

1 Process of data analysis service

1 Data Analysis Service

The spread of the Internet and use of digital sensors in recent years have reduced the cost of collecting sensor data. Hitachi is developing services for generating customer value from the analysis of collected sensor data in the form of data analysis services that draw on expertise in mathematical analysis and practical business know-how.

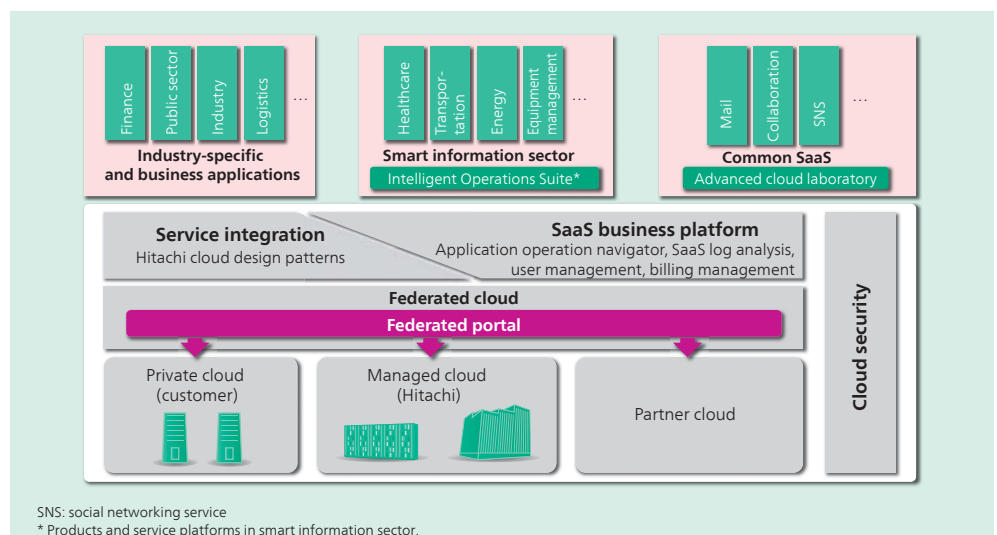
For commercial facilities, Hitachi intends to provide a spatial data management service that can assess the effectiveness of sales promotions and the health of tenant businesses, for example, by analyzing data collected on how people move through and gather at the facility, and provide this information to the organizations engaged in facility planning, tenant management, and facility management. Similarly, an equipment maintenance service

performs mathematical analyses on information such as routine equipment operation data or inspection and part replacement records to determine equipment condition and detect fault in early phase. This can help improve utilization and reduce maintenance costs by providing the basis of a system for the remote diagnosis of equipment.

In the future, Hitachi intends to work together as a group to provide total services that extend from data collection to analysis and system implementation, while also strengthening its work with customers on creating value in the early stages of projects.

2 Hitachi Cloud

Hitachi Cloud is a suite of services based around a federated cloud that provides unified management for the customer's own private



2 New cloud platform and services

cloud, a managed cloud operated by Hitachi, or partner clouds operated by providers such as Amazon Web Services*.

For these services, Hitachi has developed a federated portal for the centralized monitoring and operation of different types of clouds and is encouraging their interactions. Hitachi has also established an integrated cloud network that connects between Hitachi's data centers in Japan and also connects to Amazon Web Services in broadband. For security, a security gateway enables single-sign-on to partner clouds together with 24-hour monitoring and security measures. The software-as-a-service (SaaS) business platform provides basic functions usually required to start a new SaaS, including user management, log analysis, and billing. Service integration, meanwhile, delivers system design and implementation knowledge in the form of Hitachi cloud design patterns.

Hitachi strengthens its global capabilities under the unified "Hitachi Cloud" brand with worldwide group companies.

* See "Trademarks" on page 146.

3 TWX-21 Web-EDI Global Service

As companies seek to enhance their design, procurement, and production activities, there is growing demand in China and other parts of Asia for cloud services that can provide fast and low-cost data exchange and sharing between businesses.

TWX-21 provides a customizable Web-Electronic Data Interchange (EDI) Global Service from data centers in Japan and China. The EDI function provides applications that use links to the internal systems at the buyer company to entry quotations, purchase orders and other data to TWX-21, and allow the supplier to handle quotations, ordering, shipment, and invoicing from a web browser. The purchasing and logistics function is used to enter data on quotations, purchases, and freight that is required for complex delivery scheduling and logistics management tasks, and to handle user access permissions and workflows such as

assessing and approving quotations. This allows users to concentrate on core activities because it significantly reduces the workload associated with such tasks as coordination, parts ordering, and progress management, which were previously done manually.

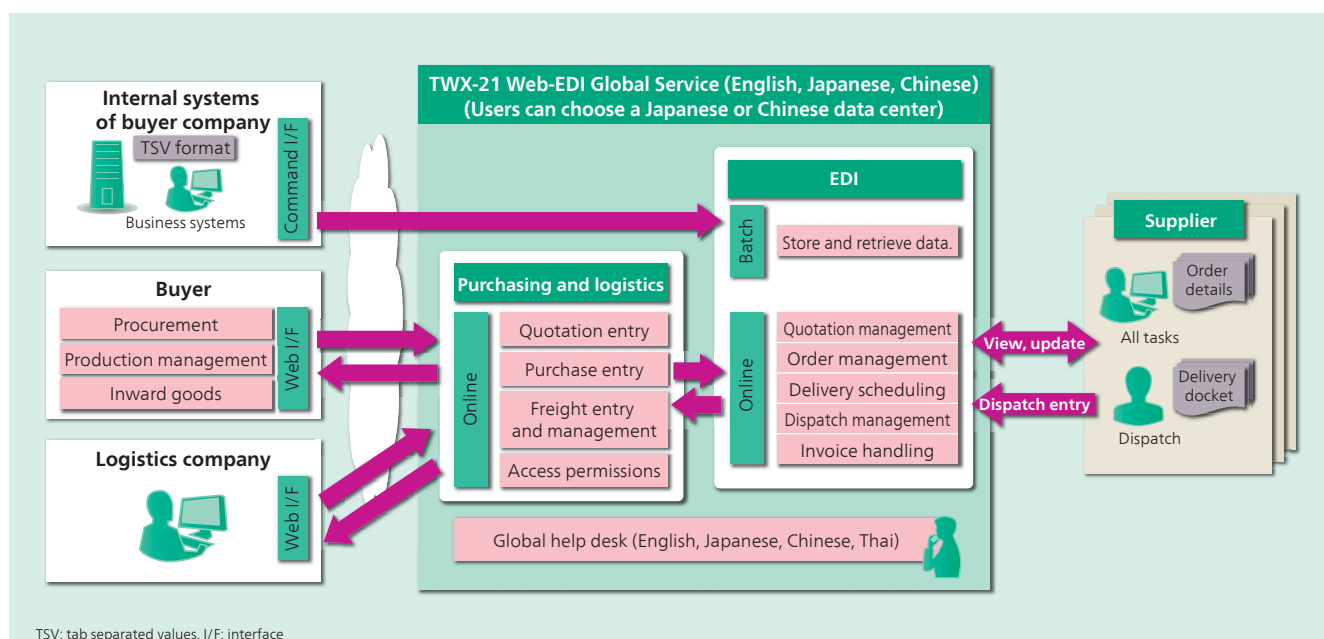
TWX-21 runs on the Hitachi Cloud SaaS business platform. Hitachi intends to continue supporting greater global competitiveness along with making ongoing enhancements based on user needs.

4 Global e-Service on TWX-21 Predictive Diagnosis

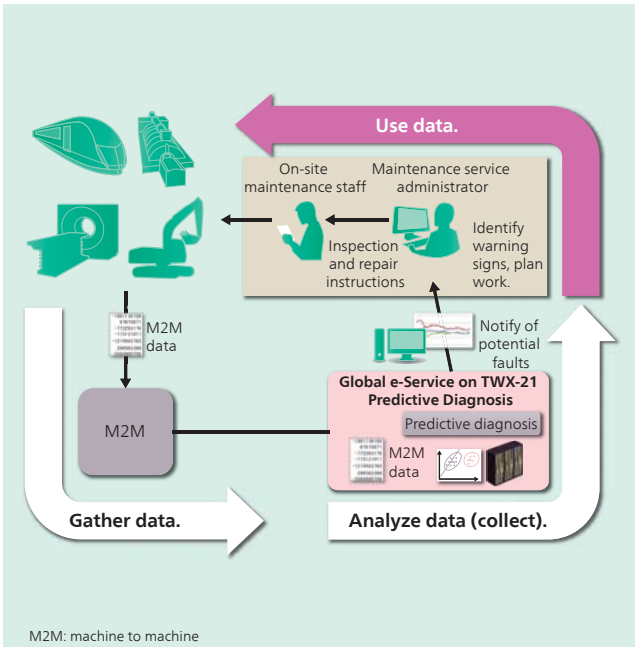
Against a background of intensifying global competition, many machinery suppliers have been building up their after-sales service businesses in recent years, including maintenance and the sale of spare parts. The requirements of machinery users, meanwhile, include a high level of utilization and lower maintenance costs. Accordingly, machinery suppliers are increasingly setting up preventive maintenance services that use remote monitoring of equipment conditions to prevent faults from occurring.

After many years of research and development, Hitachi has now implemented predictive fault diagnosis techniques for use in preventive maintenance services. It plans to launch a predictive diagnosis service in March 2015 that will use proprietary diagnostic algorithms established through this work to detect potential faults by performing automatic remote diagnosis of equipment conditions. The service will help improve utilization and reduce maintenance costs by performing remote monitoring of operating conditions and fault warning signs on machinery deployed throughout the world.

In developing diagnostic techniques that take account of machinery characteristics, Hitachi will also provide consulting services to help develop diagnostic models for the machinery being monitored, including having its specialists in big data analytics study specific diagnostic methods and conduct perfor-



3 TWX-21 Web-EDI Global Service



4 Predictive diagnosis service cycle

mance assessments. These services will shorten the time taken to develop diagnostic models and to move from model development to deployment in practical diagnostics.

5 Total SCM Cloud Service

The increasing globalization of manufacturing in recent years has exposed manufacturers to problems such as the inability to grasp sales, inventory, and production throughout the world causing mismatches between supply and demand, variability in the quality of designs from different sites, and the risk of design data being leaked. To overcome these problems, Hitachi supplies a total supply chain management (SCM) cloud service that encourages global standardization of business practices and achieves appro-

priate decision-making through the centralized management of data and systems for all business processes, from sales to design, production, and procurement.

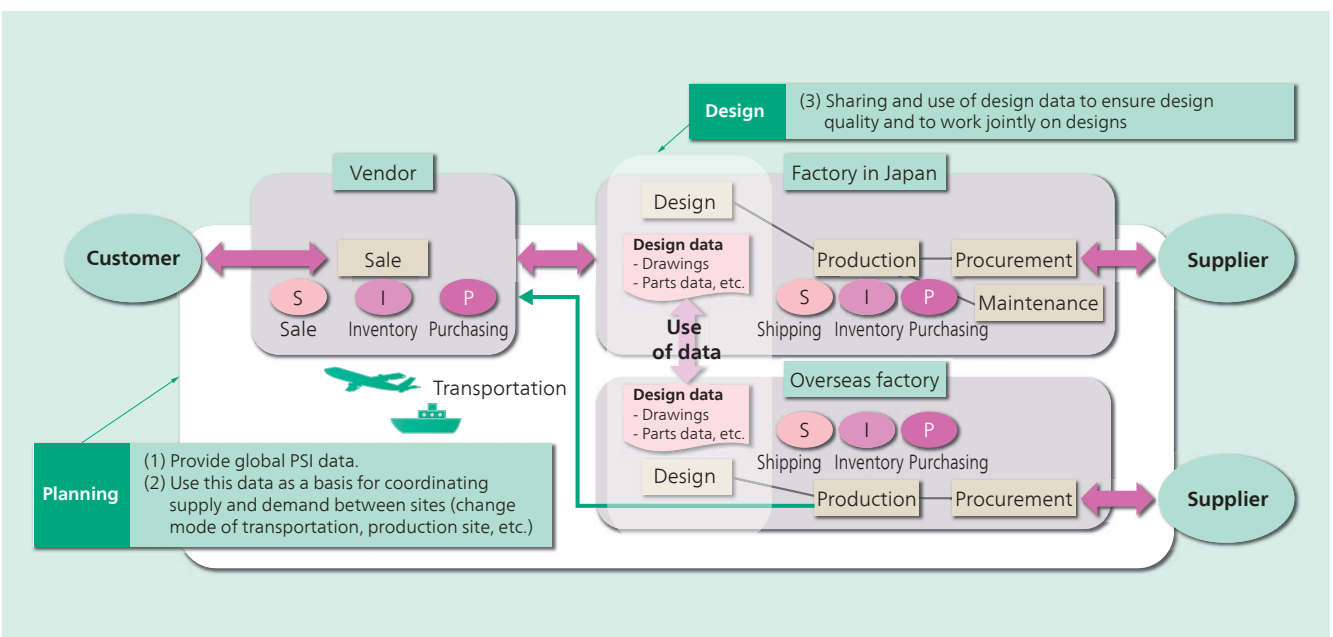
This service provides access to production, sales, and inventory (PSI) data throughout the world. It makes possible to take measures to prevent problems such as late delivery or overstocking by performing rapid simulations of how supply and demand vary across multiple sites in response to changes such as the mode of transportation or site of production. It also makes it possible to maintain design quality and work together on designs in a timely manner by using the same computer-aided design (CAD) virtual desktop infrastructure (VDI), product data management (PDM), and other systems across all sites, enabling the secure sharing and use of highly confidential design data.

Hitachi plans to add additional service options in the future, including execution systems such as quality management and production line monitoring, and business strategy systems such as the use of cost data for revenue simulation.

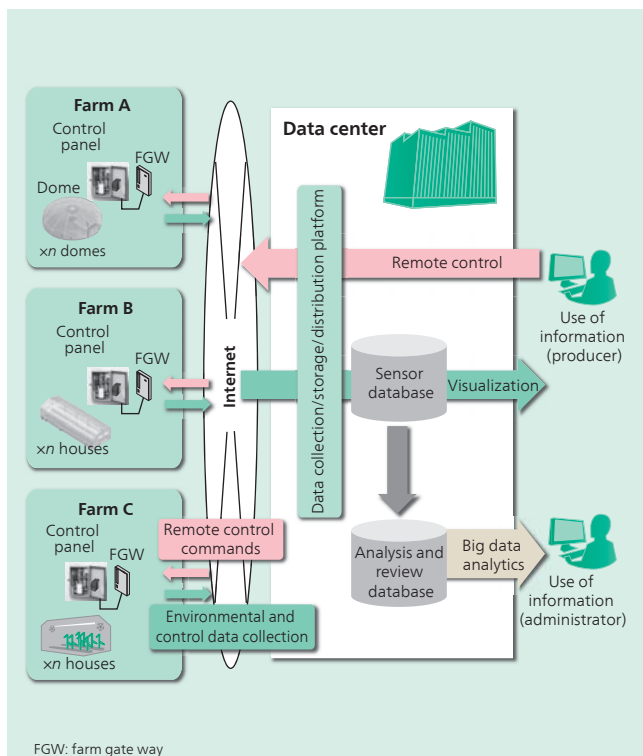
6 Cloud Services Supporting Plant Factory Production

“Plant factories” (closed growing systems) are increasingly being used to ensure reliable production and a steady supply of agricultural products by controlling the growing conditions to suit the crop being grown. This in turn has created a demand for services that monitor production conditions and equipment operation remotely to improve productivity through the use of various data analyses and by optimizing control of energy and other aspects of the environment.

The Cloud Services Supporting Plant Factory Production use the cloud to collect and manage data on plant factory growing conditions and control data from production equipment. It can supply management information to producers and equipment administrators in realtime and also control growing conditions and production equipment. All of the collected data is stored in a



5 Total SCM cloud service



6 Cloud Services Supporting Plant Factory Production

database where it can be analyzed and reviewed using business intelligence (BI)* tools to optimize growing conditions and provide support for decision-making from a management perspective.

* Tools and techniques for collecting, analyzing, and processing large quantities of corporate or other organizational data, and for utilizing it in management and other decision-making.

7 Hitachi's Lifestyle Change Program: A Cloud-based Service for Promoting Health

If a medical examination (“special health check-up”) finds that a patient is suffering from metabolic syndrome, the patient needs to receive specialist health maintenance advice. The problem with this, however, is that in many cases patients find it difficult to obtain this specialist health maintenance advice because they cannot get to daytime appointments for the necessary initial consultation with an advisor, or because health associations cannot provide such advisors at remotely located clinics. In response, Japan's Ministry of Health, Labour and Welfare relaxed the rules in August 2013 to allow videoconferencing or other information technology (IT) to be used for the initial consultation.

Accordingly, Hitachi has added a remote advice service to Hitachi's cloud-based lifestyle change program for promoting health. This involves Hitachi taking total responsibility for providing advice, including the initial consultation, via Internet-based videoconferencing. To access the service, participants use a tablet or camera- and microphone-equipped personal computer (PC) to visit a special website.



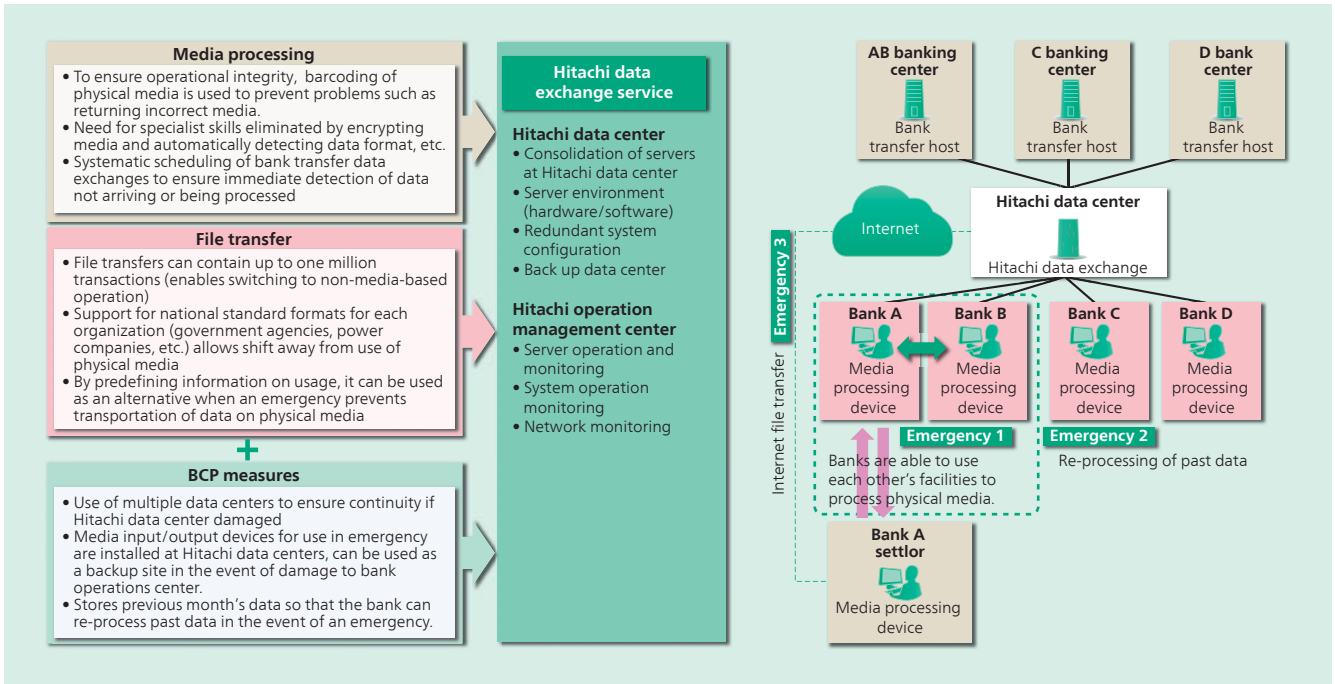
7 Web-based consultation using Hitachi's lifestyle change program's remote advice service (top) and web reservation screen (bottom)

8 Hitachi Data Exchange Service

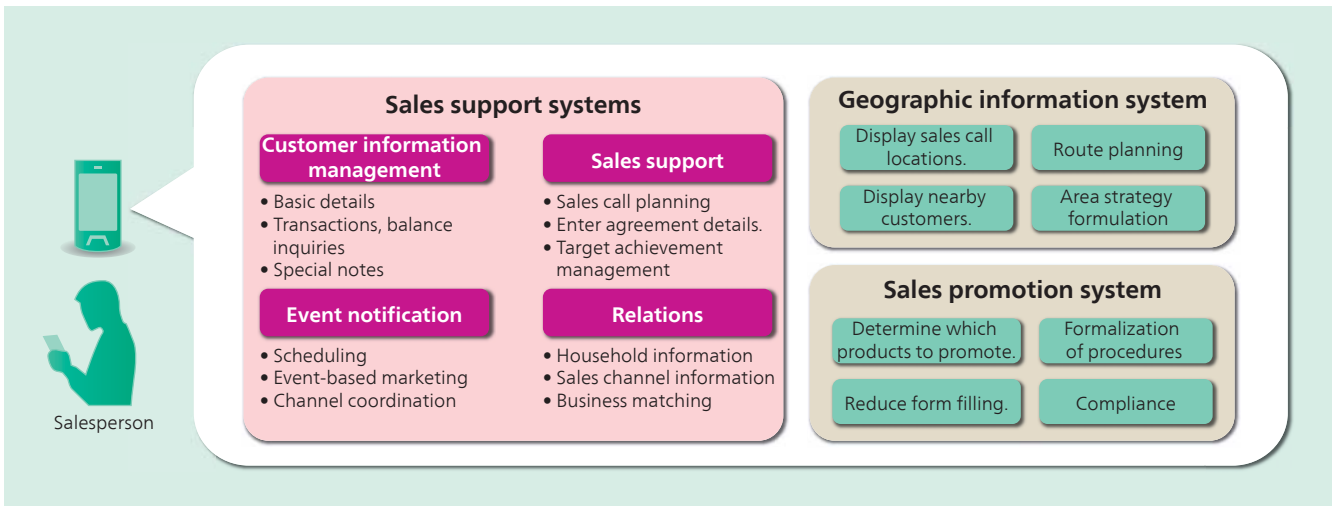
Bank transfers made by the automatic debiting of funds from a bank account are widely used in Japan as a convenient way of making payments. Accordingly, financial institutions are taking steps to strengthen their business continuity plans (BCPs), which ensure that these transfers continue to take place even in the event of a disaster or major fault. However, media that are now out of production, such as cartridge magnetic tape (CMT) and floppy disks (FDs), are still widely used for data exchange between companies and banks.

The Hitachi data exchange service provides the ability for companies and banks to exchange bank transfer data in the form of a Hitachi cloud service, enhancing BCPs without changing the current practice of exchanging data on physical media. To deal with a possible large-scale disaster, cooperation between financial institutions that have adopted this service means they can use each other's facilities to process physical media in an emergency such as a disaster or fault. The exchange of bank transfer data can also be performed by sending files across the Internet. Because it can handle the transmission of files containing around a million transactions, which posed a problem for previous services, file-based data exchange is used to eliminate the need to transport physical media.

In the future, Hitachi intends to help ensure reliable operation and greater efficiency in bank transfers by supplying the Hitachi data exchange service.



8 Overview of Hitachi data exchange service (left) and interconnection with participating banks (right)



9 Sales support solution for financial institutions using mobile devices

9 Sales Support Solution for Financial Institutions Using Mobile Devices

Past practice by sales staff at financial institutions has been to use their branch systems to prepare for making a sales call, perform follow-up tasks on their return, and execute complex financial transactions in their offices. For such users, Hitachi supplies a sales support solution that allows the use of mobile devices instead.

Using mobile devices to access the sales support system reduces the amount of preparation required for a sales call by allowing customer information to be viewed when out of the office. Furthermore, because agreements reached during a sales call can be entered on the spot, it also speeds up the availability of information and reduces the work to be done on returning to the office. Directions for getting to the sales call can also be obtained easily by using a geographic information system. Since other nearby customers are shown on the map, visits can be planned and executed with greater efficiency. Using mobile devices to access

sales promotion systems that previously were only available in the office also allows complex financial transactions to be executed during the sales call.

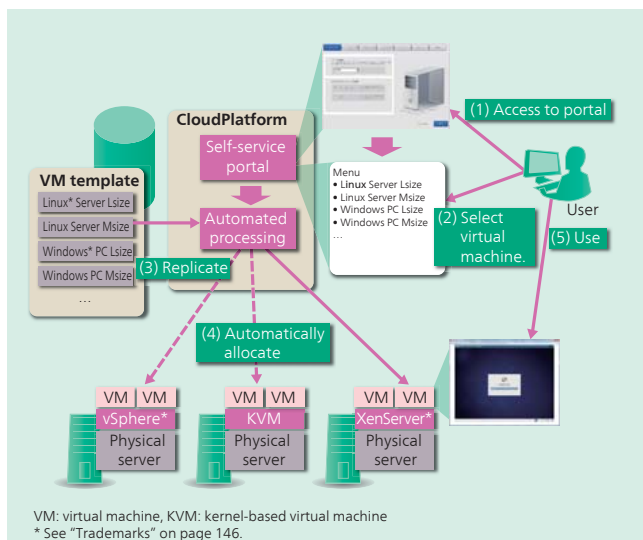
Together, these features support more efficient sales and increase sales opportunities.

(Hitachi Solutions, Ltd.)

10 Hitachi Cloud Platform Solution

In recent years, private clouds have attracted attention for their ability to satisfy both corporate governance and security requirements, and the convenience of the cloud (rapid response for demand). The Hitachi cloud platform solution is a service that implements private clouds that provide infrastructure as a service (IaaS) and desktop as a service (DaaS).

Since the core cloud management software (Citrix* CloudPlatform*) is able to work with various virtualization software and, moreover, able to be controlled and customized by application



10 How cloud platform is used

programming interface (API), this service can provide a private cloud that satisfies user needs.

By introducing the Hitachi cloud platform solution, it is possible to simplify operation of virtualization management software, reduce the IT administration department workload by automating many aspects of operation, and provide users with computing resources such as PCs and servers rapidly. Usually, users have to wait several days after sending a request to use resources, but this service can provide resources in about 10 or 20 minutes and allows users to start developing their research immediately.

This service is installed in many universities and research institutions, and Hitachi is planning to supply it to a wide range of public sector agencies in central and local government.

* See "Trademarks" on page 146.

11 Family Register Backup Data Management System for Ministry of Justice

The family register originals for four municipalities in Miyagi and

Iwate Prefecture were destroyed by the tsunami that followed the Great East Japan Earthquake in March 2011. Although the original were able to be recreated from backup copies held by the relevant Legal Affairs Bureaus, there is a risk that a future major disaster could result in the loss of both original and backup copies. Accordingly, the Ministry of Justice of Japan initiated a project to build a family register backup data management system that will hold data backups to prevent the complete loss of these family registers.

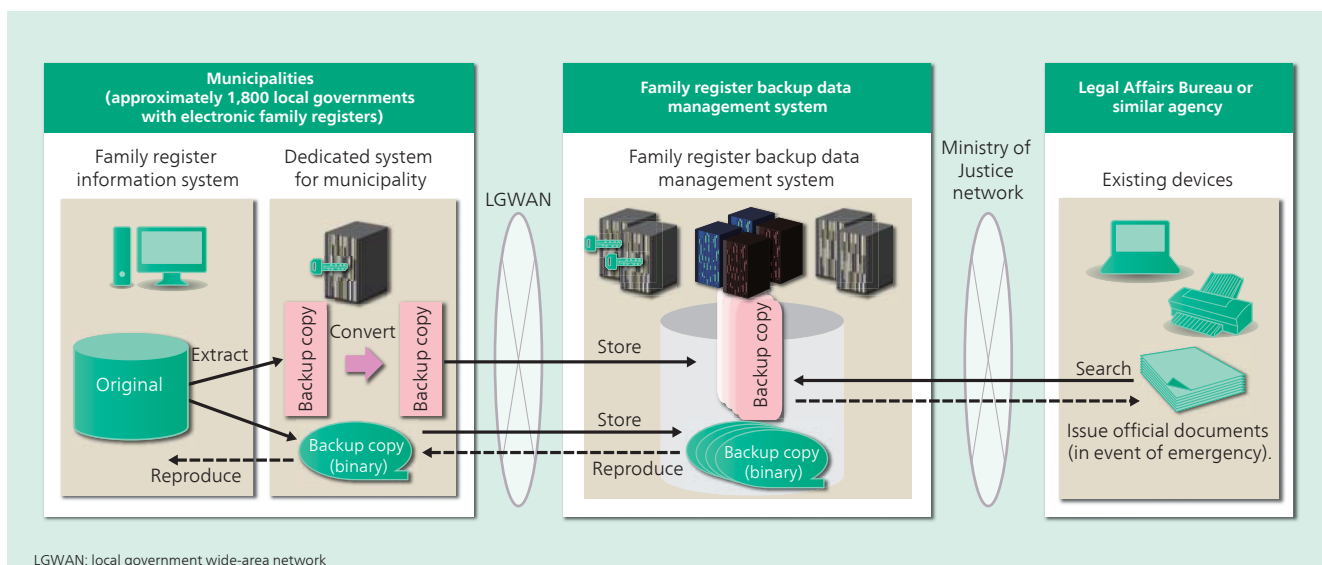
Although the practice in the past was for each municipality to send backup data annually on magnetic media to its nearby Legal Affairs Bureau or similar agency for safekeeping, the new system will daily send any updates to the family register at each municipality to a remotely located family register backup data management center via a network. By preventing the complete loss of this information even if a major widespread disaster destroys both the municipality and its associated Legal Affairs Bureau, this will maintain the integrity of what is the sole family register system for publically recording family relationships and citizenship for the people of Japan. In the event of a disaster, the Legal Affairs Bureau can also issue identity documents on behalf of a municipality.

Hitachi was awarded the contract in August 2012 and completed the system in September 2013. The system is in operation and the Ministry of Justice has been using it to hold backup data for all municipalities (apart from some exceptions) since April 2014.

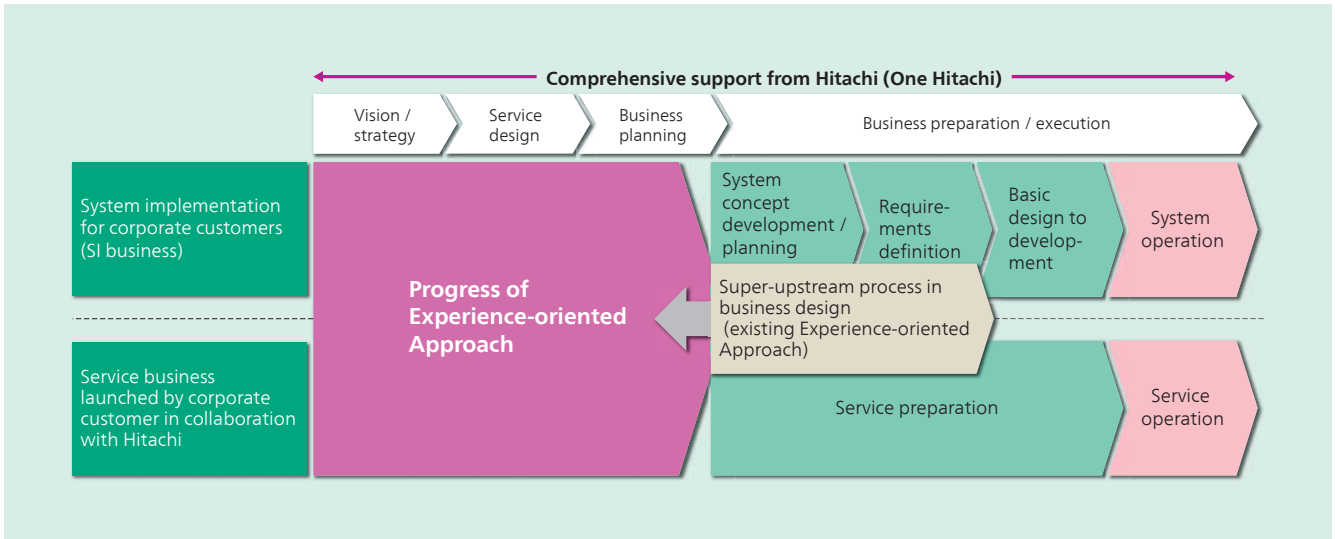
The family register backup data management system is one of the BCP measures being considered throughout the country since the Great East Japan Earthquake that has been adopted in practice. In the future, Hitachi intends to deploy the technology used in this system in other applications, not limited to the public sector.

12 Experience-oriented Approach Outlook

The Experience-oriented Approach is a technique used by Hitachi for the conceptual planning of systems. Proprietary to Hitachi, the Experience-oriented Approach combines the technologies and know-how that Hitachi has acquired on information system implementation projects with techniques built up by its design



11 Family register backup data management system for Ministry of Justice



12 Experience-oriented Approach outlook

divisions for enhancing “customer experience.” Hitachi uses this technique to work with customers from a variety of industries and types of business to create new customer experience and business innovation.

The rise in recent years of mobile, social networking, and big data technologies has made the provision of services to end users an essential part of business success. This means that systems integrators (SIs) require the ability not only to build information systems but also to work with the customers who use these systems to establish and operate services. Hitachi intends to draw on its experience using the Experience-oriented Approach to pick up the pace of business activities undertaken in collaboration with customers.

13 Mobile NFC Services for Service Providers

Near field communication*¹ (NFC), a way of transferring data by passing a device over a reader, has been increasingly incorporated into smartphones in recent years. Hitachi plans to launch a cloud-based service for implementing mobile NFC services on behalf of service providers. This service will provide for the secure addition

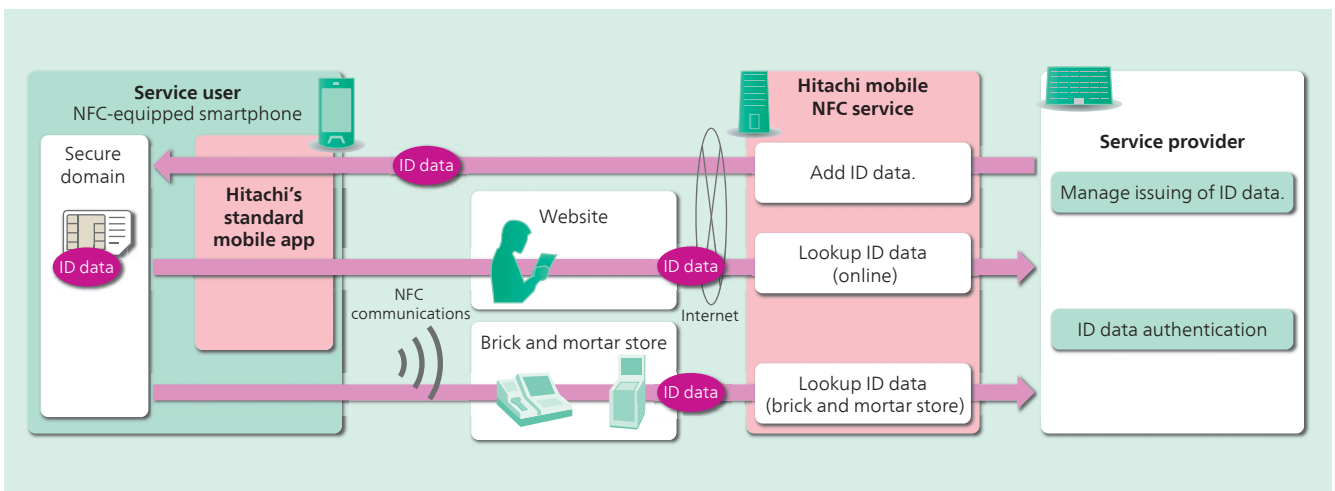
of functions for reading data by NFC in retail applications (such as online or at brick and mortar stores) to the universal integrated circuit card*² (UICC) secure domain on NFC-equipped smartphones.

The service uses Hitachi technologies such as those for encryption and authentication to provide security features such as blocking unauthorized smartphone applications, ensuring the security of communication links to service providers or other destinations, and preventing spoofing. It also provides a standard mobile app (a smartphone application that interacts with the service) that ensures secure NFC services can be established quickly, eliminating the need for service providers to develop smartphone applications or conduct their own testing for different smartphone models.

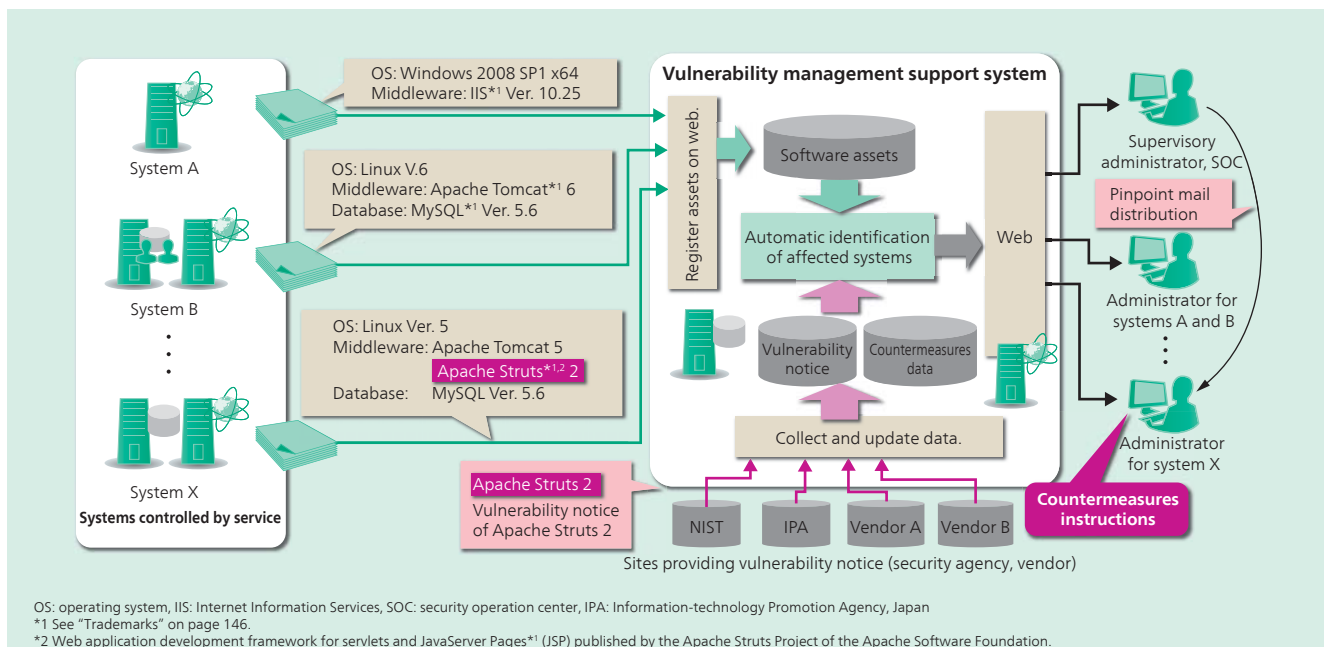
In the future, Hitachi plans to supply this service for authentication and other applications in the electronic money, loyalty card, and related markets.

*1 A short-range wireless communications standard defined in ISO/IEC 21481.

*2 A smartcard used to store a unique identification (ID) number that determines the subscriber’s telephone number.



13 Mobile NFC service for service providers



14 Vulnerability management support system

14 Vulnerability Management Support System

With cyber-attacks that exploit vulnerabilities in IT systems continuing unabated, the US National Institute of Standards and Technology (NIST) issues approximately 5,000 vulnerability notices annually. While the management of vulnerability risk has conventionally been handled by system administrators with detailed knowledge of the software used in a system, the risk of overlooking vulnerability information or not implementing patches means there is a need to eliminate human error from the process.

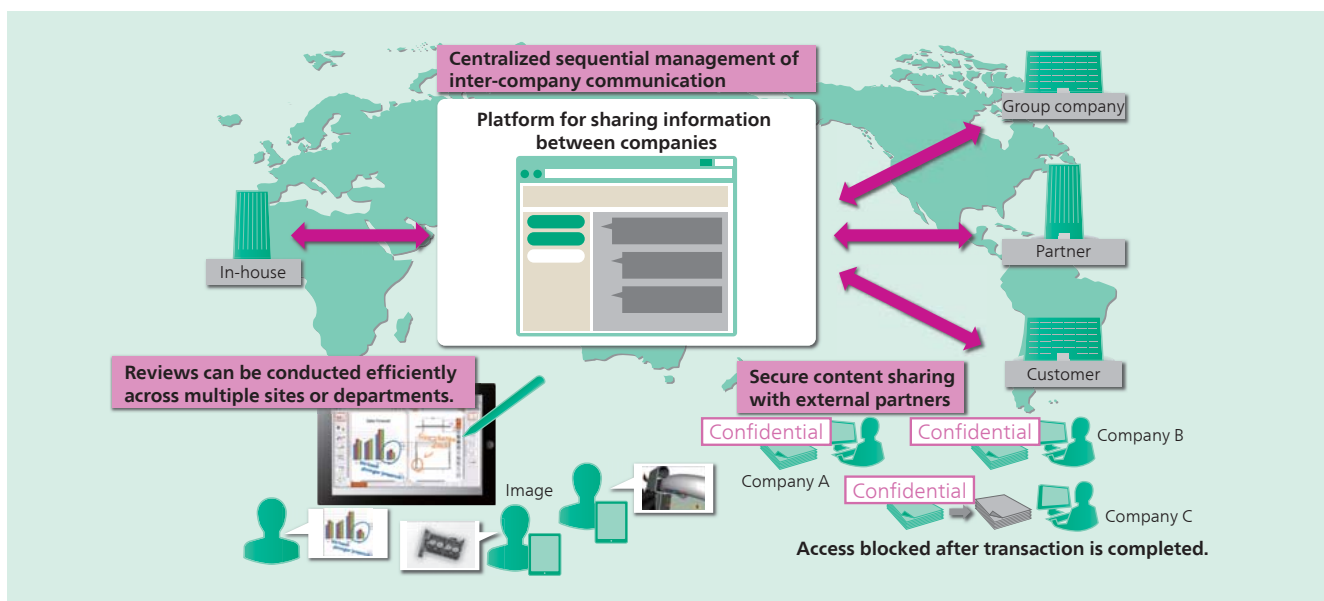
Accordingly, Hitachi has developed a vulnerability management support system that automatically accesses information about the administration of software resources and information from sites that publish vulnerability notice, and provides notifications of pertinent information. This allows system administrators

to reduce their workloads and implement comprehensive vulnerability risk management simply by approving the actions taken in response to the vulnerability notice that the system provides.

Hitachi already supplies a cybersecurity solution that provides comprehensive support for cyber-attack countermeasures and is working to progressively expand the range of service options to keep pace with the increasingly sophisticated nature of attacks. In the future, Hitachi intends to extend its services by utilizing this vulnerability management support system to provide vulnerability notice that is relevant to customers' systems in realtime.

15 Family of Products that can Take Free Advantage of Business Content

As an increasing number of companies pursue business innovations such as globalization, new working practices, and opera-



15 Sharing information between companies using a family of content management products

tional reforms, they face the major challenge of how to bring together skills, knowledge, and ideas from across the organization. As a result, many companies are looking for ways to provide flexible use of relevant “business content,” meaning documents, drawing data, forms, images, and movie. The ability to make full use of this business content can be expected to let companies achieve their maximum potential by facilitating knowledge synergies and new forms of co-creation.

To meet these expectations, Hitachi provides a family of content management products, including an inter-company information sharing platform that can take free advantage of business content. By ensuring quick and secure inter-company and inter-departmental communication, this helps grow the business by facilitating co-creation with overseas sites and other partners. (Hitachi Solutions, Ltd.)

16 Production Setup Solution for Manufacturers

There has been a growing trend toward Japanese manufacturers setting up operations overseas, influenced by economic conditions in Japan in recent years. For these Japanese manufacturers to succeed in overseas markets, there is a recognized need to change their existing manufacturing *kaizen* improvement practices to avoid problems such as overemphasizing cost reduction in on-site capabilities, or proceeding with cost improvements without specifying the accurate standards (indicators) to target.

Hitachi’s production setup solution for manufacturers is used to build in cost-competitiveness at the development and production setup stage, and has the following features.

(1) Improves efficiency by making information on production setup schedules and progress available in the lead-up to the commencement of full-scale production over a short timeframe

and involving a wide range of departments.

(2) Builds in cost-competitiveness by formulating profit plans, establishing accurate and achievable target unit prices required to achieve the planned revenue, and utilizing work on reducing unit prices after full-scale production commences.

(3) Shares and utilizes information and other useful know-how to reduce costs.

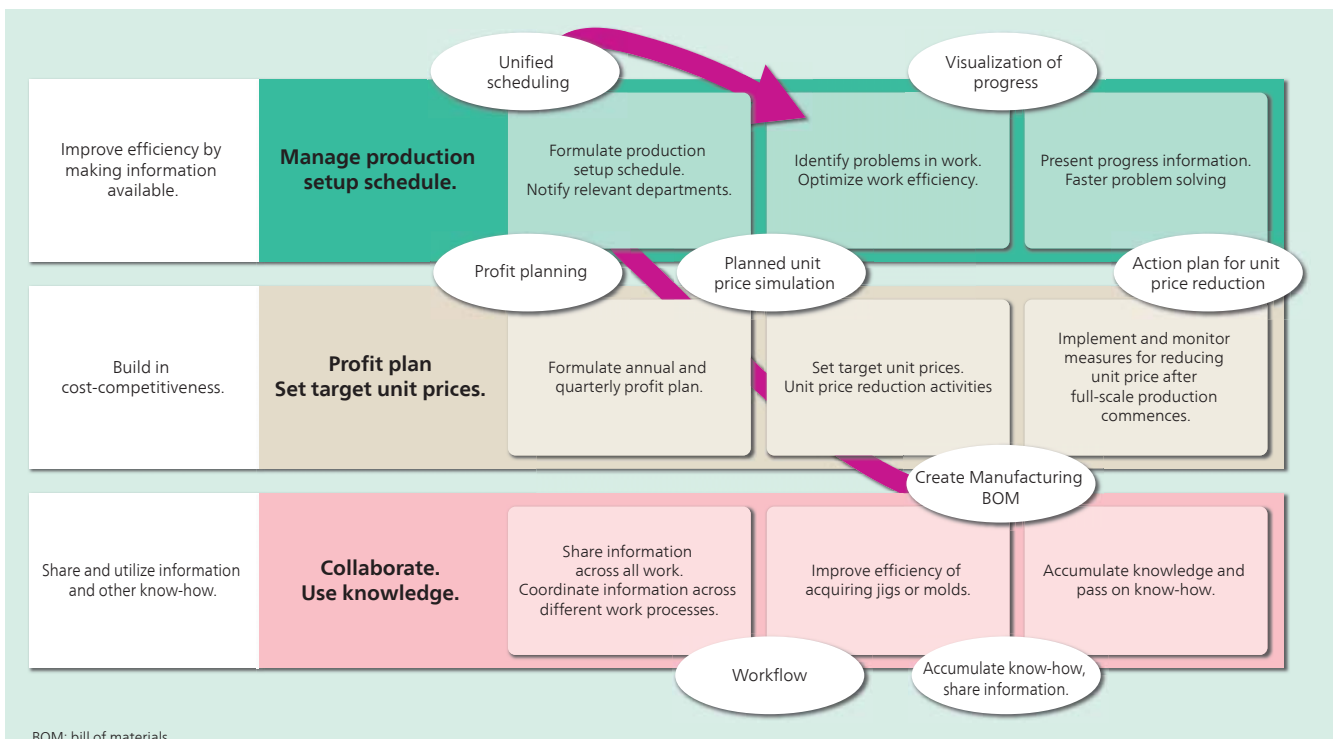
These benefits and the functions that provide them deliver comprehensive support for achieving cost structures that are superior to those of competitors.

(Hitachi Solutions, Ltd.)

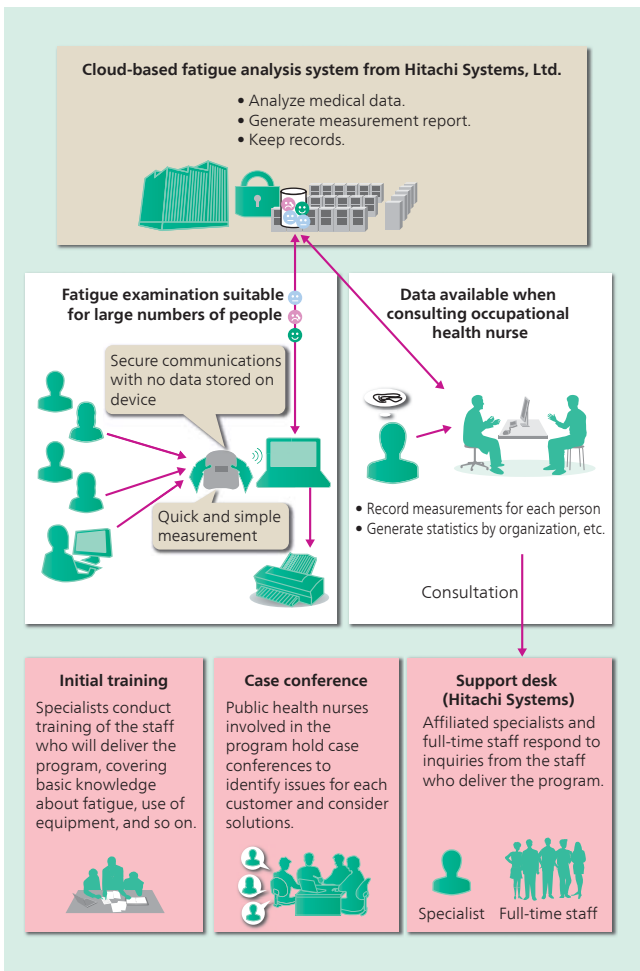
17 Fatigue and Stress Measurement System

People are among the most valuable assets of a company and a strong emphasis has been placed on things like preventing death from overwork and conducting stress checks to protect their health, with legal requirements also being introduced in Japan. While fatigue, like pain or fever, is an important warning sign of health problems, currently it can only be assessed by subjective measures such as a medical examination or consultation. In preventing death from overwork and conducting stress checks, objective fatigue biomarkers (quantitative techniques for identifying fatigue) are needed to deal with issues that are not apparent unless raised by the patient themselves, or to identify fatigue of which the patient is not personally aware.

Existing fatigue biomarkers include such physiological biomarkers as assessments of activity levels, the sleep-wake rhythm, and autonomic nerve function, and biochemical biomarkers such as blood and saliva tests for oxidants, metabolites, amino acids, and so on. The assessment of autonomic nerve function is one of the simpler of these to obtain.



16 Three benefits provided by the production setup solution for manufacturers, and the functions used to provide them



17 Use of fatigue and stress measurement system

By looking at heart rate variability to provide an indication of autonomic nerve balance and activity levels, the fatigue and stress measurement system helps make possible preemptive medical

interventions that take account of how prone people are to fatigue. (Hitachi Systems, Ltd.)

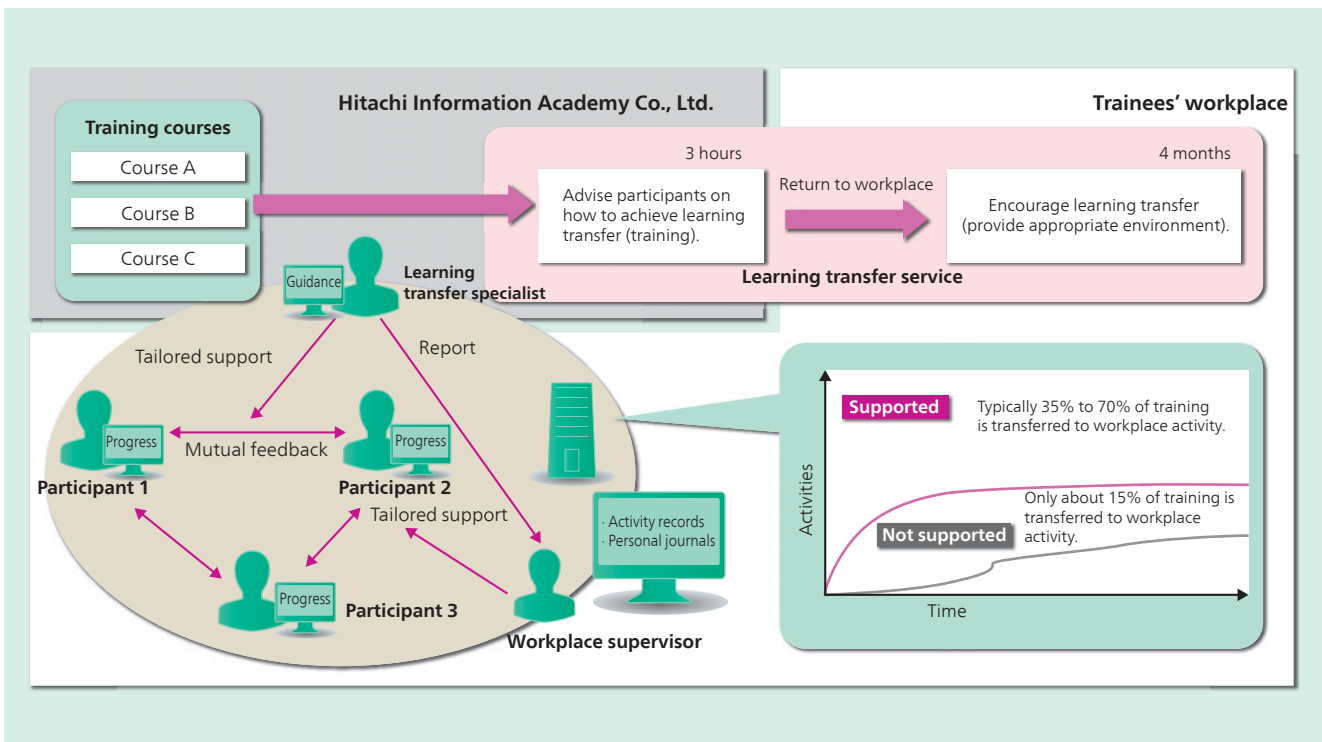
18 Learning Transfer Service

The term “learning transfer” refers to taking explicit knowledge acquired in a classroom and applying it to work to create tacit knowledge in an organization.

The learning transfer service of Hitachi Information Academy Co., Ltd. provides ways of monitoring this process and encouraging it in an efficient way. First, an instructor from Hitachi Information Academy gathers together the participants involved after their training has been completed to provide guidance on how the learning transfer is to be achieved. Then for four months after they return to the workplace, they are provided with a special cloud-based application to use as a forum for facilitating the process. The participants use this application to start utilizing their new knowledge based on individual plans covering their activities and how to incorporate the knowledge into their routines, providing each other with encouragement through mutual feedback until the new knowledge is assimilated and more desirable activities are developed. This is monitored by their supervisors who can provide support as required.

Hitachi Information Academy uses records of participants’ activities, their personal journals, and associated statistics to assess the progress of learning transfer and reports this to the stakeholders. This helps improve the return on investment for training by ensuring solid progress is made on tasks that are heavily dependent on the person performing them by having participants assist each other.

(Hitachi Information Academy Co., Ltd.)



18 Learning transfer service

IT Platform

1 Hitachi IT Platform Strategy

Leading organizations are evaluating, buying, and deploying technology according to a new model of Business-Defined IT, where information technology (IT) and business teams operate seamlessly together toward shared goals.

Within Hitachi's businesses and among our thousands of customers, we see this partnership increasingly focused on delivering unique value and solutions for improving the following three points:

(1) Mobility

Increasing productivity with secure access to critical data anytime, anywhere, via any device

(2) IT economics

Offering strategies to reduce cost and increase profitability

(3) Insight

Providing meaningful and actionable direction based on realtime data analysis to improve competitive advantages

Helping our customers succeed with this new model is a driving force behind Hitachi's IT Platform strategy.

Business-Defined IT can only flourish if there is a seamless flow of data and knowledge throughout the organization. Hitachi solutions for data mobility increase productivity and our vertical-expertise and strength in analytics help provide the key business insights our customers need to stay ahead of their competition.

The foundation of all of this, however, is a stable, programmable and adaptable IT infrastructure that can change to meet new business requirements. This Continuous Cloud Infrastructure brings new levels of availability, automation and agility to IT teams, so they can focus on growing their partnership with

the business, and not dealing with recurring limitations of outdated IT infrastructure.

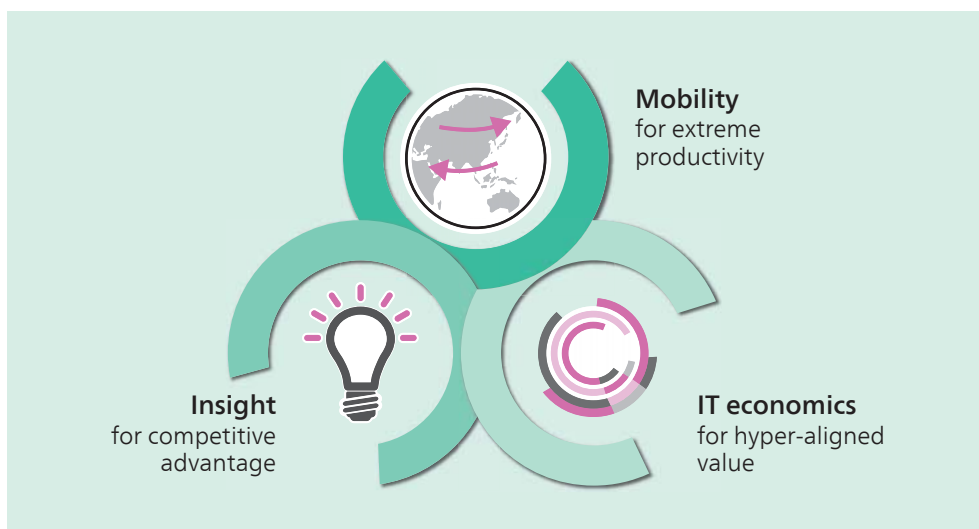
Hitachi development is leading this effort. In its new efforts, Hitachi is also focusing on enhanced software and solutions capabilities to reduce complexity and increase automation. Hitachi's new hardware platforms push new technologies like flash storage to the forefront and challenge old ways of thinking about how server and storage systems are designed. These innovations come together into complete computing stacks that reduce cost and speed time to productivity.

Tomorrow's leading companies are moving toward Business-Defined IT today, and need new, agile IT infrastructure technologies to power them forward. Hitachi is developing and delivering those technologies, today.

2 Hitachi Unified Compute Platform

The Hitachi Unified Compute Platform is an integrated platform solution that bundles management software with server, storage, and network hardware.

As a pre-configured solution for private clouds, it provides ease-of-installation and shortens the time it takes for users to get an IT system up and running (the "service-in" time). Along with reducing administration costs by providing management software that simplifies and automates the use of virtualization, the Hitachi Unified Compute Platform also provides highly dependable hardware to ensure reliable system operation and ease of system installation to ensure that the system can adapt quickly to changes in the business. It also includes an integrated platform orchestration function, meaning that hardware that in the past was



1 Business-defined IT



2 Hitachi Unified Compute Platform (left) and integrated platform orchestration function (right)

managed separately by server, storage, and network administrators, respectively, can now be centrally managed by a virtual machine (VM) administrator.

Drawing on experience from its system solution business, Hitachi's aim is to create integrated platforms that do not require configuration.

3 Hitachi Virtual Storage Platform G1000

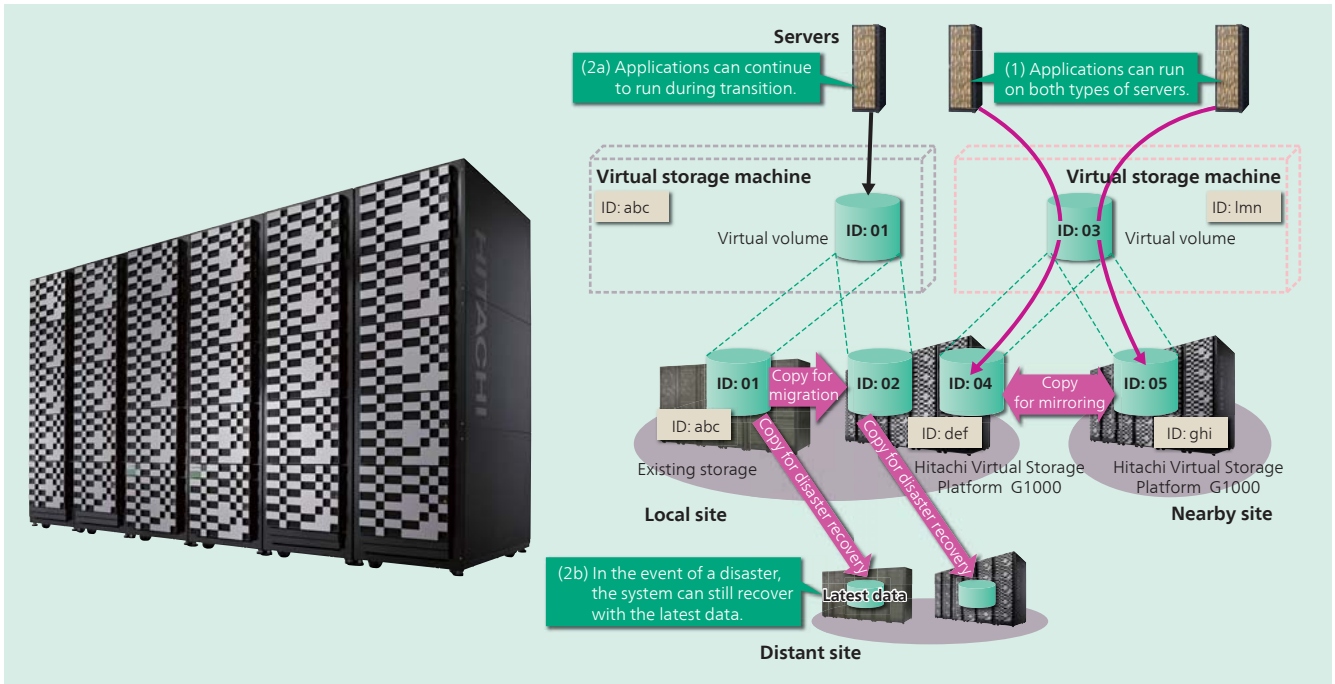
In recent years, corporate activity has been called on to respond to rapid changes in the business environment, including not only increasingly globalized markets but also the 24-hour, 365-day delivery of services and the use of big data to create new business value. Against this background, the Hitachi Virtual Storage Platform G1000 has been released on the market as a highly reliable cloud platform that utilizes newly developed storage virtualization technology. Hitachi Virtual Storage Platform G1000 is a storage platform that can respond flexibly to changes in the business environment, allowing personnel and other IT resources to be redirected toward the creation of new business value without concern for things like IT system administration and operation.

In past system configurations that have involved duplication across different sites, the inability to access data held on subsidiary storage system hardware has made it difficult to operate

business applications on subsidiary systems. The newly developed global storage virtualization technology provides a way to treat multiple storage systems as a single storage device. Because master and subsidiary storage systems are collectively treated as a single device, applications can run equally well on either type of server and access data from both types of storage systems. This improves business productivity by simplifying such tasks as server load sharing and server maintenance, and by making it possible to migrate virtual servers between master and subsidiary systems. Hitachi Virtual Storage Platform G1000 also supports rapid switching between master and subsidiary systems to allow rapid system recovery after natural disasters.

In the past, migration to new storage hardware has required a system shutdown to perform the switchover. Because the new technology treats both existing* and new storage systems as a single device, the transition to new hardware can take place without interrupting service delivery or other business activities. The existing and new hardware can also maintain a disaster-tolerant configuration during the transition to ensure that, if a disaster were to occur, the latest data would still be available to the system after recovery.

In the future, Hitachi intends to continue supplying and enhancing its IT platforms that can respond flexibly to changes in the business environment without being held back by IT system management and operation considerations, and that can help



3 Hitachi Virtual Storage Platform G1000 (left) and new global storage virtualization technology (right)

create new business value through the use of big data.

* Hitachi Virtual Storage Platform, Hitachi Universal Storage Platform V, and Hitachi Universal Storage Platform VM.

4 Compute Blade 2500

In recent years, corporate activity has been called on to respond to rapid changes in the business environment, including not only increasingly globalized markets but also 24/7 non-stop service delivery and business value creation through the use of big data. Against this background, Hitachi released the Compute Blade 2500 in October 2014 as an IT platform that supports the environment in which customers operate, with the reliability and availability to ensure business continuity, the high performance for faster processing of big data, and the flexibility to adapt quickly to



4 Compute Blade 2500

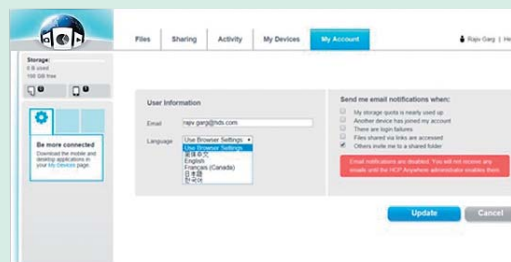
changes in the business.

Supporting a symmetric multi-processing (SMP) configuration with up to eight blade sockets, the Compute Blade 2500 can achieve high-performance systems with a maximum of 120 processor cores and up to 6 Tbyte of memory. The extensive input/output (I/O) capacity provided by the 28 Peripheral Component Interconnect (PCI) slots on the rear side of the chassis means that redundant configurations can be used despite the Compute Blade 2500 being a high-density blade server. To satisfy the increasingly strict security requirements of users such as government agencies and social infrastructure, the system has also been made more robust by the inclusion of secure account management and functions for preventing unauthorized access. Compute Blade 2500 can also be used as a cloud platform that delivers reliable performance to each tenant by using logical partitioning feature (Hitachi's hardware based logical partition capability, which the standard installation has) for the exclusive allocation of resources such as central processing units (CPUs) and memory. It improves the robustness and utilization of cloud platforms, both by ensuring security across multiple tenants and by making effective use of resources.

5 Hitachi Content Platform Anywhere

Mobility of devices, workforces, data on premise and off premise and among locations across the globe, creates many new business opportunities. However, mobility also presents new challenges for the IT professionals responsible for the protection and governance of the data content.

Hitachi Data Systems Corporation offers a tightly integrated content mobility solution designed for the enterprise and built by a single, well-respected vendor. Integration by design gives the solution of Hitachi Data Systems robust security and ease of



* See "Trademarks" on page 146.

5 Hitachi Content Platform Anywhere for PC, Mac*, Android*, iOS*, Windows Phone* and Internet browsers

implementation, and keeps IT efficient and in control of corporate data while allowing mobile workers to be more productive.

Hitachi Content Platform Anywhere provides mobile access to enterprise network-attached storage (NAS) data as well as file synchronization and sharing for user data. The combination of Hitachi Content Platform Anywhere with the hybrid cloud Hitachi Content Platform object store, empowers mobile workers by going beyond file syncing and sharing to provide mobile access to data in existing Hitachi NAS and Hitachi Data Ingestor systems, so they have secure access to cloud and enterprise data from anywhere, on any device, at any time. Hitachi Content Platform Anywhere also lets users pick from multiple languages for their client systems and offers efficient syncing of large, open and duplicate files. These capabilities extend existing investments in NAS environments and help IT bridge the gap between traditional NAS and 'next generation file services.'

(Hitachi Data Systems Corporation)

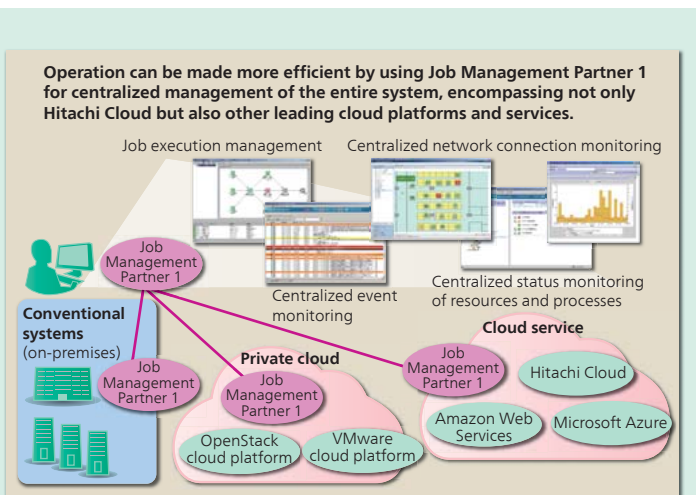
system-wide operation (including conventional on-premises systems) be performed efficiently under a multi-cloud environment that utilizes a number of cloud systems as and where needed.

Hitachi has enhanced support for key cloud platforms and cloud services in its Job Management Partner 1 V10.5 integrated systems management. Job Management Partner 1/Service Portal for OpenStack has been added to provide efficient operation of private clouds using OpenStack*, which is expected to become more widely used in the future. It provides functions that are essential for corporate use, such as approvals processing and the recording of and access to activity logs, and portal screens for cloud users that are intuitive and very easy to use. For private clouds based on VMware vSphere*, it also features enhanced interoperation between the Job Management Partner 1/Integrated Management integrated console and cloud platform monitoring products from VMware, Inc. This provides centralized management of all aspects of data center operation from cloud platforms to the operational status of applications.

With features that include improving the operation of such cloud service environments as Amazon Web Services and Microsoft* Azure*, Job Management Partner 1 will continue to

6 Integrated Systems Management Job Management Partner 1 V10.5

The growing practical use of the cloud makes it important that



6 Example screen from Job Management Partner 1/Service Portal for OpenStack, a service portal for making OpenStack operation more efficient (left), and use of Job Management Partner 1 for centralized management of an entire multi-cloud environment (right)

boost the operational efficiency of multi-cloud environments in the future.

* See "Trademarks" on page 146.

7 Hitachi Integrated Middleware Managed Service

Initiatives are being undertaken to deal with rapid changes in the business environment, such as variable demand, by enhancing use of the information that supports business activity to improve the speed and accuracy of decision-making. An important part of this is the collection of up-to-date data generated both inside and outside the enterprise, and its analysis from a variety of perspectives. However, because factors such as mergers and acquisitions (M&A) and the globalization of enterprises has given rise to a collection of disparate business systems to which improvements are made in isolation, the workload associated with initial system implementation and subsequent upgrades has been exacerbated by the need when working with this data to incorporate additional processing for its collection in different formats and conversion to a common format. Problems with out-of-date data also arise when the use of batch processing means that data is only collected periodically.

The data coordination platform service provided by Hitachi Integrated Middleware Managed Service uses a virtual integrated database to overcome these problems. Utilizing Hitachi's accumulated experience with middleware technology, this involves the analysis of database update logs to collect data as soon as it is generated, and the standardization of data formats without needing to create a program. This can consolidate up-to-date information from different systems in the same way as if an inte-

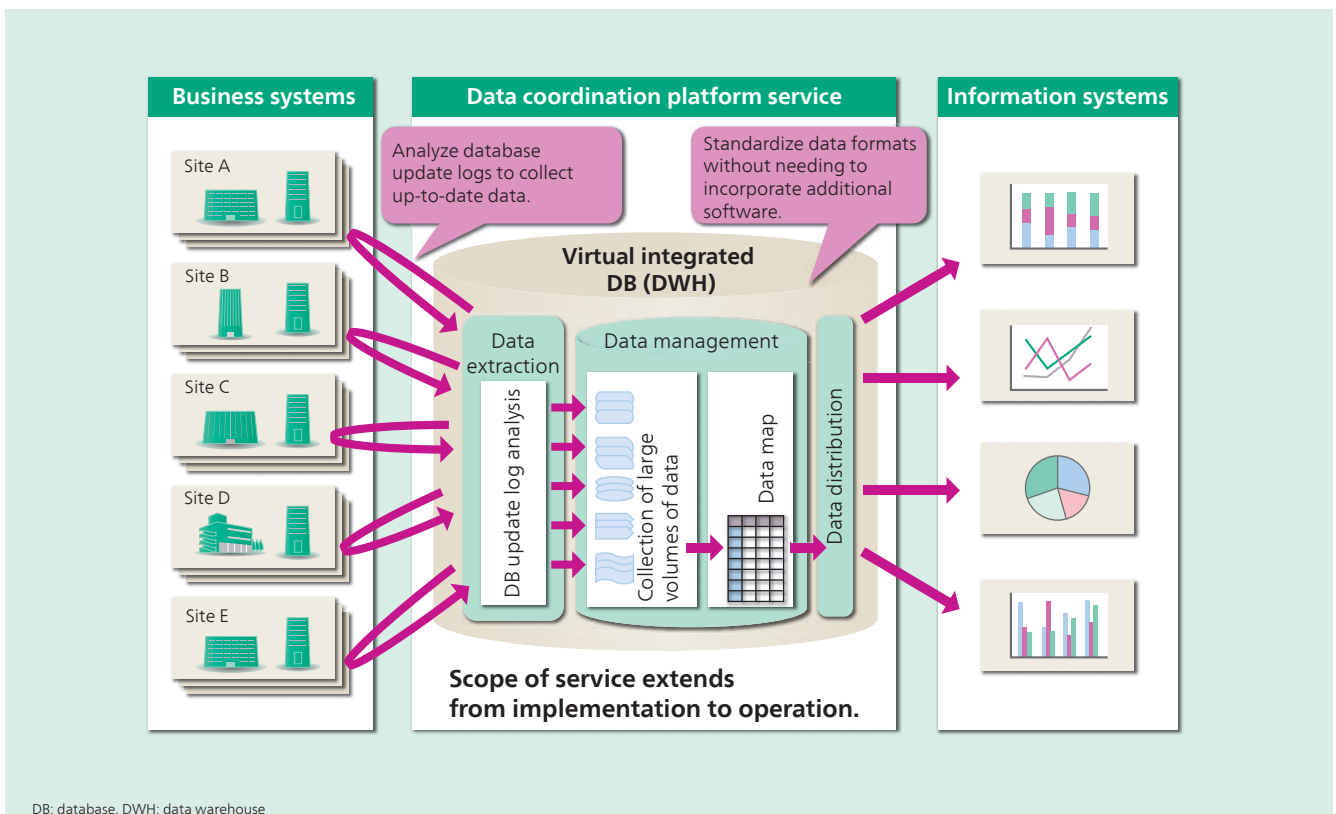
grated database had been installed. It is provided in the form of a service operated by Hitachi that extends from system platform implementation to live operation, and is billed on a monthly usage fee system.

8 Use of Hitachi High-speed Data Access Platform at Retailer

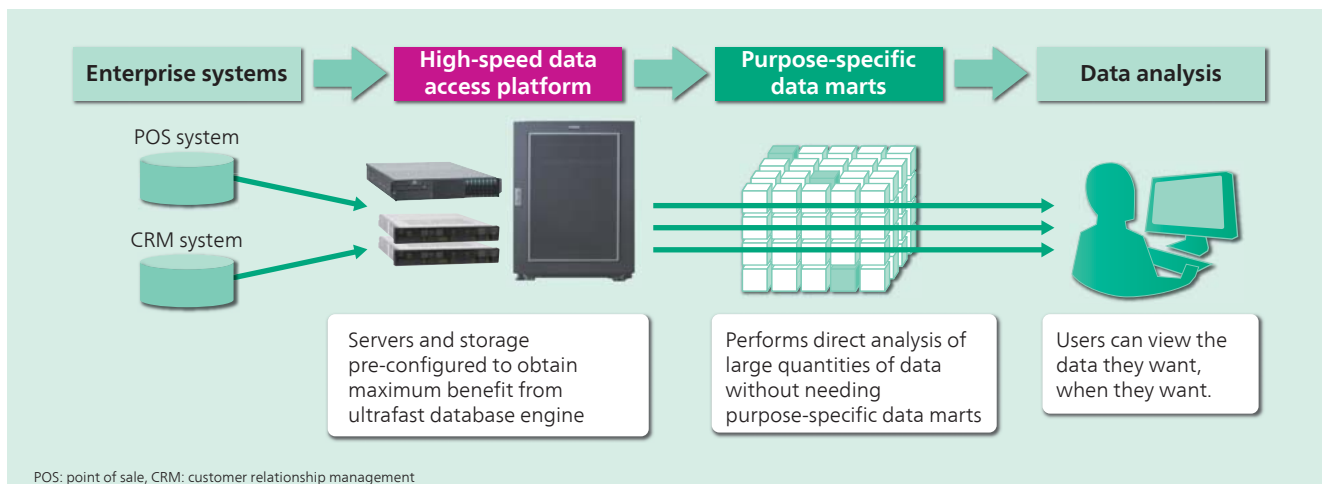
Since the tallying up several hundreds of million items of sales data every time can take a long time when analyzing sales data in the distribution industry, the practice of creating a large number of pre-calculated data marts was developed as a means to overcome that problem. Unfortunately, because a new data mart design is required each time the basis of data analysis is changed, and because this takes several months, the problems with using data marts in data analysis include an inability to adapt to changes in the basis of analysis and data becoming out of date.

To overcome this problem, Hitachi developed an ultrafast database engine that incorporates an out-of-order execution mechanism*¹ that can extract sales data and calculate basic statistics at high speed without using data marts. The Hitachi high-speed data access platform*², which combines this engine with Hitachi hardware, was released to make it possible to provide timely analytics with high quality and a short system installation time. When installed at one retailer, the high-speed data access platform succeeded in reducing the time taken for sales data analysis from 40 minutes to 22 seconds, and the number of data marts from 165 to six.

Hitachi intends to continue helping customers expand their businesses by providing IT platforms that accelerate the pace of this new value creation.



7 Use of information via Hitachi Integrated Middleware Managed Service, a data coordination platform service



8 Application of Hitachi high-speed data access platform

*1 A mechanism devised by Masaru Kitsuregawa, a Professor at The University of Tokyo and Director General of the National Institute of Informatics, and Project Associate Professor Kazuo Goda of The University of Tokyo.

*2 Utilizes the results of “Development of the Fastest Database Engine for the Era of Very Large Database and Experiment and Evaluation of Strategic Social Services Enabled by the Database Engine” (Principal Investigator: Prof. Masaru Kitsuregawa, The University of Tokyo/Director General, National Institute of Informatics), which was supported by the Japanese Cabinet Office’s FIRST Program (Funding Program for World-Leading Innovative R&D on Science and Technology).

broadband service providers, and a variety of X-as-a-service (XaaS) offerings from cloud hosting providers.

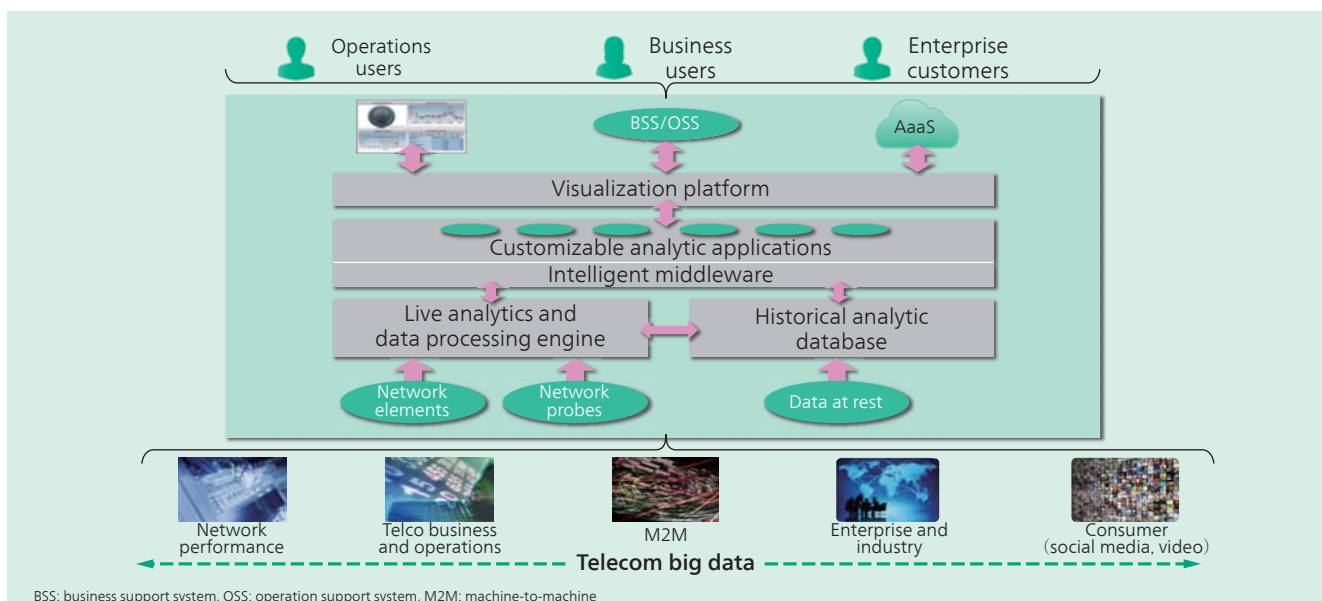
Hitachi is introducing a solution optimized for fine grain, realtime performance. The Live Insight for Telecom solution from Hitachi is a highly granular, scalable, adaptive and open analytics solution that empowers service providers to take control of their network’s performance with realtime, microscopic level visibility to improve quality of experience (QoE) with enriched services, and elevate their business value with new analytics-as-a-service (AaaS) offers. Key elements include:

- (1) A live analytic and data processing engine that can ingest up to a million events per second per core from network probes and devices.
- (2) A time series optimized historical analytic database built for rapid data access and correlation.
- (3) Intelligent middleware to enable predictive insights and realtime optimization
- (4) Customizable analytic applications supporting operations, business or enterprise use cases
- (5) A rich visualization platform that transforms powerful big data algorithms into user friendly dashboards and reports (Hitachi Data Systems Corporation)

9 Telecom Network Analytics Solution

Billions of data metrics related to network and service performance are collected hourly by service operators that could enable them to improve network efficiency, service delivery, and/or create new services. Regrettably, most of this data goes untapped due to inadequate tools to extrapolate the value in realtime or correlate it to past trends for proactive and predictive insight.

Realtime network big data analytics can play a powerful role in shaping and improving the delivery of telecom services, including 4G/LTE services from mobile operators, triple play services from



9 Telecom network analytics solution architecture

1 Hitachi's Networking Business

The spread of new technologies such as the Internet and smart-phones is bringing major lifestyle changes, making networks an essential part of people's lives. It is anticipated that this will improve quality of life and help create a safe and secure society by connecting people and a wide variety of different objects into networks and then taking the value derived from the collected data and redistributing it throughout society. In addition to the greater reliability and speed required to stabilize and accommodate this rapid expansion in networking, what is needed to achieve this is a "value reproduction ecosystem" platform for networks that can collect information and redistribute value.

Based on its core business concept of "IT × social infrastructure," Hitachi is helping create the network systems needed to cope with this social change.

In the information technology (IT) and telecommunication network sectors, Hitachi is supplying network solutions and other products that combine economic performance with the reliability and high speed of social infrastructure. Hitachi's traffic management solutions are examples of such products that can efficiently handle the rapid growth in mobile traffic without compromising speed.

For the social infrastructure sector, Hitachi utilizes technologies and know-how it has acquired in the telecommunication network sector to supply applications in the energy, transportation, logistics, public works, and other sectors with sensors that collect real-world data, platforms for the efficient transmission of sensor data, and network solutions and products for the data centers used to store and analyze the collected big data. Utilizing wireless technology developed for telecommunications carriers, Hitachi is also developing next-generation wireless systems for use in new air traffic control and other social infrastructure systems.

In the future, Hitachi intends to contribute to the transformation of society by developing leading-edge technology for the network solutions that support society, and by supplying solutions and other products.

2 Traffic Management Solutions

The objective of traffic management solutions (TMSs) is to build optimal and reliable systems through the visualization, analysis, and control of the various different networks used in social infrastructure.

The main features of a TMS solution are as follows.

(1) Realtime analysis

Enables the realtime analysis and control of traffic on a network. The realtime visualization and control of a network can provide an instantaneous view of how the network changes in response to control operations.

(2) Big data analysis

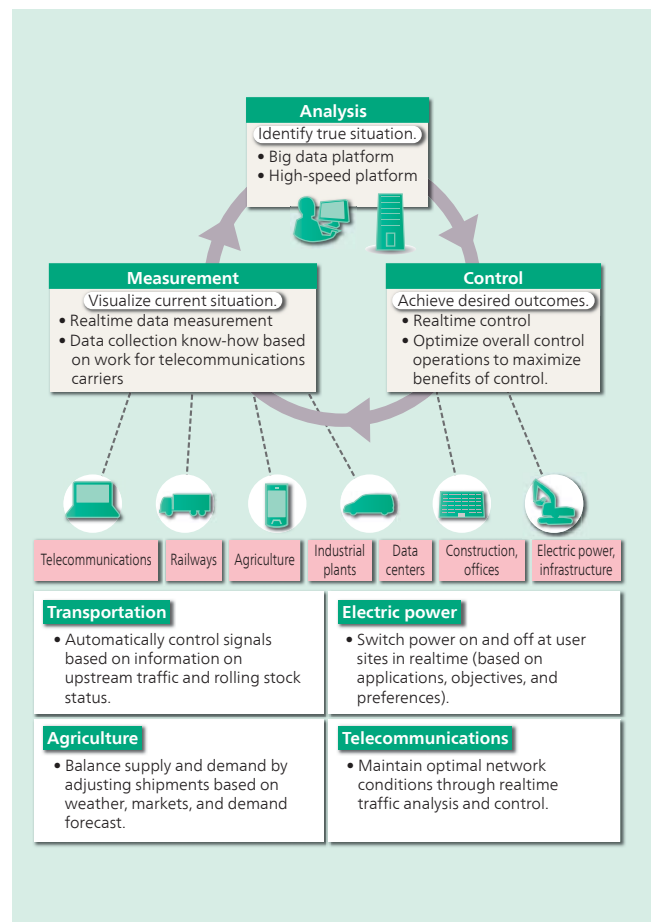
The collection and analysis of large amounts of data on the network can unlock the new value it contains.

(3) Investment optimization

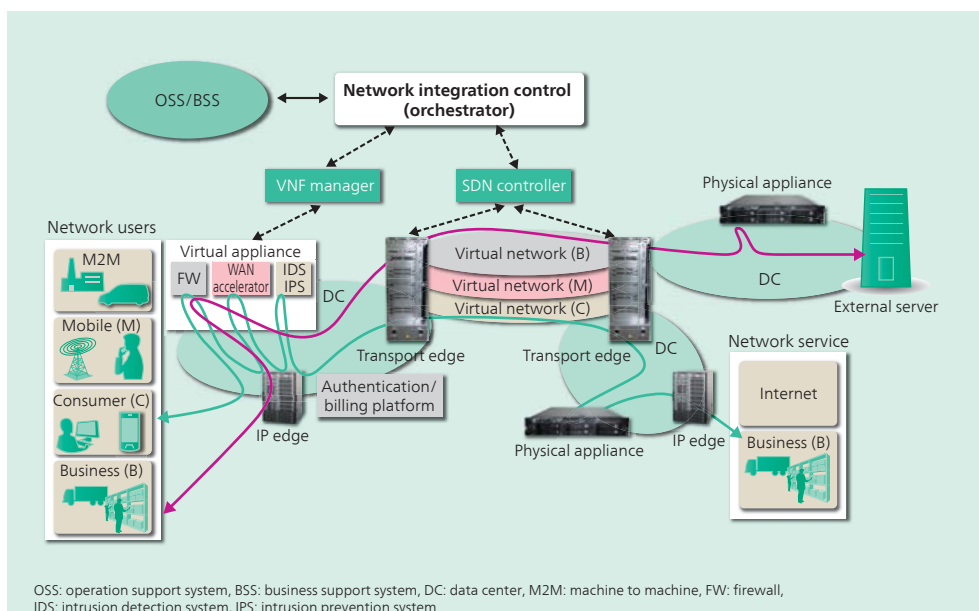
Supports the formulation of optimal investment plans by identifying system bottlenecks from the results of realtime analysis and big data analytics.

Potential uses for TMSs exist in transportation, agriculture, and electric power as well as telecommunications. In the case of telecommunications, Hitachi implemented a system for a telecommunications operator in 2013 that controls traffic based on the level of congestion in the network and is now in full commercial operation.

Hitachi plans to deploy the technology in other sectors in the future.



2 Traffic management solution concepts



3 Telecommunication network incorporating NFV/SDN solution

3 NFV/SDN Solutions

Hitachi is developing products that support network functions virtualization (NFV) and software-defined network (SDN) for building next-generation networks that provide efficient operation through the integration of fixed, mobile, and leased-line networks, and fine-grained quality and service levels through the use of end-to-end management and control.

The main features of NFV/SDN solution are as follows.

(1) NFV

This promotes the provision of new services through the addition of virtual appliance functions such as firewalls, wide-area network (WAN) acceleration, and the prevention of unauthorized access by implementing service chaining based on Internet protocol (IP) edge mechanisms that integrate with a user authentication and billing platform.

(2) SDN

Uses an orchestrator for the efficient operation of an integrated network by collecting information on server usage from a virtual network function (VNF) manager and traffic levels from SDN controller, and by the management and control of a virtual network based on user requirements.

In the future, Hitachi intends to expand functionality to facilitate deployment in mission-critical social infrastructure networks in fields such as electric power, transportation, finance, and healthcare.

4 Firewall Administration Solution Based on Virtual Network Platform Software for Data Centers

The data center firewalls used for public clouds and private corporate clouds carry a heavy administrative workload with numerous settings updates, and where emergency actions in response to a fault might result in a mismatch between the settings on specific hardware and what is specified in the master manage-

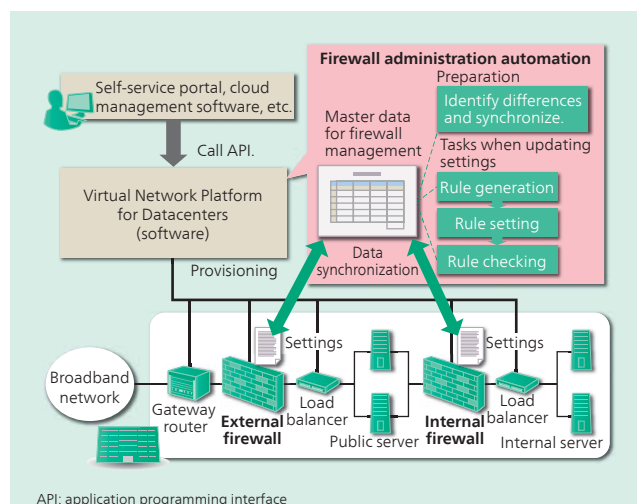
ment data.

To deal with this, Hitachi supplies a firewall administration solution that uses virtual network platform software for data centers. The solution is based on the use of a master record of management data that specifies the firewall rules (policies), and has the following features.

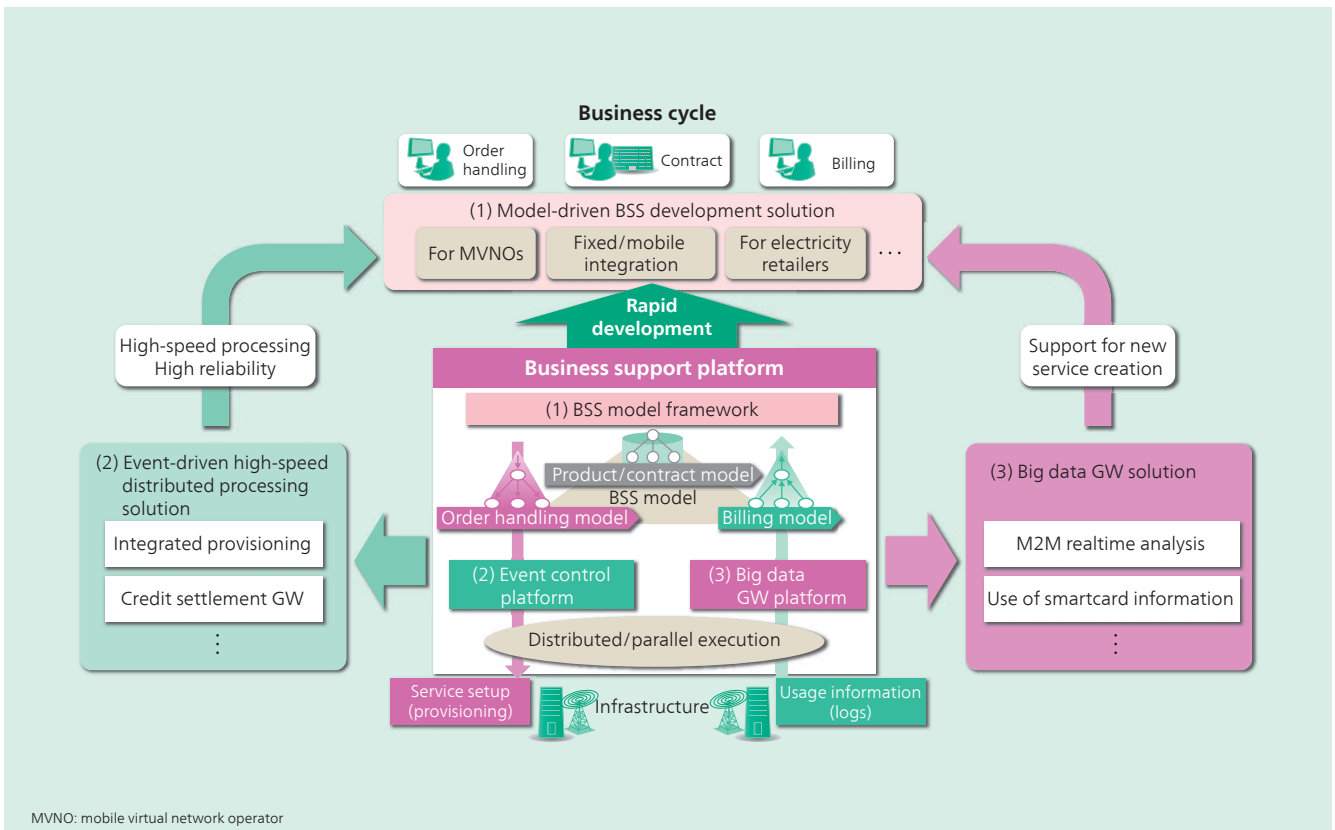
- (1) Allows identification of hardware rule settings that do not match the master data.
- (2) Allows changes in master data to be loaded and automatically applied to hardware.
- (3) Automatic post-update confirmation that rule settings on hardware match the master data.

This reduces the amount of work associated with firewall setup and improves quality by automating not only the hardware setting process but also the associated tasks of making the settings more reliable.

In the future, Hitachi plans to undertake further work on operational automation to improve reliability through the automating of tasks up to and including operational checks on hardware.



4 Firewall administration solution based on virtual network platform software for data centers



5 Solution based on a business support platform

5 Business Support Platforms

The ongoing ability to implement new services quickly so as to maintain and improve user satisfaction is an important competitive advantage in the telecommunications industry. To achieve this, Hitachi's business support platforms incorporate three platform technologies: a BSS model framework for the rapid development of BSSs that support the business cycle of having users apply to join the service, contract sign up, and billing; an event control platform that guarantees the reliability needed for core activities; and a big data gateway (GW) platform that facilitates new service creation. Hitachi is utilizing the features of these platform technologies to deploy three solutions that ensure the ongoing and timely provision of services that satisfy user needs.

The main features of a business support platform are as follows.

(1) Model-driven BSS rapid development solution

The use of a BSS model framework that stipulates design techniques that derive from the service strategy, together with modeling of the BSS's data structures and work flows, enables the rapid development of a BSS that conforms to the service provider's strategy.

(2) Event-driven high-speed distributed processing solution

This provides an event control platform that uses distributed execution and provides guaranteed handling of event-triggered transactions. It is used for high-speed processing of operations such as provisioning and credit settlement, which demand a high level of reliability.

(3) Big data GW solution

Analyzes information from M2M data and smartcards to

expedite the creation of new services by using a big data GW platform with parallel execution for realtime conversion of large amounts of generated information into a valuable format.

In the future, Hitachi intends to expand deployment of these platforms beyond the telecommunications industry to other industries associated with social infrastructure that have a growing demand for business reliability and speed.

6 M2M Traffic Solutions

M2M traffic solutions consist of M2M devices designed for expandability and a cloud service for collecting, managing, and making available workplace data and performing centralized control of M2M devices and networks. Hitachi provides comprehensive services extending from consulting on installation to system design, network implementation, cloud service operation and maintenance, and integration with business applications.

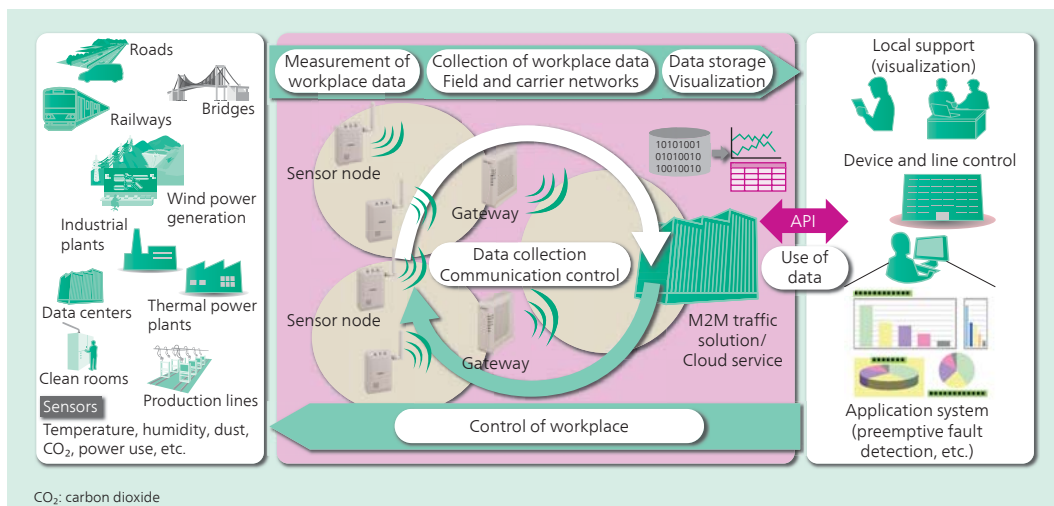
The main features of an M2M traffic solution are as follows.

(1) Efficient data collection that limits increases in telecommunications costs even for large M2M networks by consolidating measurement data in gateways for efficient transmission.

(2) In addition to providing a view of the workplace, a cloud service provides the functions required to optimize operations, such as network control and monitoring of the equipment used in the M2M system platform.

(3) APIs for interoperation with other systems are provided in the cloud. This enables interconnection with other customer systems, such as business systems or big data analytics tools.

In the future, Hitachi intends to expand its network platform



6 Overview of M2M traffic solution and products

products and services that help companies adopt M2M, and to work with overseas telecommunications carriers to deploy its M2M business globally.

7 Information and Telecommunication Core Package Solution

Along with the transition of social infrastructure to IT-based systems, expeditious implementation of system developments is required in the industrial arena.

The Information and Telecommunication Core Package Solution provides previously designed and validated technological assets as reference designs to simplify the development of products. The Information and Telecommunication Core Package Solution helps engineers concentrate their efforts on creating differentiated and compelling upper layer applications.

The main features of the Information and Telecommunication Core Package Solution are as follows.

(1) Various types of program products and software development kits (SDKs) designed for developing telecommunications and

other industrial equipment.

- (2) A hardware design kit that consists of a network processor, reference design, schematic diagrams, and bills of materials (BOM) for various types of products to shorten the design period.
- (3) Prototyping starter package that consists of an evaluation board, program product, and SDK to enable engineers to promptly start evaluating a prototype.
- (4) Professional services that provide technical support, training, consulting, and maintenance support.

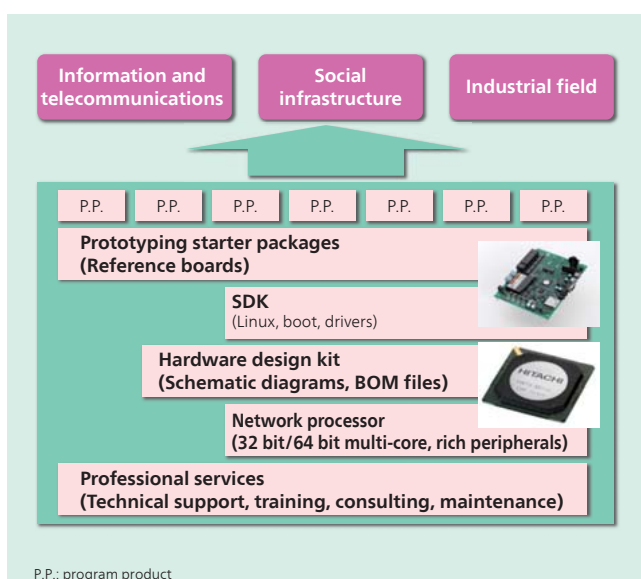
In the future, Hitachi intends to continuously enhance reference designs and to extend its applicable industrial fields to contribute to the speedy implementation of social infrastructure improvements.

8 Advanced Message Queue Solutions

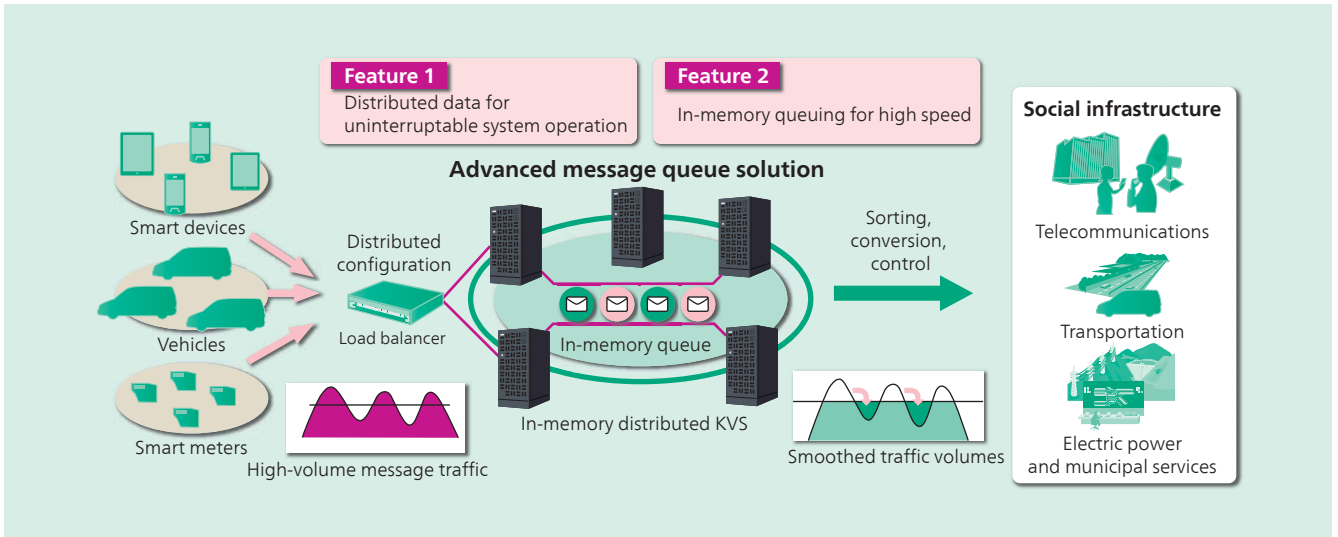
Along with the increase in communication data volumes that has accompanied the spread of smart devices in recent years, there is a growing demand for service continuity and faster speeds in the communication systems of social infrastructure companies. Since past communication systems used for message distribution have been based on message queuing, they suffered from performance bottlenecks when accessing external storage with a queue. Advanced Message Queue (AMQ) and its solutions provide the following features to overcome this problem.

- (1) Uninterruptable system operation is achieved by using a key-value store (KVS) configuration in which duplicate message data is spread across multiple servers to eliminate the need for restoring data in the event of a fault.
- (2) High-speed processing of large quantities of messages using in-memory queuing whereby the queue is held in an in-memory distributed KVS.

Having earned a strong reputation for the technology it has developed for telecommunication carriers, Hitachi now plans to supply this technology to mission-critical social infrastructure companies in fields such as telecommunications, transportation, electric power, and municipal services.



7 Main elements of Information and Telecommunication Core Package Solution



8 Advanced message queue solution

9 TCP Optimization Software

Today, everything is connected to a network. Efficient use of network infrastructure is a key to success. With Transmission Control Protocol (TCP) data transfer, performance is reduced significantly due to round-trip delay time and packet loss*. TCP optimization software reduces the data transmission time of large data that is updated frequently, which is difficult to optimize with typical caching technology. It is based on the high-speed communication technology of the Hitachi WAN Accelerator family of products and uses Hitachi's proprietary algorithm to optimize TCP data transfer performance and maximize the use of physical bandwidth. In addition, it is easy to install in existing environments. Deployment is only required at data centers. There is no need to install anything on user devices. It is beneficial to all users who use download services from the data center via Internet and mobile network environments as well as WAN.

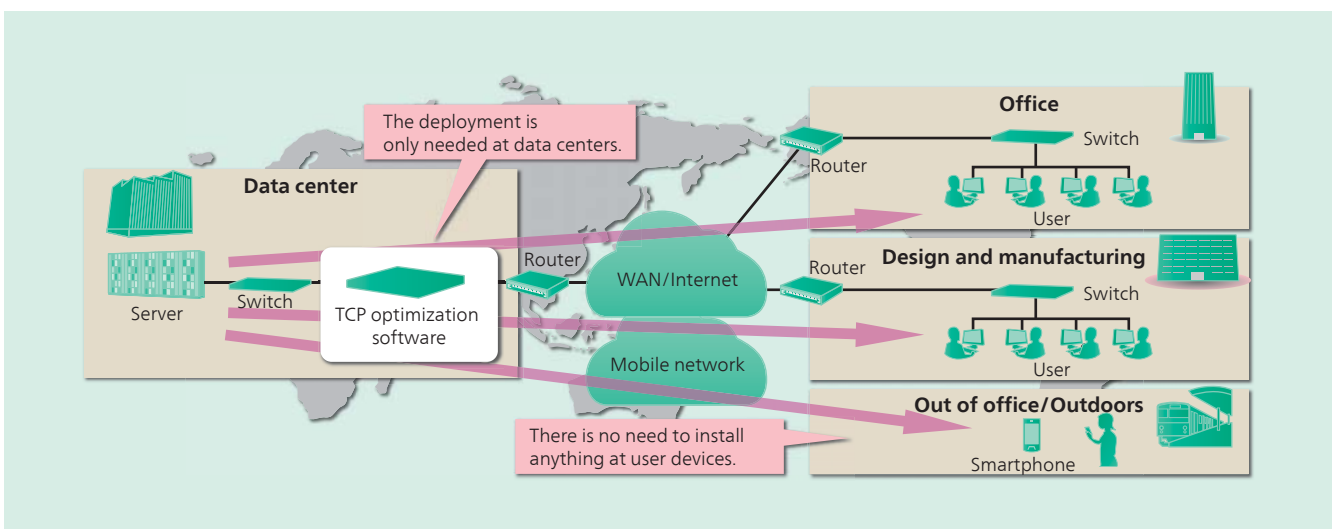
Hitachi will continue to provide wide range of solutions to improve global business efficiency and the productivity of companies.

* A packet is a small package of data used in communications between computers with control information such as the destination address. Packet loss occurs when data is lost within a network and fails to arrive at the destination.

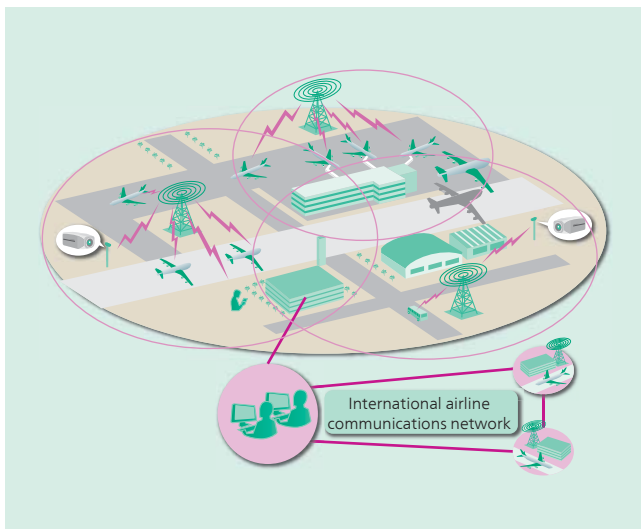
10 AeroMACS Technology for Next Generation Air Traffic Control Systems

Innovation in airport infrastructure is needed to cope with the rapid growth in demand for air travel that has accompanied the emergence of low-cost carriers (LCCs) since the turn of the century. The key to achieving this lies in air traffic control that can improve the safety and regularity of flight. The Aeronautical Mobile Airport Communication System (AeroMACS) is recognized for its potential as an airport surface data communication network technology for the next generation air traffic control systems that use mobile broadband to link the aircraft, support vehicles, and other equipment that operates on airport runways.

AeroMACS uses IEEE802.16e-compliant communications in accordance with a 2007 recommendation issued by the International Civil Aviation Organization (ICAO) of the United Nations. This provides communication speeds that are two or more orders



9 TCP optimization software



10 Airport runway using AeroMACS

of magnitude faster than the very-high-frequency (VHF) digital link (VDL) runway data communications used for air traffic control up to date. By enabling the provision and exchange of data such as weather or aircraft maintenance information and the development of highly efficient flight readiness services and visual monitoring data, it is possible to increase the frequency of takeoffs and landings while also improving safety and punctuality.

As well as being an active participant in the standardization of AeroMACS, Hitachi has embarked on prototype development in advance of the international standard being finalized and is involved in trials at public research institutes in North America and Japan. In the future, Hitachi intends to provide further support to encourage the adoption of this technology by countries and regions around the world.

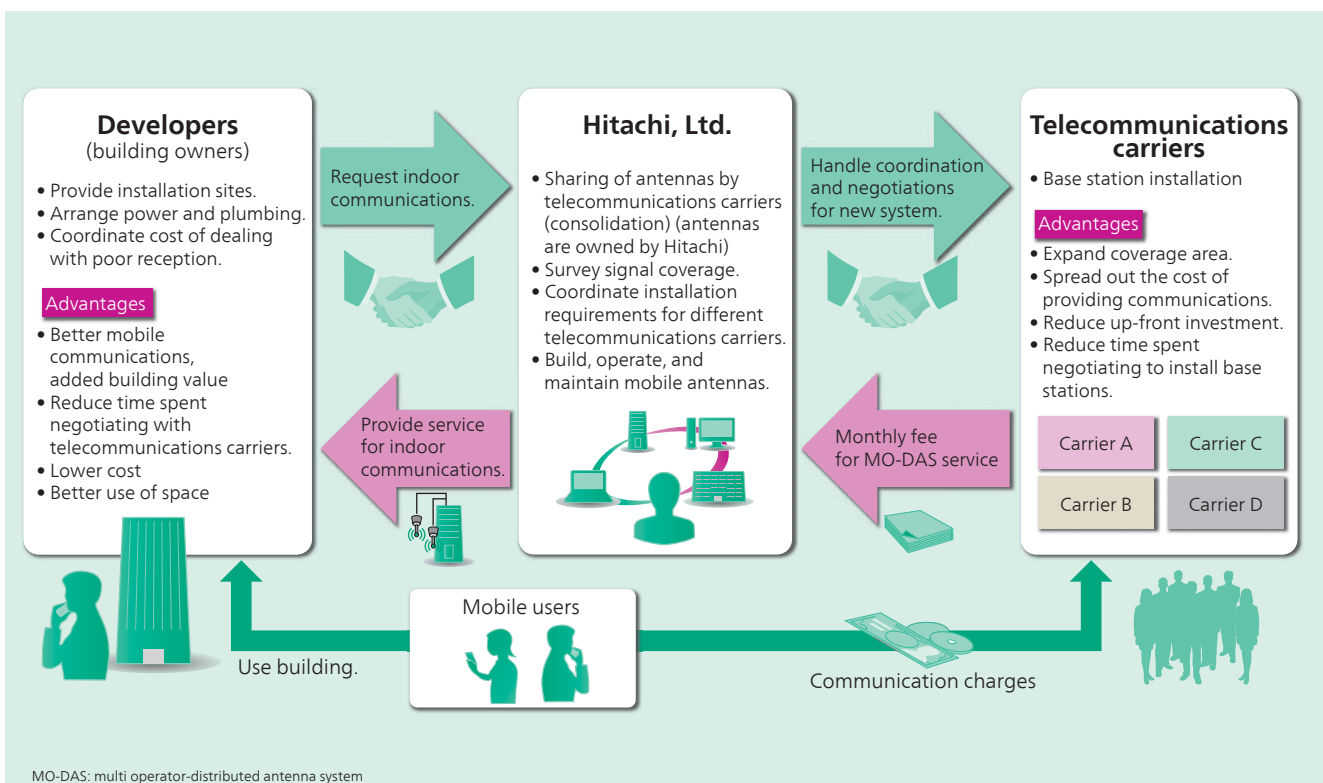
11 Indoor Mobile Antenna Sharing Solutions

The growing use of smart devices has highlighted the difficulty of establishing mobile phone connections and the associated problem of slow communications in indoor spaces such as shopping centers or office buildings. In response, Hitachi has launched indoor mobile antenna sharing solutions that can provide a reliable mobile communications environment without disrupting the operation of outdoor wireless base stations.

The main features of an indoor mobile antenna sharing solution are as follows.

- (1) Installation of a distributed antenna system owned by Hitachi that allows antenna sharing by different telecommunications carriers.
- (2) Adds value to buildings by facilitating the establishment of a high-quality mobile communications environment that supports bring your own device (BYOD) and other flexible working practices. The solution also saves space since Hitachi acts as a single point of contact for dealing with multiple telecommunications carriers.
- (3) Provides the telecommunications carrier with an efficient way to establish an indoor communications environment. Hitachi handles all of the complicated arrangements needed to achieve this, including the negotiation for obtaining base station and antenna sites, installation work, and monitoring (including 24-hour/365-day fault response).

In addition to its use of techniques for communication quality optimization and installation work design, Hitachi also intends to strengthen its relationships with property developers to expedite improvements in indoor radio transmission environments.



11 Indoor mobile antenna sharing solution