GOVERNANCE INNOVATION

Redesigning Law and Architecture in the Age of Society 5.0

Study Group on a New Governance Models in Society5.0

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Preface

To empower the society by digitalization

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Structures of industries and society are seeing significant changes as a result of the rapid advancement of technological innovation centered on digitalization. In line with such changes, laws and regulations will also need to go through significant reforms. In addition to government-led regulations and systems, a new structure of social governance in a broader sense, such as the roles of communities, should perhaps be established. In light of these issues, we invited up-and-coming researchers and practitioners in fields such as law, finance, technology and business to discuss new modalities of governance. This report summarizes the results of the discussion.

The impact of digitalization on the structures of society and the economy is wide-ranging. I will outline the main points in the preface, and the details will be explained in the main body of this report.

The first point is that the synergy structure is changing, and traditional vertical structures of industries and businesses are starting to drastically collapse. For example, in many cases, information newly obtained through IoT will become useful for totally different industries and companies, creating new synergies. As a result, it is likely that collaborations across different industries as well as entries into different fields will further increase, and industry structures will significantly change. On the other hand, regulations and business laws have been established on the premise that existing industries are structured vertically. Consequently, one of the big challenges will be to suitably change them into horizontal and function-based regulations that transcend the vertical structures.

The second point is the rapid pace of changes. Although digitalization in a narrow sense may not always be the cause, one of the major characteristics of technological innovation happening in recent years is its rapid pace. A big issue resulting from this is the difficulty of changing regulations and laws to keep up with the speed of such innovation. Especially in Japan, it takes time to revise laws, possibly because there is

a strong mindset of making and revising laws without committing any mistakes. What is important is how quickly rules can be changed in line with technological innovation and changes in business settings resulting from such innovation, and how we can build a mechanism for it.

By considering the above two points in combination, we can see that it is becoming difficult for the government to grasp the overall situation, obtain sufficient information, and then establish or revise desirable rules at an appropriate timing. This is one of the reasons why we should consider a new governance structure. In other words, the third point is the asymmetry of information. In this case, a modality of governance emerges where the government and the state set a general framework and make it function holistically by collaborating with companies and communities that are more familiar with the actual situation and have sufficient information, and in some cases are more flexible in dealing with matters. What is important in doing so is the kind of general framework that the government should set, and details of collaboration with companies and communities. These topics are discussed in depth in the main body of this report.

Nevertheless, the situation of companies having information superiority over the government with respect to the actual situation is not something that occurred suddenly in recent years. For example, in cases such as BIS regulations in the financial sector, regulations have been implemented on such premise. Moreover, in the academic field, research has been actively conducted based on recent economic theories on regulations and laws, with respect to an ideal state of regulations in an environment where there is an asymmetry of information between the government and companies, and companies have information superiority. Expansion of an information asymmetry brought by the advancement of digitalization can be interpreted as a phenomenon that broadens the fields to which that academic research should be applied and utilized.

However, the phenomenon that is occurring is not only expanding the asymmetry of information. As a major portion of corporate activities become dependent on software with the advancement of digitalization, source code written in program languages starts to regulate those activities. Then, the government, which is an outsider, not only becomes unable to obtain the relevant information, but also faces an issue of whether or not it is capable of appropriately controlling software with laws and regulations written in natural language. We can rephrase this as the emergence of a need for considering the limitations or incompleteness of statements written in natural language, which is our fourth point and the second reason for the need to consider a new governance structure.

In this case, companies currently have no choice but to assume the role of

connecting the laws written in natural language with code written in programming language. This is one of the reasons companies should take part in building a governance structure. At the same time, as statistical processing is carried out based on given data, especially with AI that uses machine learning, we will also face a difficult challenge of predicting its judgment and conducting ex-post validation. As no one has sufficient ability to make predictions, the important point to consider when building a governance structure is that there is a need not only for the government but also for all stakeholders to address the uncertainty of society as a whole.

The issue of determining an appropriate governance structure for technological innovation centered on digitalization is a challenge faced not only by Japan, but rather it is a universal challenge faced by the entire world. This report presents several viewpoints and potential solutions and asks the world for opinions, rather than suggesting only one answer. As the Japanese government moves forward with determining an ideal state for Society 5.0, we hope that meaningful policies and systems will be designed with suggestions made in this report as a fundamental viewpoint.

Governance and laws in the age of Society 5.0

George Shishido,
The University of
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for Law and Politics

This report was created by researchers and practitioners in various fields, each of whom brought expert insights and engaged in open discussion beyond their area of expertise, seeking a form of governance in Society 5.0. The result of the discussion is accurately summarized in the preface by the Chair, Mr. Yanagawa. The purpose of my essay is to explain the implications of this report in the context of laws so that readers can better understand the report.

* * *

As our social structure is changing through the integration of cyberspace and physical space, this report presents the need for a new governance model and roles of each constituent: the government, companies, communities and individuals. What I strongly felt during the process of organizing the report was the need for new ways of creating a "knowledge" which transcends the boundaries between industry, government, and academia. At the same time, I believe the meaning of—and the need for—conscious acts to protect and develop values to be safeguarded for solving social issues were also clarified.

This report refers to the "pathetic dot theory" by Professor Lawrence Lessig, the analysis of the four types of forces: the law, social norms, markets, and architecture. It discusses the issues surrounding the existing governance as well as new governance models. It may seem that the report suggests architecture's control over humans, but that is not the intent of the report. The law, markets and social norms that have regulated our life in physical spaces are expected to change their forms in alignment with architecture, and fulfill roles that are suitable for a human-centered society.

* * *

The focus of "governance innovation" is the review of rule-based laws and regulations. The types of laws assumed here are regulatory, those that regulate the behaviors of businesses by industrial sectors (business laws). Reforms of Japanese administra-

tive and judicial system started in the 1990s, and attempted to modify such social system centered on business laws. However, we cannot really say that those reforms fully succeeded in presenting and making viable alternatives to such old system.

Conversely, this report depicts a more advanced governance model suitable for the new environment in phases of formulation of rules, monitoring, and enforcement of laws. We are not aiming merely for the easing of regulations, but rather "goal-based laws and regulations" that establish and assure human rights, fairness and safety. In such laws and regulations will emphasize enhancing and bringing out the abilities of companies through incentives and enhanced accountability.

The government is not the only party that monitors the appropriateness of governance by companies. Communities and individuals are also participants of governance. Therefore, this report also discuss the schemes of empowering communities and individuals.

* * *

Based on the above, I believe that "governance innovation" is not something that can be achieved solely through reviewing laws and regulation between companies and the administration. First, we need to get an overview of the entire public and private sectors, then build a platform for the mutual collaboration of those who implement governance innovation in various fields.

In terms of laws and regulations, while business laws transform to regulate by architecture and complementary measures (such as audits), the importance of regulation by constitutive types of laws (such as the civil law and criminal law) that have continuity with social norms and markets will increase once again. For regulation against special space such as super-cities and special entities with a particularly strong social influence, regulation by special laws and acts on special measures should be considered from the perspective of legitimacy and effectiveness. Innovation that is totally different from the conventional practice is required of lawmaking itself.

Judicial or quasi-judicial bodies, which impose ex-post sanctions on companies' transgressions, are also obviously a part of governance innovation. Ex-post resolution of disputes could provide momentum for identifying and correcting dysfunction of the coupling architecture and the law, while remedying rights and interests at the same time. The rule of law and a functioning judiciary system should be positioned as the foundation of "Trust" in the context of "Data Free Flow with Trust."
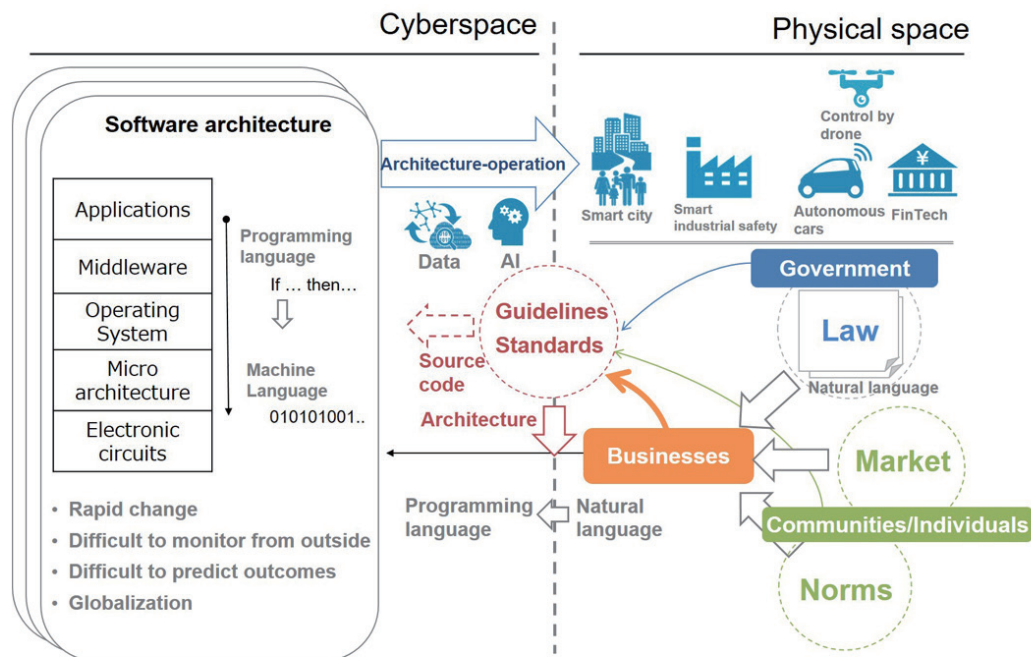
* * *

As explained above, my understanding is that the issues raised in this report will reach to the bottom of the law, including the legislature and the judiciary. It may be said that it is also the case in markets and social norms. The main body of this report

is strictly a summary of a discussion by an internal committee of the government. However, it has the potential to bring out implications that go beyond a regular "bureaucratic document." As a free member, I hope this report is read in such manner.
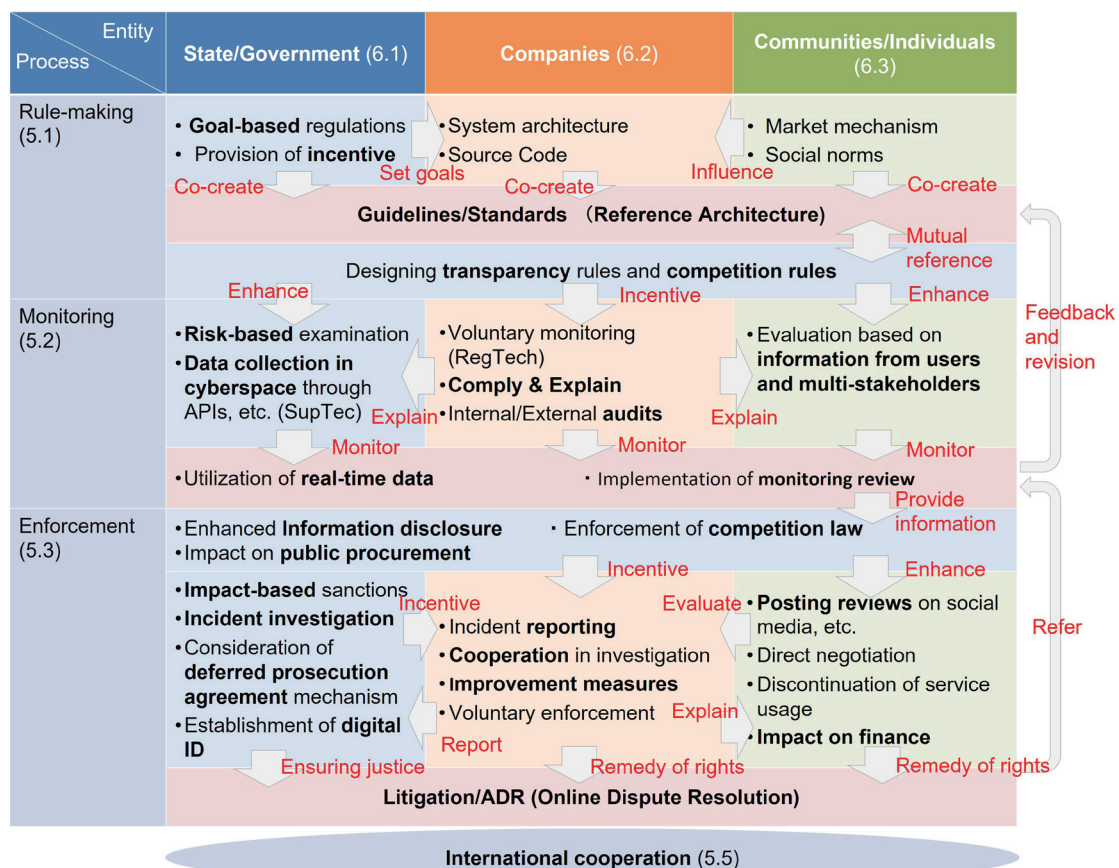
The promotion of innovation through governance and competition of knowledge surrounding governance innovation is starting to take place across the globe. While some of the report's content is somewhat provocative, I hope it provides an opportunity to think about and discuss the governance of society as a whole, as well as the governance of organizations to which we belong.

Governance based on intermediate guidelines and standards established by multi-stakeholders｜P.30

Cyberspace | **Physical space**

Software architecture

| Applications |
| Middleware |
| Operating System |
| Micro architecture |
| Electronic circuits |

Programming language
If … then…
⇩
Machine Language
010101001..

Architecture-operation

Data AI

Source code
Architecture
Programming language Natural language

Guidelines Standards

Control by drone
Smart city Smart industrial safety Autonomous cars FinTech

Government
Law
Natural language

Businesses

Market

Communities/Individuals

Norms

- Rapid change
- Difficult to monitor from outside
- Difficult to predict outcomes
- Globalization

Overview of the new governance model｜P.32

* Numbers in parentheses indicate the corresponding sections of this document.

Entity / Process	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
Monitoring (5.2)	•**Risk-based** examination •**Data collection in cyberspace** through APIs, etc. (SupTec)	•Voluntary monitoring (RegTech) •**Comply & Explain** •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**	Provide information
Enforcement (5.3)	•Enhanced **Information disclosure** •Impact on **public procurement**	・Enforcement of **competition law**	
		Incentive	Enhance
	•**Impact-based** sanctions •**Incident investigation** •Consideration of **deferred prosecution agreement** mechanism •Establishment of **digital ID**	Incentive •Incident **reporting** •**Cooperation** in investigation •**Improvement measures** •Voluntary enforcement	Evaluate •**Posting reviews** on social media, etc. •Direct negotiation •Discontinuation of service usage •**Impact on finance**
		Explain	Refer
	Report		
	Ensuring justice	Remedy of rights	Remedy of rights
	Litigation/ADR (Online Dispute Resolution)		

Feedback and revision

International cooperation (5.5)

Chapter 1: The Need for a "New Governance Model" for Realizing Society 5.0

1.1   Society 5.0 - Integration of cyberspace and physical space

With the arrival of the Fourth Industrial Revolution, the society we live in is undergoing rapid structural change. The changes by technological innovations centered on big data and AI will not simply be an extension of the information society and the Third Industrial Revolution, which was brought by the explosive spread of computers.

In the information society, humans and computers acted as intermediaries, connecting physical space (the real world) and cyberspace. In other words, data from physical space had to be input into a computer by humans so it can be accumulated in cyberspace. On the other hand, data that was accumulated in cyberspace needed to be analyzed by humans to become information that had value in society.

However, with large numbers of high-precision, low-cost sensors, cameras, and other devices scattered throughout the physical space, and the development of the Internet of Things (IoT) which connects everything to the network, enormous amounts of data from the physical space is being accumulated in cyberspace in real time without human intervention (Machine-to-Machine).

The huge amount of data collected in this way (big data) is automatically analyzed by highly developed artificial intelligence (AI). The development of AI technology has been remarkable in recent years, and in particular, the development of technology such as deep learning, in which machines perform advanced learning by themselves, has resulted in artificial intelligence that far exceeds human capabilities under certain conditions in a variety of fields such as image recognition, speech recognition, and natural language processing. In areas such as automated driving, automated financial transactions, service robots, and medical imaging, the range of decision-making by such AI-incorporated systems is expanding. Results from these analyses are fed back simultaneously to multiple devices in physical space via 5G communication which provides high speed, large capacity, and low latency communication which can generate new data.

Since it is difficult to define physical borders such as national borders in cyberspace, the cycle of data collection, analysis, and feedback occur across borders on a global scale.

These recent changes in technology can be shown as **Figure 1.1**.

Figure 1.1 │ Social changes that will Society 5.0 will bring
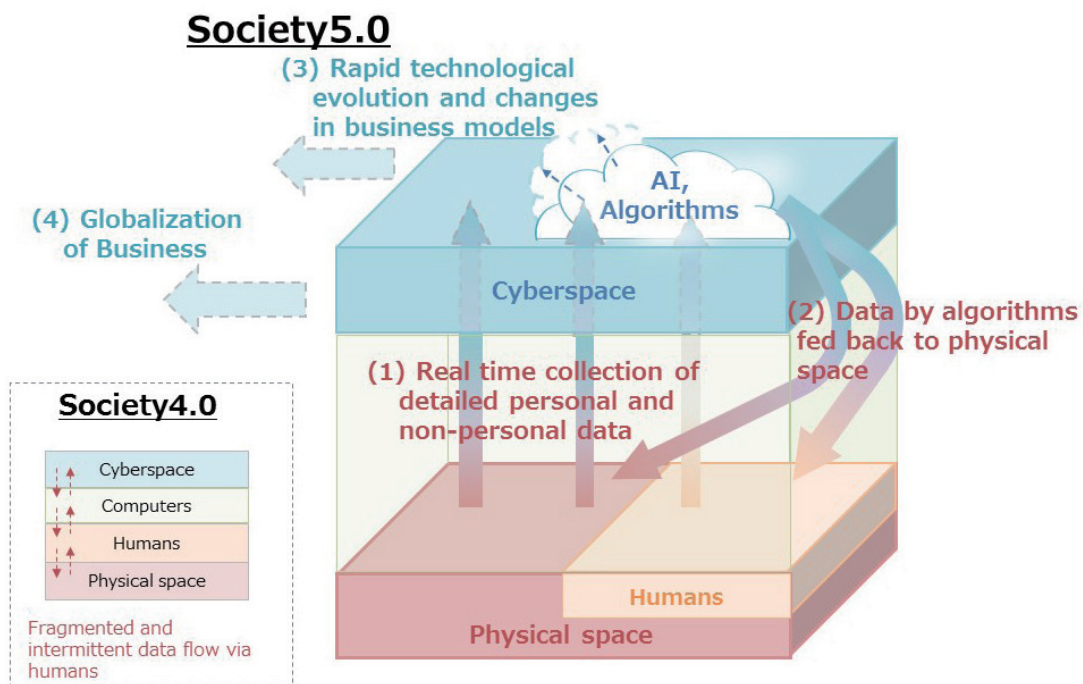
"Society 5.0" is what the government of Japan calls its vision of a human-centered society where high integration of cyberspace and physical space can promote economic development and solve social issues[1].

1.2   The need for Governance Innovation

1.2.1   The need to promote innovation

Such a society in which cyber space and physical space are highly integrated (Society 5.0) will bring about new business models and innovations that enrich people's lives. Digital platforms that we use on a daily basis, automated driving which are under global competition for technological development and being implemented, smart homes that aim for environmental compatibility, comfortable and secure living, and smart cities which aggregates these elements are just a few examples. In such a society, the functions that were performed by humans and hardware in physical space will be redefined by the functions of software in cyberspace, and recombined morefrequently. For example, the functions of multiple hardware, such as telephones,

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[1]   Cabinet Office web site https://www8.cao.go.jp/cstp/society5_0/index.html. Here, hunter gatherer societies are defined as Society 1.0, agrarian societies as Society 2.0, industrial societies as Society 3.0, information societies as Society 4.0.

PCs, cameras, TVs, music players and books, can now be provided by a single smartphone. With automated driving, software will be responsible for the safety of driving,, which will bring changes to the system where humans were assumed as drivers, such as the structure of the vehicles like brakes and gas pedals, road signs and traffic lights, and communication between vehicles. Furthermore, in smart cities, we can expect that functions of each of the urban infrastructures, such as urban mobility, energy, and water supply, will be run by software, and designed to efficiently manage resources and services based on all data collected from cities,

Given these circumstances, in order to achieve sustainable economic growth going forward, we cannot rely solely on the growth of economic activities that accompany continuous expansions of scale primarily in the physical space. As such, there is great eagerness for the emergence of creative innovations that originate in cyberspace.

These innovations in cyberspace are prone to rapid change, have ease of expanding business across borders, and more likely to result in a winner-takes-all environment with data accumulation and network effects. For Japan to continue economic growth in a society where software-based structural change is happening, creative innovation must be continuously promoted. The law shoud be there to support this economic development, and not stand in the way of innovative technologies and services. What we need is **"Governance for Innovation"- designing a governance mechanism which promotes innovation that brings discontinuous changes and creative destruction to our society.**

1.2.2 Importance of social values

Innovative technologies and services brought by the integration of cyberspace and physical space are also rapidly changing the risk landscape.

In a world where everything is connected to a network, the potential damage caused by cyber attacks can be far reaching and severe, affecting everything ranging from personal property to the life and physical/mental wellbeing of a person, and ultimately to the basic infrastructures of society.[2] In data collection and management, digital service providers collect enormous amounts of accurate personal data such as a person's behavior history, health status, economic activities, thoughts and beliefs, hobbies, and preferences, raising privacy risks. The use of such personal data in targeted political advertisements, for example, can potentially cause harm to democratic

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[2] Some example are attacks on power plant infrastructure or military defense systems, hacking attacks on cloud systems used in financial or medical systems, and hi-jacking of autonomous vehicles.

systems. Another issue is how to protect intellectual property rights and trade secrets as data sharing between businesses proceed.

In areas of data analysis, as autonomous decision-making by algorithms that involve no human intervention have come to take on important positions in society, issues regarding their safety and adequacy are also increasing[3]. Since machine learning is not based on static rules and its outputs are produced dynamically by adjusting the weights of variables through statistical processes, it is difficult to fully predict its behavior. Additionally, in the case of deep learning algorithms, even if a decision made by a specific algorithm is found to be inadequate, we are currently faced with the problem that the cause of such behavior would be difficult to explain. When these outputs by algorithms are fed back into the physical world, there are risks of unpredictable accidents, or magnifying discrimination and unfair bias driven from datasets.

Another issue is that data and AI technologies that are developed based on data are more likely to become concentrated among a few corporations due to their network effect, and therefore more likely to lead to market monopolies and oligopolies, and pose a risk to ensuring a fair competitive environment.

To ensure that innovation takes root in society and to enable sustainable economic development, **it is essential that society establish "Governance of Innovation"- governance that can appropriately control the risks of innovation, and secure social values, including basic rights such as security of property, life, mental and physical safety, privacy, democracy and fair competition.** On the other hand, many suspicions raised against innovation are based on vague anxieties that arise simply from the fact that these innovations fall outside of existing concepts and rules, regardless of the value that they can potentially offer our societies. In order to realize a truly innovative society, it is essential that we develop trust among people, ensuring them that the values that we currently share, or values that many people believe should be shared in our societies will be maintained in all of our efforts to implement innovation in our societies.

1.2.3   Dilemmas of balancing the two objectives

In order for Japan to achieve sustainable economic development and solve our social issues, **we must build a governance model that ensures basic rights such as security of property, life, and mental and physical safety, privacy, democracy**

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[3]   For example, algorithms that handle decisions for financing or job hunting may reach disadvantageous decisions for certain demographic groups depending on their race or religion, and may foment greater levels of discrimination and polarization. Algorithms used in financial transactions may cause stock price crashes in unforeseen ways, or may rig contracts automatically, in each case resulting in distortions in market functionality.

and fair competition more than they have been historically, even as we maximize innovation throughout society as a whole.

Balancing "Governance for Innovation" and "Governance of Innovation (securing social values)" under a governance model[4] based on laws and regulations is not an easy task. This is because we are faced with a dilemma where the removal of laws and regulations to promote innovation will make it more difficult to control new risks, while the creation of numerous regulations to control new risks will impede innovation. In this fast changing society, there are cases where, before discussing "deregulation or tighter regulation", the governance model of setting concrete code of conducts and obeying them is not functioning.

Figure 1.2.3 │ Why we need Governance Innovation
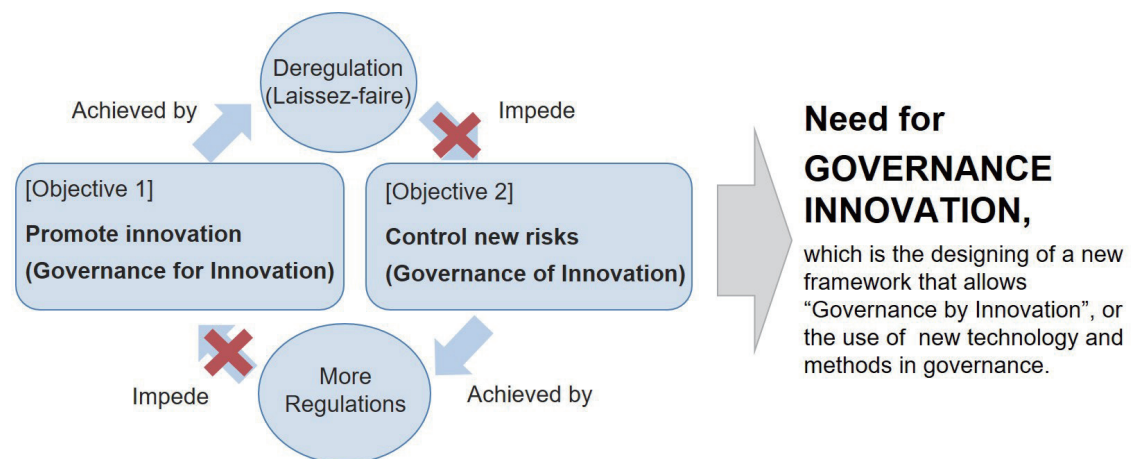
Since innovative technology and services are based in cyberspace, the methodology of governance that controls these risks must be innovative as well, or in other words, we need "Governance by Innovation". For this, it is necessary to involve businesses who take the lead in innovation, and individuals with diverse values. **It is important that we achieve "Governance Innovation", drastic regulatory reform where not only the government, but multi-stakeholders such as businesses, communities, and individuals take their part in governance.(Figure 1.2.3)**

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[4] This refers to a system whereby governments enact industry laws that regulate the actions of operators; oversee operators for their compliance by means such as permit systems, administrative directives, and reports; and sanction violating operators by means such as permit cancellation and administrative penalties. The issues associated with such models of governance are discussed in Chapter 3.

1.3   International discussions and Japan's contributions

Because cyberspace can easily cross borders, the issue of controlling new risks from digital technology is now an internationally shared agenda. Countries around the world are starting to consider governance models such as that described above which balance innovation and social values.

In the leader's declaration of the G20 Summit held in Japan in June 2019, member countries supported "the sharing of good practices on effective policy and regulatory approaches and frameworks that are innovative as well as agile, flexible, and adapted to the digital era". Additionally, the G20 Ministerial Meeting on Trade and Digital Economy declared under the title "Governance Innovation," that member countries will "strive for innovation-friendly policies to capitalize the potential of digital technologies and look to remove barriers to innovation accordingly".[5]

The establishment of a governance model that promotes digital innovation is the key to economic growth toward the realization of Society 5.0. Countries have presented a variety of governance models for achieving this objective. Furthermore, a number of global corporations—who now have as much social influence as a country—have proposed their visions for governance for new technologies and the digital age to society.[6]

Given these international circumstances, Japan has proposed to the world the concepts of "Governance Innovation" and "Data Free Flow with Trust[7]" at the G20 meeting, and is in a position to drive the formulation of international digital rules going forward such as through its participation in a wide range of international agreements including CPTPP, Agreement between Japan and the European Union for an Economic Partnership, WTO, Agreement between Japan and the United States of America concerning Digital Trade, and RCE. Given the background of the rapidly growing digital market in the Asia-Pacific region, it is important for Japan to quickly present a "new governance model" to the world and implement the model by cooperating with various stakeholders in Japan and overseas.

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[5] Para12, G20 Osaka Leaders' Declaration, https://www.mofa.go.jp/mofaj/gaiko/g20/osaka19/pdf/special_event/en/special_event_01.pdf Paras 21-24, G20 Ibaraki-Tsukuba, Ministerial Statement on Trade and Digital Economy https://www.meti.go.jp/press/2019/06/20190610010/20190610010-1.pdf

[6] Google "Artificial Intelligence at Google": Our Principles https://ai.google/principles/
Microsoft "AI Principles", https://www.microsoft.com/en-us/ai/our-approach-to-ai

[7] While "trust" in this instance refers to a certain degree of "trust by society in terms of maintaining the values that are shared in modern societies or values that large numbers of people believe that should be shared," it can also be conceived as a more specific normative concept. While there currently is no firmly established concept of trust, we believe this concept should incorporate the idea that an inter-relationship exists with respect to the disclosure and sharing of information that is needed for monitoring corporate activities, and for formulating and enforcing rules.

Chapter 2: Framework for Analysis under This Report

2.1　The Core Issue: Increasing Importance of Architecture

In Society 5.0, businesses in a wide range of industries, including finance (FinTech), mobility (MaaS[8], self-driving vehicles), healthcare (HealthTech), plant security (smart security), and city management (smart city), will develop based in cyberspace.

In cyberspace, what information a user has access to and what actions they can choose are defined by architectures designed by businesses. Architectures physically and technologically restrict business and user behavior. In cyberspace, people's behavior is effectively restricted by source code written in software and system architectures that make up complex system designs composed of software. For example, system architecture designed by private businesses will restrict or influence a user`s action in cases such as which article or ad a user will see on the internet, how an automated vehicle will run, or how an individual`s trust will be evaluated (commonly known as trust scores). Users conform to these behavioral restrictions, often unaware that such restrictions exist. Controls by such architectures are beginning to replace traditional human controls, and are exerting a major influence, not only in cyberspace, but also in physical space as well (red arrow in **Figure 2**).

Figure 2 │ The increasing influence of architectures

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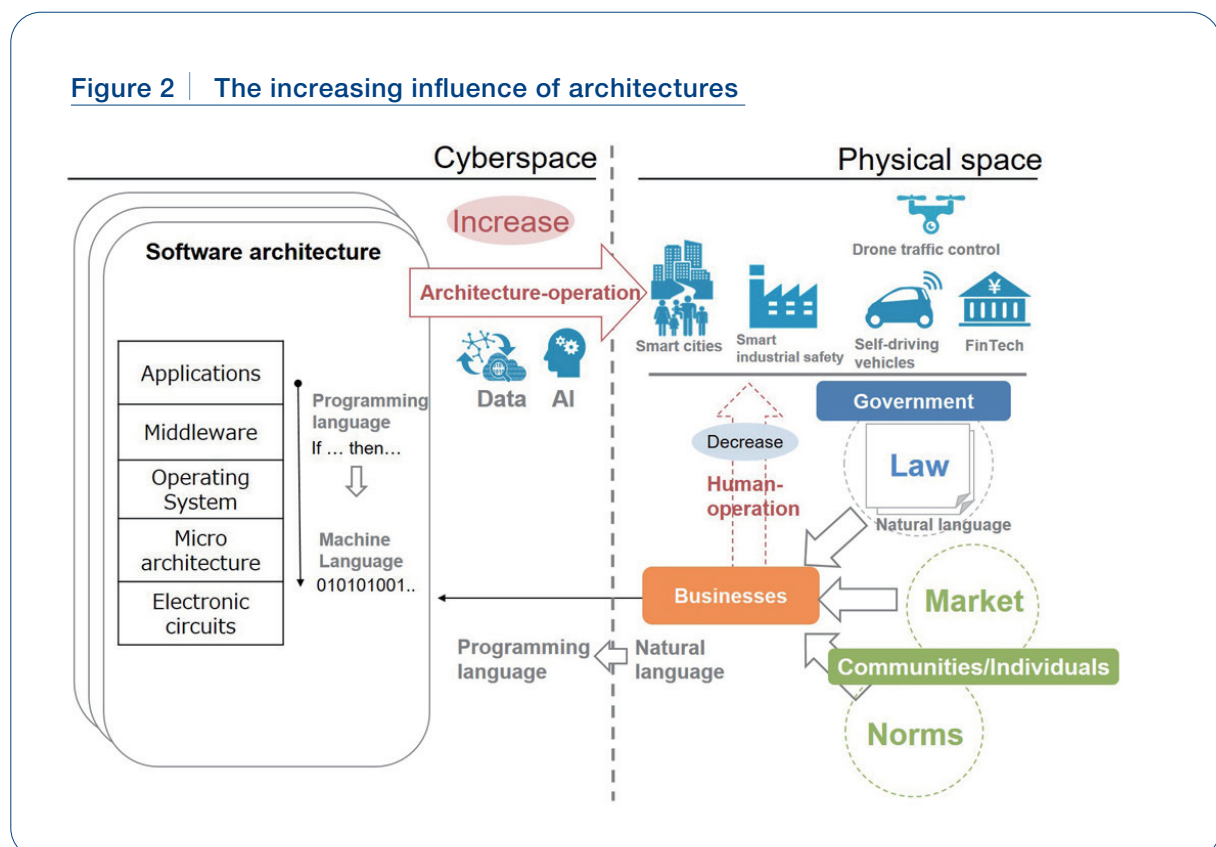
[8] Mobility as a Service

Meanwhile, private players who design the architecture in cyberspace is governed based on laws, market mechanisms, and social norms. It is designed to achieve its purposes indirectly and only reflected when a business takes action to avoid a particular outcome based on its concern for potential sanctions, decline in market value, or criticisms from the community(right side of **Figure 2**).

That being said, when we consider the fact that cyberspace architectures are extremely complex and difficult to monitor, and are different from physical space architectures (buildings, etc.) in that they can in many cases be more readily revised[9], and that monopolies and oligopolies can more easily arise in internet businesses owing to their network effect[10], which in turn results in limitations to traditional modes of market regulation, we can conclude that there are limitations to the degree of influence that mechanisms based solely on traditional law, market mechanisms, and social norms can have on corporate actions in cyberspace. [11]

Ever since the era of Society 4.0 (so-called "information society"), it has been pointed out that, in this way, cyberspace is being controlled by architectures built by private businesses, etc., and that these cannot be readily governed by law, market mechanisms or social norms. However, in Society 5.0, where cyberspace becomes the basis for growth of businesses and where enormous amounts of data is collected to enable businesses to more precisely influence their users, coupled with AI increasingly making decisions autonomously, cyberspace's influence on our physical space will become even more pronounced, which in turn will dramatically increase the importance of the issue of governance. **The issues of 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 for the governance of the economy and society.**

Assuming that the essential responsibilities of the state to its citizens undergo no major changes, states must take seriously the dramatic shifts in the roles that architectures play, reexamine how they can fulfill their responsibilities, and develop a new model of governance.

In this report, we carry out a general review, based on the aforementioned issues, regarding models of governance for advancing innovation and ensuring social value in the digital economy. To this end, we perform analyses centered around two key points: (1) the governance process and (2) primary actors of governance.

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[9] For example, when broad social infrastructures, such as social infrastructures related to payments, and remittances, etc., are built in cyberspace, changes to the order in which information is transmitted or the roster of agencies involved cannot necessarily be made easily, even if many of these infrastructures are based on information systems.

[10] A phenomenon whereby increased numbers of people or participants improve the value of a good or service.

[11] Mayer-Schönberger, Viktor, "Demystifying Lessig", Wisconsin Law Review. 4 (2008), P.721-722

2.2   Process of Governance

We organize the first point, the governance process, into three stages: **(a) rule-making**, **(b) monitoring**, and **(c) enforcement**. These terms are defined as follows for the purpose of this paper.

Rule-making: The development, design or formation of mechanisms for regulating human behavior, and the act of revising and updating these mechanisms. Laws and regulations are typical examples of rules stipulated by the state, while there are various other guidelines, standards and rules established primarily by the private sector. In addition to these written rules, there are also rules such as market principles and social norms that are formed by collective entities of communities and individuals. In addition, we also include the design of cyberspace and physical space architectures, as well as individual source codes under rule-making because these also regulate human behavior.

Monitoring: The process of collecting information needed for making evaluations by observing and monitoring the activities of businesses, individuals, machines, and programs, etc. With the advancements being made in the means for collecting information and performing analysis, the subjects for monitoring will shift from fragments in single points in time to enormous amounts of real-time data.

Enforcement: The actions that different actors are able to take to resolve a certain problem when it is detected. In addition to government surcharges and revocation of licenses, etc., this includes improvement measures taken by businesses, declines in market prices, and litigation between different actors.

2.3   Actors and methods of governance

The second point, the actors of governance, can be grouped into three categories: **(i) State/government**, **(ii) Businesses**, and **(iii) Communities/individuals**. These terms are defined as follows for the purpose of this paper.

State/government: The governing mechanisms that are responsible for legislation, administration and justice, and includes local governments.

Businesses: Business actors. These are not limited to businesses as legal entities, but include a wide range of entities who operate businesses, including unions and individuals. These not only include singular businesses, but also industry groups as well.

Communities/individuals: Members of society to which services and products are

provided. These typically refer to individual users (consumers) and their collectives, but also include third parties who are not direct users.

Each of these actors are subject to different means of regulation. American constitutional scholar, Lawrence Lessig, cites four elements with respect to the means of regulating human actions: "law, architecture, market mechanisms, and social norms"[12], and of these, the state/government is mainly responsible for law, businesses for architectures, and communities/individuals for market mechanisms and social norms.[13]

These means regulate human actions in the following manner.

Law: This refers to rules established by the state in natural language. These regulate the social activities of businesses and individuals by the threat of penalties for violations.

Architecture/code: This places restrictions on the social activities of businesses and individuals that arise in artificial environments such as buildings and the physical structures of cities. In cyberspace, people's behavior is effectively restricted by source code written in software and system architectures that make up complex system designs composed of software. In this report, unless otherwise specified, "architecture" refers to the entire structure and mechanisms of a group of systems, and "code" refers to source code by which such an architecture is written.

Market mechanism: This restricts the social activities of businesses and individuals through the adjustment functions provided by stock prices, prices of goods and services in the market, and supply and demand.

Social norms: These restrict the social activities of businesses and individuals through critiques, etc. raised by communities when a social norm is violated.

Table 2 is a tabulation of these evaluation criteria (Monitoring and evaluation are described in the following chapters).

Table 2 | Governance model framework

Process \ Actor	Government	Businesses	Communities/individuals
Rule-making	<Establish, design, provide or review a mechanism that regulates human activities>		
	• Law	• System architecture • Source code	• Market mechanisms • Social norms
Monitoring	<Collection of information necessary to evaluate businesses, machines or programs>		
Enforcement	<Actions taken in response to an incident>		

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[12] Lawlence Lessig, "Code and other laws of cyberspace : version 2.0" (2006), P.120

[13] However, as described in Section 4.1, there are cases in which the state/government directly designs and operates architectures.

In the following chapters, we will use this framework to analyze the challenges that a governance model centered on conventional laws and regulations faces, and explore the ideal for a new governance model to realizing Society 5.0.

Chapter 3: Challenges of Existing Governance Models

In this chapter, we first describe the characteristics of a governance model centered on conventional laws and regulations, and analyze the challenges that such a model faces with respect to realizing Society 5.0.

3.1   An overview of existing governance models

In Japan to date, laws defined by the state and government regulators responsible for their enforcement have played a central role in numerous areas as we describe below.[14]

(1) Rule-making

The state establishes laws and regulations, defines specific regulated subjects (businesses), and specifies the actions that should be performed by these regulated subjects (duties to act).

(2) Monitoring

Regulators oversee the status of operations, including violations of laws, at regular intervals such as annually or quarterly. Data is collected by inspectors or other officials visiting company sites.

(3) Enforcement

If a business is found to have violated any laws or infringed on any rights, regulators and courts typically determine whether the actor acted on intent or negligence, and impose legal sanctions (varying degrees of criminal penalties, administrative penalties, revocation of permits, civil damages, etc.) based on their determinations.

Under these governance models, businesses largely work on their own to translate the fulfillment of their legal obligations, which are written in natural language, into programming languages that can be executed on computers. In the process, the company itself decides how it will comply with a given rule and how much to make the state of compliance "visible."

Communities and individuals determine whether or not to use the company's

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[14] Even in terms of laws that are specific to certain business categories or activities, there are over 240 laws that serve as methods of governance, to say nothing of the large number of Cabinet Orders and ministerial ordinances associated with these laws.

products or services based on information provided by the company. If any problem occurs, users are able to negotiate directly with the company or discontinue their use of the product or service. But these actions are all on an individual basis and have no major impact on the company. In addition, individuals may go to court or use alternative dispute resolution (ADR) but these procedures are carried out offline, and have limited usage from convenience and cost perspective. These relationships can be summarized as shown in **Figure 3.1** and **Table 3.1**.

Figure 3.1 │ Issues in a governance model centered on laws and regulations
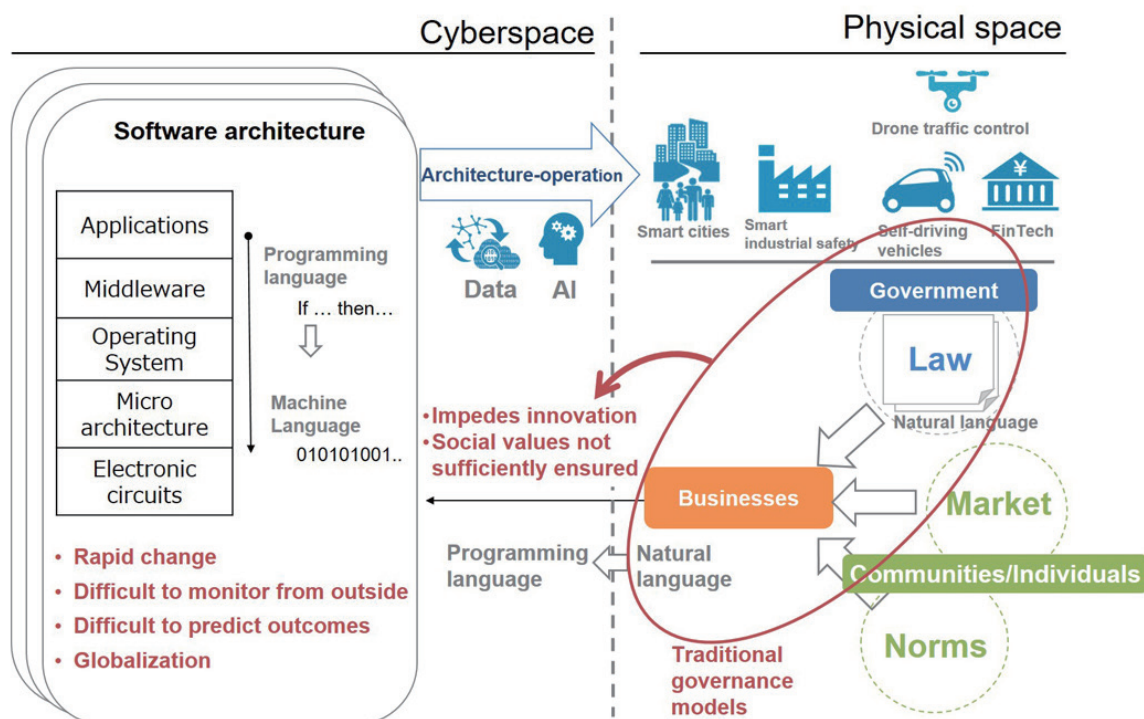
Table 3.1 │ Relationships in a governance model centered on laws and regulations

Process \ Actor	Government	Businesses	Communities/Individuals
Rule-making	• **Rule-based** laws • Assignment of **duties**	• System architecture • Source code	• Market mechanisms • Social Norms
Monitoring	• **Periodic inspections** • Data collection **on site**	• Passive response to inspections	• Evaluations based on information disseminated by businesses
Enforcement	• Administrative penalties of **uniform amounts** • **Unilateral** revocation of licenses and permits	• Passive response to investigations and examinations	• Direct negotiations • Discontinue use of service
	Litigation / ADR (off-line)		

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This type of governance model is believed to have functioned effectively in a society, where it was possible to establish a certain code of conduct in advance, based on which regulators would monitor the forms of conduct from the outside and impose sanctions as necessary. This would be a hardware-centric society, a society that is static and slow to change, where data collection is performed and decisions based on it are made by humans in physical space, and the scope of its activities is confined within national borders.

However, in Society 5.0, which is software-centric, these social assumptions begin to break down. In other words, technology and business models become dynamic and constantly undergo change, and data collection as well as the decision-making based on the data can be automatically performed by sensors, high-speed communication and algorithms. As such, these activities are able to easily cross national borders.[15]

Figure 3.2 │ Changes to social structures in Society 5.0

	Past	Today	Society 5.0	
Hardware centric				Software centric
Static				Dynamic
Cross-sectional				Real-time
Decision-making and participation by humans				Decision-making by algorithms
Entirely contained in Japan				International reach
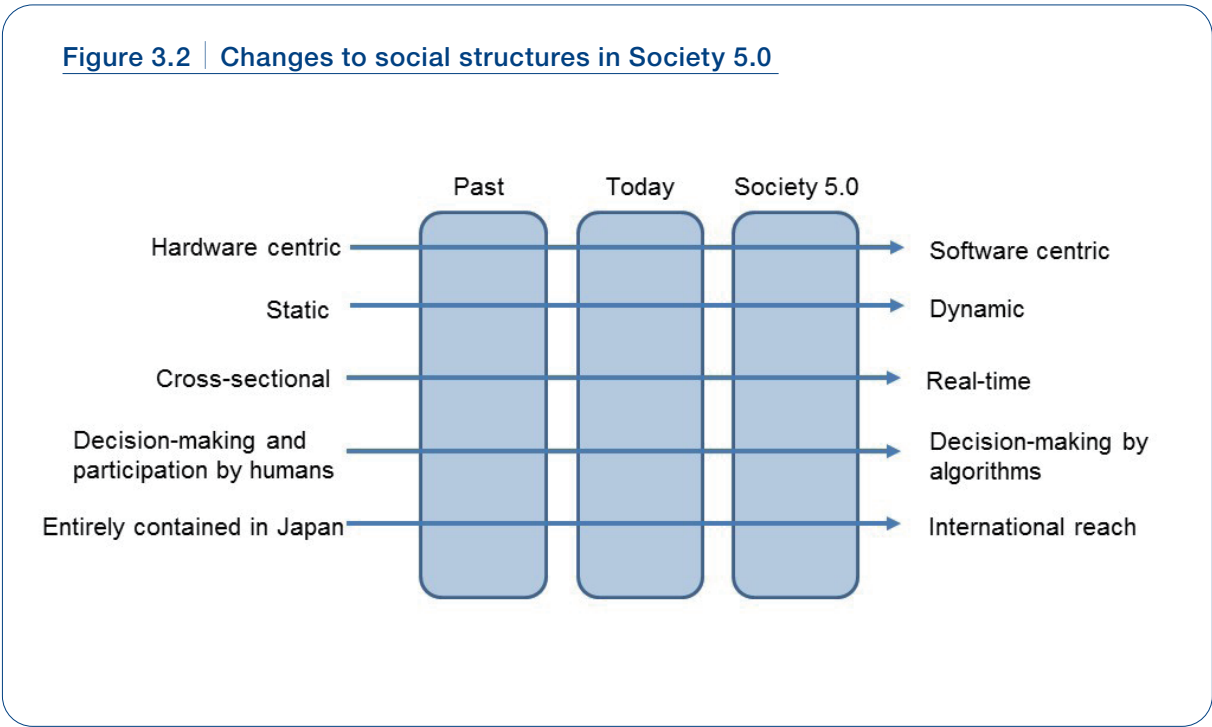
Due to these changes in social structures, existing governance models face limitations such as shown in **Table 3.2**.

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[15] The drivers of these changes to social structures are the so-called digital platformers. In recent years, the transparency and fairness of transactions, as well as monopolies and oligopolies associated with digital platformers have become topics of debate in countries around the world. We believe the "cooperative model of governance" presented in this report can be effective in the areas of transparency and fairness of transactions, protection of user privacy, safety, rules of competition and other matters associated with digital platformers. Plans are in place to conduct cross-sectorial examinations of these points at the Digital Market Competition Headquarters established under the Cabinet Secretariat in September 2019. https://www.kantei.go.jp/jp/singi/digitalmarket/

Changes in social structures and its effects on governance

* Numbers in parentheses in the left column indicate where they can be found in the text.

	Societies presumed by existing governance models	Real society
Rule-making (3.2)	• Duties to act can be defined optimally because society's structure is **static**. • **Information** needed for making rules **is held by the government**.	• Duties to act are difficult to define in advance because of the increase in **complexity and rapid changes** occurring in society. • **Information** needed for making rules is **stored asymmetrically by private actors**.
Monitoring (3.3)	• Status of compliance is relatively easy to **observe from the outside**. • Difficult to constantly collect and analyze data on an ongoing basis and **information is fragmented**.	• Operations are more **difficult to observe from the outside** than in physical space. • **Able to collect data in real-time and instantly analyze the data**.
Enforcement (3.4)	• Operations are based on **autonomous decision-making** or participation **by humans**. • **Responsibilities can be attributed to specific actors**.	• **Autonomous decision-making by AI and other systems** replace human decision-making. • **Difficult to attribute responsibilities** to specific actors.
Geographical territories (3.5)	• As a general rule, domestic legal interests are violated only by **businesses in the country**.	• **Foreign businesses** are easily able to provide products and services to the domestic market via the network.

Details will be describe in following chapters.

3.2 Issues regarding rule-making

3.2.1 Difficulties with identifying specific duty to act

In Society 5.0, where various technologies and business models are developed and become more complicated by the day, **it will be extremely difficult to identify where risks lie, and to determine, in advance, how these risks should be controlled**. Imposing rigid laws and regulations that presuppose the traditional architecture may impose excessive obligations on low-risk acts and prevent the realization of social value in innovative ways. As such, doing so would not be appropriate from either the perspective of risk control or the perspective of advancing innovation.[16]

For example, periodic inspections on certain plants or infrastructure facilities are required by law to ensure their safety. These inspections often presuppose that humans will be performing the inspection work such as visual inspections, hammering checks,

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[16] According to a survey conducted in OECD member countries, the rate of Internet penetration is five times greater in markets with free competition than in markets where the telecommunications business is monopolized. https://www.oecd.org/sti/inno/2102514.pdf

and expert supervision.[17] However, continuous collection of data on the condition of infrastructures using technologies such as sensors and cameras, it becomes possible to identify risks accurately and in real-time, even if the problems are too sensitive for humans to recognize. Security can be achieved more precisely and efficiently through the use of these types of technology.

As another example, with respect to credit extended by credit card companies, the Installment Sales Act establishes a uniform upper limit on the amount of lending according to criteria such as income, or the number of persons in a household, etc.[18] However, in recent years, credit scoring technologies have been developed which provide personalized credit services by appraising individual creditworthiness using certain algorithms based on purchase histories that are collected by personal consent. Making credit decisions based on a variety of personal information is expected to enable financial services that are more convenient for users while keeping the risk of bad debts and delinquency within a certain range.

In situations such as these, where safety, security, and other social values are realized through the use of data and AI, the types of mechanisms and systems businesses choose to employ to ensure these social values will vary from company to company, and this becomes an area where these businesses should demonstrate their initiative. For this reason, not only would it be difficult to legally require the use of specific techniques and methods, but there are more cases when it is becoming rather inappropriate.

3.2.2 Difficulties in setting boundaries on subjects of regulation

Traditional laws and regulations define a "business" as being the repeated and ongoing performance of certain actions, and often define this as the subject of regulation. However, in Society 5.0 where business models are dynamic and, as a whole, where layering and modularization continue to progress for each individual function, **it would become increasingly difficult to define any bundle of activities as a**

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[17] Example 1: Article 35 of the High Pressure Gas Safety Act. Class I manufacturers are subject to periodic security inspections of manufacturing facilities that pose the risk of explosion or other accident (limited to facilities designated by the Ministry of Economy, Trade and Industry [METI]. Hereafter: "designated facilities"); inspections which are conducted by prefectural governors in accordance with the METI ordinance.

2. Class I manufacturers (snip) must conduct voluntary periodic inspections as specified by METI ordinance, and record and maintain records of these inspections

Example 2: Article 42 of the Road Law. Road managers must maintain and repair roads in good condition at all times and make efforts to not disrupt general traffic. 2. Technical standards and other necessary matters concerning road maintenance or repair shall be specified by Cabinet Order. 3. The technical standards described in the preceding paragraph shall include standards for inspections for conducting road repairs efficiently.

[18] Article 30-2 of the Installment Sales Law. Article 30-2 (Possible amount of comprehensive payment), Article 35-3, and Article 35-3-4 (Possible amount of individual payment), etc.

"business." For example, under current regimes in the area of financial settlement legislation—where oversight is divided into business categories such as banking and fund transfers, etc.—discussions are currently underway as to how to design function-specific and cross-functional legislation in the area of settlements to ensure that rules can be defined in accordance with the risks that come from scale and modes of transaction while making considerations to ensure business flexibility in responding to user needs.[19]

3.2.3　Difficulties in predicting AI decision-making

In Society 5.0, as machine learning technologies advance, autonomous decision-making with no human intermediary by AI are beginning to have a direct effect on our personal lives and industrial activities in physical space. Many of these technologies—such as found in self-driving vehicles, quality inspections for industrial products, and credit reviews for financial transactions—have a direct impact on our lives and physical body, as well as on our property.

Traditionally, it has often been the case when evaluating and ensuring the safety and reliability of a certain system, that quality assurance would be performed by checking, only once in an initial inspection, whether the system would operate according to rules.[20] This type of method was possible because algorithms were written as a fixed set of rules, and would not be revised later.

However, unlike systems that are defined based on rules, AI that are based on machine learning perform statistical processes based on the data they are given, so it is not always as easy as on traditional systems to ensure their predictability and safety. In addition, AI are designed to continuously improve their quality by accumulating their learning from inputted data, and their technical characteristics are demonstrated through the changes that occur to its algorithm from time to time. Therefore, it is not practical to continue to examine their algorithms every time they are updated. Additionally, with respect to deep learning-based AI, we are faced with the issue that it would be difficult for practical purposes to verify the factors that came into play in reaching a particular decision after the fact (issue of algorithm black-boxing).

Due to these characteristics of AI technology, **it is becoming difficult to ensure**

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[19] Report on Developing Schemes Regarding Legislation for 'Payments,' and Legislation for Financial Service Intermediaries <Basic Lines of Thinking>" Financial System Study Group, Financial System Council https://www.fsa.go.jp/singi/singi_kinyu/tosin/20190726/houkoku.pdf
Whereas regulations were traditionally focused on hardware, such as building equipment and vehicles as we describe in Chapter 1, in a society where the role of hardware is frequently redefined by software functions, we believe it will become difficult to determine the types of hardware that regulations should focus on in their implementation.

[20] "Guide for Achieving and Improving Visualization of System and Software Quality" Product Quality Metrics WG, Software Metrics Advancement Project, METI (March 2010)

the predictability and accountability of these system with the use of quality assurance methods that have been in use for systems and software that presuppose conventional rule-based systems.

3.3　Issues in monitoring

3.3.1　Difficulties with monitoring

Cyberspace is not visible from the outside, and even if the source code was to be disclosed, it would be difficult for humans to immediately comprehend it. Additionally, information that is needed for regulation is being asymmetrically accumulated by the businesses. As a result, even if certain laws and regulations have been established in advance, **it is becoming difficult for regulators to exercise external supervision on whether businesses are actually complying with these laws and regulations, and how trust is being ensured**. [21]

3.3.2　Inefficiencies in monitoring

Regulators generally supervise financial conditions, operational conditions, equipment security conditions, etc. based on cross-sectional and uniform standards such as periodic inspections and periodic reports. These presuppose that humans will be collecting and analyzing the data.

However, even if sufficient safety and soundness are ensured in these inspections, the process creates the inefficiency of having to conduct periodic inspections and reports, as well as delays in that even if problems that rightfully need to be remedied immediately were to occur, they will go undetected until the time of the next periodic inspection. In light of the advancements that have been made in information collection technology—such as sensors and cameras, the availability of direct access to data via APIs, and advanced technologies that are capable of analyzing these data instantaneously as we describe in [2.2.1]—it is believed that **social values, such as safety and soundness of business activities, can be ensured more effectively and efficiently by using data collected in real-time from physical space**.

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[21] For example, in the Volkswagen emissions misrepresentation scandal that was exposed in 2015, a program had been set up to show a lower amount of harmful substances in emissions during tests, and such misrepresentation went undetected for a period of about six years. https://www.bbc.com/japanese/43999457

Also, in the incident of 2017 where the competition authorities of the European Commission ruled that Google had been in violation, it was found that Google had prioritized search results for its own comparative shopping services, while the search results for competing services were placed in lower positions. However, these types of manipulations to algorithms are not always easy for authorities to detect. https://ec.europa.eu/commission/presscorner/detail/en/IP_17_1784

3.4 Issues regarding enforcement

3.4.1 Difficulties concerning the specification of subjects of enforcement

One characteristic of cyberspace is that it has a high degree of anonymity, and this creates problems for ensuring law enforcement. Even if an actor is identified, it would be difficult to enforce Japanese law if that actor is outside of Japanese territory.

3.4.2 Ambiguity of the principle of distribution of legal liability in decisions made by autonomous systems

Because the consequences of individual actions are relatively easy to predict under stable social conditions, the idea behind traditional legal regimes has been to sanction those who have caused socially undesirable consequences, either by intent or negligence, to prevent similar incidents from occurring. Based on this point of view, the current legal systems for both civil and criminal liabilities are, in principle, founded on the responsibility of the person according to their intent or negligence[22], and this was a reasonable way of thinking under relatively stable social conditions.

However, with the integration of physical space and cyberspace, situations are on the rise where the actions of an actor in one area can have a major global impact in ways that are difficult to predict.[23] As the real space and cyberspace become increasingly integrated, and as complex AI-incorporated systems that integrate and analyze a wide range of data reach out to the real world or operate in concert with human beings, **it is undeniable that it will become increasingly difficult to predict the impact caused by decisions made by individual systems. Under such circumstances, if an undesirable consequence were to occur, it would not be easy to identify where the legal liability for this lies, and even if particular actors were to be sanctioned, we cannot safely say that the sanctions will have an effect in**

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[22] Article 709 of the Civil Code, and Article 38 Paragraph 1 of the Criminal Code, etc. However, with regard to civil liability, there may be cases where the burden of proving fault is transferred to the perpetrator (intermediate liability), or cases where indemnification is not granted based on proof of no-fault (liability without fault). Examples of the latter include land owner's liability for constructed structures (exceptional clause in Article 717, Par 1 of the Civil Code), mining rights holders' liability for damages (Article 109, Par 1 of the Mining Law), nuclear power operators' liability for damages (Article 3, Par 1 of the Law on Compensation for Nuclear Damage), and tanker owners' liability for damages from oil pollution (Article 3 (1) of Ship Oil Pollution Damage Protection Law), etc.

[23] For example, Facebook, which was originally developed by a male college student who wanted to get to know attractive women in Cambridge, is now being used in ways that would have been essentially impossible to imagine from the localized context at the time of its inception, and is having a global impact such as by intervening in democratic processes of other countries, or being used as a means for recruiting potential terrorists.

preventing future incidents.[24]

As long as the liability for incidents that can be caused by autonomous systems is determined and distributed based on a focus on "people's negligence" without taking into account the fluidity of social conditions that will be spurred by the development of information technologies, system developers and users will be exposed to the unpredictable risk of being held liable, and this can hinder innovation.[25] Additionally, in cases where it is not clear where liability lies, the incentive to conceal the problem will arise on the part of system developers and users. Since cyberspace cannot be easily understood from the outside, such incentives to conceal problems will be a major obstacle to the improvement of the entire system going forward.

3.5 Globalization of corporate activities

The expansion of cyberspace in Society 5.0 will further advance the integration of services offered by domestic and foreign businesses. As a result, if governments were to simply define and enforce rules in their country alone, they run the risk that sufficient social value will fail to materialize and that this will consequently hinder innovation in these countries.

The scope covered by a country's legislative jurisdiction is, in principle, limited to that country's territory (territoriality principle)[26], or if an action outside the country's legislative jurisdiction has effects within the territory, and if these effects meet a set of certain requirements, such as their substantiality (effects doctrine). Regarding the enforcement jurisdiction over which the authority of law enforcement extends, it is said that public authority cannot be exercised in the territory of another country without the consent of the government of that country. Given the limitations of these legislative and enforcement jurisdictions, **international cooperation is important in both legislation and execution** for global businesses and domestic businesses to stand on an equal footing in terms of regulations.

In addition, if multiple nations set different rules, global operation will be difficult

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[24] For example, at least one study shows that if multiple algorithms—which are each designed independently to maximize profits—participate in the market at the same time, a "collusion" situation can occur that was unforeseen by the algorithms' designers, and this could adversely affect consumers. (https://voxeu.org/article/artificial-intelligence-algorithmic-pricing-and-collusion) It would be difficult to determine which of the algorithm designers was at "fault" and even if liability with fault were to be assigned to algorithms—whose behavior is intrinsically difficult to predict—system designers will be left no wiser as to what precautions they will need to take from there on.

[25] While the Winny incident was not associated with decisions made autonomously by systems, it was a case where technology developers were criminally charged for an infringement of copyright that was caused by the use of this technology by a user. https://www.jstage.jst.go.jp/article/jjske2008/8/3/8_805/_pdf/-char/ja

[26] However, the dominant viewpoint is that if acts committed outside a certain territory has an effect within the territory of another country, and if these effects meet a set of certain requirements, such as their substantiality, then, they can be subject to regulation (the effects doctrine). 2013 Report on Unfair Trade, P.479-480

especially for SMEs. From these points, **harmonization and interoperability of rules among countries will be important**.

3.6 Direction of reforms: Moving on from unilateral state and government-centric governance to bidirectional governance involving multi-stakeholders

As seen above, models of governance centered on governmental rules and norm are facing various limitations. The following reforms to governance models can be considered as a hypotheses for overcoming these issues.

> **Rule-making:** In order to overcome the issue of the law not being able to keep up with the speed and complexity of society, regulations should be updated from rules that define duties to act (rule-based) in detail, to those that define the values that must be ultimately achieved (**goal-based laws and regulations**). Furthermore, steps should be incorporated for **receiving ongoing feedback** on the effectiveness and impact of laws and regulations, and **making revisions accordingly**.

> **Monitoring: Businesses themselves should be encouraged to provide disclosures and explanations** because it will be difficult for governments to gain a comprehensive and detailed understanding of the ways in which services—which are implemented by the private sector with the use of software code—comply with the law, and how these services impact human behavior. One conceivable way to overcome the difficulties in monitoring would be for governments, businesses, and communities/individuals to perform risk monitoring **using real-time data**, and in some cases design regimes that encourage businesses to introduce architectures and software code that require that the law be complied with in a fair manner.

> **Enforcement**: In order to be able to identify the subjects of enforcement (human actions and the behavior of facilities/equipment, etc.), **the public and private sectors should work together** to establish **systems and institutions that serve as an online ID platform**. As for complex systems equipped with AI, etc., rather that simply focusing on "attributing liability to individuals," **rules and monitoring systems should be designed in such a way that they provide incentives for businesses to cooperate** in the enforcement process with the

objective of realizing better conditions in our future societies. In addition, we must also push forward with **establishing convenient and effective methods of dispute resolution** that are equipped to handle issues in Society 5.0.

➤ In light of the **globalization** of corporate and individual activities, we must **cooperate** in organizing the extraterritorial application of rules, and **in formulating and executing international rules**.

None of these measures can be achieved by governments on their own. In other words, **active cooperation from businesses and communities/individuals will be indispensable** for building architectures designed to achieve regulatory goals, collecting real-time data needed for monitoring, and the disclosure of information at the enforcement stage, etc.

Furthermore, with the advancement of digital technology and enhancements to the ability of communities/individuals to disseminate information through networks, we believe that **there are an increasing number of settings where architectures, market mechanisms and social norms, rather than laws, have become instrumental in achieving the objectives of advancing innovation and protecting social values**.

As such, in Society 5.0, we can say that **the need for a flexible model of governance which places emphasis on lateral relationships between different stakeholders is on the rise**, rather than a model in which the state uniformly prescribes rules, supervises and enforces.

In the extreme, it can be said that the traditional model of governance is one in which a homogeneous citizenry is vertically ruled by an infallible state that is equipped with perfect reasoning. However, in today's fast-changing societies in which the future is extremely difficult to predict, it is difficult to envisage the state as being an infallible governing body. In light of the current situation where the relationship between the state and stakeholders is beginning to level, it is desirable to transition to a new governance model where the authority of sanctions is used as a means to encourage stakeholders to provide information, as well as to supervise themselves and take initiative in making reforms.

Traditional concept of the government

- Rule of law based on perfect "reasoning of the state"
- Community of homogeneous and intelligent citizens
- State and citizens in a "vertical" relationship

* From "Leviathan", Thomas Hobbes
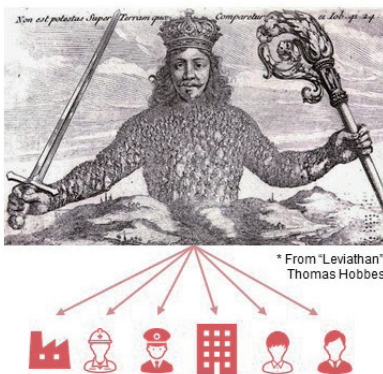
Social systems in Society 5.0

- Uniform rule-making by the state has limitations
- Actors who are practical to a limited extent become more diversified
- State and actors in a "horizontal" relationship
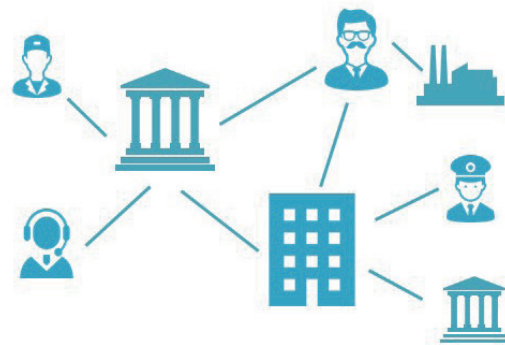
In the next chapter, in order to investigate models of governance that are more level and flexible, we examine the advantages of governance models based on methods other than laws and regulations, as well as the challenges that they pose.

Chapter 4: The Advantages and Challenges of Governance Models Driven by Different Actors

In this chapter, we examine the characteristics, advantages, and challenges posed by (1) governance by businesses (2) governance centered by communities/individuals, and (3) governance by the state/government through the use of architectures and codes in cyberspace.

To summarize each model has its advantages, challenges, and ways of overcoming these challenges as shown in **Table 4**. As Chapter 5 will describe later on, the new governance model that we envision should be one in which **the advantages of governance models centered on state/government, businesses, or community/ individual actors are capitalized on as much as possible, while overcoming the challenges that they pose**.

Table 4 | Comparison of different governance models

* Numbers in parentheses in the top row indicate where they can be found in the text.

Governance model / Process	Government-centric model		Business-centric model (4.1)	Community/individual-centric model (4.2)
	Regulation by law (Chapter 3)	Regulation that uses architecture		
Rule-making	Rules consisting of requirements and effects written in natural language	Rules written in programming language	• Voluntary rules • Trade organization rules	• Market mechanisms • Social norms
Monitoring	Periodic legal inspections	Constant data monitoring	• Voluntary monitoring (use of real-time data, etc.)	• Monitoring in markets and communities • Use of network
Enforcement	• Legal sanctions (fines, imprisonment, exclusion from government procurement, etc.) • Effective sanctions (announcements, administrative guidance, etc.)	• Digital enforcement (automatic execution) • Network shut-off	• Voluntary actions • Sanctions by self-regulating organizations	• Posts on SNS or review sites • Behavior in the market (purchases and finance) • Trial/ADR
Strengths	• Democratic legitimacy • Indirect compelling force • Fair judgment by the judiciary	• Better monitoring efficiency • Power of direct execution	• Businesses understand their own architectures and codes. • Wealth of information • Promotes innovation	• Evaluations from broader perspectives • Made more powerful through advancements in information technology and the network effect. • Also effective for foreign operators
Challenges	• Under-regulation or over-regulation • Impediment to innovation • Difficulties with monitoring • Demarcation points of responsibilities are unclear • Limitations to extra-territorial enforcement	• Adverse impact on innovation • Lack of opportunities to review rules • Risk to human rights	• Risk of conflict of interest • No democratic process • Difficult to supervise from outside	• Limitations in monitoring capability • Difficult to function in monopolized markets • Limitations to the convenience of rights remedial systems (trial/ADR system)
Measures to address these challenges	• Increase flexibility of rules and regulations • Incentives to disclose information • Make use of real-time data • Improve court system effectiveness • Review the system of responsibilities • International cooperation	• Ensure transparency and conduct periodic reviews • Limit to areas where there is no risk to innovation or human rights	• Stakeholder involvement in governance processes • Design incentives through laws, market mechanisms, and social norms	• Impose duty to disclose and explain on businesses • Public announcements and dissemination of facts by the government • Develop rules of competition • Implement online ADR systems in society

4.1   The advantages and challenges of governance by businesses

Models of governance centered on businesses that are subject to the regulation and their industry groups typically take the following form. In rule-making, individual businesses or industry groups voluntarily determine ways for managing the risks that

may arise from their technologies and businesses, and makes these clearly known internally and/or externally. As for monitoring, as a general rule, the businesses themselves perform checks to see whether operations are being performed according to rules. A conceivable technique for businesses to achieve this would be to carry out non-stop inspections based on real-time data collected on cameras and other sensors that the company installs on its own system. As for enforcement, in the event that an incident occurs or the risk of such incident is identified, the businesses themselves are expected to communicate their findings externally. Furthermore, self-regulatory agencies may sanction businesses, for example by publicizing the facts or revoking their membership qualifications.

In Society 5.0, which is centered on complex architectures in cyberspace, it is essential that the businesses themselves that construct these architectures are involved in governance. In other words, in today's world where dynamic and real-time data can be collected and various decisions are made by AI/algorithms that are difficult to predict, **appropriate risk control can only be implemented and innovation advanced when businesses, who design and operate these architectures for cyberspace, conduct governance themselves**.

However, such governance by business is more prone to conflicts of interest, and neutrality will become an issue because both the regulator and regulated belong to the same company or industry. Furthermore, corporate governance does not go through a democratic process like laws and, as described below, it is possible that rules based on market mechanisms and social norms will not be sufficiently effective. For these reasons, **it will be necessary to involve national and social stakeholders in the governance process and design appropriate incentives when designing rules and monitoring systems to ensure that businesses are able to carry out governance in a fair manner.**[27]

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[27] For example, under the accreditation system for information banks, which also represents a framework for promoting the use and application of information, the national government, specifically the Ministry of Internal Affairs and Communications (MIC) and METI, organized the "Study Group on the Optimal Accreditation Scheme for Information Trust Functions" and issued its principles for the accreditation of information trust functions to serve as guidelines to be used by accrediting organizations in their accreditation of individual information banks. Based on these guidelines, the Information Technology Federation of Japan was accredited as an information bank, and actually, it was accredited based on an accreditation framework that the Information Technology Federation of Japan issued based on the above principle.

The principle mentioned above is characteristic in that the overall framework can be more readily revised thanks to the fact that a system of governance has been established within a joint-regulating, government-participating framework which requires the installment of an ethics review board at information banks and requires the Information Technology Federation of Japan to conduct a certain degree of monitoring, and that no basis law has been established.

As for the sharing economy, a framework for joint regulation using guidelines prepared by the Sharing Economy Review Conference, which involves the Cabinet Office's Information and Communication Technology (IT) Comprehensive Strategy Office, has been established.

4.2   The advantages of and challenges of governance by communities/individuals

Models of governance centered on rules based on market mechanisms and social norms take the following form. A business' services or products are rated by the market behavior of those who have used them (repeat purchases or purchases discontinued), and the behavior of communities (positive or negative reviews). In the past, user ratings of new services or products were only shared within communities to which the users belonged, but now, such personal opinions are being disseminated instantly and widely through social networking services (SNS), and products/services review systems, etc. The influence that communities and individuals have is being amplified by the power of digital technology and networks. In addition, individuals may go to court or use alternative dispute resolution (ADR) procedures to obtain redress if they feel their rights or interests have been infringed.

Unlike governance by the state/government, which is run on limited human resources, these kinds of governance by communities/individuals are advantageous in that they involve reviews from many members of society, and **reflect the diverse values of individuals quickly and flexibly**. We also believe that the statistical reliability of these ratings can be improved at sufficient sample sizes. In addition, in Internet businesses where the network effect can be more pronounced, lower user ratings can cause negative network effects (declining user numbers will cause more and more users to move away). For this reason, this type of community/individual governance becomes a powerful regulator of businesses. Furthermore, unlike laws that clearly define the geographical territories in which they can be applied and enforced, these types of rules based on market mechanisms and social norms extend to foreign operators as well (litigations and ADR, however, may come with geographical limitations).

That being said, a number of challenges remain. Firstly, because cyberspace is dynamic and invisible, individuals and communities may not always be able to properly monitor corporate operations. Due to the fact that inflammatory or extreme reviews and discussions are more likely to attract attention, risks exist where information that may not be necessarily accurate is perceived as being fact and widely disseminated, exposing businesses to the risk of undue damage to their reputations. Even worse, disinformation, or the dissemination of information that is not simply inaccurate but outright false, can also be a problem and significantly misguide the decision-making of individuals and communities. How we should deal with disinformation is becoming a particularly hotly debated topic worldwide. Furthermore, if the market becomes monopolized or oligopolized, or if it becomes impossible for users to move between

multiple services (multihoming), this will limit the user's choices and limit the impact that ratings made by individuals or communities have on these businesses.

The use of the court system and ADRs have also been sluggish[28] as the current regimes are not necessarily user friendly.

In order to overcome these challenges, **businesses must create mechanisms for actively disclosing information on their services and products** (and the cyberspace architectures that underlie them), **and provide explanations to society**. And we must also develop rules of competition and user-friendly **institutions for dispute resolution (ODR: Online Dispute Resolution)**.

4.3　The advantages and challenges of governance by state/government with the use of architectures and source code

State/government-centric governance can regulate actions through laws and regulations as described in Chapter 3, and can also impose obligations at the level of cyberspace architectures and source code. For example, a country can obligate businesses to go through a certain API[29] so that it can perform real-time monitoring through that API, or obligate businesses to implement certain source codes in their systems to prevent them from operating in violation of laws and regulations (compliance by design at the code level).

Laws have a basic "requirements -> effects" structure and a man-made language structure that is characterized by its structure for cross-referencing terminology and definitions. And laws are compatible with software programs in that a certain input will produce a certain output (The word "code" is originally one way of saying "law"). On top of this, source code-based regulation is more advantageous in that source code is more suited for writing mathematical formulas and complex conditional branches than are laws that are written in natural language, and unlike static, written laws, it enables dynamic governance by allowing changes to be made to parameter values in real-time. As such, source code can potentially be an effective way for prescribing rules in the complex and dynamic world of Society 5.0. In addition, the ability to automatically collect data during monitoring and, in the area of enforcement, the ability to physically deny prohibited actions make it a potential tool for achieving effective governance.

On the other hand, these methods pose significant risks in terms of advancing innovation and setting up appropriate rules. In the case of regulation by law, even prohibited actions (or actions that are difficult to determine whether they are deemed

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[28]　The number of the Japanese summary court cases have been less than one million cases.
[29]　Application Programming Interface

to be prohibited) can be physically executed. Therefore, at the time the activation of a sanction for a violation becomes a problem, different interpretations that lead to reasonable results can be devised by reviewing the interpretation of the rules or the validity of its provisions, or the rules themselves can even be changed. In contrast, **due to the fact that prohibited actions cannot be physically executed in the first place under architecture-based or source code-based rules, awareness of the fact that a particular act is prohibited may become weaker, and this can become an impediment for triggering actions for reviewing the rules**. These points represent critically important risks both from the standpoint of advancing innovation and the standpoint of ensuring the availability of opportunities for reviewing rights violations, etc.

As for monitoring, constant monitoring of detailed private actor data by the government can lead to excessive governmental monitoring (surveillance), and can be a problem from the standpoint of personal freedom, including privacy and the freedom to conduct commercial activities, as well as from the standpoint of protecting basic human rights.

In order to overcome these problems, as a minimum requirement, **rules must be made transparent and reviewed from time to time**. To this end, we believe that businesses and individuals should be able to access information that is needed for reviewing rules. Another point is that it is essential that these rules are **implemented carefully and by taking into full account the potential adverse effects on innovation and human rights, etc**.

Supplementary note 2

The differences between "programming language" and "natural language"

The study group pointed out that, as a general theory, there were the following differences between natural language and programming language.

1. Efficiency in writing systems
  (1) Mathematical formulas: Natural language has a low ability to express mathematical formulas, whereas programs have greater expressive ability in this area as they are equipped with functions for "writing and processing formulas."
  (2) Parallel processing: Because natural language is written in one dimension, it is not equipped to perform parallel processing simultaneously on multiple dimensions, whereas programs are capable of parallel processing.
  (3) Conditional branching: Because natural language is written in one dimension, the amount of writing will grow exponentially as the number of

conditional branches increase. Meanwhile, programs use variables and can therefore easily handle large amounts of conditional branches.

2. Rewriting and behavior

Documents written in natural language cannot be rewritten in real-time, but in a programming language, parameters can be changed in real time.

3. Range of interpretation

(1) Ambiguity: Whereas natural language allows for different ranges of interpretation (ambiguity), programs are able to uniquely determine all concepts because all variables in a program are declared.

(2) Difficulties in organizing concepts: To describe real-world laws in a program, much effort is required for mapping the presumed concepts (the so-called symbol grounding problem).

4. Readability

Since programming languages are written for machines, humans will have difficulty recognizing the current status of the code.

In light of the characteristics of governance driven by each of these actors, we examine the overall picture of a new governance model as it should be in Society 5.0 in the next chapter.

Chapter 5: Framework for a New Governance Model

Considering from what was discussed in Chapter 3 and 4, the framework for the new governance model in Society 5.0 would be as described below.

<General perspective>
① In each process of governance, i.e., (i) formulation of rules, (ii) monitoring and (iii) enforcement, **ensure active involvement of businesses that design and implement the architectures of cyberspace as well as communities and individuals that use them**.

<Formulation of Rules>
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, s. (5.1.1)
③ **Establish guidelines and standards that businesses can refer to when designing or coding an architecture**, so that they can achieve the goals set by law written in a natural language, through the use of a program language in cyberspace. These guidelines and standards will be established by engaging **multi-stakeholders**. (5.1.2)(**Figure 5**)

Figure 5 │ Governance based on intermediate guidelines and standards established by multi-stakeholders
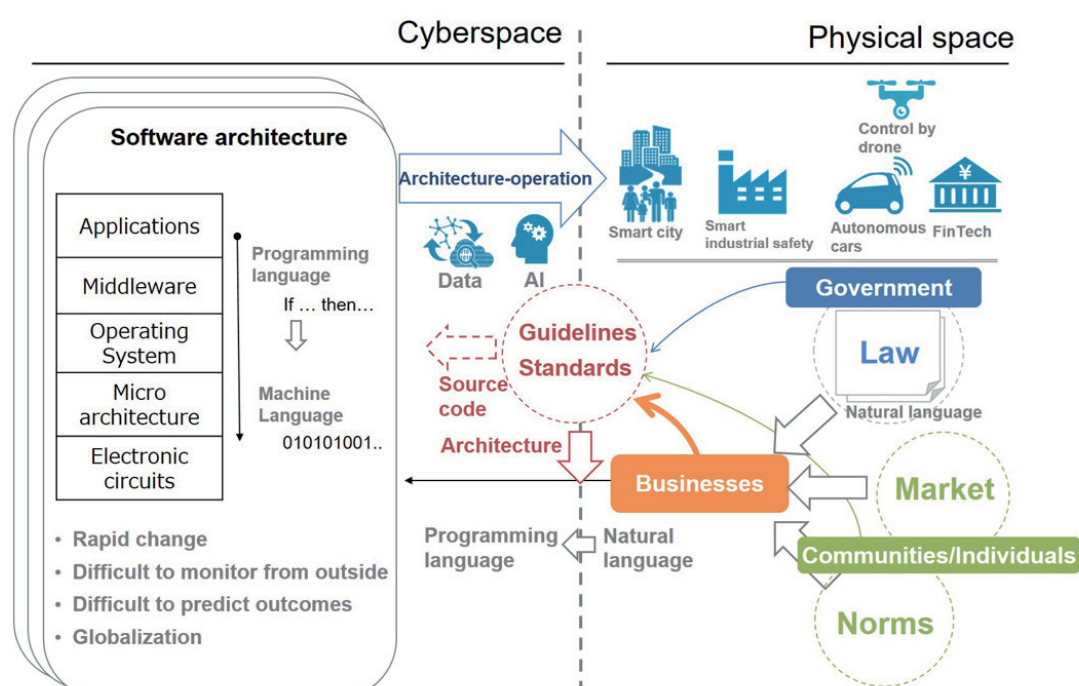
④ **Continuously evaluate the effects and impacts** of laws, regulations and guidelines/standards, and **arrange opportunities for frequent reviews**. In the review process, conduct an **evidence-based impact assessment** by referring to data collected during monitoring and claims of parties involved in the enforcement phase. (5.1.3)

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

⑦ **Have experts conduct an architecture analysis of the industry structure** 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)

<Monitoring>

⑧ Encourage businesses to take innovative compliance approaches, and **focus on the accountability (comply and explain) for their activities**. 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 Review in 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**, as well as empower communiteis and individuals through enforcement of transparency rules and cpmetition rules. (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 such 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 litigations and ADRs (ODR: Online Dispute Resolution)**to quickly and effectively resolve disputes which could 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 of 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)

The framework of an ideal governance model in Society 5 based on these relations is shown in **Table 5**.

Table 5 │ Overview of the new governance model

* Numbers in parentheses indicate the corresponding sections of this document.

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		
Monitoring (5.2)	•**Risk-based** examination •**Data collection in cyberspace** through APIs, etc. (SupTec)	•Voluntary monitoring (RegTech) •**Comply & Explain** •Internal/External **audits**	•Evaluation based on **information from users and multi-stakeholders**	Feedback and revision
	Explain Monitor Explain Monitor Monitor		
	•Utilization of **real-time data**	• Implementation of **monitoring review**	Provide information
Enforcement (5.3)	•Enhanced **Information disclosure** •Impact on **public procurement**	• Enforcement of **competition law**	Enhance
	•**Impact-based** sanctions •**Incident investigation** •Consideration of **deferred prosecution agreement** mechanism •Establishment of **digital ID**	Incentive Incentive •Incident **reporting** •**Cooperation** in investigation •**Improvement measures** •Voluntary enforcement Explain Report	Evaluate •**Posting reviews** on social media, etc. •Direct negotiation •Discontinuation of service usage •**Impact on finance**	Refer
	Ensuring justice Remedy of rights Remedy of rights		
	Litigation/ADR (Online Dispute Resolution)		
	International cooperation (5.5)		

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<Reference> Overview of a governance model centered on regulations (reposting table 3.1)

Actor / Process	Government	Businesses	Communities/Individuals
Rule-making	• **Rule-based** laws Identify • Assignment of **duties**	• System architecture • Source code	• Market mechanisms • Social Norms
Monitoring	• **Periodic inspections** • Data collection **on site** Obligate	• Passive response to inspections	• Evaluations based on information disseminated by businesses
Enforcement	• Administrative penalties of **uniform amounts** • **Unilateral** revocation of licenses and permits Enforce	• Passive response to investigations and examinations	• Direct negotiations • Discontinue use of service
	Litigation / ADR (off-line)		

In following sections, this framework is described in detail.

5.1 Formulation of rules: Rule-making by multi-stakeholders and enhancement of transparency/competition rules

5.1.1 From rule-based regulations to goal-based regulations

As mention in Section 3.2, in Society 5.0 where technology and business models change rapidly, it will become increasingly difficult for conventional laws and regulations to keep up with these changes.

On the other hand, even if technology and business models change rapidly, the ultimate objectives (goals) of law, such as ensuring safety, consumer protection and fair competition, will not change significantly. As technology and business models are merely a factor that realizes or damages these values, the need and relevance of stipulating detailed rules for such technology and business models in a law is small, and it could hinder innovation by placing certain technologies ahead of others.

Therefore, it is desirable for **laws to take the role of establishing with technical neutrality the gaols (objectives) to be ultimately protected, and for the public sector's voluntary efforts to be left with choices of technological means or business models to achieve such goals**.

Various researches have been conducted in the past that compare the characteristics of "rule-based" regulations, in which a law sets specific behaviors and obligations as an ex-ante regulatory measure, with "goal-based" regulations, which set a goal to be protected by law but is open-textured about the specific methods of achieving such goal. Characteristics of these two types of regulations are summarized in Table 5.1.1.[30]

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[30] Kaplow, L. 1992. "Rules versus Standards: An Economic Analysis." Duke Law Journal. 42:557-624.; Sunstein, C.R., 1995. "Problems with Rules." California Law Review. 83:956-.; Dr. Christopher Decker, " Regulation: goals-based and rules-based approaches", BEIS Research Paper Number 8 (UK, 2018).

Table 5.1.1 | Comparison of goal-based regulations and rule-based regulations

Factors	Goal-based regulations	Rule-based regulations
How rules are described	Open-textured and leaving scope for interpretation	Specific and detailed descriptions of behaviors and obligations
Impact on innovation	Regulatees can freely choose which approach to take as long as the objectives of the law is achieved, therefore the risk of hindering innovation is small	If an innovation violates compliance, regulations could hinder innovation
Different treatments based on each regulatee	Different treatments are available based on the past compliance information of regulatees and other characteristics	All regulates are treated in the same formal manner
Adaptability to changes in technology/markets	More adaptive to changes in technology and environment	Less adaptive to changes, and rules can tend towards obsolescence
Scope of administrative discretion and predictability	Scope of administrative discretion is wide, and predictability is relatively low	Discretion of regulators is restricted therefore predictability is high
Accountability	Accountability is imposed on firms, but firms that are not technically competent may not be able to fulfil their accountability	There will be no accountability if rules are followed, therefore it may result in tick-box type of mentality
Forms of compliance	Can lead to over- or under-compliance	Can lead to behaviors that are against the spirit of the law, although not a formal violation

Reference: Dr. Christopher Decker, " Regulation: goals-based and rules-based approaches", BEIS Research Paper Number 8 (UK)

As you can see, we will be able to adapt to changes in technology and business models more flexibly by establishing regulations that focus on the achievement of the objective of law. By doing so, we will be able to prevent the obsolescence of regulations. Moreover, it will be easier to promote innovation by businesses as such regulations give businesses the discretion of choosing a method of achieving the interests protected by law.

Another benefit of goal-based regulations is that it will enable more flexible policymaking based on the risk. In other words, by requiring businesses to implement reasonable measures based on the nature/size of the business and the impact on consumers, policies can be implemented flexibly, i.e., businesses with a strong influence on society are required to protect the interests of law more prudently, while businesses with smaller risks are allowed to take a less onerous compliance approach.

In this age where changes are rapidly taking place and the need for revolutionary innovation is increasing, setting the rules in advance could frequently create adverse effects, therefore it would be better to have goal-based regulations as a basic policy.

On the other hand, one of the issues of goal-based regulations is that they could create a gap between regulations and operation. In other words, if a law only indicates a goal, following issues could arise: (1) the scope of administrative discretion becomes broad, making it difficult for businesses to determine what types of conduct is prohibited, (2) it will be difficult for businesses with no expert insights to fulfill their accountability, and (3) it could result in over- or under- compliance.

5.1.2   Formulation of guidelines/standards led by the private sector

To overcome the aforementioned gap between regulation and operation while maintaining the strength of goal-based regulations, which is the ability to keep up with the speed of changes in technology and business models more flexibly, it is important to **establish guidelines and standards which could be referred to by businesses in an effort of achieving the goals set by regulations**.[31] This will improve the predictability for regulatees, making it easier to achieve the objective of law, especially for small to medium-sized enterprises that have difficulties securing a compliance-related budget on their own.[32]

These guidelines and standards are extremely important in a digital society. For businesses to implement laws written in a natural language by using a program language in cyberspace, it would be beneficial to establish **intermediate norms (reference architecture) which serve as a bridge between norms in physical space and an architecture in cyberspace**. Such intermediate norms are expected to be written not only in a natural language but also in an architecture in cyberspace and specific source code, or combination of these.

In light of the role of these guidelines and standards, essentially they should be discussed among a wide range of stakeholders particularly businesses that design/manage the architectures of cyberspace, as well as users, engineers, academia, experts in fields of law and audit, regardless of under whose name these guidelines or standards were provided.[33] **The government is expected to serve**

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[31]   For example, the Electrical Appliances and Materials Safety Act, Gas Business Act, and Act on the Securing of Safety and the Optimization of Transaction of Liquefied Petroleum Gas have been reviewed and revised from specification standards in which the state stipulates the size, shape and materials of each item, to "performance standards" which stipulate only the essential performance for product safety. In these cases, ministerial ordinances are specified as performance standards, and for harmonized standards, which is used as a guidance for businesses to determine if standards have been met, official standards such as JIS, which is established by the private sector, are actively adopted, and the government verifies the contents of proposals and announce them as harmonized standards.

Some are designed to make it easier to manage by indicating certain focal points such as in the API connection checklist by FISC (The Center for Financial Industry Information) and then illustrating examples of countermeasures.

[32]   For example, in the financial sector, the Banking Act, Payment Services Act, and Money Lending Business Act adopted a method of stipulating the establishment of certified self-regulatory organizations within the act, and explicitly incorporating self-regulation in the system of law. On the other hand, as in the cases of the Certification Schemes Concerning Functions of Information Trust and the report from the Review Committee on Open APIs established by the Japanese Bankers Association with respect to banking APIs, there are cases where the government has created a form of joint discussion between the government and the private sector by announcing a certified scheme or participating in a meeting body, etc, although it does not immediately place any legal grounds.

[33]   Benefits of these guidelines and standards being established by the government is that they could be explicitly put in place in the system of law, and that the possibility of legal actions being taken against any violation increases. On the other hand, there are benefits of forming a discussion led by the private sector. For example, discussion within the private sector will enable discussion points to be sorted out based on the actual situation, and increase the possibility of being able to respond to rapid changes in technology and business environment.

as a facilitator[34] **of such discussion, and to take on a role of building trust in businesses by certifying them to be compliant guidelines or standards**.

This approach of regulation could be regarded as "co-regulation" which is an intermediate form between legal regulation and self-regulation, as private entities such as businesses (not only businesses that are subject to the regulation but also market participants such as consumer organization and experts in various fields) actively formulate rules toward achieving the goals set by law.

Nevertheless, while guidelines and standards which may be frequently and flexibly revised will enhance the predictability for businesses, they will not fundamentally solve the problem of not being able to keep up with the speed of technology and services. Further, if the established guidelines and standards are implemented with a binding force in virtually the same way as law, they could end up hindering innovation.

In order to achieve both the promotion of innovation and realizing social values, which is the fundamental idea of goal-based regulations, businesses are expected to achieve the objective of law through their originality and ingenuity and actively explain it to external audience, even if they are not aligned with the guidelines and standards, or if they do not exist in the first place.

5.1.3 Continuous review of rules and regulatory sandbox

Changes in technology and business models occur rapidly in Society 5.0, and systems become obsolete quickly. Because of this, **the effects and impacts** of laws, regulations and guidelines/standards **should be evaluated continuously, and opportunities should be created to review them frequently**.

Existing laws, regulations and guidelines/standards that were created postulating only physical space, could be especially an obstacle to new social activities, since their assumption of social environment is now different. In such case, it is important to continuously look back the original goal of the rules, examine whether or not such goal is still necessary, and if it is necessary, what approaches (through laws and regulations, or whether they can be substituted by guidelines or standards, or self-regulations) should be taken to efficiently and effectively achieve the goal of the law.

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[34] This may include preparation of discussion points and environment so that meetings will progress appropriately, not necessarily requiring the attendance in specific meetings.

Figure 5.1.3 | Example of the process of feedback and review of rules
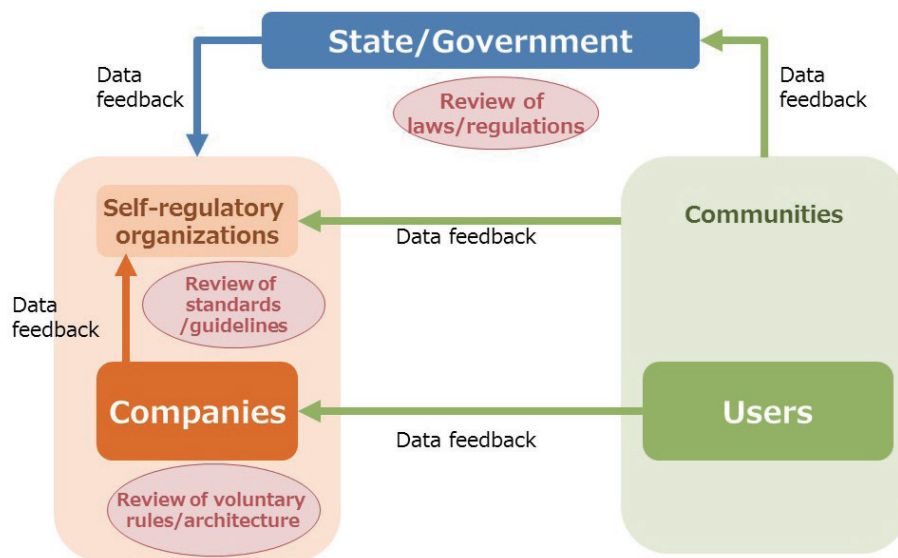
When reviewing rules, an **evidence-based impact assessment** should be conducted wherever possible, by using data collected during the monitoring phase. If interested parties dispute the relevance of a regulation in the enforcement phase, the judicial system should obtain opinions from experts as needed and determine whether the regulation needs to be reviewed. At the same time, it is also important for the private sector to review the guidelines and standards in response to such dispute. In addition, if a system such as deferred prosecution agreement mentioned in a later section is adopted, regulatory authorities need to accumulate information provided by businesses and update regulations as appropriate.

Going forward, it will be also important to utilize a regulatory sandbox system as a place to study regulations based on empirical evidence.[35] This system allows participants to experiment new technologies or businesses within the scope of existing regulations or within the scope of the special measure by limiting the participants and periods. In Japan, this regulatory sandbox system was established in June 2018, under the Act on Special Measures for Productivity Improvement, and came into force

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[35] As Britain's FCA started a sandbox system in May 2016, various countries started operating regulatory sandboxes, including Singapore, Hong Kong, and UAE.

The regulatory sandbox system in Japan is different from that of other countries in the following aspects.

● Not only the laws managed by the Financial Services Agency but also all other laws are subject to the system. This means that the Innovative Business Activity Evaluation Committee, which approves each project from a neutral standpoint, is given a strong authority to make necessary recommendations to the competent minister through the Prime Minister.

● The system is not only for regulatees to obtain licenses or for regulators to develop policies, but also to make it possible to undertake a reform or review of laws that are meaningful to both the regulatees and regulators.

Thirteen projects have been certified as of the end of November 2019, one year since the launch of the system, and ministries and agencies in charge of those projects are wide ranging, including the Ministry of Economy, Trade and Industry, the Ministry of Health, Labour and Welfare, the Financial Services Agency, the Ministry of the Environment Japan, and the Personal Information Protection Commission.

in August 2018. It is important to promote the usage of this system and accumulate data related to new technologies or businesses to reform laws. It is also important to continuously review the regulatory sandbox system to enhance its usability, and to share information with other countries that has the similar sandbox mechanism.

5.1.4 Designing incentive to encourage voluntary efforts by businesses

As the corporate activities are becoming more compmlex, information on how to achieve the objective of law and the necessary cost is often accumulated in business-es instead of the government. Under such information asymmetry, rather than the government unilaterally imposing regulations, it could be more effective to **encourage businesses to make voluntary efforts by showing them certain options**.

In traditional discussions of regulations and economics, for example, it has been suggested that tax be imposed on environmental pollution instead of mandating the use of certain technology[36], or that the government provide contract options (fixed price contract, cost reimbursement contract, etc.) and let businesses make a choice[37]. These methods will become increasingly important just as goal-based regulations in Society 5.0 in which changes occur rapidly and information is concentrated in busi-nesses, from the standpoint of encouraging unfettered activities of businesses and guiding them toward accomplishing the objectives.

Nonetheless, these types of incentive design will function effectively if businesses have enough information about their businesses. On the other hand, in Society 5.0, it is often impossible for businesses to predict exactly how their systems will behave, or what im-pacts they will have on the society. For that reason, **it is important to design not only ex-ante incentive but also ex-post incentive for businesses to cooperate with investigation/improvement in case of occurrence of an incident** (Refer to 5.3.2).

5.1.5 Development of transparency rules and competition rules with an aim to enhance discipline by communities/individuals

For governance by markets and social norms to effectively function, it is important for communities and individuals to obtain information about products and services. Therefore, it is necessary to either **mandate businesses to disclose and explain certain important matters**, or to **design incentive for such disclosure** (Refer to 5.2.1.4).

Further, if a market is monopolized or oligopolized, or if a user cannot come and

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[36] Sunstein, C.R., 1995. "Problems with Rules." California Law Review. 83:1019-1020

[37] Jean Tirole, (2018) "Économie du Bien Commun" (Japanese translation by Akiko Murai), Pg509

go multiple services (multihoming), the competitive pressure from the demander side will not work effectively. Therefore it is also important to **develop and implement competition rules that are appropriate for the digital era**. Moreover, it is important to consider how to design **data portability, as well as data access through open APIs**, in order to enhance a fair and competitive environment.[38]

It is also important for the government to clarify trade relationships though interpretative guidelines[39] for the civil and commercial codes that are the basis of trading rules (for example, sorting out ways to determine "negligence" related to a damage caused by AI) and guidelines for contracts related to advanced technology[40], so that risks related to transactions are appropriately managed.

5.1.6 Designing the architecture of industry structure

As mentioned above, regulations in the era of Society 5.0 may be disciplined from various perspectives, including establishment of goal-based regulations and guidelines/standards to be used as a reference to achieve the goals, an incentive design to encourage self-regulation, and development of transparency/competition rules to enhance the discipline by markets/social norms. Accordingly, when determining the extent of discipline by law, the scope covered by self-imposed rules, and the types of information to be disclosed and to whom, **it is important to analyze/design the architecture of the industry structure based on insights of experts in law, technology, business, as well as system design**.[41]

5.2 Monitoring: Focusing on "Comply and Explain" by businesses and utilizing real-time data

5.2.1 Increased importance for businesses to disclose information and fulfill their accountability

Under the traditional rule-based governance model, the government was expected

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[38] "Fundamental Principles for Rule Making to Address the Rise of Platform Businesses" (Dec. 2018) Pg3 by the Ministry of Economy, Trade and Industry (METI), the Japan Fair Trade Commission (JFTC) and the Ministry of Internal Affairs and Communications (MIC) https://www.meti.go.jp/press/2018/12/20181218003/20181218003-1.pdf

[39] For example, the "Interpretative Guidelines on Electronic Commerce and Information Property Trading" established by METI sets an interpretation of how laws, such as civil and commercial codes, are applied with respect to various legal issues related to electronic commerce, etc.

[40] METI "Contract Guidelines on Utilization of AI and Data" https://www.meti.go.jp/english/press/2019/0404_001.html

[41] In December 2019, IPA (Information-technology Promotion Agency, Japan) established a task-force to establish the "Industrial Architecture Design Center", which will design the common technical standards which will enable intersectoral use of data. https://www.ipa.go.jp/about/press/20191212_2.html

to monitor businesses whether they implement actions provided under laws. However, under the above-mentioned goal-based regulations, laws do not specify actions to be implemented by businesses. Therefore, instead of the unilateral monitoring of businesses by the government, it will become more important that each company monitors its own activities to see whether the goals provided under laws are achieved, and to disclose and explain the result externally.

Mechanisms and systems for achieving the objective of law differ by company. Further, the shape of cyberspace is invisible, and information needed for evaluation of cyberspace is asymmetrically accumulated in businesses, therefore it is difficult for a third party to determine from the outside how businesses are actually ensuring compliance.[42] Consequently, in order to encourage businesses to achieve sustainable innovation and protect social values set by law at the same time, a **co-creation model would be appropriate in which businesses that play a part in designing/management of cyberspace architecture to disclose and explain their approaches and concepts of compliance to the regulatory authorities or markets, timely receive feedback from them, and continue to evolve** (Refer to the image). Below figure illustrates such mechanism.

Figure 5.2.1 | Providing explanation to various stakeholders and receiving feedback

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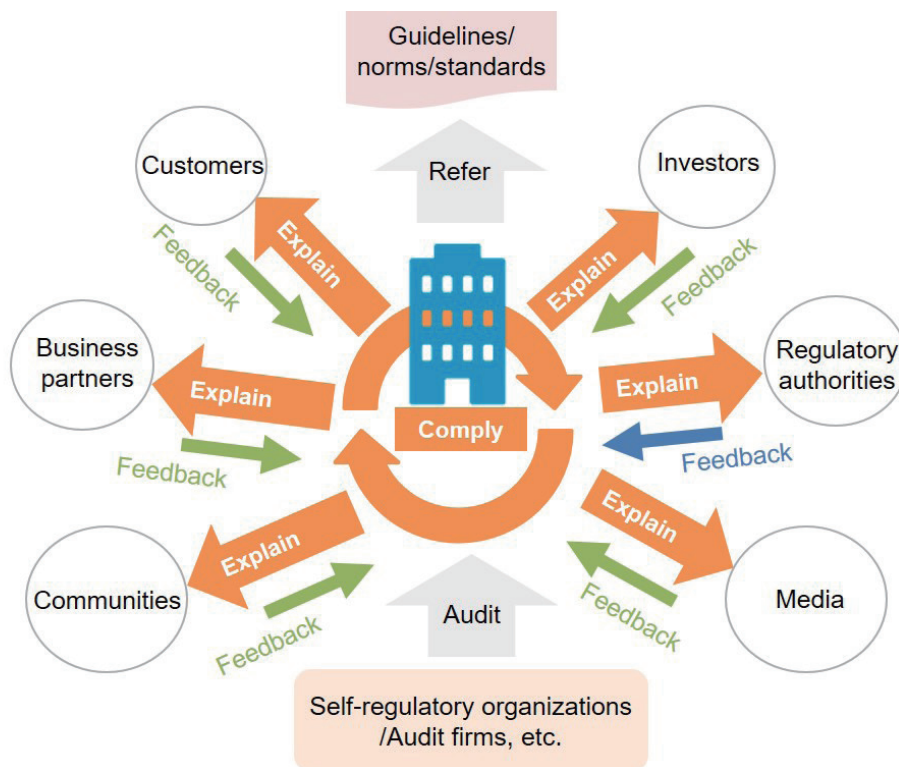
[42] One of the ways to overcome this challenge could be for the regulatory authorities to require businesses to disclose system source code, algorithms and data, etc., and for the regulatory authorities to review the legality of such data, etc. However, it would be difficult for the regulatory authorities to determine the legality of information even if businesses disclose such information, and also as explained in 4.3, the risk of affecting fundamental human rights and trade secrets could be high.

5.2.1.1　Concept of comply and explain

One of the existing concepts which require businesses to voluntary provide explanation is "comply or explain". With an assumption that principles are set by laws and guidelines, this concept require businesses to either "implement the principles, or provide explanation if the principles are not implemented"[43].

However, in Society 5.0 where there are diverse methods of achieving goals set by law and implementing principles, and where ideas toward safety and security are also diversified, simply declaring that they implement principles may not be sufficient to ensure trust. Therefore **it is important for businesses to explain how they ensure social values with which architecture, and how they detect, review and control risks, and to receive feedback from stakeholders through dialogue on an ongoing basis**. Accordingly, businesses are expected to implement enterprise risk management (ERM) based on co-creation with stakeholders, which sits on a different level from the traditional method of "whether or not to comply with laws and principles".

5.2.1.2　Various ways of gaining trust

When implementing the "comply and explain" approach, it is important that businesses gain trust from the society about the integrity of what was explained by them. In Society 5.0, methods of gaining and enhancing trust will also diversify. One way to enhance trust is for businesses to change their business processes and business models. Another way is to obtain some kind of assurance regarding their stance on and processes of gaining trust, the actual situation and resulting outcome, and the certainty of their assertions and statements.

These options could be adjusted/determined based on the required level of trust. Generally, **there are various forms of assurance such as a self-check, peer review, internal audit, agreed procedure, third-party review and audit**. For example, if internal periodic monitoring could satisfy the stakeholders, there may not be a need for involving an independent third party, as the objective could be achieved through a self-check. On the other hand, if it is important to explain the conformity to rules to external stakeholders such as regulatory authorities, it would be desirable to adopt a form of assurance involving a third party with respect to standards to be followed when conducting evaluation. It would be desirable to flexibly apply a mechanism of gaining

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[43] Principles for Responsible Institutional Investors《Japan's Stewardship Code》– To promote sustainable growth of businesses through investment and dialogue – (The Council of Experts on the Stewardship Code, 2017) https://www.fsa.go.jp/en/refer/councils/stewardship/20170529.html, "Japan's Corporate Governance Code Seeking Sustainable Corporate Growth and Increased Corporate Value over the Mid- to Long-Term" (Tokyo Stock Exchange, Inc., 2018) https://www.jpx.co.jp/english/news/1020/b5b4pj000000jvxr-att/20180602_en.pdf

trust according to the trust level required between a company and its stakeholders and the importance from a social standpoint.

Presuming the concept of "comply and explain", the certainty and consistency of businesses' assertions/statements as well as the continuity of disclosure and dialogue will play extremely important roles more than ever. As the expectation toward assurance as a method of gaining trust increases, not only the forms of assurance implemented/provided systematically/compulsory (such as the external audit system for financial reporting of listed companies, which has been already introduced in many countries) but also the forms of assurance disclosed voluntarily by businesses will further diversify.[44] **It is important that stakeholders correctly understand the meaning of assurance and continuously seek and evolve the forms of assurance as a better means of gaining trust**.

5.2.1.3   Providing incentive through laws and markets/social norms

In transitioning to a model explained above which values the process of comply and explain by businesses and the ensuring of trust, provision of incentive to businesses will be important.

First of all, for matters with a certain level of importance, a law could require businesses to disclose relevant information or to go through an audit by external auditors, as already introduced to financial reporting of listed companies. However, if businesses are required to disclose every single fact, their compliance cost will increase, which could hinder innovation.

For that reason, secondly, we should also consider a system in which **businesses actively gain trust and disclose information will be evaluated by a market**, instead of imposing mandatory requirements. For example, we could take an approach such as encouraging a market to conduct evaluation by setting a benchmark that directly links the gaining of trust to corporate values and financing, or grading managers by their ability to gain trust. Another approach is to have experts from the government or unbiased third party to review businesses' systems and grant certifications as needed.

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[44] In general, five factors are required in assurance: (1) Existence of three parties (engaging party, a party accountable for the subject and key intended users (2) appropriate subject, (3) suitable standards, (4) sufficient and appropriate evidence, and (5) documented reporting in a appropriate format depending on reasonable assurance engagement or limited assurance engagement. (Research Report No. 31 by the Audit and Assurance Working Committee, Conceptual framework for assurance engagements other than audits or reviews (The Japanese Institute of Certified Public Accountants))

5.2.2 Utilization of real-time data by businesses, the government and individuals (RegTech/SupTech)

In Society 5.0, data will be obtained from devices such as high-volume, high precision, and low-priced sensors and cameras, and the use of IoT (Internet of Things) which connects things to networks will be promoted. As a result, data that could be used for monitoring will shift from fragmentary data to real-time data. This type of **real-time data monitoring could be conducted by not only businesses but also by the government, communities and individuals, separately or in cooperation with each other. Real-time monitoring will enhance the efficiency and precision of monitoring, and it will be possible to determine in an ongoing basis whether aforementioned goal-based regulations are achieved**.

Typically, data monitoring is expected to evolve as shown in **Figure 5.2.2**.

Figure 5.2.2 | Evolution stages of typical data monitoring
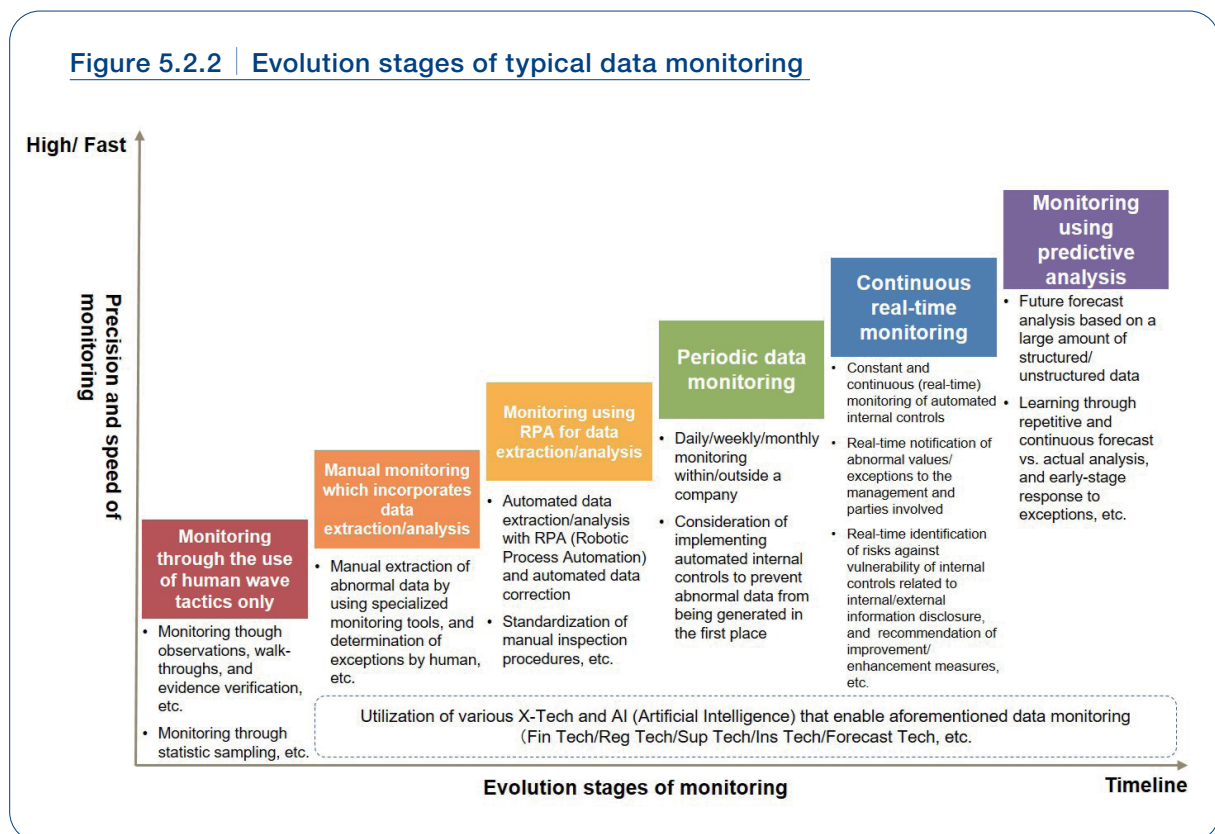
As various types of real-time data become available for analysis, businesses are able to go beyond internal data monitoring of individual transactions, and conduct a bird's eye analysis of their entire supply chains or monitor the stability across markets. Moreover, another monitoring approach is also available, by which businesses not only analyze the past and present data but also forecast the future and get feedback through backcasting. Traditionally, businesses have been using data analytics for accounting and internal audits, etc. In the future, **it will be important for businesses**

to collect and analyze real-time data in every situation of risk management and compliance, such as maintenance of infrastructures and buildings, operational management of percentages of bad debt and overdue debt in finance, and understanding of mobility traffic and weather information, **and explain them externally so that they can gain trust of society**. Such revolutionary technology that supports corporate compliance is called RegTech (Regulatory technology).

Monitoring using real-time data is also an important tool for the government in conducting efficient and effective oversight. For instance, by aligning the systems of financial institutions and those of regulatory authorities through APIs, a structure could be built in which regulatory authorities themselves could monitor information through systems as needed, instead of having financial institutions report such information to them. As a result, the burden of financial institutions to report information could be alleviated, and **the effectiveness of monitoring by regulatory authorities could be enhanced by enabling them to focus on the point with high risk**.[45] Such innovative technology used by regulatory authorities to support regulatory work is called SupTech (Supervisory Technology).

Moreover, in terms of monitoring crypto-assets through a blockchain, businesses and regulatory authorities along with users and market participants are now contributing to ensure the stability and oversight function of the market by utilizing various data monitoring methods.

On the whole, **not only businesses and the government but also individuals/ communities, including people as well as machinery and AI, need to share in various ways the information of who, what, when and how of monitoring, and the society as a whole needs to enhance the precision and speed of monitoring**. To achieve this, **the design of an architecture which enables co-creation and establishment of standards, such as API, will be an important key from the standpoint of the society as a whole when implementing and utilizing various technologies**.

5.2.3   Conducting "monitoring & review" by multi-stakeholders

It is desirable that the result of monitoring of business operations by the company, the government or communities will be externally reported on a regular basis, and be evaluated by various experts including in business, technology, law, and policy (monitoring & review). Through this evaluation, businesses can improve the design or operation of its architecture, the government can revise the regulations or

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[45] The Financial Services Agency, "Status of digitalization efforts in financial monitoring" (June 2019) Pg14 https://www.fsa.go.jp/news/30/20190620_joubun/01.pdf

guidelines/standards as necessary, and the users can determine their actions in the market based on the knowledge about the effect of the architecture on their data or activities. **This review is not necessarily conducted for the purpose of criticizing businesses, but rather for the purpose of positively evaluating businesses' activities, which will strengthen trust among businesses, users and the government**.

5.3   Effective and bilateral enforcement through the use of incentive

5.3.1   Impact-based enforcement of laws

To create incentive for businesses to ensure compliance, adequately effective penalties and liabilities need to be in place in case of any violation of law. Instead of imposing uniform penalties by behavior types, an environment should be created in which a **penalty that creates sufficient incentive for businesses to comply with regulations, taking into account the impact of a behavior on society and the extent of the risk**.

The penalty in this context is not necessarily limited to legal sanctions, such as administrative sanctions or disqualification. Whenever a company violates a law or acts against social norms, posting/sharing of news and review articles on the Internet will quickly impact the value of its products and services, likelihood of financing for the company, and in turn its enterprise value. Therefore complying with laws or observing social norms becomes important incentive for businesses in relation to markets (Integration of Compliance - Governance - Finance). The government could utilize these types of economic incentive by **publicly announcing violations by businesses**, which would be an effective sanctions on businesses (and would also create a deterrent effect backed up by such sanctions).

However, for judgments by markets and social norms to function effectively, market participants must be able to obtain sufficient information, and free and fair competition must be ensured in markets. For that reason, the government needs to consider **how to apply/enforce the transparency rules and competition rules**.

Also, **stipulating standards for government/public procurement**, such as not allowing those who violated a law to participate in any bidding, **could be an effective economic incentive in certain sectors**.

In many cases, sanctions based on such economic incentive work effectively on overseas companies over which the state cannot exercise its jurisdiction.

Further, when determining whether to impose a penalty and liability, understanding of the cyberspace architecture will be essential more than ever. Accordingly, it is desirable that regulatory authorities, independent administrative commissions, prose-

cutor's office, and courts build their capacities of digital-related knowledge and create a structure to obtain expert opinion as needed so that they could enforce the law in a fair and reliable manner.

5.3.2 Investigating the causes of incidents occurred in autonomous systems and focusing on improvement measures

As mentioned in Section 3.4.2, for any damage caused by an autonomous decision by a complex system equipped with AI (hereinafter referred to as an "AI system"), a traditional model of "attributing the liability to a person(s)" is starting to fail. Going forward, from the perspective of ensuring both the better safety and promotion of innovation, it will be necessary to establish a mechanism which breaks away from the model of "attributing the liability to a person(s)" and achieves overall optimization, i.e., a **structure with a legal system which directly improves products or product development systems by working with developers and manufacturers**.

By clarifying the party that is legally liable and streamlining the development system, the reliability of products will be enhanced and the value of companies in the market will increase. As a result, the global competitiveness of such companies will be enhanced.

5.3.2.1 Investigation of incidents

When there is a need to find out the cause of a material misconduct or incident caused by an AI system (or those which AI system could not prevent from occurring) and if advanced expertise is required, an **incident investigation committee may be established which focuses on the investigation of the cause and prevention measures based on the identified cause**. When such incident investigation committee is established and conducts investigation, the committee could require related parties and businesses to submit necessary information by adopting systems of deferred prosecution/ suspension of an indictment with conditions, which are mentioned in a later section.

By accumulating insights on new information technology through steadfast co-operation of businesses in incident investigations, regulatory authorities can fill the information gap between regulators and businesses and enhance its capacity and effectiveness of co-regulation.

5.3.2.2 Criminal liabilities of businesses: Deferred prosecution agreement and suspension of an indictment with conditions

In order to avoid the risks arising from AI systems as much as possible while trying not to discourage the development of such systems, it is worth considering the adoption of systems of **Deferred Prosecution Agreement ("DPA") and suspension of an indictment with conditions, in which businesses and involved person(s) could be spared from criminal sanctions by taking adequate prevention measures in advance, reporting to authorities and cooperating with authorities in an investigation upon occurrence of an incident, and promising to make improvements on products and development systems if necessary**[46]. To adopt such systems, it would be necessary to establish related substantive criminal laws and procedural laws[47], to create an incentive structure so that it can bring out appropriate behavior from businesses.

Both systems of Deferred Prosecution Agreement and suspension of an indictment with conditions are based on an assumption that businesses that receive the benefit of these systems should cooperated with incident investigations. Therefore, by combining with rules of extraterritorial application of law, they have the strength of rising above the limitations of sovereignty of traditional law enforcement, and enable equal application of regulations to businesses both within and outside the country.

Table 5.3.2 | Differences between modern criminal laws and sanction laws in the age of Society 5.0

	Modern criminal law	Sanction law in the age of Society 5.0
Purpose of sanction	Prevention/Retribution	Improvement/Risk management
Target of sanction	Individuals	Products/Companies
Grounds for sanction	Violation of interests protected by law	Non-cooperation in realization of social values
Predictability of violation of interests protected by law	Necessary	Unnecessary
Sanction rules	Criminal law	Various laws＋Prosecution guidelines
Law enforcement body	Government	Collaborative
System	Static	Dynamic

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[46] While the existing plea-bargaining system is a means of collecting evidence, systems of deferred prosecution/suspension of an indictment with conditions are criminal measures as an alternative to criminal punishment. That is one of the fundamental differences between the former and the latter. In addition, under the indictment suspension system based on the existing law, it is difficult to supervise the activities of the party subject to the suspension of indictment after such suspension, therefore it is difficult to apply the system in the same way as DPA. Further, to design appropriate incentive, it is essential to develop and publish guidelines on prosecutorial discretion.

[47] The existing law does not cover dual liability of businesses with respect to incidents arising from a product, and prosecution and criminal punishment are not linked to administrative sanctions, therefore a reform of substantive laws is necessary. As the validity of such application for the sole purpose of utilizing prosecutorial discretion is questionable based on the ruling on the Lockheed case by the Supreme Court for criminal justice with a bargaining nature, procedural criminal laws also need a reform. Moreover, to enhance the reliability of the systems, it is necessary to ensure compensation for victims and establish procedures for appropriately addressing emotions relating to punishment.

5.3.2.3   Civil liabilities of businesses

If it is unclear whom the liability of negligence related to a damage caused by an AI system lies with, remedies for victims cannot be ensured under the liability for tortious acts prescribed by the civil law whose principle is the liability of negligence. As the scope of application of the Product Liability Act, which reduces the burden of proof by victims, is also limited, and if providers of AI systems do not have the enough financial strength, it is impossible to provide remedies to the victims. In light of this, for systems such as an automated driving system which could cause a significant damage to an individual, it is important for the society as a whole to bear the risks of AI systems by **having an insurance system in place** or taking other measures.[48]

5.3.3   Enforcement by the private sector

The roles of the private sector including businesses/self-regulatory groups/ external experts are expected to increase in the sphere of enforcement just like the roles of businesses are increasing in the formulation of rules and monitoring. Examples of enforcement by digital platform businesses include deletion of user posts and suspension of accounts. Examples of enforcement by self-regulatory groups include revocation of certification granted to members or disqualification of members. Examples of enforcement by third parties include issuance of an adverse opinion on corporate accounting by auditing firms. The importance of these type of enforcement by the private sector is expected to increase in the digital era as they offer flexibility based on expert knowledge.

Even so, as these types of enforcement are conducted by the private sector based on their own judgments, there are cases where the procedural impartiality of enforcement is not ensured. For that reason, it is necessary to **have a scheme in place so that the appropriateness of judgment processes and results will be evaluated by third parties**. Further, it is very important to have a dispute resolution infrastructure in place in society so that parties who are not satisfied with the enforcement by the private sectors are able to have a disputed matter resolved by an independent third party who has expert knowledge and experience in such matter.

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[48] While contractual liabilities arising from development of AI should be stipulated in contracts in principle, it will be beneficial for the government to present standardized contractual terms so that contracts will be fair to both vendors and users. As part of such efforts, METI has published the "Contract Guidelines on Utilization of AI and Data" in June 2018, and updated it in December 2019.

5.3.4 Modernization of the dispute resolution system (Online dispute resolution)

It is extremely important that a fair, convenient and effective means of dispute resolution is made available in society for at least the reasons listed below.

First of all, for governance by communities and individuals to work effectively, it is important that a dispute resolution system which provides legal remedies (civil compensation of damages) is made available to market participants. Individuals can use innovative technologies and businesses with a peace of mind because of the existence of such remedy measures.

Secondly, extraction of procedural issues related to dispute resolution will be an important momentum for reviewing existing laws and regulations as well as guidelines/standards.

Thirdly, as a means of remedies against the enforcement by the private sector including businesses or self-regulatory bodies, it is important that disputes can be resolved by an independent dispute resolution organization.

Currently, trials and ADR Alternative Dispute Resolution) are generally conducted offline, and related procedures require a significant amount of cost and time. As a result, in reality, dispute resolution systems cannot be utilized for minor disputes which make up the majority of the disputes in society. That is why it is important to **promote the implementation of Online Dispute Resolution (ODR) in society** so that trials and ADR are conducted online and procedures up to the enforcement are performed quickly and at low cost[49].

5.3.5 Establishment of a common ID infrastructure for individuals/legal entities

To effectively enforce the law (not only the enforcement of regulations but also the administration of benefits such as payment of subsidies) in cyberspace where it is difficult to identify the profile of acting parties, it is important that acting parties in cyberspace can be identified. Hence it is beneficial to establish a common ID infrastructure for individuals/legal entities.

On the other hand, there may be cases in which the law could be enforced based not necessarily on personally identifiable information but on pseudonymized or an-

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[49] In Japan, discussions have started with respect to adoption of IT for trials and implementation of ODR. "Study committee to introduce IT to court procedure etc."(https://www.kantei.go.jp/jp/singi/keizaisaisei/saiban/index.html), "ODR vitalization study committee (https://www.kantei.go.jp/jp/singi/keizaisaisei/odrkasseika/)," both formed by the Japan's Economic Revitalization Bureau in the Cabinet Secretariat.

onymized information. Going forward, it is important to discuss the extent of identification of parties needed from the perspective of ensuring freedom of businesses and individuals.

5.4 Extraterritorial application/cooperation in enforcement, and formulation of international rules

In terms of laying out international rules, it is important to proceed with initiatives and standardization through international forums and dialogues between nations to ensure the interoperability of rules, while promoting cooperation in enforcement to ensure the effectiveness of extraterritorial application of domestic laws.

5.4.1 Clarification of extraterritorial application of law, and information sharing/cooperation in enforcement

To realize an **equal footing of regulations among businesses within and outside the national territory, a review of the scope of extraterritorial application of domestic laws may be conducted**[50]. It is also important to consider building a structure to provide incentive to overseas businesses so that they will provide cooperation, as in the cases of aforementioned systems of Deferred Prosecution Agreement and suspension of an indictment with conditions.

Sharing of information and cooperation in enforcement with foreign authorities will be increasingly important in the future. In this regard, we have seen cooperation in enforcement through traditional tax convention and mutual legal assistance treaty. Also, a legislation was made in recently that stipulates a government's right to access data of that country's businesses stored in a server in another country[51]. Consequently, a key challenge will be figuring out how to cooperate with foreign governments in these systems in the future.

5.4.2 Formulation of interoperable rules including standardization

In today's environment in which networks are driving the rapid globalization, it is very important to ensure mutual compatibility (interoperability) of rules from the stand-

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[50] In the discussion on the revision of the Act on the Protection of Personal Information, the direction has been set to review the scope of extraterritorial application. "Policy Principles on 3-Year Review of the Act on Protection of Personal Information" by the Personal Information Protection Commission (November2019) Pg28(https://www.ppc.go.jp/news/press/2019/20191129/)

[51] The U.S. Congress passed the Clarifying Lawful Overseas Use of Data Act (CLOUD Act) in March 2018. (https://www.congress.gov/bill/115th-congress/house-bill/4943)

point of businesses entering global markets[52]. Accordingly, **international cooperation though various international forums and dialogues** will be necessary. For example, international organizations such as OECD and WTO are discussing the development of guidelines for governance in the digital era and the formulation of rules[53]. As there have been active discussions and international exchanges for the formulation of rules among multi-stakeholders groups led by the private sector[54], it is also important that Japan actively participates in these discussions.

At the same time, it is also extremely important for Japan to **actively contribute to the formulation of international standards** from the standpoint of ensuring interoperability, since standards that are referred to when designing architecture would become essential in Society5.0, in which developed will be based on software architecture.

For example, the International Organization for Standardization (ISO), International Electrotechnical Commission (IEC), and International Telecommunication Union (ITU) are leading de jure standardization organizations that meet the six principles of international standards[55]. As member countries of the TBT agreement have promised to make sure that their "domestic standards related to legal systems conform to international standards", it is highly effective in the aspect of global expansion. It is important to leverage these opportunities to promote standardization in a wide range of spheres.[56]

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[52] In connection with GDPR (General Data Protection Regulation), which is EU's personal data protection rule, Japan received an adequacy decision on the Mutual and Smooth Transfer of Personal Data in February 2019.

[53] OECD "Going digital: Making the transformation work for growth and well-being"(https://www.oecd.org/going-digital/), a Meeting for the Exploratory Work on Electronic Commerce of WTO (Osaka Track) (https://www.meti.go.jp/press/2019/07/20190718001/20190718001.html).

[54] For example, "Global Future Council on Agile Governance" (https://jp.weforum.org/communities/global-future-council-on-agile-governance) by the World Economic Forum, and initiatives by the Internet & Jurisdiction Policy Network (https://www.internetjurisdiction.net/), etc. In addition, as part of international exchanges by domestic groups, the Fintech Association of Japan has established the APAC RegTech Network in May 2019 by working with the Singapore FinTech Association and the RegTech committee of the Fintech Association of Hong Kong. The Fintech Association of Malaysia joined the network in September. As such, collaborative initiatives are conducted across the APAC region. (https://www.regulationasia.com/tag/apac-regtech-network/)

[55] Following criteria listed in the "Principles for the Development of International Standards, Guides and Recommendations" in Article 2, Article 3, and Annex 3 of the TBT Agreement: (1) transparency, (2) openness, (3) impartiality and consensus, (4) relevance and effectiveness, (5) coherence, and (6) development dimension.

[56] [Add specific initiatives related to data circulation/automated driving/taxation/competition policies, etc.]

An new model for laws and regulations

In the discussion group, it was pointed out that in order to implement the aforementioned governance model, laws and regulation in various sectors will be structured in the following manner.

First tier: Structural "laws" that stipulates social norms and market rules, e.g., the civil law and criminal law.

Second tier: Regulatory laws (1)
- These laws define interests protected by law and fundamental principles, and they are based on an approach of ex-post regulation.
- Specific contents of regulations are based on a reference architecture (Reference example: the standard of fair treatment in the Corporation Tax Act)
- The appropriateness of a reference architecture is ensured through discipline and auditing of procedures for developing the architecture and the organization that develops the architecture.

Third tier: Regulatory laws (2) = Extra discipline for each special entity or sector
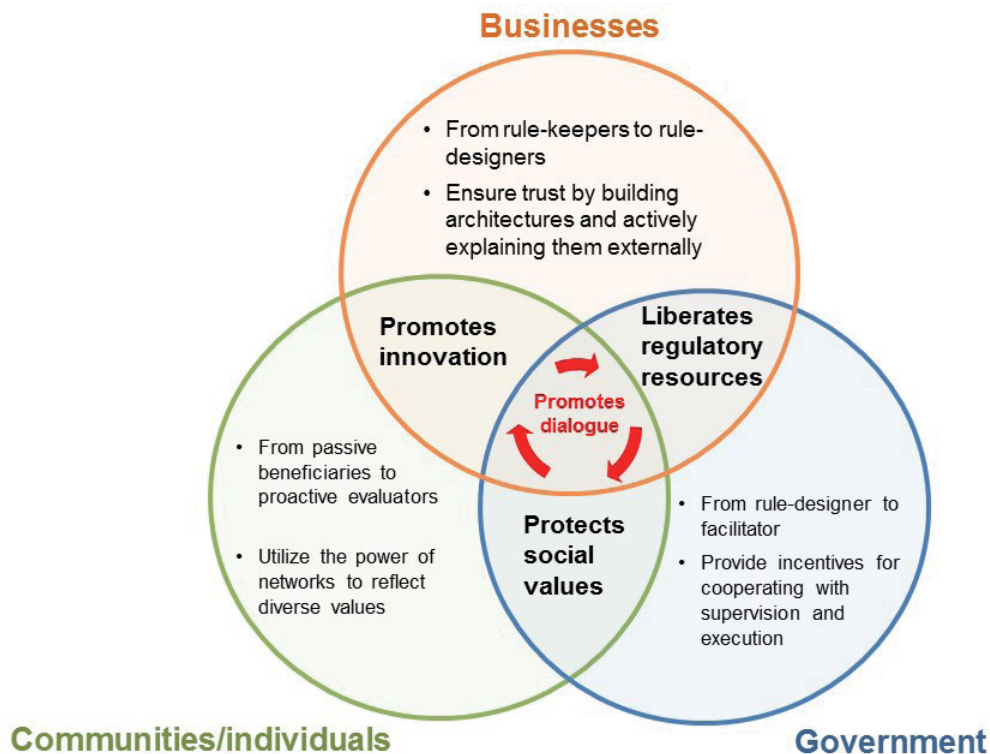- Agreement-type approach between the government and certain businesses (typically, businesses with a powerful influence in society) and control procedures of such approach
- Ways of laws: special laws and framework laws, etc.

Among these, it was pointed out in the discussion group that the second tier in particular requires cooperation of multi-stakeholders.

Chapter 6: The Roles of Businesses, Individuals, and Governments in the New Governance Model

Figure 6 summarizes the roles of each actor in the governance model described above.

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

Businesses
- From rule-keepers to rule-designers
- Ensure trust by building architectures and actively explaining them externally

Promotes innovation

Liberates regulatory resources

Promotes dialogue

- From passive beneficiaries to proactive evaluators
- Utilize the power of networks to reflect diverse values

Protects social values

- From rule-designer to facilitator
- Provide incentives for cooperating with supervision and execution

Communities/individuals

Government

6.1 Government: From designer of rules to designer of incentives

As we discuss above, the governance model that places emphasis on the voluntary efforts of businesses and appraisals made by communities/individuals will cause the change in roles of government.

Since the conventional style of rule-making with f prescribing specific duties to act for specific business categories will lose its effectiveness, and by going back to the essence, the guiding principle for rule-making will be **defining the legal objectives (goals) that must be achieved with respect to specific risks**. While how to achieve the goals will be left to the discretion of businesses and their voluntary efforts, it will be important for governments to **act as facilitators to support setting guidelines and standards** that address the issue of the high probability of typical risks arising, as well

as values that must be upheld independently of economic values. Governments may also dispatch government officials to review **businesses' systems**, or enlist neutral, third party experts to **provide certifications if necessary** . Furthermore, in areas where social values must be upheld with the involvement of public agencies—a typical such situation being market failure—the government should also **take a leadership in designing industry architectures** which define the scope of matters to be enforced by law and matters to be left to the discretion of businesses' voluntary actions and market decisions.

It will also be important to **establish market rules** to ensure that governance by communities and individuals is able to work effectively. In other words, such efforts may include (i) **obligating businesses to disclose and explain certain important matters**, and (ii) **formulating and enforcing appropriate rules of competition** to prevent the monopolies and oligopolies which are detrimental to consumers. Other critical roles include **clarification for business relationships and facilitation of business** by providing guidelines on interpreting civil and commercial laws, which constitute the foundations of transaction rules[57], and by providing guidelines for contracts related to advanced technologies[58].

As for monitoring, it would be possiblefor government to **obligate certain degrees of information disclosure to ensure better transparency and also provide incentives of informtion disclosure for bussiness** to and make diverse ratings by communities/individuals available. It will also be important for governments themselves to actively use technology in their monitoring purposes (Sup Tech). We believe that close dialogue with these businesses will be important during the process of implementing these measures. It is also important that **laws, guidelines and standards undergo periodic review to check their effectiveness and the points to be improved**.

In the area of enforcement, governments should **impose appropriate degree of sanctions in relation with the social impact of the company's specific violation**. Sanctions will not be necessarily limited to administrative dispositions. The impact on corporate value and finances which can result from the market being widely informed of a company's violation of laws or norms can put the company's survival at risk. As such, public announcements of violations made by governments can be a powerful, market-mediated form of sanction on businesses (as well as a powerful deterrent backed by the potential impact that such announcements can have). Additionally,

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[57] For example, METI's "Regulations on Electronic Commerce and Information Goods Transactions" provides interpretations on how relevant laws, including civil law, are to be applied to various legal issues related to electronic commerce.

[58] The "Contract Guidelines for AI and Data Usage" mentioned above.
https://www.meti.go.jp/press/2018/06/20180615001/20180615001.html

banning businesses who violate laws or regulations from public tenders according to government procurement can serve as an effective economic counterincentive in certain sectors.

That being said, given cyberspace's complexity and lack of visibility from the outside, cooperation from businesses is indispensable for investigating the causes of any problems that may arise and building on the findings to enable future improvements. To this end, it will also be important to **provide incentives for private businesses to cooperate**, including deferred criminal prosecution agreements that assure businesses that sanctions will not be imposed if they actively cooperate in fact finding investigations or remedial actions going forward.

As new goals and rules are formulated, and incentive structures are refined with the use of information obtained through monitoring and enforcement abovementioned, the development of administrative systemss that enable new forms of governance that are compatible with agile society can be promoted.

In order to ensure equal footing for domestic as well as foreign business under these mechanisms, it is important for governments to organize the extraterritorial application of domestic laws, cooperate with foreign governments in enforcement, **conduct discussions on how to ensure mutual compatibility with international rules, and make active contributions to promote standardization**.

6.2 Businesses: From regulated entities to co-designer and enforcer of rules

The structures (architectures) of cyberspace, which determine the changes that occur in social systems, are mainly designed and operated by businesses. Cyberspace architectures are fast-changing, complex, and difficult to understand from the outside, so independent-minded participation from private businesses is essential in any governance model that is designed to uphold social values.

Firstly, in the area of rule-making, **businesses must actively develop guidelines and standards** that ensure that laws, regulations, and social values are reflected in actual operations. Besides, it is important that all businesses **flexibly design cyberspace and physical space architectures, to achieve their objectives**, and do so by referencing the guidelines and standards mentioned above.

Secondly, in the area of monitoring, **businesses are required to actively release information on how they achieved the legal objectives (goals) and how they control risks (comply and explain)**. In addition to audits performed by a company's internal audit division to verify the appropriateness of their compliance, they may also

be subjected to audits by third-party experts if necessary. As for monitoring, it is important to control risks effectively and efficiently by utilizing real-time data collection and AI-based analyses. To achieve their objectives, and do so by referencing the guidelines and standards mentioned above. Company's diligent external explanation of the result of the monitoring, and receiving reviews on the result by the government or consumers lead to increasing social trust for the company. It is also beneficial for society, since it provides chances of amendments of laws, guidelines and standards.

Self-directed contribution of businesses in the area of enforcement is also essential. If a complex system incorporating AI or other related technology causes an accident, it would be difficult for regulators to determine the cause of the accident and build on their findings for future improvement without the cooperation of private businesses. **In the event of an accident or misconduct, private businesses should voluntarily file a report with regulators, cooperate in investigations to determine the cause, and take corrective action in the aftermath**. And the duty to design incentives that encourage such actions is left for the governments.

As we discussed above, in Society 5.0, **businesses that design and operate architectures of cyberspace are expected to play a main role in the every phase of governance, rule-making, monitoring and enforcement**.

6.3 Communities/individuals: From passive beneficiaries to active evaluators

With the advancements being made in digital technology and networks, the influence that individuals (members of our societies) and communities (collectives of individuals) have on governance continues to increase. With appropriate empowerment through the use of SNS or review sites, **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 evaluations provided by individuals heighten the incentives for businesses to uphold social values, and also encourage voluntary rule-making.[59]

In light of our world today of increasingly diversifying values, it is important that **individual opinions** and not just the one-sided values defined by the government **are reflected in governance**. As such, we believe that governments should actively promote governance based on these market mechanisms and social norms. Govern-

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[59] For example, in cases where a company handles personal information, the use of such information may be subject to criticism if it goes against social ethics even if such use is not in direct violation of any law. Conversely, safety measures that are not directly related to the utility value of a company's products or services, or efforts to achieve SDGs, etc. may have the effect of increasing corporate value.

ments may provide environment where a lot of valuable information are flowing by **putting emphasis rules on information disclosure**. It is also possible that government provide environment where consumers always have several options by **enforcing competition rule appropriately**.

Meanwhile, if a violation of laws or inappropriate behavior by a company is cited on the Internet, this information will spread instantly (so-called "social media storm") even if the citing was not entirely factual, and can lead to significant damage to corporate value or have a major impact on the company's finances. For this reason, individuals are required to have the literacy and moral disposition to refrain from slandering specific third parties for the purpose of causing them harm.

Chapter 7: Plans to make a transition to a New Governance Model

7. 1 Areas where institutional reform is possible

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. Specifically, we can expect to see institutional reforms in the following areas:

7.1.1 Cross-sectorial areas

Businesses that appear to be distinctly different from one another when viewed from a physical space perspective may share many cross-sectorial commonalities when seen from a cyberspace operations perspective.

For example, we believe that **cross-sectorial goals as well as guidelines and standards can be defined for areas such as data management (privacy, cyber-security), ID infrastructure construction, AI quality assessment and continuous data collection method**.

Because it is currently difficult to ensure the predictability and explainability of the performance outputs of complex systems centered on software—such as AI that perform machine learning—using conventional rule-based software authentication methods, in order to implement these systems in our societies we may establish more flexible evaluation criteria and construct technological foundations for evaluations that allow for AI and similar technologies to be introduced into the market to a certain level and allow performance improvements to be made through updates.

Furthermore, as described in 5.3.2, we can deepen discussion onthe behavior of complex systems including AI regarding incentivized regimes for investigations performed by businesses, criminal deferred prosecution agreement regimes, and the establishment of insurance mechanisms that cover potential dangers to society.

7.1.2 Individual areas

In addition to the cross-sectorial areas described above, we will also need to make regulatory and regime reforms in individual areas as well.

For instance, as for self-driving vehicles, we believe a shift will occur from the combination of safety ensured by the act of driving performed by conventional drivers (humans) and safety ensured by vehicle hardware, to a combination of safety ensured by control software and safety ensured by the driving environment (infrastructure), which will include intercommunication between other self-driving and manned vehicles. The regulatory and regime reforms to deal with these changes are currently being reviewed as shown in the **attachment**.

In the area of credit, discussions on the optimal form of the Installment Sales Law regime are in progress to allow the use of credit review methods that are based on big data, AI/other technologies and data for credit scoring in reviews of the estimated amounts that customers are likely to be able to pay when issuing credit cards.[60] The optimal before- and after-the-fact checks for allowing these technology- and data-based credit reviews to serve as alternatives are envisioned to be based on the idea of "pledge and review," and include before-the-fact checks for "credit review methods that use technology and data" and the "development of internal management schemes for ensuring their proper implementation."

We believe that efficient and effective security based on real-time data will advance in the future in the area of infrastructure and building maintenance and inspection. For example, in the Super Certified Operator scheme under the High Pressure Gas Safety Act, operators who satisfied with the conditions such as (a) use of new technologies like IoT or real time data collection and (b) establishment of internal risk management system, may undergo the security inspection once in 8 years at longest instead of the annual security inspection. This way of thinking can be adopted widely in the other areas such as infrastructure and building maintenance and inspection.

Figure 7.2 shows an overview of what is considered to be a whole picture of new regulation and institution after the governance reform in various fields..

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[60] "Intermediate Summary: The Optimal Form of Installment Sales Legislation in a Technological Society" Installment Sales Subcommittee, Commerce and Distribution Information Subcommittee, Industrial Structure Council (May 29, 2019) https://www.meti.go.jp/shingikai/sankoshin/shomu_ryutsu/kappu_hambai/pdf/20190529_report.pdf

Figure 7.1 | Overview of the new governance system
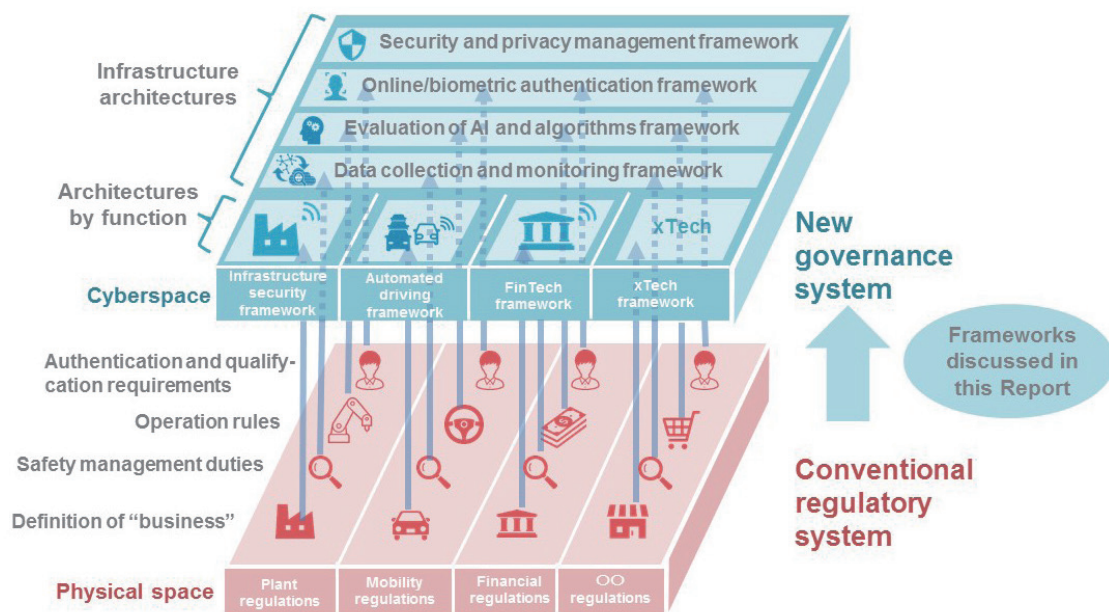
7.2 Actions in Japan

The Japanese government recognizes the study of governance model reforms as an important issue. The Action Plans of the Growth Strategy decided by the Cabinet on June 21, 2019 states, "Given that cyberspace and physical space are becoming highly integrated through the linkage of data, the government will utilize digital technologies including AI, IoT, and big data (constantly monitored data) to **begin cross-sectional reviews, working with the Council on Investments for the Future and the Administrative Reform Promotion Council, that encourage rational corporate actions through various methods such as co-regulation** without compromising safety or other legal interests that are assured by existing regulations. In doing so, from the standpoint of realizing regulations that are suited for the digital era, **reviews will be carried out before the end of this fiscal year** with the use of 'architectures' as well as reviews **for regulatory reforms that utilize digital technologies and data** in the areas of consumer protection and security associated with credit and other matters."

Based on this, it was decided in the 31st **Council on Investments for the Future** held on October 3 of the same year that, based on a mid- to long-term perspective, **demonstration projects will be conducted** on the elaboration of regulations based on the implementation of digital technology in our societies **with a focus on the three**

areas described below to identify the problems and challenges for realizing the optimal forms of future regulations, etc.

(1) Mobility: Identify the problems and challenges for realizing the optimal forms of future regulations, etc. in the area of mobility **as automobiles become more software- and connection-driven**.

(2) Fintech and financial: Identify the problems and challenges for realizing the optimal forms of future financial legal systems **as digitalization increasingly enables individual and corporate capabilities and asset statuses to be determined**.

(3) Building construction: With the advancements being made in sensor accuracy, AI-based big data analysis, and drone utilization, identify the problems and challenges for realizing the optimal forms of future regulations, etc. in the area of architecture (Building Standards Act, etc) in order to verify whether it would be possible to ensure building safety in a more precise and streamlined manner with the use of these technologies, etc.

In response to this, approximately 3 billion Japanese yen was allocated in the revised budget for 2019 to carry out the following research and development.

(1) Mobility: "Technology development related to AI-based vehicle completion inspections" and "Development of systems for evaluating the safety of self-driving vehicles"

(2) FinTech/Finance: "Development related to professional investors and interactions with elderly customers in the sale of financial products" and "System development for anti-money laundering measures"

(3) Building construction: "Technological development to enable periodic inspection of buildings' exterior walls using drones" and "Technological development to enable periodic inspections of elevators using sensors"

In the "Mid-report for the Action Plans for the New Growth Strategy" decided at the 34th **Council on Investments for the Future** held on December 19 2019, it is declared that the new committee under the Council on Investements for the Future will be set up to to identify the problems and challenges for realizing the optimal forms of future regulations.

7.3 International efforts

International cooperation on governance innovation has also begun. The term

"governance innovation" first appeared in the ministerial declaration of the **G20 Ministerial Meeting on Trade and Digital Economy** held in June 2019 in Japan, in which it was declared that member countries will aim to implement policies that are more conducive to innovation and remove stumbling blocks that impede innovation.[61] The **OECD** held a workshop of experts on governance and innovation in May 2019. Based on their results, a "Global Conference on Governance Innovation" was held in January 2020[62]. The "Osaka Declaration on Digital Economy" was announced in the leader declaration of the same G20 meeting, and the launch of the **"Osaka Track"** framework was declared[63], which aims to formulate international rules for the digital economy, and in particular, for data distribution and e-commerce. Discussions and international exchanges on rule-making by privately-driven, multi-stakeholder organizations such as the World Economic Forum[64] and Internet & Jurisdiction Policy Network[65] are also on the rise, and public and private stakeholders from Japan are also making active contributions.

In order to realize a human-centered society that achieves both economic development and provides solutions to social issues through the use of systems that highly integrate cyberspace and physical space (Society 5.0), we must make fundamental and bold reforms to our existing governance models. In order to ensure that fundamental values such as safety of life, health and property, privacy, democracy, and fair competition are ensured even more than they have been in the past while maximizing innovation throughout society, we hope that stakeholders will work together to quickly promote, cross-sectionally, "governance innovation" that is in line with the framework in this report.

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[61] Paras 21-24, G20 Ibaraki-Tsukuba, Ministerial Statement on Trade and Digital Economy https://www.meti.go.jp/press/2019/06/20190610010/20190610010-1.pdf

[62] https://www.oecd.org/gov/regulatory-policy/oecd-global-conference-on-governance-innovation.htm

[63] Osaka Declaration on Digital Economy (June 2019), https://www.mofa.go.jp/mofaj/gaiko/g20/osaka19/pdf/special_event/en/special_event_01.pdf

[64] Actions taken by the "Global Future Council on Agile Governance" (https://jp.weforum.org/communities/global-future-council-on-agile-governance), etc. As for international exchange between domestic organizations, the Fintech Association of Japan is forming alliances in the APAC region such as by establishing the APAC RegTech Network in May 2019 in cooperation with the Singapore FinTech Association and the FinTech Association of Hong Kong RegTech Subcommittee, with the Fintech Association of Malaysia joining the network in September. (https://www.regulationasia.com/tag/apac-regtech-network/)

[65] This is a multi-stakeholder organization established for the purpose of forming international rules for the Internet, and is based in Paris. https://www.internetjurisdiction.net/

Example of New Governance Model
Applied to Self-Driving Vehicles

Automated driving is a representative example of a system that highly integrates cyberspace and physical space which is expected to see real-world implementation. The key to safety for automated driving at SAE level 3 or higher will be the striking shift from the combination of safety ensured by actions performed by conventional drivers (humans) and safety ensured by vehicle hardware, to a combination of safety ensured by control software and safety ensured by the driving environment (infrastructure), which will include intercommunication between other self-driving vehicles, manned vehicles, pedestrians and other road users. Furthermore, in the future, as the division of roles related to control software and driving environment ensuring safety are reorganized from time to time in this hierarchical and networked automatic driving system, it is believed that the system will eventually become extremely complex and that such complex systems will also require governance.

While the 2019 amendments made to the Road Transport Vehicle Act and Road Traffic Act were based on existing road related laws, they can be commended for having established frameworks that support safety systems under automated driving systems at SAE levels 3 or higher which are presumed to develop into extremely complex systems. We analyze how the aforementioned new framework can be applied to this case for each of the three factors of governance.

1. Rule-making

Regarding the safety of self-driving vehicles, the Basic Safety Guidelines for Self-Driving Vehicles established in September 2018 prescribes, "No reasonably predictable and preventable accident caused by automated driving systems must occur in the Operational Design Domains (ODD) of self-driving vehicles." The Guidelines provide specific descriptions of its goal-based requirements for the following ten requirements as: [1] Defining the ODD, [2] Safety of automated driving systems, [3] Compliance with safety standards, [4] Human machine interface (HMI), [5] Installation of data recording devices, [6] Cyber security, [7] Safety of vehicles used in driverless mobile driving services (added requirement), [8] Safety evaluations, [9] Ensuring safety in the process of usage, and [10] Provision of information to users of autonomous vehicles. That being said, all of these requirements were qualitative, and did not include specific standards, etc. This can be commended as a scheme in which self-driving vehicle manufacturers and other players are allowed to satisfy

goal-based requirements through combinations of a range of innovations and technologies. In other words, this can be said to be a specific example of goal-based regulation that presumes that an explosion of technical combinations for ensuring safety and reliability will occur in systems that are based on extremely complex software.

2. Monitoring

As for the driver's obligations during automated driving at SAE Level 3, the ban against holding and using a wireless device, such as a mobile phone, or focusing on images displayed on an image display device does not apply in instances where [1] the vehicle is not deemed to be a poorly maintained vehicle, [2] the ODD is being met, and [3] the driver is in a state of readiness to immediately take appropriate action if and when either of the aforementioned conditions ceases to be met. In other words, this is a commendable example of allowing an automated driving system to take over some of the safety management obligations which conventionally were continuously imposed on the driver (humans) while driving a vehicle. In the future, as automated driving systems advance and automobiles become increasingly connected, it is expected that vehicle operation data can be acquired in real-time and the system will be responsible for constant monitoring.

In addition, in order to enable automakers to transmit control software, easily and on a large scale, to vehicles that are in use and enable them to change the vehicles' performance or add functions, such as additional drive assist functions, a regime was introduced that requires automakers to receive a permit in advance from the Minister of Land, Infrastructure, Transport and Tourism for each program in situations where [1] vehicle modifications by way of modifications to certain programs are carried out via telecommunication lines, and [2] programs are provided to users or other parties through the use, etc. of the telecommunication lines used for the purpose of making said modification. This change to the system can also be commended as a reform with a sight on the near future where control software on automated driving systems will be updated from time to time just like smartphone apps are today.

3. Enforcement

As for automated driving systems that are envisioned to be used in real and unamusing settings that are close to our everyday lives and directly affect human life

and physical integrity, an institutional system must be developed that drives a cycle for improving safety where, in the event that a problem such as an accident occurs, society is able to react calmly, investigations are carried out from a technological perspective on the cause of the accident, and the findings are used to benefit future development. In the United States, autonomous driving during demonstration tests is also subject to the National Transportation Safety Board's accident investigation system, just as aircraft are.

In Japan as well, the Ministry of Land, Infrastructure, Transport and Tourism and the National Police Agency have worked together to make necessary budget requests and discussions for establishing a setup in fiscal 2020 that enables quick and comprehensive accident investigation and analysis of autonomous vehicles, etc., and this can be commended as being a part of the government's efforts to establish a regime for this purpose. In relation to crimes that involve businesses, systems are in place in the United States for deferring criminal prosecutions (criminal deferred prosecution program) which can have a catastrophic effect on the survival of businesses, in exchange for promising to cooperate with the authorities' investigation and take actions such as improving their compliance system and providing restitution for damages Also, in the context of self-driving vehicles, businesses may benefit from this program by disclosing data or otherwise cooperating with the authorities' investigation of accidents or other events, or by improving their development operations, making this a powerful incentive for businesses to provide information to the government. Meanwhile, under current Japanese criminal laws, if an accident were to occur during the operation of a self-driving vehicle or system, individuals responsible for development or manufacture at the manufacturer may be charged with criminal liability for professional negligence resulting in death or other charge, or conversely, the criminal liability system may be rendered essentially dysfunctional due to investigative difficulties. While the differences in the legal systems of each country and the ideas that underlie them must be taken into account, we think that, going forward, studies must be carried out on optimal forms of incentive systems, which may include, for example, the introduction of deferred prosecution agreement schemes that are in line with the context of autonomous vehicles and encourage businesses to disclose data associated with accidents and other events, as well as improve their product development operations or the products themselves.