual income.

The phenomenon of past data having an impact on decisions also occurs in human decision-making. However, when these decisions are made by AI, the rationale of these decisions are difficult to explain and this makes it difficult to determine after the fact whether any factors that should not have been considered were in fact considered. We must also keep in mind that decisions made by AI extend over a greater scope and are repeated a greater number of times than decisions made by humans, making the likelihood of these decisions having a major impact on our societies that much greater.

(5) Continuously changing algorithms

AI parameters undergo change depending on the content of data that they learn so their algorithms will continuously change after they are implemented. Taking into account the continuous changes that their

28) With regards to facial recognition technology, it has been understood since 2008 when the BPIA (Biometric Privacy Identification Act) was enacted in the state of Illinois, USA, that notification and consent is required to collect or use biometric information such as facial images, fingerprints, and retina scans. However, the fact that no societal consensus has been fully reached has become a major issue, for example, in response to lawsuits where businesses are being sued for the use of public domain data to educate their facial recognition technologies, actions which they deemed to be in compliance with existing laws.

algorithms undergo, evaluations for their governance must be monitored appropriately to enable ongoing troubleshooting after they are started up, and not only at the time of their implementation[29].

2.4 The effects of decisions made by algorithms on physical space (Actuation)

2.4.1 Effects on physical space

One of the features of Society 5.0 is that decisions made by algorithms directly affect physical space without human intervention. In the past, results from cyberspace calculations were generally passed on to humans and affected physical space through human intermediaries. In Society 5.0 however, there will be more instances where algorithms will be directly responsible for controlling objects in physical space, such as in automated driving and drone piloting, as well as in controlling power plants and manufacturing plants.

We believe that being able to have high-precision machines substitute for humans in tasks that have traditionally exposed humans to hazards, or tasks where errors in human decision can be introduced can help reduce the levels of risk for society as a whole. Meanwhile, the question of how we are to govern the decisions made by machines becomes critical because the nature of AI is such that their functions are difficult to guarantee, and if any problem was to occur, the reason for its occurrence would be difficult to explain.

2.4.2 Governance issues that arise from effects on physical space

Questions that arise from the fact that decisions made by machines without human intervention will have an effect on physical space include [1] how we are to manage the risks posed by autonomous machine decisions, and [2] who is to be held liable and what the nature of this liability will be if an accident were to occur as a result of autonomous machine decisions.

29) For example, controversy has been brewing over authentication for software as a medical device (SaMD). Since these are difficult to properly update under current review systems that are designed for medical devices as things which are presumed to provide specific levels of performance, discussions are under way on how to set up review systems for software. In Japan also, the amended Act on Securing Quality, Efficacy and Safety of Products Including Pharmaceuticals and Medical Devices provides frameworks for quicker reviews and other actions. In the US, the FDA provides mechanisms for setup authentication in this area and further improvements to these systems are hoped for going forward.

(1) Managing risks posed by autonomous machine decisions

In situations where autonomous machine decisions can have an effect not only in cyberspace, but in physical space as well, the management of risks in these situations becomes that much more critical. Although one conceivable solution would be to always have human decision makers intervene in the process of translating decisions made by machines into operations in physical space, there is no guarantee that humans will be able to make decisions based on enormous amounts of data more appropriately than AI, not to mention in automated driving settings and other split-second situations where there is no time for a human decision to intervene. For this reason, it will be important to equip autonomous machine decisions themselves with specific levels of safety instead of relying on humans for all decisions.

(2) Liability in accidents that result from autonomous machine decisions

This characteristic of AI where after-the-fact explanations are difficult to determine makes it difficult to verify whether an unfavorable output (output that conflicts with requirements), if one were to occur, was a result of the algorithm or the data entered. This makes it difficult to determine who is liable and to what degree they are liable in the event of an accident. The majority the tort liabilities in civil law (Article 709 of the Civil Code), criminal liabilities, and administrative penalties are triggered only in cases where the agent is found to be "negligent" [30]. But in accidents that result from AI behavior, which is basically difficult to predict, it would be difficult to determine the conditions under which the agent can be deemed to be negligent, and therefore difficult to determine who is to be held liable even if the cause of the accident can be determined. For this reason, we must consider whether we should revise the requirements for holding AI and other information systems legally liable, as well as the types of compensation society should provide if, hypothetically, certain instances where no liable party can be identified are expected to occur repeatedly.

30) Negligence on the part of manufacturers is not a requirement of the Product Liability Law (PL Law) and this allows plaintiffs to file suit for damage compensation solely on the basis of a product having a defect. However, "product" is defined as "any movable property that is manufactured or processed" in Article 2, Paragraph 2 of this Law and therefore, computer programs or services that are not movable do not fall under the definition of "product."

2.5 Interoperability between systems equipped with a variety of different functions (Interoperability)

2.5.1 Interoperability between systems provided by multiple actors

In CPSs, systems provided by a variety of different providers, including hardware and software for communication, operational processes, and operation monitoring, work together to run and monitor operational processes.

This setup where systems composed of hardware and software provided by different actors are interconnected and behave as a larger system is a characteristic of CPS (system-of-systems). Based on this characteristic, innovative services that combine a variety of different functions are being successively developed from CPS.

2.5.2 Issues that arise from system interoperability

(1) System interoperability, safety, and liability

As interoperability between various systems progress, phenomena that were unexpected at their design stages can occur, including interoperability causing problems between systems even if they are properly functioning systems individually, or minor changes or interruptions in a particular system amplified by other systems and resulting in widespread impacts. For this reason, we are faced with questions such as how we can ensure the overall safety of such complexly interoperating systems, and to whom and in what way relevant parties should be held liable in the event of an accident.

While it would be preferable that information regarding changes to systems that can impact other systems is disclosed sufficiently transparently in advance to administrators of interconnecting systems, and that these changes are made with their consent, it will not be easy to reach consensus and implement accountability among stakeholders with different objectives and interests.

(2) Limitations of vertically siloed regulation

As a result of system interoperability in cyberspace, horizontally oriented per-function business models now have more influence than traditional vertically oriented business models. For example, as systems focused on specific functions such as “payment” or “matching”— including payment

platforms and vacation rental platforms — emerge, traditional frameworks of "industry" such as banking and lodging are faltering, and crosscutting legislative amendments are underway accordingly[31].

Going forward, we believe this layering and function-specific orientation of businesses will continue to increase, and that instead of vertically siloed "industry regulations" that are based on traditional vertically-oriented business models, goal-based regulations will need to be introduced.

2.6 Augmentation to transcend geographical constraints and industry lines (Augmentation)

2.6.1 Augmentation in Society 5.0

In Society 5.0, large numbers of people and things will be networked, and a variety of services will be provided on these networks. Because cyberspace has no visible borders, these services can easily cross national borders. Data on people and things can be used in a diverse range of services, and business can expand their operations across industry lines.

In the following section, we discuss issues that arise from augmentation in Society 5.0 where geographical constraints and industrial sectors can be easily crossed[32].

2.6.2 Governance issues that arise from augmentation

(1) The expanding influence of individual actors

In Society 5.0, where people and things connect across borders, individual actors can potentially cause unforeseen effects by their actions.

For example, the dissemination of inaccurate information (misinformation), and the dissemination of false information for particular agendas (disinformation) have been an issue for some years. While false information existed even before the Internet, this type of information can now be disseminated over wider ranges at unprecedented speeds owing to

31) In 2017, the "Residential Accommodation Business Act" was enacted to ensure that vacation rentals are run properly. In the area of finance, a new "Financial Services Intermediary Business" category was created in the amended Act on Sales, etc. of Financial Products in June 2020 to facilitate the implementation of platforms that serve as one-stop intermediaries such as banks, securities companies and insurance companies for a wide range of financial products.
32) While many of these issues have been around since the information society (Society 4.0) when the Internet began to grow, the significance and characteristics of these issues will undergo changes in Society 5.0 where the Internet becomes the infrastructure for many aspects of our society of which our physical space is a part.

the emergence of social networking services (SNS) and the availability of functions that allow general users to disseminate information and share this information with a single click[33]. This mis/disinformation is instantly disseminated far and wide, and can become a risk to democratic systems which are supposed to operate based on a diverse range of views that are based on accurate information.

And, due to the merging of cyberspace and physical space, the impact that incorrect data has upon physical space will become that much more pronounced. Although the impact of each set of data may be small, when these are handled in aggregate, we face the potential risk of various forms of discrimination becoming amplified, or systems such as for traffic control or financial transactions experiencing serious problems from biases contained in the data.

And because the cost of designing and manufacturing hardware (devices) and software will come down, individuals will be able to easily build systems that can impact third parties, and this will be another issue for governance.

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33) It is believed that such fake news is motivated by economic and political reasons. As an economic reason, we can point to how people's interest level or attention span regarding particular information has declined as the amount of information on the net continues to grow. The degree of people's interest has economic value under this attention economy, which means that attention-grabbing content has more value than quality content. As a result, we are seeing a rapid spread of false information that is attention-grabbing but has no reliable grounds. Meanwhile, as for political reasons, we have seen multiple reports, mainly from overseas, where fake news was used for the purpose of influencing elections or other political processes.

For example, the following overseas cases are listed on page 19 of the "Final Report from the Platform Services Study Group" (2020) from the Ministry of Internal Affairs and Communications (https://www.soumu.go.jp/main_content/000668595.pdf).

- It has been reported that during the US presidential election held in December 2016, supporters of the then Republican candidate Donald Trump and foreign sources disseminated and spread false information to tarnish the reputation of the then Democratic candidate Hillary Clinton, and that this had an impact on presidential election results. One specific example was how information claiming that the Vatican released a statement announcing the Pope's support for Donald Trump spread on SNS (the content of the article was later denied by the Pope).
- In the UK, it has been reported that false information affected the referendum on the UK's exit from the EU which was held in June 2016.
- In France, during the presidential election in May 2017, the spread of false information claiming that the then presidential candidate Emmanuel Macron held "paper companies" and bank accounts in tax havens became a problem.
- In Germany, in connection with a string of terror attacks carried out by immigrants in 2016, photos showing Chancellor Merkel with immigrants who were unrelated to the incidents were used to disseminate false information suggesting that the Chancellor was associated with terrorists.
- Even if a news report is not fake, the selection of information on SNS can cause divisions in society. In other words, because in the attention economy it is more rational from an economic standpoint for platforms to display only information that is thought to be more to the liking of their users, users will gradually lose exposure to information that conflicts with their viewpoints (filter-bubble).

(2) The increasing network effect and escalation of concentration

The so-called digital platforms are the entities that take maximum advantage of cyberspace's characteristic of being able to easily cross the lines of national borders and industries.

Digital platforms have grown rapidly by providing services to consumers with various different attributes (multi-faceted markets[34]), and through the network effect[35] that is produced from these conditions. Furthermore, by analyzing the data obtained from users through their services to provide the optimal content for individual users and enhance the lock-in effect, and by leveraging their enormous market value to invest heavily in R&D and acquire innovation through the acquisition of venture companies that may potentially become their future competition, these platforms have grown into powerful mega-platforms[36]. These mega-platforms use the data they obtain on people and things in a variety of different services to operate businesses that cross national borders and industry lines[37].

Digital platforms bring dramatically improved convenience and market access to individuals and businesses, and their expansion in scale is not a bad conduct per se. That being said, risks can arise from a relatively small set of digital platform companies attaining enormous amounts of power including situations where businesses who provide services on a platform are met

34) A service is said to make up a "multi-faceted market" when it is provided to users with different attributes. For example, online malls and app stores serve two segments of users: sellers who seek to sell their products or apps on the Internet, and consumers who seek to purchase them. SNS serves users with a variety of attributes, including users who seek to post articles or exchange messages, advertisers who seek to post ads that target these users, and developers who provide apps on SNS to users.

35) This refers to the effect where the value of a network increases the larger the number of its users, and as the number of its users grows the greater the value of the network. For example, in SNS type services, the more users there are who use the same service, the more users there will be for all users to share posts and exchange messages with, and this makes the SNS more convenient for users (direct network effect). In online malls and app stores, the more users there are who purchase products, the greater the value of the network for sellers because they can expect to sell more products. For users, the more sellers there are who sell products, the greater the value of the network because they are more likely to find the products they seek or products that are lower priced (indirect network effect).

36) Headquarters for Digital Market Competition Medium- to Long-Term Outlook Report, p. 27, https://www.kantei.go.jp/jp/singi/digitalmarket/kyosokaigi/dai4/siryou3.pdf (6th Digital Market Competition Conference, 2020)

37) For example, Google gathers a broad range of data from its search engine, email service, location information service, video posting site, smart appliances and other sources to refine its AI, and provides platforms and solutions services that use AI. Facebook also provides business tools that utilize AI-based tools and APIs, and runs AR/VR businesses with the aim to build a social platform that goes beyond SNS. https://developers.facebook.com/products/

with one-sided demands from platform operators[38], or platform operators giving preferential treatment to services that they themselves provide on the platform over services provided by other businesses, or consumers having no choice but to provide private information that they would rather not provide in return for using the platform[39]. Some also point out that early acquisitions of companies that can potentially become these platforms' future competitors may stifle competition[40]. Furthermore, user data does not leave these huge digital platform companies as a result of users being locked in to these companies, and this may deny other businesses the opportunity to use this data, or make it difficult for businesses to enter various markets.

Another critical issue regarding digital platforms is the extent of liability that digital platforms themselves should be expected to bear for damage and infringements caused by platform users (privacy infringement, copyright infringement, false information, hacking, etc.)[41]. One way of looking at this problem is that, in principle, digital platforms are not liable for the actions of their users because the platforms themselves are not the agents of transactions or illegal activities, and are simply providers of "venues"[42]. However, the more dominant standpoint in recent years is that parties who profit through the administration of their networks should be held liable to

38) The "Act on Improvement of Transparency and Fairness in Trading on Specified Digital Platforms (Act 38 of 2020)" (commonly known as the Digital Platform Trading Transparency Act) was enacted in Japan in May 2020 to improve the transparency and fairness of trading carried out on digital platforms such as e-commerce malls which continue to gain widespread popularity. Based on this Act, operators who are larger than a certain scale and deemed to be specified digital platform providers are now obligated to disclose information such as on their trading terms and conditions, voluntarily prepare procedures and systems, and submit fiscal-yearly reports regarding measures they have implemented and overviews of their businesses accompanied by self-assessments..

39) Fair Trade Commission "Standpoint on Abuse of Superior Bargaining Position in Transactions between Digital Platform Operators and Consumers that Provide Personal Information, etc. from the Viewpoint of the Anti-Monopoly Act" (2019) https://www.jftc.go.jp/houdou/pressrelease/2019/dec/191217_dpfgl.html

40 Fair Trade Commission "Guidelines to Application of the Antimonopoly Act Concerning Review of Business Combination" and "Action Guidelines Concerning Review of Business Combination Procedures" (2019) https://www.jftc.go.jp/houdou/pressrelease/2019/dec/191217_kiketu.html

41) These liabilities may include the liability of an online mall where a purchaser incurs damage from a defective product purchased from a user (store owner) selling their product on the mall, or the liability of a video sharing site where TV programs or movies are uploaded without the permission of the copyright holder.

42) In practice, we see examples of laws that waive the liability of network administrators for damages with respect to content that results in privacy infringement, libel and slander, or copyright infringement. For example in Japan, the "Act on the Limitation of Liability for Damages of Specified Telecommunications Service Providers and the Right to Demand Disclosure of Identification Information of the Senders (commonly known as the 'Provider Liability Limitation Act')" places limits on the liability of network administrators including Internet connection providers and bulletin board administrators for damages caused by privacy infringement, libel and slander, or copyright infringement on the Internet, and defines the right of victims to demand the disclosure of identification information of senders. However, businesses who operate SNS sites—sites which have been spreading rapidly in recent years—often do not have information on senders, such as their names. As a result, victims that are defamed on SNS sites are forced to initiate multiple lawsuits to obtain the names and addresses of senders, and the undue burden that victims must bear has been an issue. To address this situation, reviews to amend relevant laws began in fiscal 2020 to streamline procedures so that victims are able to demand the disclosure of necessary information in a single procedure.

some extent for damage incurred by third parties as a result of connections made on the network. Efforts are underway in many countries to clarify the obligations of digital platforms as network administrators[43].

(3) The advancement of globalization

As CPS networks expand beyond national borders, CPS governance issues also spread globally. Rules that vary widely from country to country may unduly burden businesses and users, and disrupt law enforcement. Actions should be taken to organize perspectives on the application of a particular country's rules outside of its region, the formulation of global rules, and the establishment of a framework of cooperation with respect to investigation and enforcement.

2.7 Reconfiguration of systems according to changing conditions (Adaptability)

The roles of individual systems in CPS constantly undergo change and are redefined according to the status of peripheral systems and acquired data.

For example, let us hypothesize a virtual currency that is originally designed for transacting items only within a specific app. As the app begins to form connections with a variety of other services, the range of products and services that can be purchased with this virtual currency expands considerably, until it ultimately comes to perform functions that are akin to legal tender. These developments will likely bring changes to system requirements on safety and privacy, the nature of their goals, and governance mechanisms that will be needed to achieve these goals.

43) The "Act on Improvement of Transparency and Fairness in Trading on Specified Digital Platforms (Act 38 of 2020)" (commonly known as the Digital Platform Trading Transparency Act) was enacted in Japan in May 2020 to improve the transparency and fairness of trading carried out on digital platforms such as e-commerce malls which continue to gain widespread popularity. Based on this Act, operators who are larger than a certain scale and deemed to be specified digital platform providers are now obligated to disclose information such as on their trading terms and conditions, voluntarily prepare procedures and systems, and submit fiscal-yearly reports regarding measures they have implemented and overviews of their businesses accompanied by self-assessments. In the EU, the P2B Regulation (Platform Regulation) came into effect in July 2020, which prohibits platform operators from suspending or cancelling a user's account with no clear reason, or in ways that the user is unable to appeal. Furthermore, in December 2020, the EU announced two bills (the Digital Services Act Package) to regulate major IT companies: the "Digital Services Act (DSA)" and "Digital Markets Act (DMA)." Large corporations are defined as those with more than 45 million users, equivalent to 10% of the EU population, and these corporations may be subject to regulations of this Package. Furthermore, DSA obligates large SNS operators and such to expeditiously delete illegal content, and a fine of up to 6% of the company's annual sales is being proposed for breaches.

In this way, operators of these systems will be required to understand the changes occurring in external conditions, define new goals if necessary (revising required definitions), and make changes to system design accordingly, while continuing the operation of each of the individual systems.

2.8 Governance issues that arise from CPSs

In this Chapter, we have discussed the characteristics of CPSs which forms the infrastructure of Society 5.0, and the governance issues that they entail. In closing this Chapter, we summarize these characteristics in the table below from the standpoint of their impact on governance.

[Figure 2.8] Features of Society 5.0 built on the CPSs

	Society 4.0 and earlier	Society 5.0
[1] Daily life and digital technology	Physical space and cyber space are separated.	Cyber space is integrated to Physical Space and becomes an indispensable foundation of lives.
[2] Object of trust	Tangible (people, things)	Intangible (data, algorithms)
[3] Acquirable data	Limited	Greater scale, scope and variety
[4] Decision-making actor	Only Humans	Humans + AI and systems
[5] System conditions	Stable	Fluid
[6] Predictability & controllability	Relatively predictable and controllable.	More areas become unpredictable and uncontrollable.
[7] Responsible actor	Easily identified	Not easily identified
[8] Concentration of control/power	Predisposed to concentration	More predisposed to concentration
[9] Geographical relationships	Local OR global	Local AND global

[1] Information technology as a social infrastructure

Previously, the physical world and information spaces were separated, and people were able to choose the information to access and actions to take without the intervention of information technology. In Society 5.0, however, where cyberspace and physical space are integrated to make up infrastructures that have become indispensable in our daily lives, it would be unrealistic to eliminate the intervention of these information technologies.

For this reason, also from a governance perspective, discussions on

this matter must focus on how we can make use of these information technologies and moderate the adverse effects that can potentially result from their use, and not on how we can eliminate their effects.

[2] The need to establish a foundation of trust in cyberspace

Whereas people and things in physical space (including pieces of paper with information written on them) were previously considered to be the objects of trust, in Society 5.0, because data transmitted between CPSs have direct impact on physical space, the question of whether data and the actors sending data can be trusted becomes critical. For this reason, it is important that we establish social infrastructures and assessment systems that ensure the reliability of the data and actors in cyberspace.

[3] Diversification of acquirable and available data

Because the scale, scope, and variety of acquirable and available data will diversify in CPSs, risks related to privacy and security will increase accordingly. Meanwhile, this data can also be used for governance purposes, and we believe this will enable us to create governance mechanisms capable of addressing situations in real-time.

[4] Managing risks posed by autonomous decisions made by AI

Whereas previously societies were founded on the premise that people will be making all decisions, in Society 5.0, AI and other autonomous algorithms will substitute for people in making a wide range of decisions in our societal lives. And these decisions will come to have direct impact in our physical space. That being said, the mechanisms of AI are such that their actions are difficult to predict, and actions that they take are difficult to explain after the fact. For this reason, the question of how we are to manage the risks that may arise from decisions made by AI becomes a critical governance issue.

[5] Continuously changing states

The algorithms and functions of individual CPSs will constantly undergo change and be redefined according to data acquired from outside the system and changing conditions in adjoining interoperable

systems. Therefore, it will be important to conduct ongoing monitoring to deal with any problems even after they are started up, and also to review and update their required definitions in a timely manner.

[6] Difficulty of predicting and controlling results

Because the behavior of AI and other elements that make up CPS is difficult to predict, and these elements interoperate in a complex manner, it is often extremely difficult to predict and control the results produced by CPS. For this reason, we must build governance mechanisms that are based on the premise that these systems are difficult to predict and control.

[7] Difficulty of determining responsible actors

Because, as discussed above, the behavior and states of CPSs will be extremely difficult to predict or control and their behavior may basically be impossible to explain in our attempts to determine the cause of their behavior after the fact, or events may be caused by a combination of causes that involve a wide range of stakeholders, it will be difficult, before or after the fact, to determine who is to be held liable, and to what extent.

[8] Concentration of control/power

A characteristic of CPSs is that factors such as the network effect, economies of scale, and the ease with which their services can expand across industrial sectors and national borders can lead to a disproportionate concentration of data, users, and financial rewards among particular actors. Once such concentration occurs, we will see an increase in instances where the principles of free competition cease to function, and the question of how we can ensure fair competition will become a very important political issue.

[9] Connecting global and local

Previously, issues such as privacy, democracy, the implementation of conditions for fair competition, and environmental pollution belonged to the local realm, but these issues are now coming to be connected globally. For this reason, when studying the topic of governance, it will

be imperative that we cooperate in developing international rules for governance, as well as in areas such as monitoring and execution.

These changes in our societies will necessitate major changes to corporate governance, as well as to governance mechanisms for social systems such as laws and regulations, and markets. That being said, before we begin any discussion on an ideal model of governance, we must first examine what it is that we seek to achieve through governance. In the following Chapter, we will be discussing the "goals of governance."

Chapter 3

Goals of governance in Society 5.0

In this Chapter we discuss the goals that we should seek to achieve in Society 5.0. As we discussed in Chapter 2, the features of Society 5.0, such as its ever-changing social conditions, the difficulty of predicting and controlling results, and the difficulty of identifying responsible parties, will pose difficulties for governance models that are based on the idea that "the objectives of governance can be accomplished by defining certain rules and procedures in advance, and by complying with these rules and procedures." Instead of traditional models such as these, it will be key in Society 5.0 to take approaches where goals are shared among stakeholders, and methods of governance that are flexible and adaptable to changing circumstances are implemented to achieve these goals.

The "goals" in this Report is a broad concept of values to be achieved through governance, which may include "mission", "vision", "value", "purpose", or "objective" depending on the context. These goals can be considered to have several layers. To begin with, we can envision upper level governance goals—something that we might refer to as "Ultimate Goals"—that are, and will likely continue to be, generally shared by a large number of stakeholders.

Next, from the perspective of achieving our Ultimate Goals, we can envision intermediate levels, such as "Core Values" and "Fundamental Institutions" which—regardless of the fact that the importance of preserving and developing these levels is recognized and shared by all stakeholders—may be prone to differences in interpretation or understanding as a result of shifts in social conditions or technological prerequisites, potentially resulting in considerable fluidity to their conceptual substance.

Finally, we can envision low level "Practical Goals" that will be defined by different stakeholders to achieve the aforementioned higher level goals. Goals at this level will necessarily be couched in controversy because the breadth of interpretations of Core Values and Fundamental Institutions, as well as changes to the available technological options can result in the

creation of a variety of different goals. As such, in this Chapter we also discuss matters that were the subject of discussion at the Study Group as factors that must be considered in defining goals as "specific targets."

Naturally, when we take into account the characteristic of CPSs, that is, the ever-changing states of our societies, these hierarchical structures themselves will undergo dynamic changes through the activities of various stakeholders, and there is no doubt that, precisely for this reason, governance will carry that much more significance. That being said, from the standpoint of conceptualizing goal-based governance, we believe there is certain value in having discussions on goals we envision at least at our current stage and attempting to present ideas on the nature of their structures.

In this Chapter, we would like to present an overview of the goals of governance in Society 5.0 based on the issue awareness discussed above.

3.1 "Goals" in Society 5.0

3.1.1 Happiness as a universal "Ultimate Goal"

The achievement of human happiness—the underlying philosophy of governance that has been transmitted from ancient times[44] to the modern era[45]—is expected to remain unchanged and continue to be shared among all peoples in Society 5.0. In this sense, happiness can be positioned as an Ultimate Goal in Society 5.0 as well.

3.1.2 "Liberty" as an Ultimate Goal of governance in Society 5.0.

"Liberty" is also expected to continue to exist as an Ultimate Goal of governance. That being said, novel nuances will enter into its meaning.

In traditional models of governance, the focus has been on "negative liberty" or the guaranteeing of liberty from external interference. We can say that the presumption here is that there is a deep connection between "happiness" and "negative liberty" where happiness is achieved precisely because people with diverse values are able to live as they choose.

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44) See page 20, "Nicomachean Ethics, Volume 1" Aristotle, translated by Saburo Takada (Iwanami Shoten, 1971).
45) Article 13 of the Constitution of Japan defines the pursuit of happiness as the supreme consideration in legislation and other governmental affairs.
46) Richard H. Thaler, and Cass R Sunstein "Nudge: Improving Decisions About Health, Wealth and Happiness" (Yale University Press, 2008)

However, when we take into account the advancements in CPS, we see that it is becoming increasingly unrealistic to live our lives independently of technological influence. It is also becoming clear that appropriate influence from outside sources can open up even more possibilities for people to achieve happiness[46]. In other words, we cannot deny the possibility that situations may become more frequent where happiness is achieved not through the intervention of an individual's conscious decision, but by means of digital technology. In a society such as this, it would no longer be appropriate to define the achievement of liberty and autonomy in the negative sense as the sole Ultimate Goal.

Needless to say, this does not mean that liberty will cease to be an Ultimate Goal of governance in Society 5.0. The meaning of "liberty," however, will need to be reinterpreted. The word "liberty" in Society 5.0 should be used to also mean a state where we are able to proactively choose, based on our individual values, the nature of technological influences under which we choose to pursue our happiness. And we believe that the creation of precisely this type liberty should be positioned as an Ultimate Goal of Society 5.0.

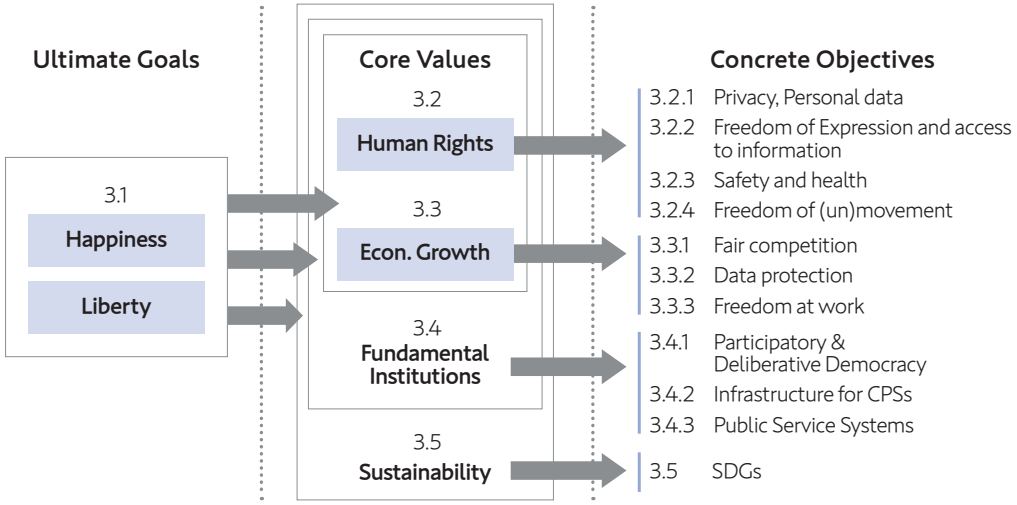
3.1.3 Ultimate Goals, and the Core Values and Fundamental Institutions in Society 5.0

As discussed above, even if the Ultimate Goals of governance in Society 5.0 can be understood to be the realization of happiness and liberty, these ideas are too abstract for envisioning concrete mechanisms of governance. Therefore, we would like to illustrate by example the Core Values and Fundamental Institutions that must be referenced for envisioning concrete governance mechanisms for realizing happiness and liberty, and the Practical Goals that derive from these Core Values and Fundamental Institutions.

In this Chapter, we methodically discuss the elements that make up the Core Values from the perspectives of the guarantee of basic human rights and economic growth (and the realization of free and fair markets for it), and discuss the institutions that are closely related with realizing these Core Values as Fundamental Institutions and present them alongside the related Practical Goals. In doing so, we also discuss the changes that the interpretation and understanding of Core Values and Fundamental Institutions are undergoing in Society 5.0, and the different variations of Practical Goals that arise from these changes.

In 3.2, we discuss privacy, freedom of expression/freedom of access to information, life/physical safety and health, and freedom of movement as basic human rights that make up the Core Values that are particularly important in Society 5.0. In 3.3, we discuss and examine fair trading environments, data protection, freedom of workstyles and availability of educational opportunities which are the Core Values that will be needed to realize free and fair markets in Society 5.0. In 3.4, we discuss the Fundamental Institutions that are closely related to these Core Values, i.e., participatory deliberative democracy, CPS infrastructures, and access to public services. In addition to the above, in 3.5, we also touch on the realization of sustainability related to the preservation and development of the above-mentioned Core Values and Fundamental Institutions. The schematic below shows the relationships between these ideas.

[Figure 3.1.3] Overview of goals discussed in this Chapter



3.2 Basic human rights as a Core Value

3.2.1 Privacy and personal information

The Core Value of privacy has traditionally been discussed in terms of the proper handling of information about oneself[47]. However, in addition to this, in CPS-based Society 5.0, privacy should be re-interpreted through different approaches, such as “the right to have data administrators and users effectively perform objective and proper management of personal data” or

47) Otonashi Tomohiro "Reconfiguration of the Right to Privacy: From the Right to Control Personal Information to the Right to Proper Handling of Personal Information" (Kyoto University, 2020)

"the right to be provided with proper information and choices so that one is able to give effective consent to the use of one's privacy information[48]." On this topic, discussions were carried out on the probability that stakeholders may define goals in the form of Practical Goals, for example, by taking into account factors such as the following.

(Example of factors to consider with respect to privacy in Society 5.0)

[1] Expansion of privacy rights by means of digital technology

People can now use SNS and other services to post their personality (persona) as they want to be seen, so it may be advisable to promote the use of digital technology that is aimed at enhancing the influence that information on our persona has.

[2] Expansion of the right to pursue happiness using personal data

It may be advisable to promote the use of personal data for the purpose of increasing the possibilities in people's pursuit of happiness, such as through novel credit scoring methods based on personal data which, unlike traditional one-size-fits-all approaches, allow individuals to obtain creditworthiness based on their personal history of actions and other attributes.

[3] Risks to equality from the use of personal data

Our pursuit of liberty and fundamental equality might be at risk of being violated as a result of profiling and inappropriate use of personal data that is gathered.

[4] Limitations of personal consent-based models

It is rare for an individual to carefully peruse the fine print of the terms of use and privacy policies, and therefore it is implausible to assume that they fully understand how their data is being handled. Meanwhile, requiring individual consent from individuals, even in cases, for example,

48) As an example of [1], models already exist where businesses—who are bound by requirements that are stricter for certain personal information than those prescribed in the Act on the Protection of Personal Information—are responsible for conducting reviews associated with certain use of data. With regard to [2], the right to be able to freely transfer one's personal information (data mobility), and the right to have one's personal data erased (right to be forgotten) have also been cited as important examples of rights.

where the use of their data serves the public interest and the risk of causing disadvantage to the person is minor, may not only be excessive as a form of privacy protection, but may actually hinder innovation. Therefore, it may be insufficient to have only one legal system centered on personal consent.

[5] Whether or not people actually have the right to choose to consent

There might be cases where individuals essentially have no choice but to provide consent to privacy policies prescribed by platform services and other services that function as CPS infrastructures.

3.2.2 Freedom of expression and the right to access information

While freedom of expression, a Core Value, has traditionally been understood to be an inviolable right, in Society 5.0, this should be understood to be the right to realize the dissemination of information through proper use of the Internet, platform services such as SNS, and devices such as smartphones. "The right to know," which is a premise to the above, should be understood not only as the right to not be prevented from freely gathering information, but also as the right to access important and accurate information. Based on these perspectives, the points we might consider in defining Practical Goals associated with freedom of expression and the right to know include the following.

(Example of factors to consider with respect to freedom of expression, the right to know in Society 5.0)

[1] Augmentation of freedom of expression through digital technology

Platform services such as SNS, which allow everyone to easily post and share content, serve to dramatically improve freedom of expression and the right to know in cyberspace. So, in principle, it may be advisable to minimize intervention to these services.

[2] Augmentation of and restrictions to freedom of expression through digital platforms

Intervention made by platform operators as a countermeasure against copyright infringement, defamation, or hate speech might pose a major problem for freedom of expression, regardless of whether the intervention is excessive or too limited. While platform operators' voluntary, technology-based measures for ensuring the appropriateness of content should be honored, it may be advisable to have them held accountable through the availability of user appeal processes, fair dispute resolution, and transparency with respect to deletion of content.

[3] Excessive screening of information

The filter bubble phenomenon caused by the excessive customization of information is a threat to our essential right to know and our other goals such as democracy and fair competition. As such, it may be advisable that we discuss appropriate regulatory measures for ensuring that people are able to come into contact with an accurate and diverse range of information.

[4] The balance between secrecy of communications and pursuit of personal happiness

Although ensuring secrecy of communications[49] is key for preserving the Internet as a space for free and open speech, and also as an infrastructure for economic activities and innovation, perfunctory adherence to this principle may be insufficient for preventing certain situations and may actually be an obstruction to the pursuit of happiness such as in situations where parties disseminate content that infringes on others' rights.

3.2.3 Life, physical safety and health

The realization of life and physical safety, a Core Value that forms the basis for our pursuit of personal dignity and happiness, may be greatly enhanced through digital technology. Meanwhile, containing the risk of digital technology at an appropriate level is also important for ensuring life and physical safety in Society 5.0. Factors we might consider in defining Practical

49) For the purpose of ensuring cyber security and network neutrality, as well as for dealing with child pornography and sites selling pirated products, discussions are underway on the secrecy of communications such as on how, under whose responsibility, and under what circumstances communications can be restricted or shut off, including how conflicting legally protected interests can be coordinated.

Goals for realizing "life, physical safety and health," a Core Value, include the following.

(Example of factors to consider with respect to life, physical safety, and health in Society 5.0)

[1] High levels of safety realized through automation

The widespread implementation of autonomous driving and autopilots is likely to afford us the possibility to benefit from high levels of safety without being affected by the driver's or other operator's condition.

[2] Machine substitutions for hazardous tasks

With respect to inspections performed on infrastructure, factories and other facilities, the use of sensors to capture data and perform real-time inspections in place of human visual inspections is likely to help us eliminate physical hazards for inspectors and improve inspection precision.

[3] Enhancing our health using digital technology

Online medical care, medication guidance, and AI-based diagnostic imaging are expected to support our fight against illnesses that threaten our lives and physical health. In light of the fact that data collected from physical space and their analysis are playing a major role in controlling the spread of COVID-19 cases, it may be advisable that we make active use of digital technologies in countermeasures against other epidemics as well.

[4] The need for appropriate risk management

In systems that are directly related to our life and physical health, any malfunction in any of the stages consisting of sensors, communication, and data analysis can result in great damage to our happiness. As such, it will be important to contain risks under an appropriate level in our efforts to maximize the benefits to life and physical health.

3.2.4 Freedom of movement

Freedom of movement, a Core Value, has traditionally been understood to be the negative right of not being prevented from moving about freely in physical space. In Society 5.0, where cyberspace and physical space are merged, this right should be extended to the right of persons in locations separated by large distances to have personal interactions through digital technology without the need to physically travel. Factors we might consider in defining Practical Goals related to freedom of movement include the following.

(Example of factors to consider with respect to freedom of movement in Society 5.0)

[1] Realizing freedom of movement with MaaS

Local public transportation services have become difficult to maintain due to declining birthrates, the aging population, depopulation in rural areas, and the decrease in mobility due to the COVID-19 outbreak. And this has become an issue especially for the elderly and other demographic segments in their pursuit of happiness. Maas (Mobility as a Service)—a service that uses digital technology to match up mobility demand and supply in real-time to enable users to seamlessly use multiple means of transportation, including public transport systems, on-demand buses, car sharing, and eventually autonomously driving vehicles—may be just what we need to realize freedom of movement[50].

[2] Ensuring the "freedom not to move"

In addition to teleworking, which has become a popular mode of working in response to the COVID-19 outbreak, the fusion of 5G/6G with VR/AR technologies will enable people to have personal interactions between locations that are separated by large distances without the need to physically travel. From the perspective of realizing the pursuit of happiness, and in light of these technologies, it may be advisable that we revise regulations that presuppose face-to-face

50) MaaS Alliance "White Paper"(2017) https://maas-alliance.eu/wp-content/uploads/sites/7/2017/09/MaaS-WhitePaper_final_040917-2.pdf

meetings and the use of hard-copy documents[51], and set up an environment where individuals are able to independently decide whether or not to travel. And, in order to achieve this, it may be advisable that we examine the reliability of communication in remote areas and how we can ensure network security.

3.3 Core Values that support economic growth

3.3.1 Fair trading environments

In the digital society, there is a tendency for a relatively small number of digital platform companies to grow to a huge size owing to the network effect and accumulation of data. While there is no problem with the scale-wise expansion of companies per se, the question of how to realize the Core Value of ensuring fairness in trading between businesses[52] and consumers—the users of these digital platforms—becomes important given that these platforms function as de facto infrastructures[53]. For this reason, the following points should particularly be kept in mind when defining Practical Goals.

(Example of factors to consider with respect to fair trading environments in Society 5.0)

[1] Value created through digital platforms

Services provided free of charge by platforms create large amounts of value. For example, free video platforms provide useful content to viewers, and the many free web services have positive effects on education and business. In formulating policies for competition, it may be advisable that we conduct fair assessments of the positive effects that these platforms have on society.

51) Regulatory Reform Promotion Council "Regulations and Institutions in the Digital Era" (2004), p.4 https://www8.cao.go.jp/kisei-kaikaku/kisei/publication/opinion/200622honkaigi01.pdf

52) In their study "Real-World Study on the Trading Practices and such of Digital Platformers (B2B trading on online malls and app stores)," the Fair Trade Commission conducted studies on the competition environment of participating businesses and evaluations relating to competition policies, based on which the Commission seeks to improve the interests of consumers.

53) For example, users who post videos on video platforms have essentially no bargaining power to negotiate the advertisement fees set by the platform, and the same applies to meal delivery persons who have no bargaining power to negotiate the delivery fees set by the meal delivery platform. And these platform companies come to possess extremely personal information on consumers' preferences on video content and food.

[2] Ensuring transparency

In many cases, the mechanisms that underlie the algorithms used in services provided by digital platforms, how they handle user data, and the risks associated with using their services are not clearly understood by the users. In establishing a fair trading environment between platforms and their users, it is advisable that we ensure the transparency of these services and transactions.

[3] Ensuring the availability of options for choosing appropriate levels of quality and quantity

In order to ensure a fair trading environment, it is necessary to not only ensure transparency, but also to ensure that users have option to choose the right levels of quality and quantity. For this reason, it is likely to be important to provide data portability to allow users to move their data to other platforms, as well as establish an environment that gives users more flexibility in customizing their terms of service use.

3.3.2 Data protection

The sources of wealth are shifting from tangible assets, such as supplies and factories, to intangible assets, such as knowledge and information. Data, which makes up these intangible assets, have features that are vastly different from those of tangible assets. So in order to grow economies centered on data, we will need mechanisms for protecting data based on an understanding of how their features differ from those of tangible assets. Factors we might consider in defining Practical Goals for realizing data protection, which is a Core Value, include the following.

(Example of factors to consider with respect to data protection in Society 5.0)

Data differs significantly from tangible assets in that it can be replicated inexpensively with no degradation to its quality. In other words, while data can generate great wealth if it is exclusively possessed, it provides great positive externalities for society if made public. Therefore, it may be advisable to promote trust-based data sharing by various stakeholders (Data Free Flow with Trust), and design data protection schemes that enable their utility to spread throughout society.

3.3.3 Ensuring freedom of workstyles and educational opportunities

Digital technology has also brought a diverse range of options to the way people work. While people can now make a living as "gig workers"—people who receive orders for one-off jobs on the Internet without belonging to a specific company or being restricted by geography—it has also been pointed out that unemployment or cases where people have difficulty finding employment may increase as machines replace humans in more and more tasks that humans have traditionally performed[54]. Given such an environment, substantially ensuring the freedom of people to choose their occupations, and enabling them to lead a free and flexible life are extremely important Core Values for the pursuit of happiness. Points we might consider in studying the Practical Goals for achieving this include the following.

(Example of factors to consider with respect to freedom of work style and educational opportunities in Society 5.0)

[1] The rights of gig workers

Working as a gig worker expands the freedom of choice of occupation and enables people to lead a free and flexible life. On the other hand, people engaged in such work are generally not entitled to workers' compensation, social security, or retirement packages, etc., and they may also be faced with intense competition. Furthermore, contract terms are often unilaterally defined by the ordering party or platform. Therefore, it would be advisable that we look into establishing social systems that enable people to lead economically stable lives while respecting the freedom of individual working styles[55].

[2] Ensuring educational opportunities for workers

While the mechanization of various operations in Society 5.0 can cause unemployment or make it difficult for people to find employment[56],

54) https://www.imf.org/ja/News/Articles/2019/10/09/blog-widening-gaps-regional-inequality-within-advanced-economies{j} https://www.imf.org/external/japanese/np/blog/2018/050118j.pdf

55) See Fair Trade Commission etc. "Guidelines for Establishing an Environment where Freelancer's Are Able to Work with a Sense of Security" (2021) https://www.meti.go.jp/english/press/2021/0326_003.html
[Note: The public is invited to send in their comments until Jan 25, 2021]

56) International Monetary Fund (IMF) "Widening Gaps: Regional Inequality within Advanced Economies" (2019) https://www.imf.org/ja/News/Articles/2019/10/09/blog-widening-gaps-regional-inequality- within-advanced-economies Adrian Peralta-Alva, Agustin Roitman "Technology and the Future of Work" (2018, IMF) https://www.imf.org/external/japanese/np/blog/2018/050118j.pdf

new occupations will also be created. That being said, a prerequisite of most of these new occupations will likely be that people have a certain degree of training associated with CPSs. Going forward, it is likely to become exceedingly important for workers to continue learning about these fast-changing CPSs. So it would be important to build mechanisms and environments that enable all people to learn the necessary skills.

Column 7

Advancements in the horizontal division of labor in Society 5.0

Advancements in information and communication technologies have reduced the costs of communication. This has facilitated communication and information exchange between companies as well as between individuals separated by physical distance. Standardization has been advancing globally in the area of industrial production as well. These developments have made it easier for businesses to outsource the functions that they previously relied on in-house resources for[57]. It is no longer uncommon for companies to outsource their general affairs and accounting operations altogether.

On the other hand, there are also companies who have their own production departments which enable them to make continuous upgrades, and information companies who have their own information departments for accumulating their know-how in-house. The key here is that the departments that constitute the core of the value creation that these companies provide will remain in-house and the rest will be outsourced. These moves will accelerate with further advancements in information and communication technology. Departments that do not make up the core of the value creation that companies offer will be split off at an accelerating rate, and the traditional idea of "outsourcing" will begin to lose its meaning. This means that we will no longer find people who create value and those who do not in the same company. Income inequality will widen in society as a whole.

Additionally, individuals who gain recognition on par with major corporations through SNS will be able to more easily run small businesses by making full use of this horizontal division of labor. We may see the era of "influential individuals," rather than the era of "individuals," progressing even further. Tools such as artificial intelligence pricing and data-based marketing, that are currently in the limelight, may become commoditized in the future and we may see a rising number of small businesses developing highly profitable services by making full use of these tools. Individuals who are able to combine and make full use of technologies—not only those who actually develop these technologies—and have the ability to attract attention are likely to see their market value grow significantly.

57) An example of this would be Apple who designs and sells their products themselves, and outsources their production.

3.4 Fundamental Institutions in Society 5.0

3.4.1 Participatory deliberative democracy

Digital technology may help enrich democracy, the bedrock of our societies. Traditionally, due to limitations in our means of transmitting information, political decisions have been made by majority vote based on simple voting systems, or through lobbying by corporations, industry groups, and citizens' groups. But through the use of digital technology, we may be able to create democratic systems in which a diverse range of citizens are able to participate; systems that are based on dialogs (deliberations) that have more legitimacy and are more self-reflective. Factors we might consider in defining Practical Goals for creating participatory deliberative democracy as a Fundamental Institution include the following.

(Example of factors to consider with respect to realizing democratic systems for Society 5.0)

[1] Creating democratic systems that utilize digital technology

Through the use of methods such as online discussions and AI or other technologies to identify information that we need to make our decisions, we may be able to create participatory deliberative democratic systems that are more substantive[58]. We may also be able to increase citizens' motivation to participate in politics, for example, by introducing weighted voting to increase the weight of their decisions on issues that are of high interest to them.

[2] The risks that digital technologies entail for democratic systems

Under advertising models that place a premium on the number of clicks that content receives, information is customized according to individuals' interests and concerns (filter bubble). What this means is that people with a particular idea are provided with only information that is supportive of that idea, and this may cause collective political polarization. On top of this, the possibility of information being compromised by inaccurate information (misinformation), or false information aimed at achieving particular agendas (disinformation) is

58) Masaki Taniguchi and George Shishido "Digital Democracy is Coming" (Chuokoron-Shinsha, 2020), p. 113

also a potential risk.

3.4.2 CPS infrastructure

In Society 5.0, where many different systems interoperate to provide solutions to social issues, public infrastructures including not only hardware but also software, such as ID infrastructures, personal authentication infrastructures, payment systems, and city OSs will all become indispensable Fundamental Institutions. Factors we might consider in defining Practical Goals for realizing our Fundamental Institutions, or CPS infrastructures, include the following.

(Example of factors to consider with respect to providing infrastructures in Society 5.0)

[1] Defining cooperative and competitive areas

While there is the idea that the operation of infrastructures of a highly public nature should be left to public agencies, there are instances where efficiency can be improved by relying on free competition in the private sector. In building infrastructures for CPS, we should perhaps incorporate in our designs the distinction of which functions to include in cooperative areas, and which areas to include in competitive areas with the aim of supporting the pursuit of individual happiness under conditions such as urbanization, aging populations, and population decline.

[2] Setting goals to be achieved by infrastructures

Infrastructures in CPS will likely need to achieve a variety of different goals concurrently, such as improving economic efficiency over the long run by taking into account life cycle costs, caring for the environment, ensuring resilience against natural disasters and cyber-attacks, and ensuring inclusiveness[59].

3.4.3 Enhanced access to public services

Public service systems that can be efficiently accessed through CPSs are also important Fundamental Institutions for achieving personal

59) G20 Principles for Quality Infrastructure Investment (2019) http://www.mof.gov.cn/en/Cooperation/mulid/202011/P020201104580715919242.pdf

happiness[60]. In order to improve access to government services, it is desirable to aim for fundamental reforms that allow governments to proactively listen to the needs of citizens, and enable citizens to receive various government services online or in a one-stop setting[61]. The following points should be considered in defining the Practical Goals for creating such public service systems.

(Example of factors to consider with respect to better access to public services in Society 5.0)

[1] Using cutting-edge technology in government services

We believe that, through the use of mechanisms such as smart contracts with the prerequisite that system transparency and provider accountability are ensured, we should design government services that make use of state-of-the-art technologies such as mechanisms that make integrated use of personal data and bank account information associated with personal identification numbers to provide government services efficiently to persons who meet specific criteria[62].

[2] Reforming the governance systems of government services

In designing electronic public services such as described above, it will likely be necessary to upgrade laws and regulations, systems, and service provision practices, organize ordinances that have been defined on a region-to-region basis, and also carry out reforms of entire governance systems that involve the standardization of national and local government systems.

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60) Some estimates report that, if the cost reduction targets for administrative procedures are achieved, the national government will save an estimated 73.15 million hours (186 billion yen), and local municipalities will save 197.28 million hours (501.7 billion yen), with a direct impact of 1.3 trillion yen on GDP. Mikio Mizobata "How Much Productivity Will Increase from Regulatory and Administrative Reforms" (Daiwa Institute of Research, 2018) https://www.dir.co.jp/report/research/economics/japan/20180723_030007.pdf

61) As a premise of fundamental reform, in July 2020, the Minister of State for IT Policy, Minister of State for Regulatory Reform, major private economic organizations, and other organizations jointly announced their declaration “Rebuilding administrative procedures and business formats through the aggressive utilization of digital technologies” which aims to fundamentally reform the institutions, practices, and mindsets based on the “hard-copy documents, seals, and face-to-face meetings” principle to move forward with significant reforms to laws and regulations regarding hard-copy documents, seals, and face-to-face meetings.

62) India introduced its Aadhaar system in 2009. Aadhaar is a biometric ID system of the Unique Identification Authority of India (UIDAI) which is in charge of the gathering and management of the names, addresses, biometric and other information of citizens. Each citizen registered in the system receives a 12-digit numerical ID, and by using this ID, they can receive social security at public agencies efficiently and provide proof of identity when opening bank accounts.

3.5 Creating sustainable societies

The risks posed by the natural world to humankind are increasing year by year, what with pandemics such as the COVID-19 outbreak, global climate change, natural disasters such as earthquakes and typhoons, and resource depletion. Many of these natural threats are thought to be triggered or propagated by the effects of human activity[63]. Therefore, the nature should be understood not as an environment that is contra-positioned outside of our societies, but as an environment that interacts with our societies and that humans must take action to ensure a sustainable world where we are able to coexist with the natural environment over the long term.

As part of international cooperation efforts being carried out to achieve a sustainable environment, the United Nations has defined a set of 17 Sustainable Development Goals (SDGs) in 2015. (See illustration below).

[Figure 3.5] The 17 SDGs

(Source: United Nations website)

Achieving these goals is made that much more difficult by the fact that these are societal issues, none of which can be resolved in isolation, and that numerous issues are in trade-off relationships with other issues[64]. For example, Zero Hunger (Goal 2) may lead to ecosystem destruction, and may conflict with goals such as Life Below Water (Goal 14) and Life on Land (Goal 15). Decent Work and Economic Growth (Goal 8) may conflict with

63) The idea of an "Anthropocene" epoch is also being proposed as a new geological epoch in which humankind has come to have a major impact on the Earth's ecosystems and climate.
64) These conflicting relationships are particularly marked between goals associated with happiness, or SDGs 1 thru 9 and 11, and goals deeply related to environmental preservation and public interest, or SDGs 10 and 12 thru 17.

Climate Action (Goal 13). Whatever the case may be, attempts to improve these global issues on an individual basis will not be effective, and we will need a comprehensive approach that transcends regional and interdisciplinary boundaries. Factors we might consider in achieving these complex goals which cut across a variety of different layers include the following.

(Example of factors to consider with respect to the formation of sustainable societies in Society 5.0)

In order to achieve multiple different SDGs concurrently, we will likely need to carry out the following actions on a global scale: Set goals and adjust conflicting goals, define indicators to enable measurements, perform environmental monitoring based on real-time data, share information on technologies and test results that help achieve these goals, and revise our goals and the means for achieving them based on these results.

3.6 Summary of the goals of Society 5.0

In Chapter 3, we examined the goals for governance to achieve.

While we may use the word “goals” for governance as somewhat of a cover-all term, they actually involve some layers. There is agreement on the importance of Ultimate Goals such as happiness and liberty, which can be universally shared and are highly abstract at the same time, as well as the importance of basic human rights and democracy, but there can be some breadth and fluidity in the interpretation and understanding of Core Values and Fundamental Institutions. Furthermore, Practical Goals may be approached by a variety of different approaches depending on the stakeholder. And all of this potentially makes for a diversity of different layers.

Moreover, we have also shown that these goals cannot exist independently of technological developments and the changes in social conditions that they bring about, and that they may undergo constant change under the influence of these factors. For example, while "liberty" should continue to be positioned as an Ultimate Goal of governance, the truth is that liberty is expanding beyond traditional "negative liberty" and is

shifting into an idea that encompasses a "state where we are able to proactively choose, based on our individual values, the nature of technological influences under which we choose to pursue our happiness" (3.1).

Based on the above understanding, we summarized, particularly in 3.2 and later of this Chapter, the Core Values and Fundamental Institutions that provide critical indicators for designing specific governance mechanisms, and also discussed their associated Practical Goals.

As we have discussed in this Chapter, the goals themselves can be interpreted and understood in a variety of different ways, and essentially all individual systems have multiple goals which in many cases may be in trade-off relationships with other goals (For example, it is plausible to think that improving the transparency of systems that handle private information will generally increase the risk to privacy).

Given this state of affairs, in the following Chapter, we examine how we might redesign mechanisms of governance for corporations, laws, infrastructures, markets, and citizen participation in ways that will enable us to constantly revise goals that are ever-changing and may invite controversy in the process of their realization, and achieve multiple conflicting goals on an ongoing basis while constantly pursuing optimal trade-off solutions for these goals.

Chapter 4

Designing and Implementing Agile Governance

4.1 General discussion: The idea of agile governance and its general principles

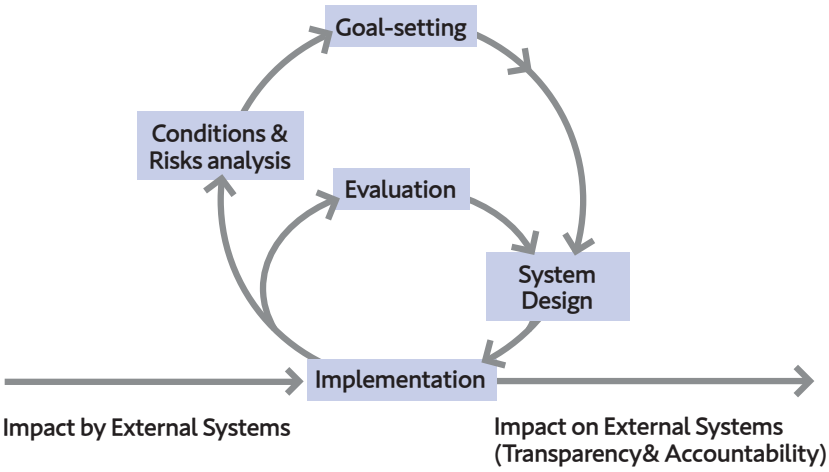
4.1.1 The underlying idea of agile governance

Society 5.0 which is based on cyber-physical systems (CPS) will undergo changes in a complex and rapid manner, making it difficult to predict and control (Chapter 2). The governing of such societies will require approaches in which certain goals are shared among stakeholders and, to achieve these goals, methods of governance that are flexible and adaptable to changing circumstances need to be implemented, as opposed to approaches where detailed rules and procedures are strictly defined in advance. That being said, these "goals" themselves will constantly continue to change along with changes in technologies and societies, and therefore cannot be defined unequivocally in advance. (Chapter 3).

In light of these changes that societies will undergo, the governance model for Society 5.0 must be one where solutions are constantly revised to ensure their optimality based on constantly changing conditions and goals. For this reason, we do not believe it would be appropriate to apply models of governance whose goals and procedures are fixed in advance. The models of governance we should pursue for our various social systems are those that are designed to continuously and rapidly run cycles of "analysis of conditions and risks," "goal setting," "system design," "implementations," "evaluation," and "improvements." In this Report, we refer to this type of governance model as "agile governance[65]." Shown below is a schematic of this idea.

65) The term "agile" derives from a word that describes an approach of software development where development, coupled with ongoing verification, is carried out agilely and flexibly based on the premise that system requirements and specifications will undergo change as opposed to being fixed in advance. "Agile governance" refers to governance mechanisms that apply this approach. World Economic Forum White Paper "Agile Governance: Reimagining Policy-making in the Fourth Industrial Revolution WEF White Paper" (2018) http://www3.weforum.org/docs/WEF_Agile_Governance_Reimagining_Policy-making_4IR_report.pdf

[Figure 4.1.1] The underlying idea of agile governance



This governance model has the following characteristics.

[1] Analysis of conditions and risks

As we mention in Chapter 2, Society 5.0 systems are affected by constant changes that occur in peripheral conditions (not only changes in our physical conditions, but also changes to rules, market conditions, and other conditions). Therefore, the governing actor should constantly analyze these external conditions, changes to these conditions, and the risk landscapes that result from these conditions.

[2] Goal setting

As we mention in Chapter 3, "goals" will constantly change in Society 5.0 as a result of changing conditions, including changing technologies. For this reason, the governance goals themselves should be constantly revised in accordance with the changes in external conditions and the impact of technology (Note that changes in external conditions do not necessarily result in changes to goals).

[3] Designing governance systems

Governing actors design governance systems based on the defined goals. Systems in this context include not only technological systems, but organizational systems and their applicable rules as well. They must be designed to be fit for the purposes of the goals defined in Chapter 3.

Based on the discussions given in Chapter 3, we believe the basic principles that must be upheld when designing governance systems are (i) transparency and accountability, (ii) availability of appropriate quality and quantity of options, (iii) stakeholder participation, (iv) inclusiveness, (v) appropriate allocation of responsibilities, and (vi) availability of remedial measures.

(i) Transparency and accountability

In order for the stakeholders of a system to understand how they are being impacted by the system, it is imperative that the providers of these systems properly disclose information on the goals of the system they operate, the system designs employed to achieve these goals, the positive impacts and risks that can result, their operational setup, the operational outcomes, and remedial measures among other matters.

System providers in this context include not only private businesses, but a diverse range of actors including governments, organizations, and individuals. Explanations must be provided in a clear and easy-to-understand way to ensure that stakeholders are able to correctly understand the impacts of the system. In other words, accountability must be ensured through approaches that facilitate understanding with the use of simulations and/or videos, and not by disclosing lengthy terms of service or fragments of source code that are difficult to decipher.

(ii) Ensuring the availability of options for choosing appropriate levels of quality and quantity

In order for individuals to make decisions on the types of technological influences that they choose to pursue their happiness under, they must be able to choose from among appropriate options of quality and quantity to begin with. However, as mentioned in Chapter 2, control and power can more easily become concentrated in CPS- based societies, and there is a tendency for the options of available systems to become limited. For this reason, fair competition environments will be needed to ensure the availability of various options in the market. In situations where particular services are nevertheless provided exclusively by a single actor, it is important that users are given multiple options within these services, or user participation is enhanced in technical designs as described below.

(iii) Multiple stakeholders participating in system design

The question of what type of technological influences for people to live under will serve their pursuit of happiness, by its nature, has no unambiguous answer. Moreover, it is commonplace in pluralistic democratic societies for multiple reasonable opinions to be opposed to each other. Given these circumstances, in order to achieve the Ultimate Goal of realizing people's happiness and liberty, it is imperative to have participation from a diverse range of individuals in system design associated with digital technologies and, based on this premise, collaboration between stakeholders with pluralistic values. We can therefore say that, in order to realize liberty in Society 5.0, it is imperative that we implement mechanisms that allow people to experimentally and reflectively explore the ideal shape of their pursuit of happiness through democratic deliberation while keeping pace with technological advancements and changes in our views of what it means to be human. From this perspective, it is important that we develop mechanisms that allow us to discuss the ideal shape of technological system design based on actual participation from a diverse range of stakeholders in the initial design stages of all systems—systems that regulate the cognitive and behavioral options in our lives—as well as in times when these systems experience any problems.

(iv) Inclusiveness

In order for everyone to be able to pursue happiness based on CPSs, even those who are not familiar with digital technology need to be able to use the system properly and discern its risks. For this reason, it is important to ensure system inclusiveness and to create a society where no one is left behind.

(v) Appropriate allocation of responsibilities

In order to ensure the right of people to pursue happiness under the influence of technology, it is important to allocate appropriate administrative, criminal, and civil responsibilities, etc. to provide incentives for system providers to provide the above-mentioned transparency and accountability, options for choosing appropriate levels of quality and quantity, and comprehensive measures for ensuring inclusiveness.

With respect to designing liability schemes for CPSs in Society 5.0, whose associated uncertainties and complexities will continue to grow, it will be

important that we go beyond the traditional framework of liability for fault which presupposes predictability, and develop liability schemes that encourage coordinated actions aimed at improving systems, as well as mechanisms for properly compensating those who have suffered damage (see 4.2.10).

(vi) Availability of remedial measures

In order to guarantee people's right to pursue happiness under the influence of technology, it is important to provide, in addition to pre-defined regulations, ex post facto avenues for dispute resolution and rights redress, and to ensure the viability of these measures.

It is important to not rely solely on time consuming and expensive court procedures, but also to implement a variety of different online dispute resolution systems (ODR: Online Dispute Resolution) for different types of disputes and stakeholder needs, including consultation and complaints support with operators and relevant organizations, as well as alternative dispute resolution processes performed by neutral specialized organizations (ADR).

[4] Implementation of governance systems

This refers to the process of implementing designed governance systems. The governing actor should continuously monitor the status of system operation based on real-time data and other inputs. Additionally, it is imperative that they properly disclose to stakeholders who may be affected, information on matters such as the goals of their systems, system designs used to accomplish these goals, risks that arise from these systems, their operational setup, results of operations, and remedial measures.

In light of the processes and outcomes of these operations, the governing actor should implement both the evaluation and analysis described below.

[5] Governance system evaluation

The governing actor evaluates whether the initially defined goals have been accomplished. The system is re-designed if these defined goals are not being met (elliptical cycle in the bottom half).

[6] Re-analysis of conditions and risks

Secondly, the governance goals themselves may have to be revised as a result of effects caused by external systems (outer, circular cycle). For this reason, continuous analysis must be performed on whether there have been any changes in the conditions or risk landscape in which the governance system operates, and if there have been, whether these changes necessitate revisions to its goals.

Column 8

Agile Governance, Agile Development and PDCA

For some readers, the “agile governance” framework may look similar to “agile development” or “PDCA”. This column illustrates the relationships between “agile governance” and these concepts.

1. Agile Development

"Agile development" is one of the software development methods. It iterates analysis, design, implementation, and testing in short periods. Agile development values individuals and interactions, working software, customer collaboration and responding to change[66].

“Agile development” and “agile governance” presented in this Report are common in that they value flexible and adaptive processes and involvement of multi-stakeholders. On the other hand, they are different in terms of the length of cycles and the stakeholders to be involved to the process, reflecting the difference in the nature of “development” and “governance”. For example, in “agile development”, the iteration period usually takes one week to one month, while the “agile governance” cycle may take longer in general. In addition, “agile governance” may need to involve wider variety of stakeholders than “agile development” (i.e., not limited to customers and users related to specific services but also governments, individuals, and communities), since agile governance aims to realize social values such as human rights and sustainability.

2. PDCA

"PDCA" is a business improvement process that repeats the cycle of Plan, Do, Check, and Act. Comparing this with the “agile governance” cycle, “Plan” corresponds to "system design", “Do” corresponds to "operation", “Check” corresponds to "evaluation", and “Act” corresponds to "improvement". Thinking in this way, agile governance is a model that contains PDCA as a part of its process (elliptical cycle in the bottom half) but in addition: (i) it also requires continuous analysis of conditions and risks, and re-definition of goals prior to “System Design” (the outer circular cycle), and (ii) it requires to fulfill accountability to external stakeholders. This extra requirements characterize the concept of agile governance, which is based on the premise that the environment, risks and goals of society are constantly changing, and multi-stakeholder approach is necessary to achieve the goals.

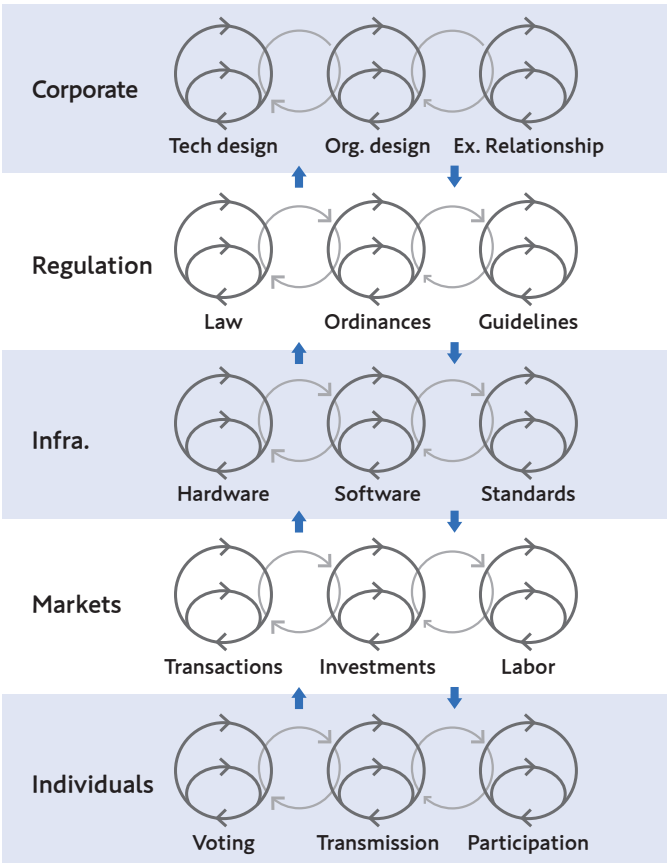
66) Manifesto for Agile Software Development (2001) (https://agilemanifesto.org/iso/en/manifesto.html)

4.1.2 Multi-layered agile governance

Governance will be implemented in various layers of society. For example, typical forms of governance include [1] governance performed by businesses (corporate governance) (4.2), [2] governance by way of regulations (4.3), [3] governance by means of public infrastructures in which multiple services are able to operate (4.4), [4] governance by market mechanisms whereby services that are in line with the objectives of market participants are chosen from among multiple services (4.5), and [5] governance by individuals and communities that is realized by participation in the development of social norms and/or political decision making (4.6). As we discuss below, the underlying idea of agile governance discussed in 4.1.1 can be applied to these different layers.

And based on this, real-world governance in societies is achieved through interactions between overlapping layers of these individual governance mechanisms. The following illustration is a schematic of how these interact with each other.

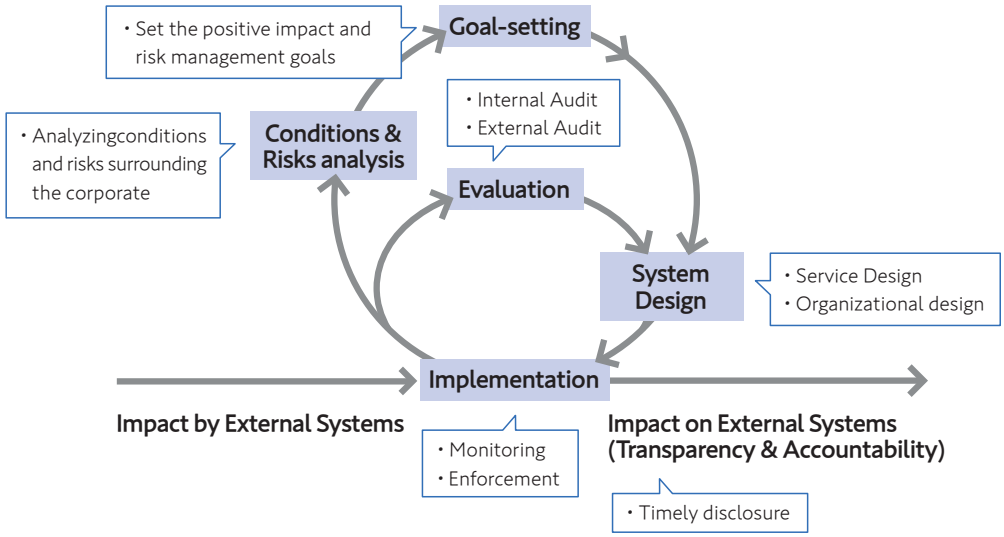
[Fig. 4.1.2] Schematic of the interrelationships between agile governance in different areas



In order to fulfill goals such as we discuss in Chapter 3 for society as a whole in an environment where a variety of these governance models interrelate with each other, we should implement "Governance of Governance" which addresses the question of "which goals should be governed by which governance mechanism (layer)" (4.7). Furthermore, global cooperation on individual governance mechanisms and the overall blueprint will be imperative (4.8).

In this Chapter, we discuss these mechanisms of agile governance. From sections 4.2 to 4.6, we discuss the basic framework of agile governance for a variety of different governance mechanisms including for corporate, regulatory, infrastructure, market mechanisms, and individual and community participation. Followed by this, we discuss designs for Governance of Governance as an overall blueprint in 4.7, and international cooperation regarding these efforts in 4.8.

4.2 The roles of businesses in agile governance



4.2.1 Businesses are central to agile governance

Businesses are the implementing and operating actors of CPS in Society 5.0. In order to run agile governance cycles, information on the design and operation of related governance systems must be continuously evaluated and analyzed, and much of this information is possessed and managed not by governments, but by the businesses who provide the products, services, or platforms.

In addition, corporate activities are becoming increasingly sophisticated, complex, digitalized, and globalized, making it exceedingly difficult for governments to comprehend and monitor the details of these activities from the outside. Given these circumstances, it is more effective and efficient for companies themselves to take the responsibility of monitoring their business activities. In light of these changes in social structure, businesses will be expected to be actors who take on responsibilities of governance under a "horizontal" model of control (co-regulation), as opposed to being a subject of governance implemented by governments under the traditional "vertical" model of control[67].

67) At the root of this line of thinking is the idea that clearly distinguishes businesses (body corporate) from human beings and treats them as a kind of system. Until now, companies have been managing risk within their organizations in the context of corporate governance and compliance, but under the framework of agile governance, the need is emerging to reconsider the positioning of these activities based on their interrelationships with other governance systems.

The impact that corporate activities have on society can typically be expected to be incomparably greater and more extensive than that of individuals. And recent trends in globalization and digitalization are believed to be accelerating this.

In view of the importance of these corporate roles and the severity of impact that corporate activities can have on society, we first consider the roles that corporations should play in the framework of agile governance (While we use the term "corporation" for convenience's sake, the same idea can be applied even to situations where governments or non-profit organizations design and implement systems that may not exactly be considered to be public infrastructure)[68].

4.2.2 The roles of companies in goal setting

As we discuss in Chapter 3, goals such as "basic human rights" and "fair competition" do not exist in isolation from technology, and discussions have begun on their specific details which presupposes the different technologies of the time[69]. In many cases, these technologies are provided by companies. As such, companies are expected to play an important role in setting up governance goals, that is, goals regarding the nature of positive impacts they seek to provide to their users and other stakeholders through the products and services they provide, and the levels at which they seek to manage the risks that arise from these activities.

For example, in cases where a platform provider (P) provides a platform for intermediating transactions between businesses (B) and consumers (C), the following would be one conceivable example of their goal setting process:

[1] Maximize the advantages for both businesses (B) and consumers (C) by enabling optimal matching to reduce transaction costs.

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68) The word "corporation" in this context basically refers to companies of a certain size (mostly listed companies), but we must also consider how businesses that do not fall into this category, i.e., SMEs, are to be positioned, as well as what their roles and responsibilities are. Traditionally, there were large gaps between the corporate governance and compliance requirements of unlisted and listed companies. That being said, the idea that corporate governance and compliance programs should be developed through a risk-based approach has started to become the global standard in recent years. And while it is not necessary to require SMEs to have mechanisms equivalent to those of listed companies, it is reasonable to require SMEs to implement risk management according to their size and the risks they are exposed to because risk-based approaches in and of themselves can be applied to any entity regardless of its size.

69) See 3.1.1

[2] Ensure a fair competition environment for businesses (B) who transact on the platform.
[3] Maintain fairness and transparency of the terms of trade between the platform provider (P) and businesses (B).
[4] Protect consumer (C) privacy
[5] Protect consumers against risks that may arise from the platform provider's (P) or businesses' (B) activities.
[6] Ensure speedy and fair resolutions to disputes between businesses (B) and consumers (C).

It is important to create an environment in which businesses that properly commit to setting such goals are the ones who will be highly valued from the market and society.

4.2.3 The roles of businesses in system design

Businesses will be responsible for designing how these defined goals will specifically be achieved through technological and organizational means. System design here includes not only the design of technical systems related to products and services, but also the design of organizational systems and their applicable rules and procedures[70]. That is, companies will engage in the system design process as a provider of technical systems, or as a designer of organizations and the like that operate these systems.

For example, a system design such as the following can be considered for the scenario given in 4.2.2[71].

70) See 4.1.1 [3]
71) See 2.6.2 [2] and 3.3.1 for information on digital platforms.

<Table 4.2.3> Example of goal setting and system design by platform companies

Goals	Technical system design	Organizational system design
[1] Optimal matching	▶ Data analysis by AI algorithms	▶ Daily analysis of user feedback
[2] Fair competition between businesses	▶ Ranking algorithms are designed for fairness	▶ Disclose primary determination factors used by ranking algorithms
[3] Fair trade between Platforms and Businesses	▶ P provides some the data it possesses to businesses	▶ Disclose key terms of transactions and explain their rationale
[4] Privacy protection	▶ Privacy by design (Designing of private information protection starts in the planning and design stages)	▶ Appoint a Chief Privacy Officer (CPO)
[5] Consumer protection	▶ Automatic monitoring for illegal or inappropriate listings	▶ Provide online complaints desk
[6] Dispute resolution	▶ Resolutions are suggested by AI	▶ Provide dispute resolution procedures and a dispute resolution policy

4.2.4 The roles of companies in the implementation of governance systems

In the process of implementation of designed governance systems, companies are expected to act as a provider or user of the system through the provision of products and services, as well as through R&D activities, etc., and also play a part in monitoring their own businesses[72]. In the context of this monitoring, the company will be required to run the cycle of designing, implementing, and performing continuous reviews on the organization's governance systems and compliance programs according to the size of the company, the potential impact of the risks it faces, and the frequency at which they may occur. The company will also be required to appropriately address problems found through monitoring and take necessary measures to

72) By positioning monitoring carried out by companies in this way, a continuous connection is formed between governance in the sense of social governance, and so-called corporate governance.

resolve these problems[73].

Technologies that can be used for monitoring have made rapid progress in recent years. Whereas data could only be acquired in fragments in the past, the acquisition of data on devices such as sensors and cameras, and advances in IoT (Internet of Things), where all manner of items are connected to networks, are increasingly enabling us to acquire data in real time. By utilizing these real-time data, companies can not only improve the efficiency and precision of monitoring, but also make determinations on risk situations and the status of goal achievement at any time, affording them more flexibility in choosing the means for achieving their goals, and ultimately allowing them to carry out sustainable innovation while ensuring compliance.

Column 9

Toward the implementation of real-time monitoring

In our rapidly changing societies, whether or not a company is able to properly determine the status of its goal achievement under the goal-based principle is an important key to achieving both innovation and compliance. While the introduction of real-time monitoring, particularly for internal audits, has been considered in the past, we cannot necessarily say that its introduction has seen much progress. This has been due to factors such as that the technology required to realize this is not yet sufficiently developed.

In order to achieve real-time monitoring, a system for carrying out monitoring must obviously be designed, but one prerequisite for achieving this is that it is not enough for the information possessed by the company to be monitored to be simply digitized, and that the information must be managed in digital space in an integrated manner. However, at present, many Japanese companies use systems that were uniquely optimized for different departments, and their IT systems have become black boxes due to excessive customization. As such, the reality is that there is no company-wide optimal environment where data can be used. In order to ensure that they are able to obtain the data they need in real time, these companies must consider standardizing their data and reconsider the interfaces between systems in light of their business models and monitoring objectives.

4.2.5 The roles of companies in verifying, evaluating, and making improvements to governance systems

Under agile governance, it will be required to carry out continuous evaluations and make necessary revisions to determine whether the defined goals are being achieved by the governance system used at any particular

73) Designs and operations founded on a risk-based approach have started to become the global standard in recent years with regard to corporate risk management, including the monitoring of business activities. And international standards related to risk management, such as ISO31000, have also been established.

point in time, or whether the goals themselves need to be revised. To achieve this, it is necessary to properly collect and analyze information relevant to its design and implementation. And, due to the sophistication of the information technologies that these companies develop and use, the data required for these evaluations is often accumulated not by governments but by these companies. As such, participation of corporation will be essential in the processes of verifying, evaluating, and improving these governance systems.

Companies are expected to provide opinions on the operational status and viability of governance systems as providers or as users, and to provide information gathered through the provision of products and services and the operation of their platforms. And, if a problem is found through monitoring of their corporate activities or by other means, they are expected to perform appropriate fact-checking and root cause analyses, formulate and implement measures to prevent the recurrence of the problem, report their results to the relevant supervisory authorities, and thereby participate in the verification, evaluation and improvement of related governance systems.

4.2.6 The Importance of accountability

As mentioned above, companies are expected to play an important role in governance, from setting goals to designing, implementing, evaluating and improving governance systems. With respect to the governance of entire companies, listed companies are required to "comply 'or' explain" the Corporate Governance Code, which is based on principle-based approaches that do not rely on laws or regulations to encourage speedy and decisive decision-making[74].

However, it is difficult for outside parties to observe and ascertain the kinds of system design companies actually use and the nature of the goals they are accomplishing on these systems, as well as how they detect, evaluate and control risks. Therefore, it is important that the companies who design and operate these systems proactively fulfill their accountability to their stakeholders regarding the status of the design and implementation of

74) While this type of trust assurance was traditionally provided on an industry-by-industry basis in accordance with the so-called industry laws, the vertically-siloed structures of industries and businesses that these arrangements were premised on are now undergoing great upheavals (see 2.5.2 (2)). Therefore, in a society where industries are intricately related to each other through networks, it is conceivable to focus on companies themselves and ensure trust for these companies.

their governance systems and compliance programs associated with their products, services, or organization, and ensure trust for themselves or their activities through the process of being rated by and receiving feedback from their stakeholders ("comply 'and' explain")[75].

In order to have companies play these important roles that are expected of them under the framework of agile governance, it is not always enough to persuade them of the importance of these roles and leave it up to their independent initiative.

To ensure viability, we can build a mechanism equipped with properly designed incentives for companies which make it a reasonable choice for companies to proactively fulfill their expected roles in the various processes of agile governance[76]. Therefore, the following sections 4.2.7 to 4.2.10 introduce specific ideas on how to design these incentives.

4.2.7 Proposal for institutional reform [1] Designing incentives through disclosure systems, etc.

One potential way of encouraging the active participation of companies in agile governance and ensuring trust in companies[77] would be to further upgrade our systems of disclosure, and the criteria that institutional investors use to rate companies. By creating mechanisms with better systems of disclosure and criteria for rating companies[78], which ensure that companies, who contribute to the various governance processes and properly fulfill their accountability, are duly recognized and valued in the market[79], we will be able to develop functional incentives that encourage companies to actively participate in governance processes and fulfill their accountability.

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75) However, this does not require the disclosure of sensitive information related to trade secrets or the cores of a company's business. This is strictly about companies being required to explain, in an easy-to-understand manner, the advantages that stakeholders can receive to the extent that the these stakeholders can be affected, the kinds of technological and systemic designs that are being employed, the risks that these designs entail, and how these systems are being operated.

76) From the perspective of ensuring reliability, it is believed that the designing of such an incentive structure will be beneficial in that the designs of institutions in Japan in the context of global markets and the accountability of companies that operate therein can be improved.

77) We must keep in mind that the trust that we speak of here must be ensured not only in the Japanese market but in global markets as well.

78) It is believed that governance systems that companies rely on to fulfill their expected roles also encompass mechanisms for training personal talent who are capable of running these systems.

79) It is believed that due market recognition will also lead to more financial possibilities. By organically linking governance and compliance efforts with market ratings as described here, we may be able to integrate governance, compliance and finance, and encourage companies to actively participate in the various processes of governance.

4.2.8 Proposal for institutional reform [2] Establishment of corporate sanctions systems in consideration of incentives

As one of the concrete measures to encourage companies to actively participate in agile governance and to establish and operate internal corporate governance systems and compliance programs, and thereby to ensure that these companies are trusted, it is important to develop an incentive oriented corporate sanctions systems[80].

For example, we can prepare sanctions that companies will see as threats[81], such as [1] imposing turnover-based monetary sanctions[82], [2] revising the requirements and applicable scope of dual liability, and [3] requiring certification for some operations, which will be cancelled if ever convicted.

From the perspective of deterring wrongful acts and cover-ups, and encouraging companies to properly monitor and detect wrongful acts and problems, we can introduce, in addition to the measures described above, mechanisms that waive or greatly reduce sanctions for companies[83] that (i) detect fraud and problems on their own, (ii) voluntarily report these to the relevant supervisory authorities, (iii) cooperate in necessary investigations, and (iv) implement effective measures for preventing recurrence. We can also introduce programs that provide financial rewards for whistleblowers for certain areas[84] [85].

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80) It is believed that discussions on drastic reforms to corporate sanctions systems are linked to essential debates, such as on the significance of punitive sanctions. Based on the perspective of ensuring the viability of roles that companies play in agile governance, the emphasis here is on designing functional sanctions systems that see businesses (body corporate) as institutions, and not as extensions of humans, while taking into account their positioning and relationships with other related institutions.

81) In other words, if the possibility of companies being charged for wrongful actions and the impact of consequential sanctions are of such a degree that they are likely to imperil these companies, this will create the incentive for them to expend proportionate costs to implement governance systems and compliance programs for the purpose of preventing wrongful acts and reducing these risks to acceptable levels.

82) Calculating corporate sanctions based on sales (turnover) or revenue is becoming the global standard.

83) While it is a typical practice to exempt or reduce sanctions against companies who voluntarily report their fraud and cooperate in investigations, it is possible to design a system that makes the former response a reasonable choice for companies by establishing a significant difference between the disposition of companies who have implemented (i) or (iv) and the disposition of companies that have not, with the latter subject to stricter sanctions.

84) In the United States, for example, there is a reward system for some violations of laws and regulations, and under certain conditions, when the provision of information or related cooperation in investigations results in sanctions against a company, the reporter receives a reward. The program is designed to make incentives less likely to arise for companies to neglect their monitoring of wrongful acts, or cover up any wrongful acts. Such a mechanism is considered to be particularly important from the viewpoint of bringing the detection rate of fraud related to the use of AI to an appropriate level.

85) In addition, it would be reasonable to introduce the lawyer-client confidentiality privilege from the viewpoint of encouraging companies to properly respond to risks, such as conducting objective investigations and reporting to supervisory authorities.

Furthermore, it is important to implement procedures that enable flexible processing for individual cases in order for incentives to function properly. From this point of view, it will also be worth considering to develop pre-trial agreements including Deferred Prosecution Agreements (DPA). The development of corporate crime countermeasure legislation that take these incentives into account has become a trend, particularly in many countries including the U.S. and EU member states[86]. It will be necessary to promote institutional reforms that take full account of consistency with the systems in our country, by referring to the efforts and challenges made there.

4.2.9 Proposal for institutional reform [3] The need for guidelines on compliance programs, etc.

In order for incentives for designing and implementing governance systems and compliance programs within organizations to function properly, it must also be clear for corporations on what kinds of mechanisms they will need to put in place[87]. Meanwhile, because there are large variations in the sizes of companies and the uniqueness of their situations depending on the businesses they are engaged in, it is difficult to present a uniform, one-size-fits -all system of governance, and in fact, such a system should not even be pursued.

Therefore, with respect to governance systems and compliance programs that companies should develop, it would be important for relevant authorities, etc. to take the initiative or act as facilitators to formulate guidelines that define the parameters of evaluation and the underlying idea of performing evaluations. In addition, it is also important to ensure the fairness and transparency of relevant procedures, and from this perspective, to prepare and publish guidelines that clarify prosecutorial discretion and sentencing criteria

In particular, whereas agile governance presumes the use of flexible governance, in which goals and their associated rules and procedures are operated and revised in rapidly-run cycles, we can conversely expect to see, as a trade-off to the implementation of these flexibilities, difficulties in

86) Institutional reforms based on this idea are being advanced in the United States, the United Kingdom, and France among other countries. Recently, in Germany, a corporate crime countermeasure bill called Verbandssanktionengesetz (“Corporate Sanctions Law”) has been proposed.

87) If this is left unclear, this in and of itself can become a risk factor, and may impede incentives-based decision making, or make the company reluctant to perform the roles that are expected of them.

employing approaches such as hard laws and judicial scrutiny that were traditionally considered to be important. In order to realize the idea of the rule of law even under these situations, it would be important for supervising authorities to provide, even more proactively than in the past, the policies that underlie the situation-specific goals, and codes of conduct and procedural rules that derive from these goals to clearly identify where accountability lies.

4.2.10 Proposal for institutional reform [4] Design of a comprehensive risk-based corporate liability regime

As the areas where AI and related systems interact with each other continue to expand, innovation is expected to accelerate in a variety of different ways, creating new value and improving our convenience. Meanwhile, areas that present us with greater unpredictability and difficulties in verifying causes after the event will also expand[88]. Under these circumstances, in order to achieve the objective of governance, i.e., to maximize positive impacts from the use of these system while managing the risks that arise from their use at acceptable levels, it will be important to have the perspective of seeing accidents and other negative outcomes that unavoidably occur at certain rates of frequency as unavoidable risks of system operation, and the perspective of generally streamlining the management of these risks and the distribution of loss throughout the entire system when these risks manifest.

For example, while AI that is expected to be implemented in advanced autonomous driving technologies and traffic systems that support them is only able to control their behavior statistically, and the operation of AI systems made up of these systems interacting with each other may reduce the total number of traffic accidents, accidents will unavoidably occur at a certain rate. Given this example, the attempts to resolve problems by imposing legal liabilities based on the idea of fault to eliminate the occurrence of individual and specific outcomes altogether will result in failing to achieve optimal balance between innovation and risks[89].

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88) See 2.3.2 on governance issues that arise from AI

89) Regarding civil liabilities, see "Accidents and Civil Liability of Self-Driving Cars" Masahiro Kurita, Law Bulletin No. 1136 (2019) page 27, and criminal liabilities, see "Fault in the Development and Use of Artificial Intelligence" Yosuke Sakashita, Law Time Report No. 1136 (2019), page 13. There is also the question of whether the institutional ability of courts, which seek to determine the occurrence of legal liabilities on the basis of fault or lack thereof, is truly fit for properly handling complex events that can result from CPS.

In this regard, from the perspective of managing and distributing the risk of accidents to achieve the optimum conditions for operating these systems, it would rather be more worthwhile to implement a system of strict liability, which would be an extension of what we currently have, where, in the event that an infringement of legally protected interests results from a product or service provided by a provider, the provider is held liable for compensation regardless of whether they were at fault, or whether their product or service was found to be defective[90]. This is because, under such a system, we can expect to see prompt relief for victims, and providers will be able to statistically calculate the risks that may arise from their AI-based services and products and reflect these in the price of their services and products, thereby achieving the optimal balance between innovation and risk through market mechanisms[91].

That being said, we cannot deny that extending strict liability without exceptions will have the effect of discouraging innovation in Society 5.0 because areas of "uncertainty[92]" do exist that are impossible or extremely difficult to anticipate even by operators at the cutting edge who are equipped with advanced, specialized knowledge[93]. As such, we can envision liability schemes aimed at determining the causes for the purpose of preventing and improving on problems in the future— schemes that make the distinction between computable risks, which allow the application of strict liability, and "uncertainties" that are often extremely difficult to even anticipate in advance and cannot be calculated[94]. In the areas of uncertainty, we should not immediately pursue the operator's liability for negative outcomes in cases where the operator has fulfilled their due accountability regarding the outcomes. Therefore, again in this context, it is possible to

90) The current Product Liability Law which prescribes strict liability does not apply to intangibles such as data or algorithms (Product Liability Law, Article 2, Paragraph 1). In addition, it has been pointed out that, with respect to objects such as AI whose performance should be evaluated from a statistical perspective, it is questionable whether it would be appropriate to apply a concept such as "defect" whose design is premised on tangibles that do not have this property (Kurita, See previous footnote). This is because, even with a "proper" AI that provides high degrees of safety, accidents will unavoidably occur so long as its behavior is based on statistics.

91) Jennifer Arlen & Reinier Kraakman, Controlling Corporate Misconduct: An Analysis of Corporate Liability Regimes, 72 N.Y.U. L. Rev., p.687, 698 (1997)

92) The word "uncertainty" here does not refer to risks, which are computable events, but to events that are not computable. See Frank H. Knight, Risk, Uncertainty and Profit, pp.19-20 (1921)

93) Google, Consultation on the White Paper on AI - A European Approach, 41 (2020)

94) In this regard, it may be pointed out that in the case of risks, which are computable, it may suffice to place operators under the obligation to avoid risks and determine their liability for fault based on this. However, leaving room for exemption for operator liabilities that result from negative outcomes will result in providing incentives to operators to spend excessive costs to qualify for exemption, and this may break the optimal balance between innovation and risk. This will also create cases where victim relief cannot be fully realized for reasons such as information inequality.

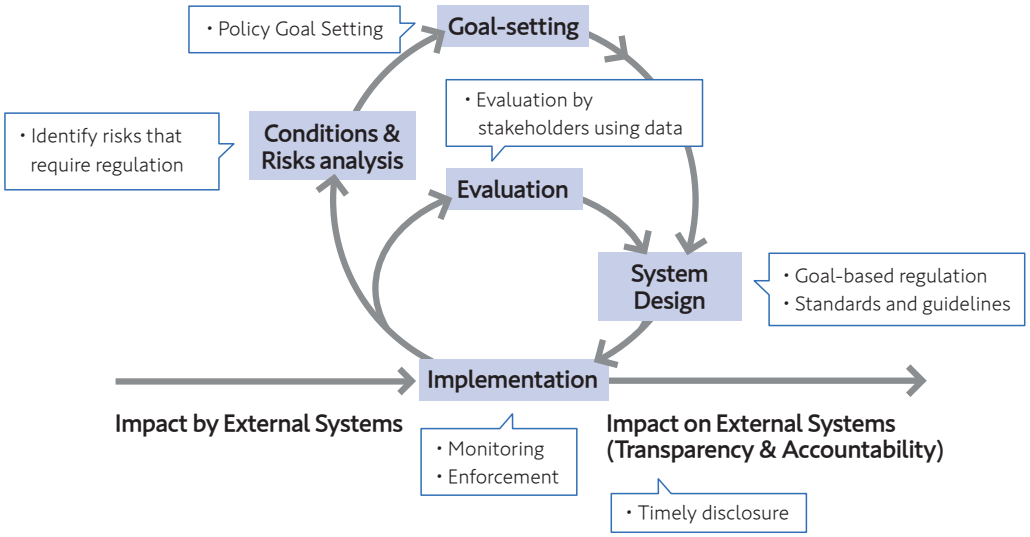
design schemes that provide companies with incentives for fulfilling their risk management and accountability responsibilities through the use of mechanisms that waive sanctions for companies under the condition that they guarantee to implement sufficient preventive measures in advance to address risks, promptly report to the relevant authorities and cooperate with their investigations in the event of an incident, and improve their products, systems and their development processes. The utilization or application of DPA (Deferred Prosecution Agreement) as discussed in 4.2.8 would be promising options for realizing such schemes.

Even under such schemes, it will not necessarily be easier to clearly distinguish between "risks, which are computable in advance," and "uncertainties, which are not computable in advance" that result from cutting-edge technology. Therefore, although the risk of moral hazard and the problem of so-called regulatory capture may emerge in the initial stages of the scheme's implementation, these two can eventually be rationally distinguished as necessary knowledge is accumulated and shared by the stakeholders involved as a result of running agile governance cycles and processing cumulative numbers of cases.

Furthermore, in order to ensure that those who have been victimized by risks and uncertainties stemming from AI are given proper relief, we should consider taking advantage of insurance systems and improving public compensation systems. Meanwhile, discussions must also be carried out which take into consideration the fact that although insurance can reduce the risk of operator insolvency and ensure victim relief, it is also fraught with the potential for moral hazard and it may be difficult to expect insurance systems to function in areas of uncertainty[95].

95) If a technology produces unavoidable negative outcomes at a statistically constant rate while also providing beneficial value to society, it is believed that approaches similar to remedial measures provided for pharmaceutical side effects would be more beneficial for achieving victim relief. Kurita, See previous footnote.

4.3 Designing laws and regulations to realize agile governance



4.3.1 Challenges faced by traditional laws and regulations

Laws and regulations constitute one of the primary mechanisms for governance in our societies. This model consists of a nation with democratic legitimacy establishing specific rules (laws and regulations, etc.), regulators monitoring events, and regulators and judicial systems carrying out enforcement actions if a problem is found (administrative and/or criminal penalties, etc.).

However, as we have discussed at length in our first report, this governance model based on traditional laws and regulations faces challenges such as those listed below as we move towards realizing Society 5.0 (A summary of our first report is attached to the end of this Report as Attachment 2).

(1) Challenges regarding rule-making

The traditional governance model is based on the premise that nations determine the “rules on how things should be” for each industry in advance. But in a CPS-based society, due to its complexity and rapid rates of change, it would be difficult to define the scope of regulations and the duties of action, and even if they were, they would very quickly become obsolete. As a result, laws may not be able to control the risks posed by innovation, and may in fact impede innovation.

(2) Challenges regarding monitoring

CPS are complicated, change rapidly, and have huge amounts of information flowing through them that are difficult to recognize from the outside, which makes it difficult for third parties to objectively monitor them. At regular monitoring intervals of, say, once a year, it would be difficult to effectively and efficiently manage risks that constantly occur.

(3) Challenges regarding enforcement

Traditional governance models presume that all acts are intermediated by autonomous decisions made by individuals or legal entities, and this makes it possible to attribute responsibilities to these individuals if a problem were to occur. However, it is not clear who or what legal entity should be held liable if something goes wrong in the society where autonomous decisions are made by machines such as AI. In addition, in processes where various systems interoperate with each other and engage in feedback loops with their environments, it is difficult to determine who is responsible and the nature of their responsibility if a problem were to occur.

(4) Challenges regarding the scope of geographic jurisdiction

Traditional governance models were able to protect legal interests within a particular territory by applying and enforcing the laws of that country to those who infringe on legal interests within its territory. However, in a society that originates in cyberspace, which is connected across national borders, it is becoming increasingly difficult for a single government to sufficiently protect the interests of its citizens simply by defining a set of rules and enforcing them.

In this way, laws and regulations are facing various challenges as our societies undergo changes. To overcome these issues, we believe traditional regulatory models should be revised and put in line with agile governance where regulatory systems are constantly revised and evaluated. In the following section, we discuss designs for laws and regulations based on this perspective.

4.3.2 “Goal-based” laws and regulations

In order for laws and regulations to function properly in this rapidly-changing and complex Society 5.0, we should employ “goal-based” regulations that prescribe the goals to be accomplished, as opposed to “rule-based” regulations that prescribe specific duties of action[96]. This is because under rule-based regulations, the governance approaches that companies can work with are likely to become limited, and this may cause the system design and evaluation processes of agile corporate governance to become nonfunctional.

Therefore, in order to achieve agile governance, it is desirable for regulations to be designed through a "goal-based" approach that defines the intentions of the goals that companies should achieve, and leaves the defining of specific goals and the ways in which these goals are achieved in this context up to companies’ discretion.

“Goals" set by laws and regulations are different from "goals" set by companies (4.2.2). In other words, the goals that businesses define for themselves are associated with the impact that their products and services have on stakeholders, while the goals defined in laws and regulations are the minimum level goals that should be ensured in the course of these corporate activities. Because it is difficult to determine risks on a “per industry” basis in Society 5.0 where systems with a variety of functions are interoperated right and left, goal-based regulations should be prescribed based on risks, or functions associated with risks. For example, traditional regulations, which were based on the premise that people, objects and places exist, entrust risk prevention, to a degree, to the abilities of these entities. However, in order to replace regulation with mechanical processes in cyberspace, the functions that were previously performed by humans should be disassembled, and examinations must be carried out on how each of these functions can be replaced by mechanical processes, based on the identification of existing risks and the scope of risks that should be allowed.

4.3.3 Flexible rule design based on standards and guidelines

In order to bolster businesses’ efforts in agile governance and their practical application as they seek to achieve the goals prescribed by law, it is

96) The word "goal(s)" here does not refer to goals at individual system levels, but to minimum level requirements that must be uniformly achieved by all systems to which regulations apply.

important for government and the private sector to work together to establish rules based on standards, guidelines and other soft laws. This is likely to improve predictability for regulated parties, and make it easier for them—especially for SMEs who may have difficulty procuring sufficient budgets for achieving compliance on their own—to achieve the objectives of the laws.

The contents of these standards and guidelines are not limited to legal document formats. For example, some of the compliance tools we can envision going forward include public releases of development tools that allow users to achieve the objectives of laws by embedding certain code into their software programs, or APIs that simply need to be plugged in to allow users to automatically acquire the data they need for compliance.

Considering the significance of these guidelines and standards, regardless of whether the formal formulating body of these guidelines and standards is a government or private organization, etc.[97], discussions should essentially be held by involving a wide range of stakeholders including users, companies, engineers, academia, legal and audit experts, centered around companies who design and manage the architectures that integrate cyberspace and physical space. It would be desirable for governments to function as facilitators in these discussions[98], and fulfill the role of fostering society's trust in companies by certifying companies who meet the formulated guidelines and standards in certain cases.

That being said, while guidelines and standards which can be revised more frequently and flexibly than laws will improve predictability for companies, there is no fundamental solution to the problem of their inability to keep up with the speed of changes in technology and business models. Furthermore, it should be noted that the formulated guidelines and standards may ultimately hinder innovation if they are implemented in ways that are effectively binding, such as is the case with regulations.

97) The advantages of having governments formulate these guidelines and standards are that they can be explicitly positioned within the legislative framework, and the greater feasibility of legal action against violations that they provide. Meanwhile, there are advantages to having private sector-centered discussions including how issues can be organized in line with real-world conditions, and how the possibilities for responding to rapid changes in technology and business environments can be increased through such discussions in the private sector.

98) This is not to say that they will need to attend individual and specific meetings. Their tasks may include organizing agendas and settings for meetings to ensure that they can proceed properly.

Column 10

Achieving compliance through technology (SupTech/RegTec)

1. Overview

According to a Thomson Reuters report[99], the number of changes made to laws and regulations worldwide in 2019 came to 56,624 to the best of their knowledge. This was equivalent to 217 changes per business day.

Because technology is essential for responding to such rapidly changing policy goals and regulatory environments, in the financial industry, both the regulated financial institutions and financial regulators have been actively working on the use of technology from an early stage with RegTech, or solutions used by regulated financial institutions to achieve regulatory compliance, and SupTech, or supervising solutions used by financial regulators; technologies that essentially make up two sides of the same coin.

2. Specific solutions

As the scope of financial regulation continues to expand and becomes increasingly complex with every passing day, a variety of specific solutions have been created which fall into the following five segments.

Segment	Main description	Main technologies
[1] Profiling Due diligence (ID management and control)	・Financial companies collect data from multiple sources and carry out simplified profiling, including user KYC, AML/CFT regarding business partners, and fraud screening.	・Blockchain ・Biometric authentication
[2] Reporting dashboard	・Automatically collects and analyzes data supplemented by financial companies, and prepares notifications and reports, etc. and submits them to regulators.・Regulators also collect, analyze and provide feedback on the above data in real time.	・API ・BigData ・RPA
[3] Risk analytics (Risk management)	・Predict, discover, and monitor conduct riskssuch as illegal or fraudulent activities by financial company employees.	・API ・BigData ・RPA
[4] Dynamic compliance	・Financial companies collect information on changes in regulatory details, conduct real-time monitoring, and reflect results in internal regulations and compliance systems.	・AI ・API
[5] Market monitoring (Transaction monitoring)	・Financial companies collect, monitor and perform other tasks on data of products and services handled, countries/regions, KYC, and transaction histories. ・Regulators collect, monitor, and perform other tasks regarding data from market transactions from multiple sources (including BOJ and EDINET).	・AI ・API ・RPA ・Blockchain

99) Thomson Reuters, "Cost of Compliance: New decade, new challenges", (2020) https://www.jdsupra.com/legalnews/cost-of-compliance-2020-new-decade-new-31844/

3. Features of RegTech and SupTech solutions

Because RegTech and SupTech systems are designed based on the premise of interoperability, inter-compatibility (interoperability) is important for these systems, and the data exchanged between systems must be in structured machine-readable and machine-executable formats.

In addition to these technological requirements, there must be practical incentives for both the public and private sectors, and a Financial Services Agency report[100] released in 2019 states that the following seven properties will therefore be needed.

Viability	Better internal control at financial institutions, and better financial monitoring by authorities.
Efficiency	Less costs for financial institutions' for operations and reporting to authorities, and less system costs for financial institutions and authorities.
Flexibility (connectivity)	Able to support new technologies and non-financial players.
Quick reportability (real time)	Participants receive information in real time.
Interactivity (data sharing)	Not a one-way, reporting-only system. Instead, data is shared with participants.
Simplicity	Agile development performed on simple systems, and not on heavy and bulky traditional systems.
Confidentiality	Ensured confidentiality of shared information.

4. Towards social implementation of RegTech and SupTech

While challenges and pain points for both regulated financial institutions and financial regulators clearly exist, full-scale social implementation of these solutions is still in the future. And in order to implement these systems in our societies, it will be important for the public and private sectors to work together to form co-circulating ecosystems because, among other reasons, RegTech and SupTech are two sides of the same coin as mentioned above. For advancing the creation of such ecosystems, we will need specific processes for gaining the trust of stakeholders and obtaining supplies of risk money while running cycles of "awareness," "dialogue" and "trial" to eventually lead them to their actual implementation[101].

In fact, the FCA in UK, which currently leads the way in this field, began exploring the use of RegTech in 2015 to support the growth and development of the country's Fintech market, and in the same year, launched their "Call for Inputs" program to solicit opinions from various private sector stakeholders. The following year, in 2016, the FCA launched a

100) https://www.fsa.go.jp/news/30/20190620_joubun/01.pdf
101) Hachiro Kuwajima "On the study group associated with the future shape of RegTech/SupTech" (NTT Data Institute of Management Consulting, Inc., 2019) https://www.meti.go.jp/shingikai/sankoshin/shomu_ryutsu/kappu_hambai/pdf/022_03_00.pdf

hackathon-style program called TechSprint[102] as part of their effort to create ecosystems that incorporate the "awareness," "dialogue," and "trial" cycle. Other countries are also starting to use TechSprint. For example in 2020, Saudi Arabia, chair of the year's G20 meetings, held the G20 TechSprint[103] which was supported by Saudi regulator SAMA as well as MAS of Singapore, indicating that collaboration between international regulators and the creation of ecosystems have already begun. In addition, according to a report[104] by the Cambridge Centre for Alternative Finance, more than 70% of RegTech companies do business in two or more countries, indicating how the private sector is also expanding their operations internationally.

In Japan as well, it is hoped that the public and private sectors will work together on the various activities needed in Japan for "awareness," "dialogue," and "trial" to move forward with the creation of ecosystems and the social implementation of solutions in parallel, as both sectors maintain their contact with international RegTech and SupTech ecosystems. Currently, although the financial field leads in the social implementation of RegTech and SupTech worldwide, the more widespread the use of agile governance becomes, the more apparent similar issues will become in non-financial fields as well. These types of collaborative public and private sector efforts, and the creation of ecosystems will also become important. (Takeshi Kito)

4.3.4 Experimental implementation and evaluation of institutions

In order to reform laws and regulations by means of the agile governance approach, it will beimperative to conduct demonstration tests for technologies and institutions. By performing empirical experiments on innovative technologies that may formally be in violation of traditional laws and regulations, companies will be able to properly determine the risks of such technologies, and redesign systems to ensure that risks can be contained at allowable levels. Regulators will be able to review existing regulations based on the results from these demonstration tests, and revise regulations into forms that are more reasonable and innovation-friendly.

The "regulatory sandbox" is an example of a framework where companies are allowed to conduct demonstration tests and regulators are able to make revisions to regulations based on the results from these tests. The purpose

102) Financial Conduct Authority 2020 "Fostering innovation through collaboration: The evolution of the FCA TechSprint Approach" (2020) https://www.fca.org.uk/publication/research/fostering-innovation-through-collaboration-evolution-techsprint-approach.pdf
103) BIS "G20 TechSprint" https://www.bis.org/hub/g20_techsprint.htm
104) Emmanuel Schizas, Grigory McKain, Bryan Zhang, Altantsetseg Ganbold, Pankajesh Kumar, Hatim Hussain, Kieran James Garvey, Eva Huang, Alexander Huang, Shaoxin Wang, Nikos Yerolemou. "The Global RegTech Industry Benchmark Report" (Cambridge Judge Business School, 2019) https://www.jbs.cam.ac.uk/faculty-research/centres/alternative-finance/publications/the-global-regtech-industry-benchmark-report

of this system is to create an environment for a limited group of participants, or for limited amounts of time, where demonstration tests on novel technologies and such can be performed within the scope of existing regulations or the scope of preferential measures, based on which agile updates to laws and regulations can be made[105].

Currently, regulatory sandbox systems are being established and implemented in various regions and jurisdictions, and information sharing and mutual cooperation between regulatory sandbox systems between these different countries is also important. For example, in November 2020, Canada, Denmark, Italy, Japan, Singapore, the United Arab Emirates, and the United Kingdom launched the Agile Nations Charter and acknowledged the importance of creating rules based on the regulatory sandbox among other matters[106].

Going forward, it would be exceedingly important to promote the use of this system in Japan and overseas, realize results such as specific revisions to laws, etc. based on accumulated empirical data related to new technologies, etc., and also to revise the system to improve its convenience, and establish interoperability between regulatory sandboxes used in other countries.

4.3.5 Ongoing revisions to laws and regulations, and standards and guidelines

The effects and impacts of laws and regulations, guidelines, standards set by private organizations, and self-regulation, etc. should be continuously

105) Ever since the announcement of the UK FCA system in May 2016, regulatory sandbox framework operations have been launched in Singapore, Hong Kong, and the UAE. In Japan, this system was started up in August of 2018 based on the Act on Special Measures for Productivity Improvement that came into effect in August the same year. The regulator sandbox system in Japan differs significantly from other countries' systems on the following points.

- All laws and regulations are covered, not just those related to finance under the supervision of the Financial Services Agency. Therefore, the Innovative Business Activities Evaluation Committee, which is involved in the certification of projects from a neutral standpoint, has strong authority to make recommendations to each competent minister through the Prime Minister as necessary.
- The system is not only used for licensing regulated parties or formulating policies for regulators. The purpose of the system is to enable amendments and revisions to laws and regulations that are meaningful to both regulated parties and regulators.

As of the end of November 2019, one year after the start of operation, there were 13 certified projects with a widely varied range of competent ministries and agencies of projects, including the Ministry of Economy, Trade and Industry, the Ministry of Health, Labor and Welfare, the Financial Services Agency, the Ministry of the Environment, and the Personal Information Protection Commission.

While the regulatory sandbox system is a nationwide framework, National Strategic Special Zones have been established as frameworks for enabling deregulation and reform on a regional basis. From the perspective of implementing agile governance in local autonomy systems that are made up of multiple layers under the national government, ensuring interoperability between the regulatory sandbox system and National Strategic Special Zones is also an issue for future study.

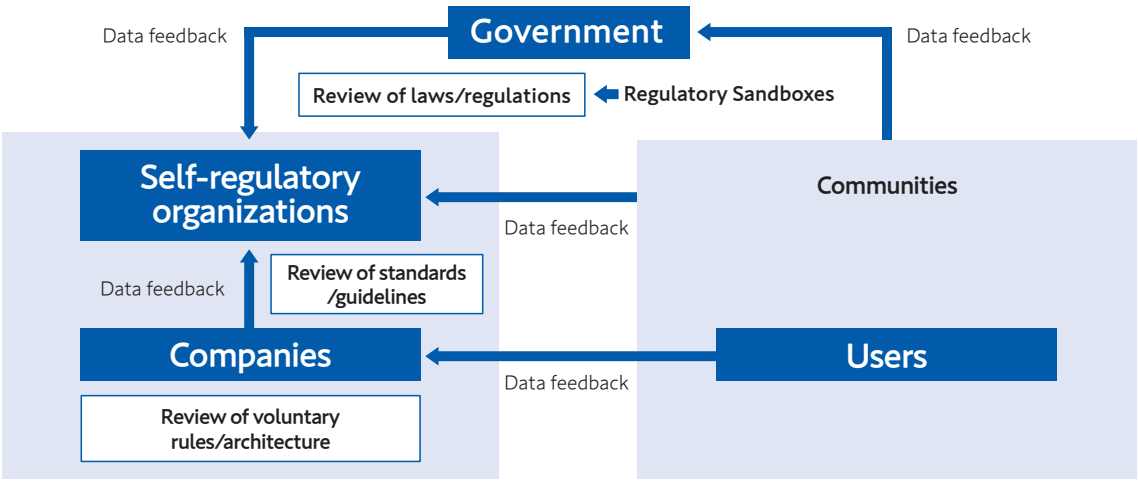
106) Agile Nations Charter (11 May 2020), 4.g) https://www.meti.go.jp/press/2020/12/20201209001/20201209001-1.pdf

evaluated in accordance with the concept of agile governance, and opportunities for revising them should be provided.

Existing laws, regulations, guidelines, standards and such that have been established solely on the basis of physical space are premised on divergent social environments and may actually be obstacles to innovation. In such cases, in addition to returning to the originally planned goals and reassessing the validity of those goals, it will be important to carry out ongoing reviews based on data for determining the most efficient and effective approach of regulation for achieving these goals. (e.g., Should this be by means of regulation, guidelines, or standards? Or should this be left up to voluntary rules?)

In doing so, the participation of businesses (4.2), as well as individuals and communities (4.6) should be encouraged to carry out reviews involving multiple stakeholders instead of conducting these reviews within the confines of government.

[Figure. 4.3.5] Schematic of ongoing revisions of rules



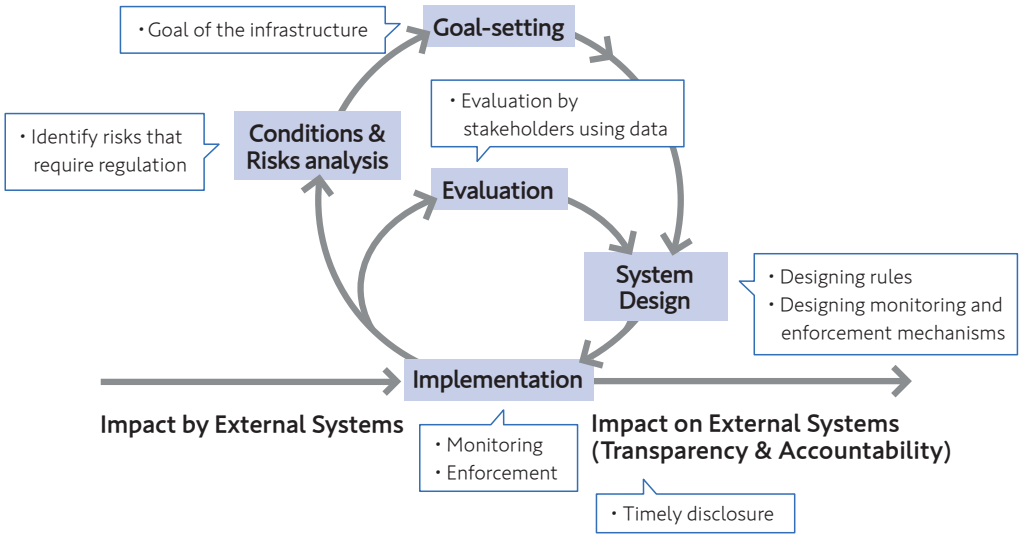
Column 11

Future visions for the rule of law

Traditionally, hard laws and judicial judgment have played a key role in controlling power, which can affect people's pursuit of happiness. In Society 5.0, the importance of hard laws and judicial judgment will not be undermined, but due to the increasing fluidity of the regulatory environment and the need for swift actions in responding to uncertainty, soft laws more than hard laws, and coordinated enforcement more than judicial judgment are likely to become the dominant legal devices for rights redress and enforcement. Under these

circumstances, the creation of soft laws, high levels of accountability and guarantee of procedures in the enforcement stage will have an important meaning in order to ensure that the objective of the rule of law — to restrain arbitrary exercise of power — continues to be fulfilled. In addition, in order to respond to potential increases in the influence of technological power, what we must ensure is high accountability by the builders of the code and architecture that form the basis that drives technological power, and a highly transparent information disclosure system. In any case, the principle of the rule of law as the basis of a free and open democracy can only be realized by rational and consistent control of powers that have a substantive influence on people's pursuit of happiness.
(Tatsuhiko Inatani)

4.4 Agile governance for infrastructure



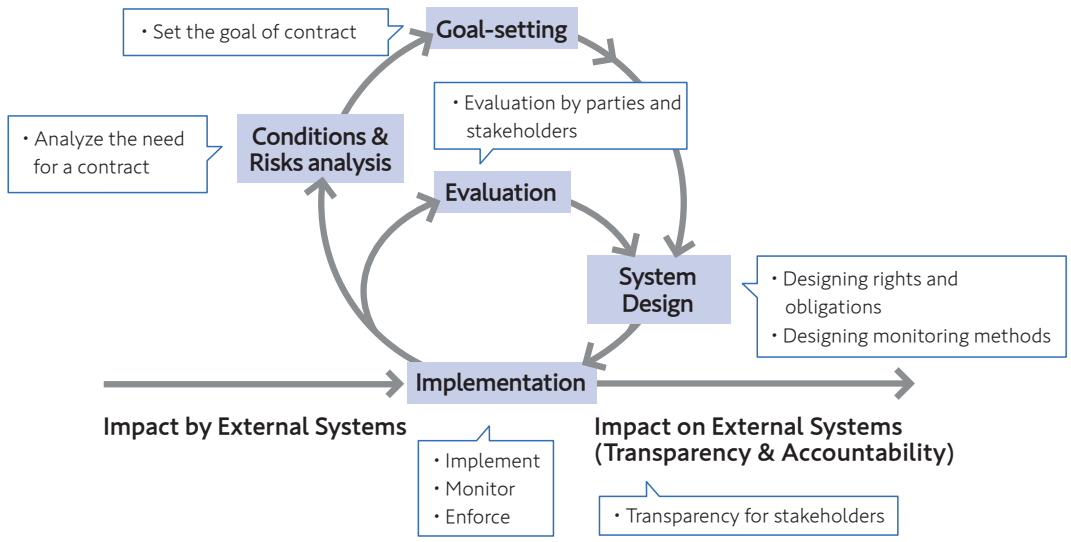
One of the key factors for the advancement of CPSs is the interoperability between systems operated by different actors. For example, in areas such as MaaS where various transportation services are integrated, as well as in areas such as operational control of large numbers of unmanned drones and service robots, personal identification and authentication (KYC) for online transactions, and payment mechanisms, efficient operation would be realized by linking systems between multiple actors through shared infrastructure. However, it can be difficult to proceed with the development of such infrastructure due to biases that lean towards maintaining the existing hardware infrastructure and the difficulty of designing forward-looking interoperability. Therefore, it is desirable to carry out multi-stakeholder design to determine the scope of fields to include as cooperative

fields, and based on this, determine the type of infrastructure to build.

The agile governance concept can also be applied to the governance of these infrastructures. Goals may be to promote innovation and economic development, improve economic efficiency by taking into account life cycle costs, care for the environment, ensure resilience against natural disasters and cyber-attacks, and ensure inclusiveness. The balancing of these multiple goals, and actual system design, should be carried out with the participation of multiple stakeholders including providers and users of the infrastructures. Government should promote the setting up of venues where governance is designed by multiple stakeholders. In doing so, it will be important to not only design the functions of the infrastructure itself, but to also design functions for monitoring the proper operation of the infrastructure, and functions for resolving disputes that may arise from problems with the infrastructure.

Ongoing reviews by stakeholders will also be needed with respect to evaluations on whether the goals listed above are being met during infrastructure operations, and what types of improvement measures, if any, need to be taken.

4.5 Realizing agile governance in markets



4.5.1 Markets as the place where agile governance is to be realized

Markets have an affinity with the concept of agile governance. This is because, through the act of purchasing and reviewing products and services,

stakeholders who trade in markets constantly monitor and rate products, and change their choices depending on changing environments and risks. In an era where society is becoming increasingly complex and values diversified, it would become more important than ever for stakeholders in the market to carry out fair transactions that reflect diverse values in order to realize an innovative and prosperous society.

In order for the market to function properly as a means of achieving such agile governance, at least the following conditions should be met.

[1] Fair competition is functioning in the market and market participants have access to appropriate quantities of information of appropriate quality, and have appropriate options to choose from. (4.5.2)
[2] Rights associated with data, which constitute sources of wealth in Society 5.0, can be designed flexibly and are protected. (4.5.3)
[3] Infrastructures are in place that allow users to efficiently trade a variety of forms of rights and wealth, including data. (4.5.4)
[4] Dispute resolution mechanisms are in place for realizing or redressing rights that are traded on the market. (4.5.5)

Each of these are examined below.

4.5.2 Ensuring fair competition, transparency, and options

(1) Challenges regarding ensuring fair competition and the availability of proper information and options

Agile governance based on the market mechanism is a mechanism in which various stakeholders (consumers) in the market rate the services provided by companies, and this is reflected in prices and sales to encourage proper governance by the company based on the principle of competition. A premise for these functions to work is that options are available for consumers for choosing the appropriate levels of quality and quantity. And traditionally, it has been believed that free markets offer more options and provides optimal conditions for consumers.

However, in reality, mega-platforms have expanded into a variety of fields that are essential in our private lives and business operations by leveraging their staggering customer contact points and data volumes, and have cemented their competitive advantage. As a result, the details

of options that are available in our private lives (e.g., the types of personal information we provide in exchange for the use of their SNS or map apps), as well as the details of options that are available to companies in their business activities (e.g., the type and amount of advertisement fees they pay and the media they pay these fees to for Internet advertising) are increasingly being unilaterally defined by the platform companies involved.

In addition, because CPSs are complicated and difficult to understand from the outside, there is also the issue of users not being able to determine how the data they provide is being processed, and the quality of services that they are being provided.

The choices made under these circumstances are formally understood to be concluded under the agreement of both parties under the "freedom of contract," but it is questionable whether these choices can truly be considered to be free.

Consumer protection legislation, labor legislation, and antitrust legislation among others have sought to protect those who are at a disadvantage in terms of bargaining power and information. However, a big difference with the past is that, in recent years, individuals and businesses of all descriptions (including "gig workers" who are positioned between individuals and businesses), and not only these "typologically vulnerable people," are being deprived of their bargaining power, and that the situation is moving beyond a simple asymmetry of information into one where other options are not available to begin with. As a result, it appears that the process of agile governance, which is run by continuously evaluating goals and systems through the involvement of multiple stakeholders, may not be functioning satisfactorily in markets.

And since the mission of mega platforms, which are private companies, is to increase their market value, there is little incentive for them to resolve conditions such as described above unless legal sanctions or fatal reputational damage are possibilities.

(2) Efforts aimed at ensuring fair competition and the availability of proper information and options

In order to achieve agile governance in the market, it is important to first ensure transparency through information disclosure so that users

can make informed decisions about their transactions. Information to be disclosed is wide-ranging, including service details, the handling of user data, and important decision-making criteria for the user (the order in which products are displayed, conditions for terminating service provision, etc.). It is important to provide explanations that are clear and easy-to-understand for general users to enable them to make their own decisions. Regarding such information disclosure, it is conceivable to introduce mechanisms where neutral organizations are able to determine the accuracy of information on behalf of users.

However, simply disclosing information will not assure that users will be given enough options. Efforts aimed at ensuring an open competition environment such as enabling data portability to allow users to transfer their own data to other platforms, and making subgroups of data held by operators available to other operators may also be useful. Furthermore, especially for services with infrastructure functions, it would be worth examining how they can be made to provide setups in which conditions can be more flexibility customized by users, as opposed to users being faced with either-or propositions that essentially say, "either use this service by accepting all the conditions or not at all."

It will also be important to properly apply and enforce the competition laws. Regulations on business combinations and legislation on the abuse of dominant bargaining positions are believed to be effective deterrents against businesses leveraging their competitive advantage to acquire potential competitors at an early stage, or demand one-sided conditions. Theoretical studies based on digitization and appropriate enforcement will be required to determine the scope of application of these laws and how the sanctions should be carried out.

4.5.3 Data protection

(1) The need for data protection and its challenges

In order to realize Society 5.0, all manner of data should be distributed and utilized. A considerable amount of effort and cost is required to generate high-quality data. Therefore, it will be important to design appropriate incentives in relation to generating quality data and sharing it with third parties[107].

107) It is said that the utilization of big data requires the following factors: (1) data volume, (2) matching data formats, (3) data correctness, and (4) data continuity. Ministry of Internal Affairs and Communications "For the Statistical Utilization of Big Data" https://www.soumu.go.jp/main_content/000554053.pdf p. 20, 21

One way of designing such incentives may be to protect the data in certain ways. That is, appropriate protection is provided to prevent wrongful acquisition or usage of the provided data, and profits earned from the provided data is properly returned to the data provider.

That being said, data, which has no physical substance, is not subject to protection by ownership or possession. Furthermore, there are only a limited range of situations where it is protected under laws that protect patent rights, copyrights, and other intellectual property rights laws. For this reason, in order to receive legal protection for data, it is generally necessary to define data usage and access rights by contract[108]. However, it is not easy to define contractual rights in advance for data utilization because data is expected to have a broad range of specifications and effects, and there is a considerable risk of contracts with stipulations that may not necessarily be appropriate being concluded by parties who are effectively in a stronger bargaining position.

Furthermore, even if a contract is entered into, it would be difficult to verify whether the data is used according to the contract. And, in the event that a contract is breached, it would be difficult to calculate the damage caused by the breach. What is more, once the data is out, it cannot be put back in.

Based on this state of affairs, in order to encourage the distribution and utilization of data in the market, it would be necessary to reconsider existing means of regulation and their implementation.

(2) Design and realization of data protection

It is said that approaches for protecting data by law are broadly grouped into property-right-granting type approaches that grant exclusive rights that are equivalent to the ownership of an object, and action-regulating type approaches that are limited to regulating acts of infringement[109]. Of these, according to the property-right-granting type approach, it would be conceivable to extend the scope of data to be included under patent rights

108) A model for such contracts, the "Guidelines for Contracts on AI and Data Use" has been published in Japan. Ministry of Economy, Trade and Industry (METI) “Contract Guidelines for AI and Data Usage” https://www.meti.go.jp/press/2019/12/20191209001/20191209001.html

109) In addition, it would be conceivable to grant rights with restrictions or limitations that serve to encourage data utilization. Specifically, this can be done through types of right-granting that are accompanied by obligations such as those that come with the obligation to license usage under specific conditions (FRAND conditions, etc.), or those where injunction request rights can be exercised only within a limited scope, or done through types that grant the right to demand remuneration where only the right to charge a price is granted. “New Information Property Review Committee Report” (March 2017, p. 18-21) Information Property Review Committee; Committee for Verification, Evaluation and Planning; Intellectual Property Strategy Headquarters

and copyright protection, or establish rights, such as *sui generis* rights (unique rights) provided for databases in Europe[110]. However, such approaches will end up accepting the monopolization of data—the accumulation of which produces great utility—by a subgroup of parties, and are very likely to impede the distribution and utilization of data. Furthermore, it would be difficult to demarcate the data that should be granted such rights. For this reason, when protecting data by law, protection should be based on action-regulating type approaches. Based on this, it would be desirable to adjust data usage rights by contract for each individual usage right based on the standpoints of encouraging data usage and the need for data confidentiality, and factors such as the degree of contribution to data creation.

In other words, in order to promote the utilization of data in society as a whole, instead of adopting legislative approaches for granting property rights to data in general, the matter should be basically left up to flexible forms of regulation based on contracts between transacting parties and, from the perspective of promoting reasonable contract negotiations and conclusions, the matters to be stipulated in such contracts should be clarified based on guidelines and such[111]. Also, a multifaceted approach will be required[112] such as by providing legal protection for data against wrongful acquisition or usage[113], and defining the extent to which certain data can be used without the permission or consent of the rights holder[114] in cases where the degree of disadvantage to the rights holder is minor.

We should also consider mechanisms for monitoring whether data is handled according to contract provisions, and mechanisms for providing rights redress to respond to rights infringements.

110) Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases
111) In Japan, the Ministry of Economy, Trade and Industry has published their "Contract Guidelines for AI and Data and Usage" as a model for enabling adjustments such as these by contract. It is desirable that such guidelines are reviewed as needed (4.3.5).
112) Also see the approach discussed in an earlier footnote (109).
113) In Japan, the amendment of the Act against Unfair Competition protects “shared data with limited access” against wrongful acquisition or usage. The “action-regulating” approach is the approach prescribed in this amendment for providing legal protection for data. The definition of “shared data with limited access,” the criteria of unfair competition, and other information is published in the Ministry of Economy, Trade and Industry "Guidelines for shared data with limited access.” It is desirable to clarify in this way, in guidelines and such, the extent of protection provided and to update their provisions in a timely and appropriate manner.
114) In Japan, the amended Copyright Law provides that copyrighted material may be used without the permission of the rights holder for purposes such as deep learning for AI development and location search services provided that no disadvantage is caused to ordinary rights holders, or the degree of disadvantage to rights holders is minor. In addition, under the amended Act on the Protection of Personal Information, “anonymously processed information” can now be provided to third parties without the consent of the person, provided that certain rules are observed. See 3.2.1 for the use of personal data without the consent of the individual.

4.5.4 Developing infrastructures that enable safe and flexible transactions

In Society 5.0, where data and other intangible assets constitute the sources of wealth, it becomes important to develop market infrastructures associated with trading these intangible assets. Examples of market infrastructure include systems such as for writing and recording contracts, systems related to payment, systems related to ID verification, data standards and quality standards for different sectors, and systems related to data management and traceability.

Multi-stakeholder governance as described in 4.4 should be implemented in building these infrastructures.

4.5.5 Developing systems for swift dispute resolution and rights redress

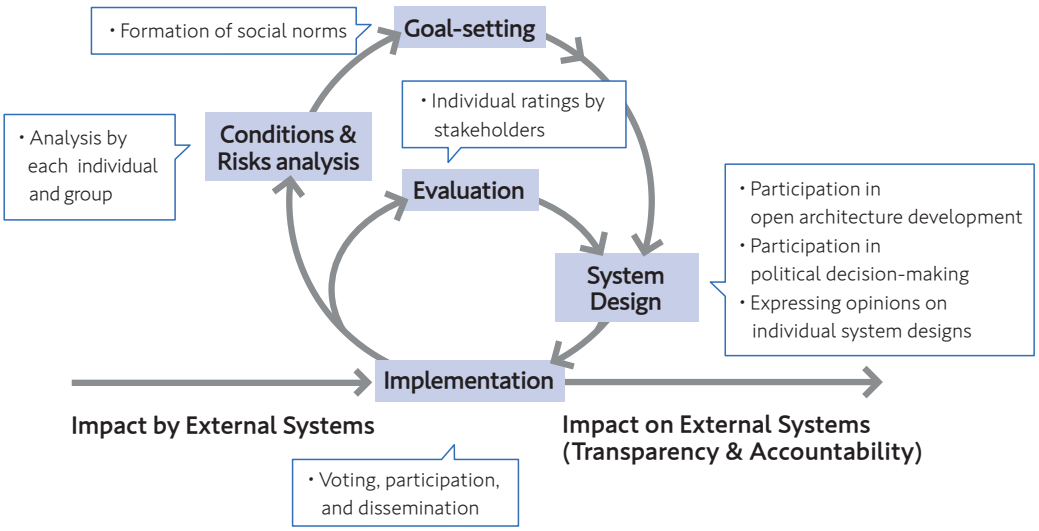
Dispute resolution mechanisms as a means of remedy for rights are essential for ensuring the sound functioning of markets. In Society 5.0, which will be complex, fast-changing, and increasingly difficult to make future predictions in advance, ex post facto dispute resolution will have more importance than has been traditionally the case. However, trials, the primary avenue for dispute resolution, and ADR (alternative dispute resolution) are basically conducted offline, and their procedures, in addition to being not very convenient, involve considerable cost and time. As such, these are often difficult to utilize in small-scale disputes, which account for a large percentage of disputes in our societies. To this end, it is important to bring the courts and ADRs online, and to push for the social implementation of online dispute resolution (ODR) which will enable parties to implement procedures leading up to execution quickly and at low costs[115].

In addition to these centralized approaches to dispute resolution; centralized in the sense that they involve the intermediation of some authority; the use of technologies such as blockchains, smart contracts, and AI to build decentralized law enforcement systems can potentially become a feature of Society 5.0. However, since it has been pointed out that these law enforcement approaches have peculiar problems, such as difficulty in making ex post facto corrections, it will likely be necessary to take measures such as

115) In Japan, studies have begun on the introduction of IT in trials and the implementation of ODR (in the narrow sense with ADR in mind). “Study Group for the Introduction of IT in Trials” Japan Economic Revitalization Bureau, Cabinet Secretariat (https://www.kantei.go.jp/jp/singi/keizaisaisei/saiban/index.html)
”Summary Report on Advancing the Vitalization of ODR” Study Group for Vitalizing ODR, Japan Economic Revitalization Bureau, Cabinet Secretariat (https://www.kantei.go.jp/jp/singi/keizaisaisei/odrkasseika/pdf/report.pdf)

alerting users and creating guidelines according to their phases of dissemination.

4.6 Agile governance by social norms



4.6.1 The importance of governance by social norms

It will be more important than in the past for individuals and communities to participate as stakeholders in Society 5.0 where CPS make up the foundations of our individual lives and communities. And their methods of participation will not be limited to traditional ways of involvement, such as "one person, one vote" or "complaint filing," and may include a variety of approaches as described below, such as posting on SNS, participating in civic tech, and contributing to open-source software communities. As in the examples mentioned in Chapter 1, there have been numerous cases where innovations, regardless of the fact that they were not in violation of any law or regulation, were not implemented because they were considered to be problematic in light of people's social norms. Overall, we can say that the influence that individuals and communities have on governance is growing.

Governance based on social norms developed by individuals and communities are characteristic in that, unlike rigid law, they can flexibly reflect the specific situations from moment to moment, and people's values associated with them. In this respect, these are highly affinitive with the concept of agile governance, which constantly evaluates changes in the environment and reflects them in system design.

On the other hand, they also create the risks of social division and personal lives being threatened by misunderstandings based on unsubstantiated false information or focused attacks (so-called “blow ups”) on particular individuals or organizations. In addition, as failures are inherent in the early stages of implementing innovation, another risk is that intensive criticism against unavoidable problems may hinder the social implementation of innovation. The challenge is to achieve sound governance based on accurate information and the acceptance of a diverse range of ideas.

As such, we discuss the following three aspects of the ideal shape of governance to be carried out by individuals and communities.

[1] Providing individuals and communities with appropriate information on which they can base their decision-making (4.6.2)
[2] Ensuring the participation of individuals and communities in political decision-making (4.6.3)
[3] Ensuring the participation of individuals and communities in system design (4.6.4)

4.6.2 Providing individuals and communities with appropriate information on which they can base their decision-making

In Society 5.0, which is complex and rapidly changing, information is overflowing in amounts that are incomparable to what was available in previous societies, making it increasingly difficult for individuals to understand the events in their societies.

In addition to this, the information that individuals come in contact with has been selected by some method. Some of the information provided may have been selected by the so-called “filter bubble” and tailored to individual tastes, or may be click bait that exaggerates the facts or expresses only unilateral views. In addition, due to the increasing diversity of the senders of information, there have been more than a few cases where social criticism was triggered based on incorrect or fragmented information. As we have seen, even though there formally may be a "free market for thought and speech" on Internet space, the information that people actually come in contact with may be based on nothing more than a narrow spectrum of values. It can be said that this state of affairs may become a hindrance to the

agile governance process where current situations are evaluated based on various events and these evaluations are reflected in system design.

Therefore, in Society 5.0, the accuracy of information and diversity of values provided to individuals becomes key. Therefore, platforms should be required to clearly indicate that they disclose their methods and grounds for selecting information. In addition, neutral institutions that evaluate the accuracy of information on the Internet and raise risk awareness will also become more increasingly important. Furthermore, it will be important for public institutions to transparently provide objective information and data that can be used by individuals and communities as a basis for making their decisions on developing their norms[116].

The purpose of agile governance is not to define any single "correct answer" or "truth." Rather, what we should do to create a better society is to continue our search for optimum solutions for each instance, while repeating a variety of trial and error in the face of changing goals and social conditions. Therefore, it will be important to develop social norms that are built, not around blaming specific individuals, but around tolerating mistakes and failures, and if any problem occurs, holding discussions aimed at investigating the causes and making improvements.

4.6.3 Ensuring the participation of individuals and communities in political decision-making

Advancements in digital technology have given individuals and communities the ability to diversify how they participate in political decision-making. It is important to go beyond the traditional "one person, one vote" and “lobbying by powerful parties” approaches, and more practically reflect the views of stakeholders in public policy.

The approach to solving social issues and problems of governments’ administrative services by combining the voluntary participation of citizens and technology is also referred to as Civic Tech, and thanks to the development of digital technology, this new form of citizen participation is already being developed and put into practical use in many regions in Japan and overseas.

For example, in Europe, a project called D-CENT (Decentralized Citizens ENgagement Technologies) was run from October 2013 to May 2016 with

116) Tokyo Metropolitan Government "New Coronavirus Infection Response Site" https://stopcovid19.metro.tokyo.lg.jp/

EU funding. D-CENT tools based on open standards, open APIs, and shared identification systems were developed and operated by multiple municipalities to realize direct democracy and economic empowerment[117]. In Japan, non-profit organizations are working in public-private partnerships utilizing IT, an example of which is Code for Japan, a general incorporated association and non-profit organization that is developing a new coronavirus infectious disease control site for local municipalities[118]. In order to increase the opportunities for citizens to get involved in politics and express their wishes, it can be said that mechanisms will be required that utilize digital technologies to identify such potential needs regarding political participation.

4.6.4 Ensuring the participation of individuals and communities in system design

In Society 5.0, where CPSs make up the foundations of our lives, it will be important for individuals and communities to be involved not only in political decisions but also in the design of individual systems and services. In the following sections, we describe open-source software and the availability of means of simulation for users as ways that individuals and communities can participate in these system design processes.

(1) Designing and improving open-source software

Open-source software is a type of software that is made available to the public based on the idea that its source code[119] can be made available to the public and handled in any way that people choose. Because the source code is made available, people are able to understand the structure and operating principle of a given program, make modifications to parts of it to change its behavior, or embed the program into other programs. Software released as open-source is released so that people can easily acquire the entire program

117) D-CENT, "About," (https://dcentproject.eu/about-us/) The city of Barcelona, Spain introduced this as a participatory platform under the name Decidim Barcelona. Decidim offers multiple participatory processes including for local public policy, as well as a process called participatory budgeting, which allows citizens to propose and vote on the local municipality's investment projects. While persons need to be registered citizens of Barcelona to be involved in proposal decisions, anyone who creates an account on their website is able to make proposals and participate in the discussion process. DECIDIM.BARCELONA, (https://www.decidim.barcelona/)

118) Code for Japan, "Data disclosure support for COVID-19 infection countermeasures," (https://www.code4japan.org/activity/stopcovid19). The organization also works in collaboration with various organizations named "Code for [name of region]," forming a network of over 80 organizations throughout Japan. Code for Japan, "Brigade (Code for X)," (https://www.code4japan.org/brigade)

119) Source code is a human-readable program written by software developers, and is converted into a computer-executable machine language program (object code) which can then be executed.

from the Internet or by other means. In many cases, the program can be used, duplicated, modified, redistributed, or embedded into other programs that people develop on their own in any way they prefer, subject to certain conditions[120]. By utilizing open-source software, developers are able to realize necessary system functions in a shorter amount of time compared to if they were to design and develop the entire program on their own. And owing to their excellent efficiency and convenience, there have been an increasing number of cases in recent years where corporations have begun to use unmodified open-source software in parts of information systems and control systems that they develop and provide, or embed modified versions of these software in these systems.

Ongoing mechanisms are available for sustainably enabling various stakeholders to voluntarily and constantly make adjustments or modifications to, or trash these open programs even after a system is built, which exemplifies agile governance in practice. However, due to their nature, their administrators or locus of responsibility are often unclear. It is also time consuming to perform post-operation assessments, and to verify whether improvements are being made based on these assessments and if so, by whom. Therefore, in managing the quality and safety of CPSs, it is important from a governance perspective to examine questions including: In what kinds of situations should we use open-source software? How can we objectively verify their safety? And how should liabilities be assigned in the event of a problem?

Column 12

The process of implementing agile governance from the perspective of open-source software development processes

When we consider the process of realizing an agile governance mechanism based on the process of agile open-source software development described above, our actions as the ones who benefit from the deliverables may have the following characteristics.

- First come, first served (Nothing happens just by having discussions within an organization. One can take initiative only by publishing it as soon as possible, putting it into practice, and then by receiving support as well as fielding criticism from many.)
- Corrections and adjustments can be made over and over (Publishing it doesn't mean that its deliverables are frozen in place. It is a common recognition of society that deliverables are perpetually unfinished.)

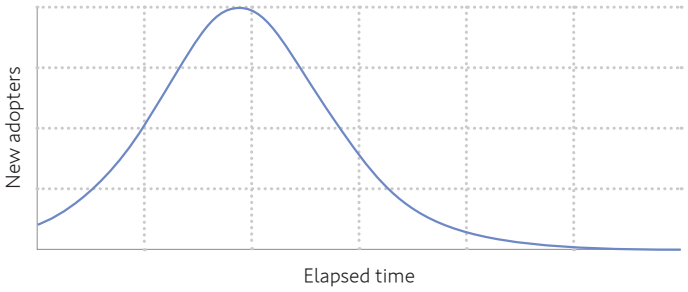
120) Source: IT Glossary (http://e-words.jp/)

- Survival competition (Proposals that survive harsh criticism, such as “This is no good,” or “Other proposals are better” end up being widely used.)
- Verification by users themselves (Early adopters who are able to perform verifications themselves use it earlier than anyone else. They may give it a high rating, criticize it severely, or quickly get bored and abandon it.)
- Trust in mature systems (The majority, who lack the ability to perform verifications themselves, will often use systems that have become less problematic after a history of actual use by large numbers of people.)

At first glance, these open software mechanisms may seem to be diametrically opposed to legal or administrative practices, but in fact, there are areas where features similar to them have been institutionalized. For example, under patent law, the first applicant to file for an invention is granted patent rights (first-to-file principle).

- Examiners of the Patent Office are responsible for identifying the reasons why the invention in an application does not "satisfy" patent requirements. Third-party opposition to patents and requests for trials for invalidation of patents are also frequently used.
- The patent applicant can make amendments to the content of an application, and make revisions even after the patent right has been granted.
- The Patent Office’s examination practices (provided in the Patent/Utility Model Examination Standards document) are constantly subjected to user criticism and are frequently revised.
- The broad outline of the matured patent rights system continues to receive ongoing support from its users.

When many legal systems and administrative practices begin to implement agile mechanisms, the global spread of new systems may come to have the earmarks of the Bass Model illustrated in the example in the chart below which is known as an aspect of the Diffusion of Innovation where, over time, newly proposed mechanisms are newly adopted by an increasing number of jurisdictions and organizations, and after peaking, the number of new adoptions begins to gradually decline (See chart below)[121]. In fact, it has been observed that the spread of legal systems is often in line with the Bass Model[122].



121) Frank M. Bass, A New Product Growth for Model Consumer Durables, 15 MGMT. Sci. 215 (1969)., EVERETT M. ROGERS, DIFFUSION OF INNOVATIONS (5th ed. 2003).
122) Michal Shur-Ofry, Gadi Fibich & Shira Green, The Diffusion of Legal Innovation - Insights from Mathematical Modeling, 52 CORNELL INT'l L.J. 313 (2019)

For example, moves to incorporate sounds, scents and colors, etc. under trademark protection, and legal systems to promote carbon neutrality are currently likely to be in the climbing phase before the peak. Looking at individual patent applications, for example, we can see that applications for inventions that use deep learning are rapidly becoming popular.

In order to achieve widespread implementation of a new governance system, it will be important to be the first proponent (take the first initiative to launch the climb up the peak), or an early adopter (become one of the players who launch a solid climb up the peak). (Shinto Teramoto)

(2) Ensuring the availability of means of simulation to users

How are we to enable the participation of large numbers of individuals and communities—who are not and never will be directly involved in open-source software design—in system design?

Users' norms-awareness is generally a major concern when companies develop their services, and users are able to rate companies and their services, and encourage improvement by commenting on their services on SNS. However, the subjects of opinions and ratings given by general users are limited to user interfaces, an area where they are able to make judgments on. In many cases, they are not able to make any judgments on the behavior of algorithms or data handling that goes on in the background due to lack of transparency.

For this reason, system developers/operators are required to explain the algorithms and data handling in a manner that is understandable to users[123]. These explanations may not be limited to verbal explanations, and it may be worth considering, for example, providing simulations that allow users to have a simulated experience of the viewpoints of system developers/operators.

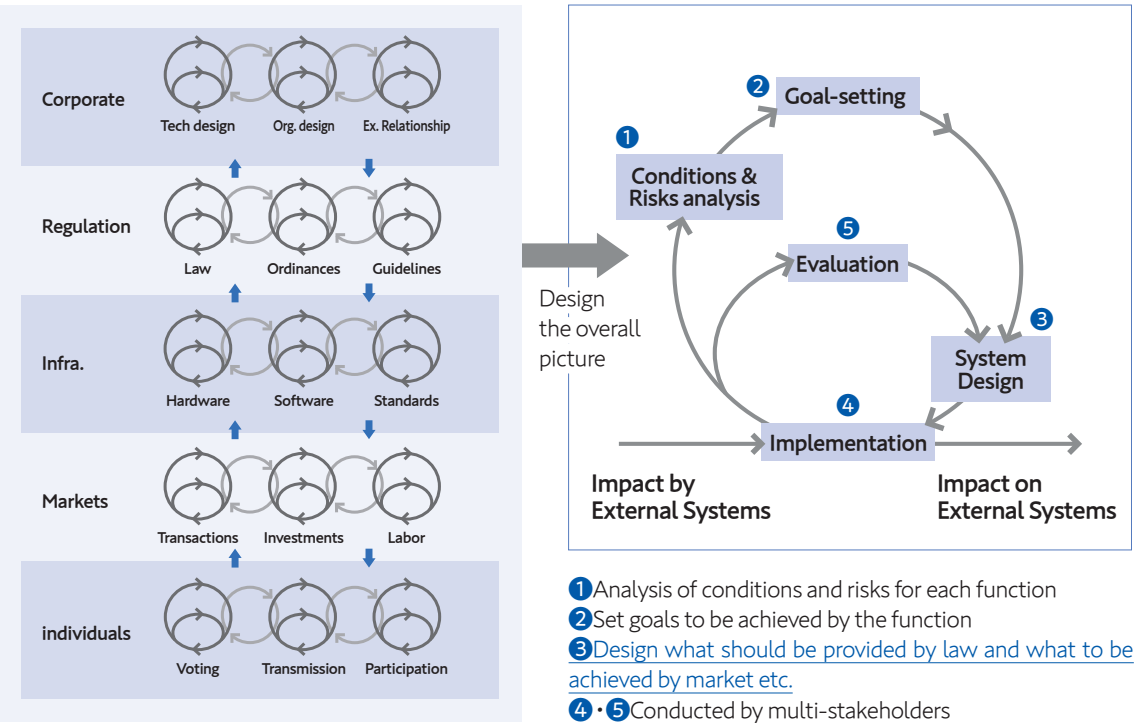
123) The "Act on Improvement of Transparency and Fairness in Trading on Specified Digital Platforms (Act 38 of 2020)" (commonly known as the Digital Platform Trading Transparency Act) was enacted in Japan in May 2020 to improve the transparency and fairness of trading carried out on digital platforms such as e-commerce malls which continue to gain widespread popularity. Based on this Act, operators who are larger than a certain scale and deemed to be specified digital platform providers are now obligated to disclose information such as on their trading terms and conditions, voluntarily prepare procedures and systems, and submit fiscal-yearly reports regarding measures they have implemented and overviews of their businesses accompanied by self-assessments.

4.7 Governance of Governance

4.7.1 Governance by combining multiple governance mechanisms (Governance of Governance)

[Figure 4.7.1] Governance of Governance

Overall shape of governance for individual functions



1 Analysis of conditions and risks for each function
2 Set goals to be achieved by the function
3 Design what should be provided by law and what to be achieved by market etc.
4 · 5 Conducted by multi-stakeholders

So far, we have looked at the ideal forms of agile governance in various governance mechanisms in areas such as corporate, law, infrastructure, markets, and individual/community participation. The concept of agile governance—where various actors constantly review their goals in response to changes in conditions, and continuously design, implement and evaluate systems based on these goals—is essential for Society 5.0, which is fast-changing and difficult to predict.

Based on this, real-world governance in societies is achieved through interactions between overlapping layers of these individual governance mechanisms. In other words, when a certain innovation emerges, the objectives of each of the actors should be achieved not only through the design of the technology itself, but also through the entire governance system, including laws and regulations relevant to the technology and the entire infrastructure system. Therefore, in considering the governance of

various systems in Society 5.0, we should design blueprints of governance overall that specify “how we should combine multiple governance mechanisms to achieve our objectives” (GoG: Governance of Governance), and not by simply making individual governance mechanisms agile.

The following model is an example of a potential combination of governance mechanisms.

[1] The levels of goals that should be ultimately achieved is stipulated by law.
[2] The means for achieving these goals is left to the initiative of businesses.
[3] Market participants, individuals and communities rate the actions of the above-mentioned businesses on an ongoing basis.
[4] In fields where it is better to establish certain areas of cooperation, government or neutralorganizations bring stakeholders together to build infrastructure.

This is simply an example, and for systems such as nuclear power plants that pose extremely high levels of risk in the event of accident, it is conceivable to have stipulations down to detailed rules fall under the provisions of law. In addition, it is worth considering establishing systems of certification provided by specialized neutral institutions for cases where it is difficult for general market participants to determine whether goals are being achieved. Meanwhile, with respect to technologies with low levels of risk, it may often be better to leave them to the market without any legal regulations to begin with.

In addition, the various measures described in sections of this Report will be needed to realize these results. For example, these include [1] creating forums for realizing participatory deliberative democracy for designing legislation (4.6.3), [2] providing appropriate incentives to ensure corporate transparency and accountability (4.2.7 to 4.2.10), [3] ensuring a fair competition environment and the availability of appropriate options for consumers to enable them to rate and make choices in the market (4.5.2), and [4] ensuring multi-stakeholder participation in infrastructure design (4.4), among other measures.

The key here is that, in Society 5.0 which undergoes rapid change, "environment/risk analysis," "goal setting," "system design,"

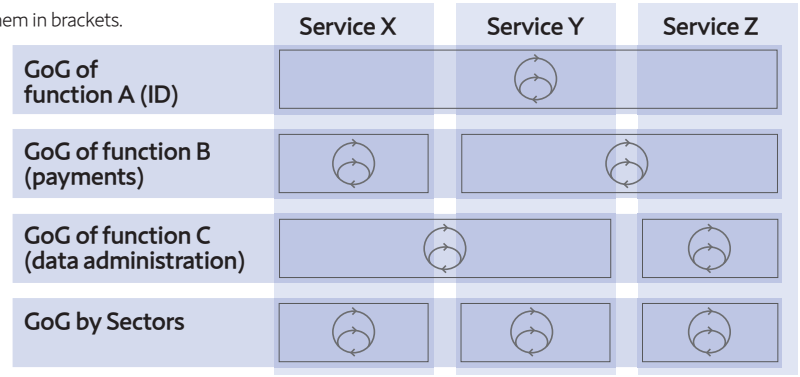
"implementation," "evaluation," and "improvement" in line with the agile governance concept should be continued, even for Governance of Governance discussed above. Furthermore, with respect to their implementation, transparency of the whole—and not only of individual governance mechanisms—should be ensured and comprehensive evaluations with the participation of multiple stakeholders should be conducted.

4.7.2 Governance of entire services that combine multiple functions

In 4.7.1, we discussed Governance of Governance (GoG) for specific functions, and we note here that the various services in Society 5.0 are provided by combining more than one of these functions (2.5). For example, a list of only a broad category of functions for MaaS services will include [1] personal identification, [2] matching, [3] payment, and [4] operation. And it is extremely difficult to predict in advance what kind of function will combine with what other kind of function to create a new service. For this reason, the Governance of Governance process should be constantly applied, not only to the governance of individual functions, but also to the governance of configurations where multiple functions are connected.

[Figure. 4.7.2] Governance of services provided by a combination of multiple functions

* Examples of functions and services are shown beside them in brackets.



This makes it difficult for service providers to govern entire services where multiple functions are connected to each other to provide the service. Therefore, governance environments should be built where service providers only need to ensure that the governance of the functions that they provide meets requirements (i.e., parties using functions provided by a third party are able to trust assertions made by the third party).

To ensure this, Governance of Governance must be appropriately implemented for each function, and clear descriptions should be provided on what and to what extent third parties may trust the function. Specialized knowledge on individual functions, as well as on individual governance mechanisms (businesses, legal, infrastructure, market, etc.) will be required to actually apply Governance of Governance in practice. To achieve this, it would be essential to establish public and open specialized agencies in which experts and stakeholders from a diverse range of fields are able to participate.

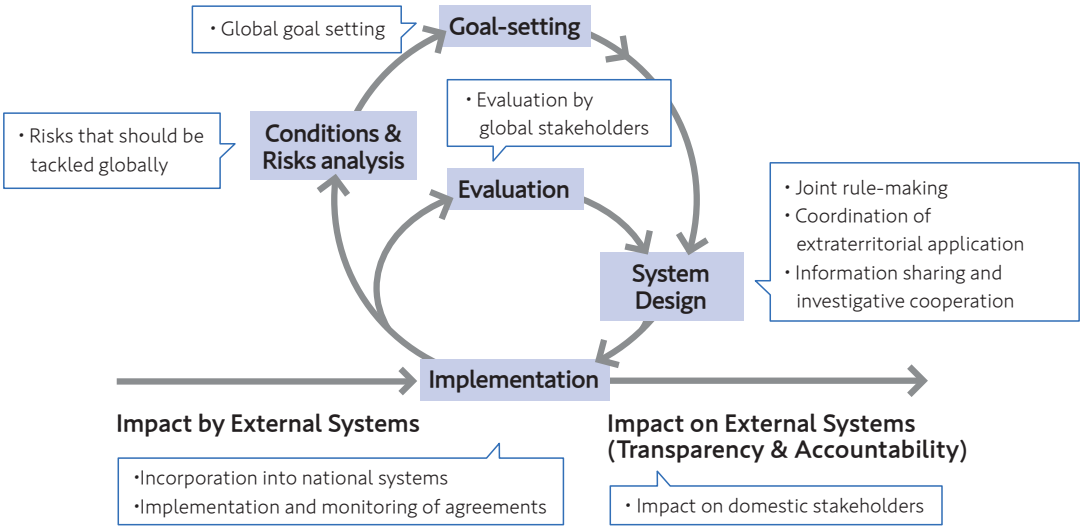
Column 13

Efforts in Japan to realize Governance of Governance

In Japan, the Digital Architecture Design Center (DAC) was established in May 2020 at the Information-technology Promotion Agency (IPA), an independent administrative agency for the purpose of putting "Governance of Governance" into practice[124]. Furthermore, on October 16th of the same year, the Ministry of Economy, Trade and Industry launched the "Digital Market Infrastructure Development Council for the Realization of Society 5.0" to promote the development of a horizontally traversing digital market infrastructure (especially for selecting the fields in which to work on the design of digital architecture). Going forward, it will be important to proceed globally on the design of digital architecture through the collaboration of various stakeholders, with a view to collaborating with similar organizations in other countries.

124) Based on the 2019 “Bill for amending parts of the Act on Facilitation of Information Processing”

4.8 Realizing agile governance globally



As CPSs, which has no clear borders, becomes the foundation of society, local business activities and personal communication will come to have global impacts as discussed in Chapter 2. Furthermore, issues such as global warming, environmental pollution, and measures to counter the COVID-19 pandemic are also global in nature. Therefore, agile governance, the topic of this Chapter, should also be carried out on a global scale. To achieve this, public and private actors should promote, at the global level, the formation of rules, information sharing, and establishment of survey/execution cooperation systems on various issues.

4.8.1 Intergovernmental and multi-stakeholder initiatives

Cooperation between nations is imperative in order to form global rules. To this end, it would be desirable to promote cooperation in individual and specific fields, such as mobility, finance and healthcare, while aligning our perspectives on the governance needed for the new era, such as by sharing ideas associated with agile governance and the goals that we must achieve.

Globally, cooperation frameworks on governance are already being established in a diverse range of fields. For example, in November 2020, the establishment of the Agile Nations Charter was declared by willing nations with the aim of promoting international cooperation in the formation of rules on innovation, and to jointly move forward with information sharing

and demonstration tests[125]. In the financial sector, the Global Financial Innovation Network (GFiN) was established by regulators of willing countries in 2019[126] and cooperation is underway on the formation of rules regarding innovation.

An example of a global multi-stakeholder initiative would be the World Economic Forum's Global Future Council on Agile Governance which is studying agile regulation and has published a toolkit that regulators can refer to[127]. In the field of AI, studies into how theory and practice regarding AI governance can be connected is being carried out by the Global Partnership on Artificial Intelligence (GPAI)[128].

International taxation is also a key area where intergovernmental cooperation is essential. International debate is ongoing, primarily led by the OECD, as to which countries have taxation rights, and the type of taxation rights that they have, on profits generated from the global activities of companies[129].

By working within the framework of these initiatives to develop interoperable rules, methodically organizing ideas regarding the extraterritorial application of domestic laws, and advancing cooperation in areas such as investigation and enforcement, we will be able to develop a global governance environment that will enable the realization of people's happiness while promoting innovation.

125) Participating countries are Canada, Denmark, Italy, Japan, Singapore, the United Arab Emirates, and the United Kingdom (alphabetically or in no particular order). https://www.meti.go.jp/press/2020/12/20201209001/20201209001-1.pdf
126) The Global Financial Innovation Network (GFIN) https://www.thegfin.com/
127) World Economic Forrum "Agile Regulation for the Fourth Industrial Revolution: A Toolkit for Regulators" (2020) http://www3.weforum.org/docs/WEF_Agile_Regulation_for_the_Fourth_Industrial_Revolution_2020.pdf
128) The Global Partnership on Artificial Intelligence (GPAI) https://gpai.ai/
129) https://www.oecd.org/tax/beps/

4.8.2 International cooperation in standards development

In Society 5.0, which is expected to evolve around software architectures, the standards that are referred to when designing architectures are important. For this reason, working with multiple stakeholders on the development of international standards is also essential for ensuring governance for CPSs.

For example, ISO (International Organization for Standardization), IEC (International Electrotechnical Commission), and ITU (International Telecommunication Union) are prominent de jure standardization organizations that meet the Six Principles of international standards[130]. The TBT Agreement is highly effective from the perspective of international operations as all member countries promise that "domestic standards associated with legal systems will be consistent with international standards." The ISO in particular, in line with its directions in recent years, has set up specialized committees for developing solutions to social issues such as "aging societies" and "scientific investigation," as well as on the "circular economy" and other visions for societies. Under these major themes, the Organization is ramping up its activities in the area of establishing evaluation standards, ethical standards, system compatibility and other standards as international rules.

As described in Chapter 2, consensus building among international stakeholders in the public and private sectors through the development of standards such as these[131] will also be important to achieve the goals described in Chapter 3 for the technical infrastructures and bases of rules needed for realizing Society 5.0.

130) The following conditions described in the "Principles for the Development of International Standards, Guides and Recommendations" described in Articles 2 and 5, and Annex 3 of the TBT Agreement. (1) Transparency, (2) Openness, (3) Impartiality and Consensus, (4) Effectiveness and Relevance, (5) Coherence, and (6) Development Dimension.
131) With respect to the topic of Society 5.0, the IWA (International Workshop Agreement) meeting at ISO is also scheduled to start in 2021.

4.8.3 System connectivity between private businesses

In addition to the above-mentioned cooperation between nations and the formulation of standards, efforts to encourage the connection of systems between private companies are being advanced in countries worldwide. For example, in the financial industry, the standardization of technical specifications related to open APIs and the construction of API exchanges, which consolidate APIs of various private companies, are being advanced under government leadership. While these efforts are in some cases voluntarily carried out by private companies, they are predominantly being realized with the support of public agencies, and it can be said that public-private cooperation has become imperative in this area as well[132].

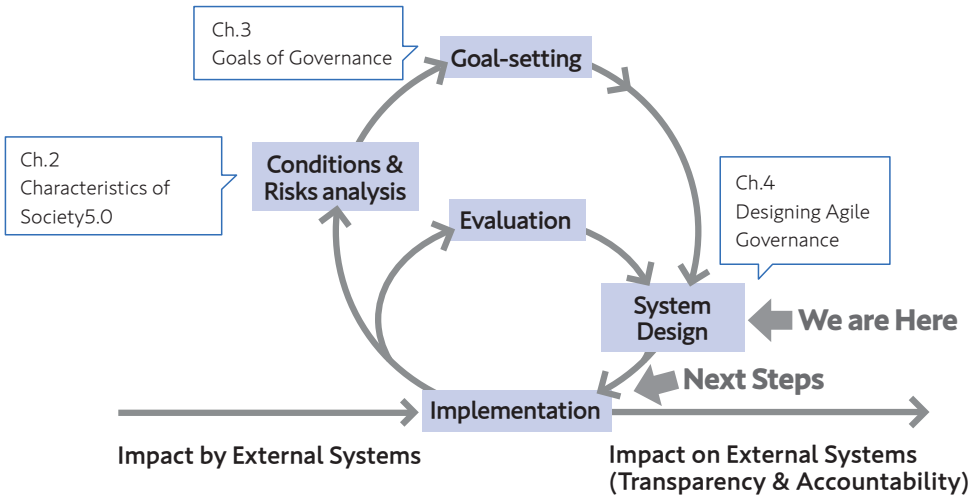
132) In the UK for example, for the purpose of promoting internal competition in the financial industry, which has become oligopolistic due to its vertically integrated business model, and to become a world leader in the field of open API, the Competition & Markets Authority established its Open Banking Implementation Entity in September 2016 to promote API-related standardization and have financial institutions make their APIs open. As of November 2020, 289 companies are providing APIs and forming an ecosystem.
In Asia, the Monetary Authority of Singapore played a central role, working together with the International Financial Corporation and the ASEAN Banking Association, in establishing the ASEAN Financial Innovation Network, an organization for promoting innovation in the financial industry. In November 2018, the organization started providing its API exchange with the aim of promoting the use of open APIs. As of December 2020, 64 financial institutions have provided APIs, and 372 companies are using these APIs.
Turning our eyes to the Middle East and North Africa, Fintech Galaxy, a Fintech hub of the UAE, collaborated with central and private banks in Arab countries to launch an API exchange called FinX22 in July 2020, expanding its services across 22 Arab countries. In addition, Singapore's ASEAN Financial Innovation Network formed partnerships with Fintech Galaxy in April 2020 and with the National Payments Corporation of India in August the same year. Going forward, it is believed that collaboration will move forward between API platforms spanning Southeast Asia, South Asia, the Middle East, and North Africa.
Meanwhile, in Japan, the amended Banking Act, which came into effect in June 2018, obligates financial institutions to make efforts to disclose their APIs, but measures are currently limited to individual actions and, unfortunately, almost no advancement is being made with respect to enabling interoperability between domestic financial institutions, or with overseas API platforms.

In closing

In order to maximize the positive impacts from innovation in CPS-based Society5.0, we need appropriate governance mechanisms (Chapter 1). When designing such governance mechanisms, we should consider that the world we live will change fast and become more complex and uncertain, which makes it difficult to control risks in advance (Chapter 2). Likewise, the goals of governance will continue to change along with the change of technologies and societies (Chapter 3). Therefore, we should implement "agile governance" approaches that are designed to continuously and rapidly run cycles of "conditions and risks analysis," "goal setting," "system design," "operations," "evaluation," and "improvements" in a diverse range of technological, organizational, and social systems (Chapter 4). This is the key message of this Report.

In fact, this Report itself is also structured according to this "agile governance" framework. That is to say, following introductory part of Chapter 1, Chapter 2 frames the "environment / risk analysis" in society, Chapter 3 discusses the "goal setting" that should be achieved by governance, and then Chapter 4 "designs the system" of agile governance. From this perspective, what is needed as the next step is to "implement" this model in various governance mechanisms, "evaluate" them and "improve" if necessary, while continuously "re-analyze" the environment and risks.

These governance reforms cannot be achieved by specific actors alone, such as governments and large corporations, and can only be realized through cooperation between a diverse range of domestic and foreign stakeholders, including SMEs, individuals, and communities. To this end, going forward, we believe dialogues for redesigning models of governance based on shared visions need to be carried out in a variety of different fields.



While there will be no end in these transformative times to the efforts required in the area of agile governance—through which we continue to explore the ideal shape of human happiness—we believe methodologies do exist for achieving this. Our hope is that this Report will serve as a starting point for discussions on how such methodology can be established.

Glossary of Terms

Agile governance

A model where multiple stakeholders continuously and rapidly run cycles such as for “analysis of conditions and risks,” “goal setting,” “system design,” “implementation,” “evaluation,” and “improvements.”

Architecture

The basic concept and characteristics of a system, which is realized through the relationships between elements, and becomes the principle of its design and evolution. (See ISO/IEC/IEEE 42010-2010)

Cyber-physical system (CPS)

A mechanism for connecting the virtual world (cyberspace) and the real world (physical space) with IoT-related technologies to refine industrial processes and solve social issues. Its purpose is to gather large amounts of data from various fields in the real world such as industry, healthcare, infrastructure, energy, transportation and public services, convert this data to valuable information and data through cloud computing and big data processing technology in the virtual world, and send them back to the real world to effect streamlining and optimization throughout society as a whole.

Goals

The “goals” in this Report is a broad concept of values to be achieved through governance, which may include "mission", "vision", "value", "purpose", or "objective" depending on the context. There is a hierarchy in the goals of governance as discussed in 3.1.3.

Governance

This refers to the designing and implementation of technological, organizational, and social systems performed by stakeholders for the objective of maximizing the positive impacts that are produced from the implementation of systems that integrate cyber and physical spaces (CPS: cyber-physical systems) while managing the risks that arise from the use of these systems to levels that are acceptable to the stakeholders.

Governance systems

Systems for implementing governance, which include not only technological systems but organizational systems and social systems as well. In Chapter 4 of this report, we examine the ideal shape of governance systems of companies, regulations, infrastructure, markets, and social norms.

Risks

The potential harm multiplied by the likelihood it will materialize.

Society5.0

A human-centered society where high integration of cyberspace (virtual space) and physical space (real space) can promote economic development and solve social issues.

Stakeholders

Parties who are directly or indirectly affected by a system. This refers to a wide range of actors

ranging from not only system administrators/designers and those who directly use or contract these systems, but also those who are exposed to unilateral and latent risks, such as passersby whose actions are captured on surveillance cameras, or pedestrians who cross the road in front of self-driving cars, as well as regulators and other public actors.

Systems

A collection of multiple elements whose elements are not limited to hardware and software, but also include people and organizations (NCOSE. 2015. Systems Engineering Handbook: A Guide for System Life Cycle Processes and Activities, version 4.0.).

Executive Summary of the First Report

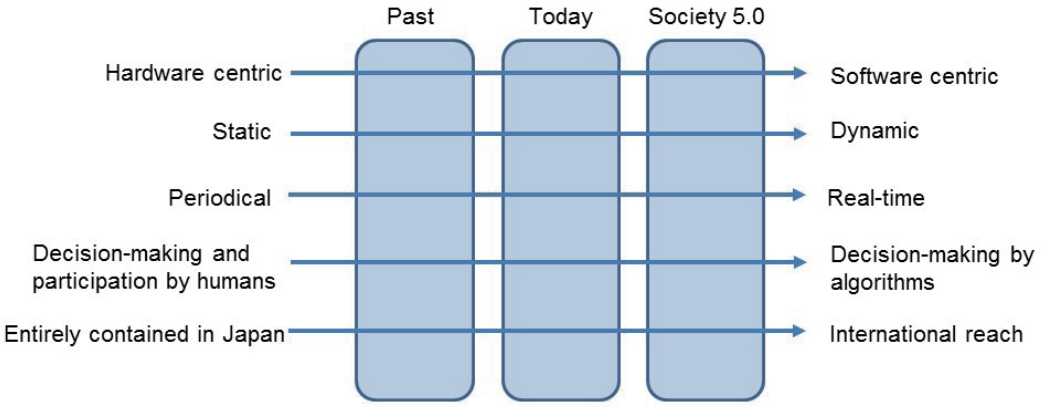
Executive Summary

- With the arrival of the Fourth Industrial Revolution, the society we live in is undergoing rapid structural change. A huge amount of data is collected through devices and sensors scattered throughout physical space, and is analyzed and processed by highly-developed artificial intelligence (AI). The analysis then exerts a major influence on the activities of humans and machines in the physical space. In this way, cyberspace and physical space are becoming highly integrated.
- Japan is pursuing a human-centered society in which a high degree of integration between cyberspace and physical space can promote economic development and solve social problems ("Society 5.0"). This report attempts to provide a framework for the new governance model to realize Society5.0 from two perspectives: the processes of governance (rule-making, monitoring and enforcement), and the stakeholders of governance (government, businesses, and communities and individuals).
- In order to achieve Society5.0, we need to maximize innovation throughout society, bringing disruptive change and creative destruction to society by implementing new digital technologies and using them to create innovative services (Governance *for* Innovation). At the same time, it is more important than ever to manage the potential risks brought by such innovation, to achieve fundamental values such as securing property, life, health, privacy, democracy, and fair competition (Governance *of* Innovation). Further, considering the complexity and speed of changes of social systems, we need to achieve fundamental values using innovative technologies (Governance *by* Innovation).
- To achieve these three goals simultaneously (i.e., Governance *for* Innovation, Governance *of* Innovation, and Governance *by* Innovation), we need to establish a new governance model under which the government, businesses, communities and individuals cooperate and fulfill their responsibilities by playing appropriate roles in governance
- At the G20 Ministerial Meeting on Trade and Digital Economy held in June 2019 in Japan, member countries declared that they would "strive for innovation-friendly policies to capitalize on the potential of digital technologies and look to remove barriers to innovation accordingly," under the title of "Governance Innovation." Establishing a new governance model is a critical common goal for the global community.
- As the integration of cyberspace and physical space progresses, the information that businesses or individuals can access and the actions they can choose in-

creasingly depend on the “architecture” of cyber-physical space. Therefore, how and by whom the increasingly integrated architectures of cyberspace and physical space are to be designed, and how the regulating elements, including laws, market mechanisms and social norms, should function are becoming crucial questions for the governance of the economy and society.

- In this regard, the traditional government-centric governance model is not ideally designed to maximize the benefits inherent in the architecture of Society5.0 while controlling the associated risks. The “traditional” governance model is one under which legislatures provide detailed rules (laws), regulatory authorities conduct periodic monitoring, and law enforcement agencies or courts enforce the law (administrative or criminal sanctions) and respond to violations.
- This type of governance model is believed to have functioned effectively in a society (i) that is static and slow to change, (ii) where data used for monitoring is collected by humans, (iii) where all decisions are made by humans, and (iv) where social activities are confined within national borders. In such a society, it was feasible to establish a certain code of conduct in advance; it was reasonable to monitor compliance periodically; it was possible to hold a specific individual liable when a violation occurred; and it was easy to enforce the law on the liable individual.

Figure 3.2 | Changes to social structures in Society 5.0



- However, Society5.0 is a society where (i) technologies and business models change rapidly, (ii) data used for monitoring is increasingly complex, (iii) many decisions are made through AI, and (iv) social activities can easily cross borders. In this cyber-centric society, it is difficult to specify codes of conduct. Rules cannot catch up with the speed of technological change or business models. The ability of humans to monitor information is small relative to the amount of data that can be collected by sensors. Holding a specific individual liable for decisions made by AI is

difficult. And the effectiveness of laws that apply only to one jurisdiction is limited. If we persist with the traditional governance model while society is changing as described above, we risk impeding innovation on one hand, or failing to uphold social values on the other, both of which would be failures of core functions of governance.

- To realize Society5.0, keeping the aforementioned social changes in mind, we need a multi-stakeholder governance model that values voluntary efforts by the businesses that design cyber-physical architecture, with active involvement of communities and individuals to reflect various values in governance.
- Considering these issues, this report proposes the following governance model. (Numbers in parentheses indicate the corresponding sections of this report.)

<General perspective>

① In each process of governance, i.e., (i) rule-making, (ii) monitoring and (iii) enforcement, **ensure active involvement of the businesses that design and implement cyber-physical architectures as well as the communities and individuals that use them.**

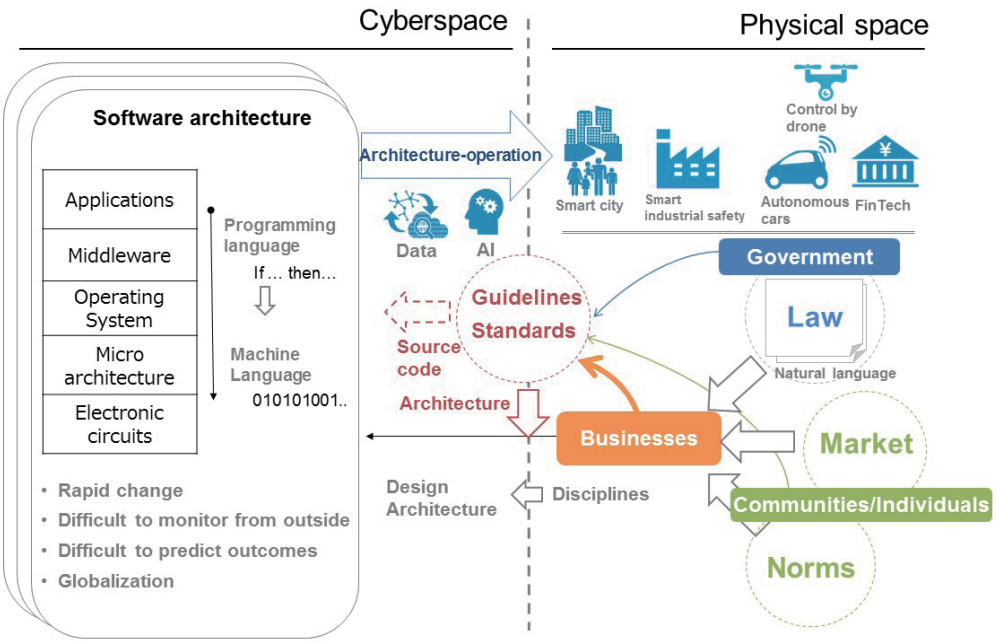
< Rule-making>

② Shift from rule-based regulations that specify detailed duties of conduct to **goal-based regulations** that specify values to be achieved at the end, in order to overcome the problem of laws not being able to accommodate the speed and complexity of society. (5.1.1)

③ **Establish non-binding guidelines and standards that businesses can refer to when designing or coding architecture**, so they can achieve the goals set by laws written in natural language through the use of a program language in cyberspace. These guidelines and standards will be established by engaging **a wide range of stakeholders**. (5.1.2)(**Figure 5**)

④ **Continuously evaluate the effects and impacts** of laws, regulations and guidelines/standards, and **arrange opportunities for frequent reviews**. In the review process, conduct an **evidence-based impact assessment** by referring to data collected during monitoring and claims of parties involved in the enforcement phase. (5.1.3)

Figure 5 | Governance based on intermediate guidelines and standards established by multi-stakeholders



⑤ As the information required for governance is concentrated in the private sector (information asymmetry), **design an incentive mechanism** to promote self-regulation by businesses **so that businesses will utilize the information they have in their governance**. (5.1.4)

⑥ **Oblige or incentivize information disclosure (transparency rules)** so that discipline by market and social norms will work effectively. In addition, **establish and enforce competition rules in a way appropriate for the digital era** to ensure competitive pressure from the demand side. (5.1.5)

⑦ **Have experts analyze and design an architecture necessary for governance** to determine the extent of discipline by laws and regulations, the scope covered by self-imposed rules, and types of information to be disclosed and to whom. (5.1.6)

<Compliance and Monitoring>

⑧ **Encourage businesses to take innovative approaches to achieving goals provided by laws comply, and focus on accountability for their activities (comply and explain)**. Further, in order to maintain public trust, **utilize various forms of assurance depending on the risk**, such as self-check, peer review, internal audit, agreed procedures, third party review and external audit. (5.2.1)

⑨ **Consider technologies and mechanisms** that enable each stakeholder, such as businesses, the government and individuals, **to access real-time data and**

conduct efficient and effective monitoring. (5.2.2)

⑩ **Conduct "monitoring and reviews" on a regular basis**, in order to report and evaluate the result of monitoring among stakeholders which will lead to revision of rules and improvement of systems. (5.2.3)

<Enforcement>

⑪ The government will **enforce laws in accordance with the social impacts of corporate conduct**. (5.3.1)

⑫ If an incident occurs as a result of a judgment made by AI whose behavior is difficult to predict, **provide an incentive for businesses to actively cooperate in the investigation of the incident, instead of holding a specific individual liable**. (5.3.2)

⑬ **Utilize de facto enforcement by the private sector**, such as businesses, self-regulatory groups and external audit firms, **while ensuring the appropriateness of such enforcement**. (5.3.3)

⑭ **Proceed with online processing of litigation and ADRs (ODR: Online Dispute Resolution)** to quickly and effectively resolve disputes that arise between businesses, individuals and the government. (5.3.4)

⑮ To ensure enforcement against conduct in cyberspace, **establish a common ID infrastructure for individuals/legal entities**.(5.3.5)

<International Cooperation>

⑯ Since digital technologies and businesses easily transcend national boundaries, from the perspective of achieving an equal footing for businesses in Japan and overseas, promote the **establishment of rules for extraterritorial application, enforcement based on international cooperation, standardization of rules and ensuring of interoperability**. (5.4)**(Table5)**

➢ Under this governance model, the roles of the government, businesses, communities and individuals are expected to change in the following way.

✓ The **government** will serve as a facilitator of multi-stakeholder rule making, rather than the sole provider of rules. For monitoring and enforcement, the government will design incentives for businesses, communities and individuals to proactively take part in those governance processes.

Table 5 | Overview of the new governance model

* Numbers in parentheses indicate the corresponding sections of this report.
The pink cells ( ) indicate multi-stakeholder processes.

Process \ Entity	State/Government (6.1)	Companies (6.2)	Communities/Individuals (6.3)
Rule-making (5.1)	• **Goal-based** regulations • Provision of **incentive**	•System architecture •Source Code	• Market mechanism • Social norms
	Co-create / Set goals / Co-create / Influence / Co-create		
	Guidelines/Standards (Reference Architecture)		
	Mutual reference		
	Designing **transparency rules** and **competition rules**		
	Enhance / Incentive / Enhance		
Compliance and Monitoring (5.2)	•**Risk-based** examination •**Data collection in cyberspace** through APIs, etc. (SupTec)	•**Comply & Explain** •Voluntary monitoring (RegTech) •Internal/External **audits**	•Evaluation based on **information from users and multi-stakeholders**
	Explain / Explain		
	Monitor / Monitor / Monitor		
	•Utilization of **real-time data**	• Implementation of **monitoring review**	
	Inform / Inform / Inform		
Enforcement (5.3)	•**Impact-based** sanctions •**Incident investigation** •Consideration of **deferred prosecution agreement (DPA)** •**Digital ID**	Incentivize •Incident **reporting** •**Cooperation** in investigation •**Improvement measures** •Voluntary enforcement Report	Evaluate •**Posting reviews** on social media, etc. •Direct negotiation •Discontinuation of service usage •**Impact on finance**
	Explain		
	Ensuring justice / Remedy of rights / Remedy of rights		
	Litigation/ADR (Online Dispute Resolution)		

Feedback and revision

Refer

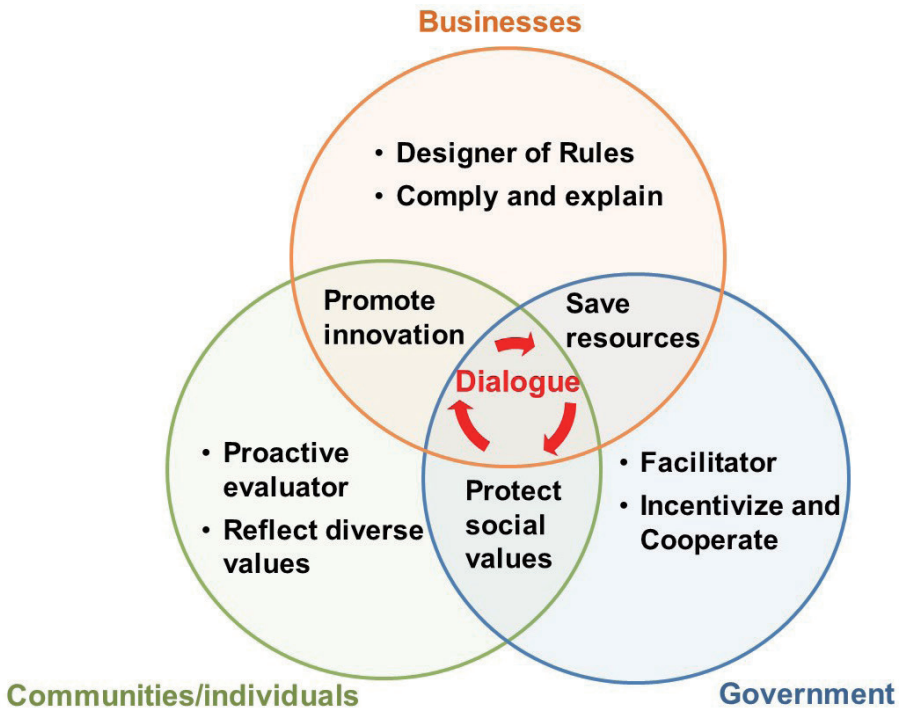
International cooperation (5.5)

✓ **Businesses** will become active designers of rules through self-regulations and architecture, rather than passive follower of given regulations. They are expected to play a leading role in ensuring trust in new technologies or business models by explaining their rules and architecture externally.

✓ **Communities** and individuals can become more than vulnerable actors who lack sufficient information, and become actors who are able to actively communicate their values and evaluations to society. These activities can be empowered by appropriate design and enforcement of disclosure rules and competition rules. (**Figure6**)

➢ Going forward, we will need to push forward with specific regulatory and institutional reforms in accordance with the framework of the new governance models presented in this report. Discussions have already started towards regulatory reform in the areas of mobility, fintech/financial and building construction. Also, it would be possible to provide a cross-sectoral framework in areas such as privacy, cybersecurity, AI quality assessment, and ID infrastructure.

Figure 6 | Changes in the roles of and benefits for each actor in governance innovation



➢ Since “Governance Innovation” is a global issue, it is important for stakeholders from Japanese industries, the public sector and academia to actively take part in global research and policy making in international forum, as well as to strengthen inter-governmental collaboration.

Study Group on a New Governance Models in Society5.0

(As of June 30, 2021)

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