Overview

Public-sector IT Solutions Supporting Progress of Society

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HOW TO USE IT FOR PUBLIC SECTOR

ONE after another, various different concepts and forms of data are being digitized and used throughout society in conjunction with information technology (IT).

With information considered an integral part of the social infrastructure, the public sector is among those asking questions about what form its use should take, including how to apply IT so that it is integrated into society; what the adoption of IT will change and how; and whether the application of IT will be beneficial, safe, and sound.

The introduction of the identification (ID) number system, for example, will re-define social attitudes about what is important and where priorities lie.

IMPACT OF IT UTILIZATION ON SOCIETY

The use of IT influences the functioning of society in the following three ways:
(1) Maintaining stability: IT can be used to implement rule-based practices and manage them reliably to ensure the smooth and proper functioning of society.
(2) Raising awareness: The expanding scope of digitization gives people a broader view of the world.
(3) Encouraging innovation: The new insights prompted by raising awareness give rise to innovation.

These influences correspond to the series of processes by which society functions, and among the innovations prompted by raising awareness, those that gain consensus support from a public perspective become incorporated into stable public institutions.

The use of IT contributes to this process through the following two mechanisms.
(1) Efficiency improvement: Ongoing process improvements to all sorts of societal systems boost their operational efficiency.
(2) Problem solving: Identifying problems and attainment targets leads to solutions through the collaborative creation of new value.

While the relative emphasis on these two mechanisms will vary depending on the needs of the time, ultimately what they both have in common is that they lead to social progress in terms of "stability" (see Fig. 1).

CHANGING PERSPECTIVES AND TOPICS FOR IT UTILIZATION

With the use of IT being extended into areas that cross the boundaries within organizations in an effort to improve the overall efficiency of societal systems,

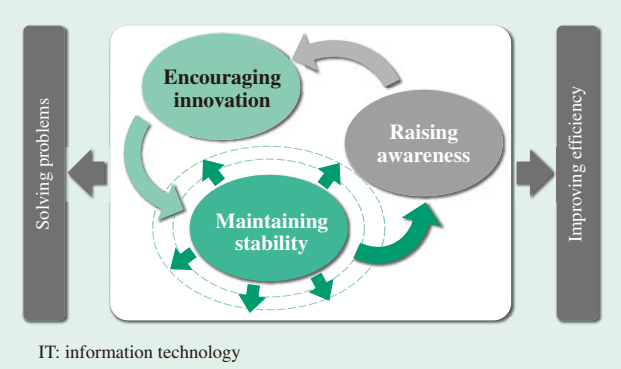

Fig. 1—Impact of IT on Society.
Raising public awareness and encouraging innovation play major roles in promoting the adoption of digital technology and IT systems. The public sector seeks to achieve a steady expansion of society by both solving problems and improving efficiency.

changes are evident in the perspectives and topics associated with the use of IT in the public sector.

Societal Value as a Criterion for Using IT

Growing integration between systems in the public sector is creating a need to use societal value as a criterion for choosing the type of system to use and how to handle data. A shift has taken place away from assessing the value of systems in isolation when considering the suitability of particular systems and toward making decisions based on the value of systems to society.

Risks of Relying on IT

IT already plays an essential role in the operation of public infrastructure such as electric power, water, and healthcare. If IT functions became unavailable, going back to running such infrastructure manually would be difficult.

In addition to the strengthening of security and the expansion of maintenance requirements commensurate with this growing reliance on IT, the recruitment and training of the staff needed to keep all of these systems running are also major challenges.

Pursuing New Opportunities Made Possible by IT

On the other hand, a wide variety of work is underway seeking to use IT to create new value. Among those initiatives that are attracting attention are the following.
(1) Big data initiatives involving the analysis of high-volume data flows to generate added value
(2) Initiatives such as the Internet of things (IoT) aimed at bringing various goods into the digital world
(3) Initiatives for augmenting human activity through the use of knowledge-based functions that combine artificial intelligence with information collected from sources such as the IoT

Among the activities associated with societal systems is Germany's Industrie 4.0 concept, which seeks to bring about a fourth industrial revolution by promoting the integration of physical objects with the Internet[1].

TABLE 1. Japan's International Competitiveness in IT
While Japan is evaluated highly for individual uses, there is scope for improvement in social environment.
Source: The World Economic Forum, "The Global Information Technology Report 2015"

	Category				Lowly ranked indicators	Highly ranked indicators
	Subindex	Ranking	Indicator	Ranking		
Overall 10th out of 143 nations	Environment	18	Political and regulatory environment	8	Efficiency of legal system in challenging regulations (19/143) Number of procedures to enforce a contract (27/143)	Intellectual property protection (7/143) Software piracy rate, % software installed (2/143)
			Business and innovation environment	35	Total tax rate, % profits (116/143) Number of procedures to start a business (94/143)	Availability of latest technologies (11/143) Intensity of local competition (2/143)
	Readiness	15	Infrastructure	17	Mobile network coverage, % population (39/143) International Internet bandwidth (63/143)	Secure Internet servers (20/143) Electricity production (23/143)
			Affordability	43	Prepaid mobile cellular tariffs (102/143)	Fixed broadband Internet tariffs (23/143) Internet and telephony sectors competition index (1/143)
			Skills	15	Quality of educational system (33/143)	Quality of math and science education (21/143)
	Usage	4	Individual usage	13	Mobile phone subscriptions (60/143) Use of virtual social networks (61/143)	Percentage of individuals using the Internet (12/143) Mobile broadband Internet subscriptions (3/143)
			Business usage	2	Capacity for innovation (7/143)	PCT patent applications (1/143) Firm-level technology absorption (2/143) Extent of staff training (2/143)
			Government usage	7	Importance of ICTs to government vision of the future (20/143) Government success in ICT promotion (27/143)	Government Online Service Index (9/143)
	Impact	11	Economic impacts	12	Employment in knowledge-intensive activities, % workforce (63/143)	Impact of ICTs on new services and products (14/143) PCT ICT patent applications (3/143)
			Social impacts	13	Internet access in schools (37/143) ICT use and government efficiency (25/143)	E-Participation Index (4/143)

ICT: information and communication technology PCT: Patent Cooperation Treaty

CHANGES IN CRITERIA FOR VALUE IN IT

International Competitiveness Indicators and Assessments

Table 1 lists the World Economic Forum (WEF) criteria for international competitiveness in IT[(2)]. In the 2015 survey, Japan placed 10th overall out of 143 nations (compared to 16th in 2014). The criteria are divided into the categories of "Environment," "Readiness," "Usage," and "Impact" and include the extent of IT use in public activity as well as the IT environment.

While Japan is ranked highly for business and other individual uses, it has a relatively poor rating in terms of criteria that consider the social environment, such as business innovation. Taking this assessment on its own, IT competitiveness can be thought of as an area in which different societies are in competition with each other. In other words, the challenge can be thought of as how to improve the value of the nation's society amid a global society that adopts this attitude.

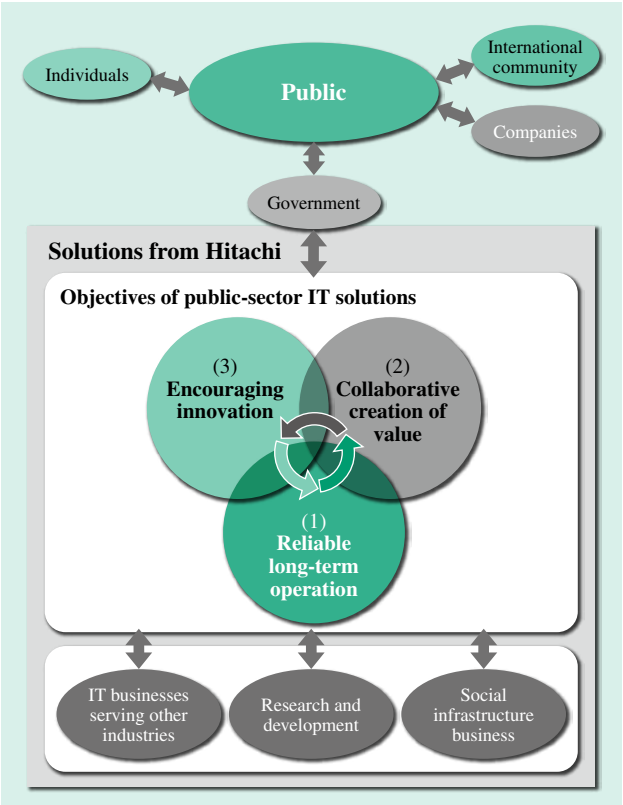

Fig. 2—Objectives of Public-sector IT Solutions.
The objectives of public-sector IT solutions are reliable long-term operation, collaborative creation of value, and encouraging innovation. Research and development at Hitachi support these solutions. Public-sector IT solutions deal with a wide variety of public challenges, primarily through the issues facing government agencies.

Declaration to be the World's Most Advanced IT Nation

In an effort to improve its IT performance, Japan has been publishing a "Declaration to be the World's Most Advanced IT Nation"[(3)] since 2013.

The 2015 version identifies the following four policies with the aim of achieving "true affluence."
(1) A society that grows toward the future
(2) A dynamic society that invigorates communities, people, and jobs
(3) A society where people experience safety, security, and prosperity
(4) A society where one-stop public services are available

The declaration identifies the use of solution-based IT as the way to make the public aware of the growth of society and the revitalization of the places where people live.

INVOLVEMENT IN PUBLIC-SECTOR IT SOLUTIONS

Hitachi supplies public-sector IT solutions in order to use IT to contribute to the smooth functioning of society.

The following sections describe the objectives for public-sector IT solutions in terms of three different considerations (see Fig. 2).

Reliable Long-term Operation

Information systems based on regulatory requirements that provide the infrastructure of public life need to remain in continuous operation over periods of decades. Furthermore, infrastructure that remains in ongoing use is achieved by keeping pace with changes in society.

Collaborative Creation of Value Using Information Infrastructure

The coverage of the infrastructure that supports the distribution of information is expanding along with advances in digital technology. To take advantage of this, there is a need for new rules and guidelines on the distribution of information that are based on use of the information infrastructure. The establishment of these through cooperation between stakeholders leads to the collaborative creation of value.

Encouraging Social Innovation

Social Innovation seeks to adopt new approaches to solving societal challenges, with the use of IT serving as an important tool for this work.

ACTIVITIES BY HITACHI

The following sections describe what Hitachi is doing in relation to these three objectives.

Reliable Long-term Operation

The information systems used by national and local government agencies for activities such as social security, resident information, and taxation are part of the infrastructure that supports the public's way of life.

For these public sector activities, Hitachi is contributing to the reliable operation of government services by supplying municipality solutions and solutions for central government agencies that include business application development and the outsourcing of operation and maintenance.

These business applications include systems that need to remain in operation for many years while also undergoing modifications required to comply with changes in the law. In response, Hitachi is developing technology that is specific to the requirements of this sector, including, for example, the development of a technique for producing a system requirements definition from the relevant statutes in order to comply with an amendment to a law. Hitachi also enables the ongoing use of business applications that represent important assets and incorporate operational know-how built up over time and the long-term reliable operation of these applications through activities that include the conversion of legacy systems[(a)] to open platforms and system migration[(b)].

Collaborative Creation of Value Using Information Infrastructure

(1) Promotion of standardization

Standardization is essential for making information infrastructure available to a larger numbers of users. For example, the use of consistent character sets and vocabularies is necessary for data from different sources to be treated as the same type of data. To achieve this Hitachi is drawing on know-how acquired through activities such as the development of systems for household registration administration by local government to participate in the establishment of the Japanese Character Data Platform[(c)] and the Infrastructure for Multilayer Interoperability[(d)]. Similarly, Hitachi is also actively pursuing the standardization required for information integration, including participation in the development of the Geospatial Information Platform[(e)] for sharing data on the location of goods and people.

(2) Use of ID number system

The social security and tax number system (ID number system) is being introduced with the aims of enabling the inter-departmental sharing of information for social security and taxation, providing efficiency and transparency in government, and greater convenience for the public.

By transforming government procedures from being paper-based to digital practices, comprehensive adoption of the ID number system will provide seamless interoperation between various different business systems. In response, Hitachi is actively involved in implementing and operating highly convenient and reliable systems that are designed with consideration for both public and private sector users. An article in this issue of *Hitachi Review* describes this work on the ID number system in detail.

(3) Dealing with system vulnerabilities

Along with advances in the distribution of information, cybersecurity for preventing data leaks, countering terrorism, and so on is growing in importance. Cyber-attacks deliberately target organizations and infrastructural functions that play important public roles with the aim of damaging them, and leaving the vulnerabilities of individual systems exposed leads to the inadequate functioning of public systems.

As cyber-attacks are growing in sophistication and ingenuity to the extent that actions taken by organizations on their own are unlikely to be adequate,

(a) Legacy system
An existing information system that has been in use for some time (as opposed to a newly installed information system). The term is mainly used to refer to application systems that have been built to run on mainframes and "office computers" (old-style mini-computers).

(b) System migration
The transfer of information system assets from an old system to a new one. It refers to the conversion of application programs built using obsolete programming languages and development environments to a different language and new environment.

(c) Character Data Platform
A data platform that provides a character set for government use, containing approximately 60,000 characters, including *kanji* characters used in names, and font data. It was established primarily by the National Strategy Office of Information and Communications Technology, Cabinet Secretariat, Ministry of Economy, Trade and Industry, and Information-technology Promotion Agency, Japan (IPA).

(d) Infrastructure for Multilayer Interoperability (IMI)
A platform available for use across different information systems that defines consistent notation, meaning, and data formats for words and other terms used in government. It is being set up in tandem with the character data platform.

(e) Geospatial Information Platform
An information platform that provides one-stop access for searching and browsing various types of geospatial information, including maps, weather, earthquake magnitudes, tsunamis, aerial and satellite photography, and location data for people and vehicles, so that users can obtain and use this information. The platform is being developed jointly by the National Institute of Information and Communications Technology (NICT), The University of Tokyo, and Hitachi, Ltd.

it is important to adopt a collaborative approach in the form of a defensive network for sharing information between organizations about such matters as security incidents, vulnerabilities, and attack warning signs. An article in this edition of *Hitachi Review* describes such an initiative.

Encouraging Social Innovation

(1) Use of data

Big data techniques, such as statistical processing or the extraction of highly reliable information from which the noise has been eliminated, are needed to obtain useful results from the analysis of information that flows in large quantities. Hitachi is actively engaged in encouraging Social Innovation by supplying big data and other solutions.

Among the issues associated with big data that have attracted widespread attention is the need to ensure the privacy of personal data. Hitachi is working actively on the development and application of technologies that allow this data to be used safely, including *k*-anonymization(f) and privacy-preserving analysis techniques(g).

OUTLOOK FOR THE FUTURE

Orientation toward Solutions

A growing number of initiatives are underway in the field of "open data," which means making public data held by government institutions available for other uses to improve industrial competitiveness. Hitachi is contributing to progress on open data by supporting the stocktaking of data held by government institutions as well as through the development and operation of the government's DATA.GO.JP data catalog.

Leading local governments are working on utilizing this public data to provide information on local characteristics, assess the state of activities and services, and benchmark against other regions, heightening expectations for use in such activities as business process re-engineering (BPR) or regional development planning.

With regard to the challenges facing the adoption of IT in education, developments include the full-scale introduction of digital textbooks starting from this academic year.

As part of this, Hitachi is participating in the consortium along with 12 textbook publishers to provide a common platform for digital textbooks. This has the potential to enable new forms of teaching. One example is the use of flexible cross-referencing between textbooks for different subjects to provide pupils with a deeper understanding, such as the use of social studies textbooks to learn about the settings in the texts used to teach Japanese.

Through the supply of public-sector IT solutions, Hitachi is actively involved in initiatives like this that are oriented toward the solution of societal challenges.

Further Advances in Adoption of Digital Technology

With the revised Japan Revitalization Strategy (Growth Strategy) 2015(h) having referred to shifting away from practices that are based on interviews and paperwork and instead adopting IT-based practices, the design of institutional practices under Japan's new legal system will be based on the use of information systems in the future.

The development of information systems in accordance with statutes requires expertise in both administrative practices and information systems. Furthermore, ensuring adequate time for the investigation and implementation of system requirements is a challenge for providing system interoperation with other processes.

In response to these challenges, Hitachi is contributing to high-quality public-sector IT systems by advising the relevant institutions as well as by improving development techniques and transferring skills.

Using Social Innovation to Solve Problems

Japan is recognized as a pioneer in confronting certain challenges, including numerous societal issues that have not been successfully dealt with by existing frameworks such as its low birth rate, aging population, and frequent natural disasters. Facing up to these challenges and acting boldly will lead to Social Innovation.

(f) *k*-anonymization
A technique for modifying data to make it difficult for individuals to be identified. It reduces the probability of identifying a particular individual in a dataset to 1/*k* or less by modifying the data so as to guarantee that it will contain a certain number (*k*) of instances with the same attributes.

(g) Privacy-preserving analysis technique
A technique for analyzing encrypted data without having to decrypt it. It uses a high-speed searchable encryption technique that can perform searches with both search key and database in encrypted form. This reduces the risk of information leaks in applications such as big data analytics.

(h) Revised Japan Revitalization Strategy (Growth Strategy) 2015
The second revision to the growth strategy that forms the "third arrow" of Abenomics, the economic policy of the Abe Cabinet. The Cabinet decision was made on June 30, 2015. The Japan Revitalization Strategy has achieved results by specifying policies for economic growth, including strengthening corporate governance. The 2015 Revitalization Strategy represents Abenomics as having now entered its second stage and includes policies for ensuring the elimination of deflation.

As noted on the Ministry of Internal Affairs and Communications website promoting information and communication technology (ICT) use in regions[(4)], while numerous demonstration projects and other trials aimed at overcoming challenges have been conducted around the country, few of them have gone on to nationwide deployment. On the other hand, there are many successful examples of localized initiatives that are tailored to the specific conditions of their community.

This has prompted one proposal for the use of IT that takes advantage of the characteristics of central and regional areas that involves a division of responsibility under which regions develop those systems that utilize regional characteristics and central areas are responsible for the mechanisms for loosely coupled interoperation between central and regional areas and between different regions.

Hitachi intends to continue proposing a variety of ideas for how to achieve prosperity in Japan based on its extensive experience and technologies built up over time, including contributing to regional revitalization through the implementation of systems and services that suit local conditions, and fostering Social Innovation by providing information integration platforms that link individual systems together and using the information exchanged. Furthermore, Hitachi also intends to supply solutions overseas that solve the problems faced by different countries and regions.

CONTRIBUTING TO SOCIETY THROUGH PUBLIC-SECTOR IT SOLUTIONS

IT and its applications continue to evolve in step with changes in social processes. From a public interest perspective, this can be thought of as a long-term process that requires stable operation.

Hitachi is contributing to the building of social processes through public-sector IT solutions by developing technologies from a long-term perspective and transforming them into dependable solutions.

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