

Services & Platforms

1 Hitachi Cloud & DX Solutions Accelerating Customer DX

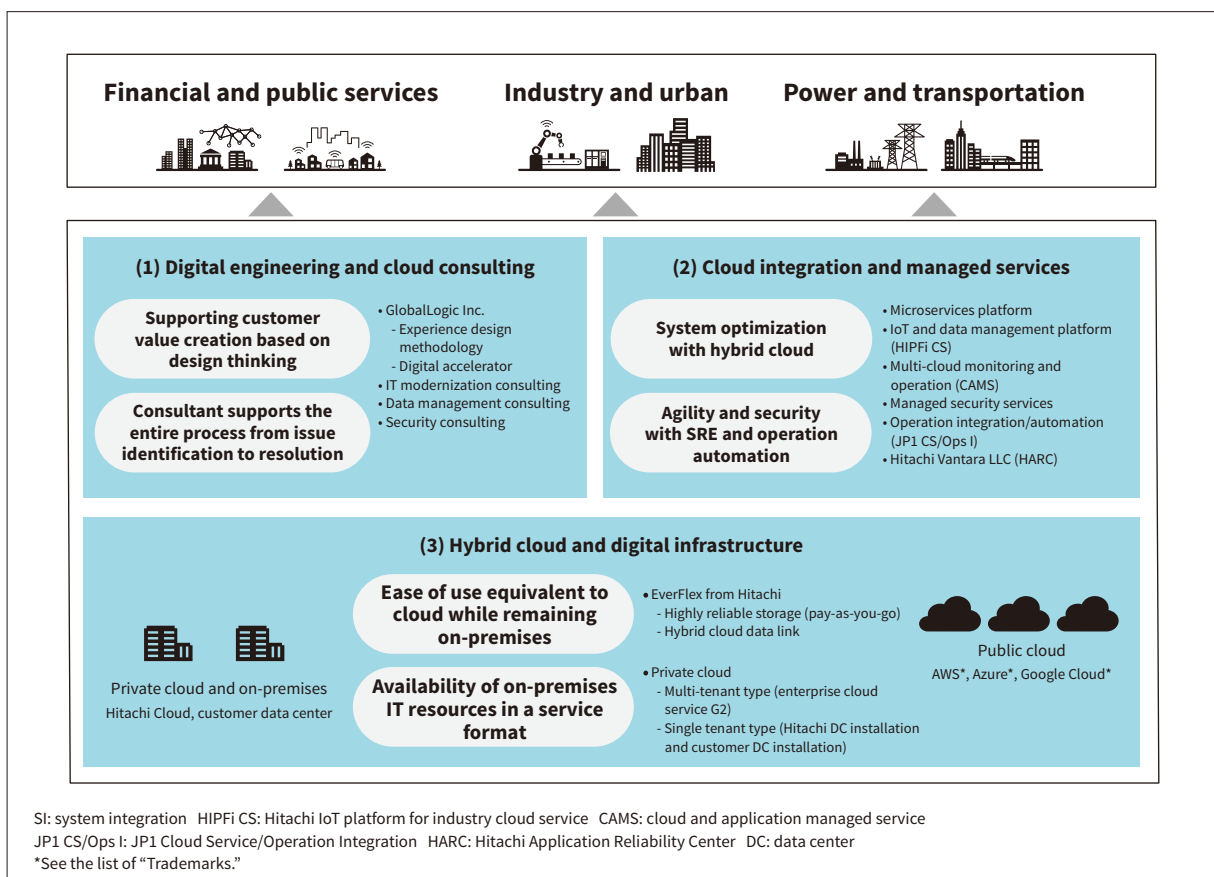
Many companies are engaged in digital transformation (DX) initiatives to cope with advances in digital technologies, the spread of COVID-19, and ever-increasing uncertainty. With a certain level of success in improving productivity by streamlining work, future challenges in this regard include an urgent call for the creation of new products and services to swiftly adapt to business environments, and for results from the fundamental transformation of business models.

To help accelerate customer DX efforts, Hitachi offers a full range of upstream and downstream services such as consulting to solve customer management issues, digitally driven business value creation, multi-cloud platform driven system integration, and operation, maintenance, and security tasks for constructed systems.

Hitachi solutions that support customer DX efforts are shown in the figure below. Services that support customer problem solving are provided from viewpoints (1) to (3), and continued support for customer DX promotion is provided through a combination of these services.

(1) Digital engineering and cloud consulting

GlobalLogic's proven design methodology facilitates business value creation using customer digital methods based on "design thinking." Designers that are masters in experience design methodology work with customers through the entire process from identifying issues to proposing solutions, while architects simultaneously formulate feasible development plans, providing end-to-end support in their realization. Additionally, a variety of consulting services are available to support modernization of existing systems for improving business agility, utilization of existing data buried in-house, and security measures for migration to the cloud.



1 Hitachi solutions supporting customer DX efforts

Hitachi provides a full range of support solutions from the formulation of grand designs for maximizing customers' business value with hybrid cloud services, to the proposal of action plans, and system construction and operation. This is offered through a collaborative effort between engineers with experience in building and operating social infrastructure systems and cloud vendor certified engineers, by utilizing on-premises and cloud solutions according to customers' specific requirements, designing system allocation plans, cloud migration methods, and cloud native development support.

(2) Cloud integration and managed services

Developing new services from scratch for each project results in long turnaround times when building cloud-driven systems. Hitachi has turned the knowhow it has gained from collaborative creation (co-creation) efforts with customers, cloud vendors, and partner companies into an asset that functions as a framework used to build highly reliable, highly secure cloud platforms in a short period of time, and to speed up customer IT modernization.

Additionally, cloud service operation and maintenance can result in a variety of issues such as unexpected high costs, unstable service, and the manifestation of security risks due to complex hybrid and multi-cloud platform operation. Hitachi solves such problems by offering operational services that are tailored to private cloud (on-premises) and public cloud platforms, eliminating silos through standardized operations, automated operation tailored to both IT operations and security operations, and advanced DevOps support through site reliability engineering (SRE).

(3) Digital infrastructure and hybrid cloud

Requirements of foundational services that support hybrid cloud platforms include ease of use equivalent to the cloud while remaining on-premises, and availability in a service format (pay-as-you-go) for on-premises storage, servers, and networks. EverFlex from Hitachi, seamlessly links on-premises Hitachi storage data and public cloud data for operation of applications without any awareness of where the data is stored. Because Hitachi's highly reliable IT resources such as storage, servers, and networks are available in a service format similar to a public cloud platform, customers can use these without any significant investment, on a pay-as-you-go basis.

Hitachi provides continuous support for customer DX efforts by first understanding the issues, studying solutions, then initiating a cycle that entails designing, implementing, operating, and maintaining cloud systems. Hitachi provides optimal support for customers through a

collaboration between GlobalLogic and Hitachi Vantara for expanded assistance on a global scale, and by working with various partner companies.

The Services and Platforms category introduces some of the features and use cases of services and initiatives that support customer DX efforts.

2 Nojima's DX Acceleration Empowered by GlobalLogic's Digital Engineering

Nojima Corporation announced a partnership with GlobalLogic Japan, Ltd. in June 2022. The collaboration intends to accelerate the development and implementation of Nojima's DX strategy.

The co-creation program focuses on the deployment of brand-new customer experiences that integrate GlobalLogic's digital engineering with Nojima's digitalization initiatives. The program targets accelerating the transformation of Nojima's brick-and-mortar stores, as well as its unique "consulting-based sales" approach for home appliance sales in Japan.

Currently, Nojima, GlobalLogic Japan, and Hitachi are promoting discussions to evolve the program to provide new customer experiences with better visibility throughout the partnership.

The program will support the consolidation of Nojima's DX initiatives to reinforce its "inspiring services." Program objectives may include developing initiatives to improve customer satisfaction; constructing a platform using digital engineering technology; and developing applications that strengthen the connection to end users.



2 Interview during store visit

3 GlobalLogic to Expand the Digital Engineering Footprint

GlobalLogic is strongly expanding its digital engineering footprint through the opening of new offices and acquisitions across the globe. In addition to the inauguration of new engineering centers in Mexico in 2022, GlobalLogic announced plans to open new engineering centers across Spain in 2023, and this announcement was made at a meeting between the Spanish Prime Minister Pedro Sánchez and GlobalLogic President and CEO Nitesh Banga. GlobalLogic also signed an agreement to acquire Fortech, a leading Romanian engineering company, in November 2022 and Hexacta, a Latin American company headquartered in Uruguay, in January 2023.

With 28,000 employees at locations in 16 countries as of the end of December 2022, GlobalLogic is a leading digital engineering company that supports digitalization efforts at over 500 companies. The expansion of GlobalLogic's footprint in Latin America and Europe is part of the company's strategy to meet the growing global demand for DX, which is expected to increase further in the future. For Hitachi, which aims to achieve the top global position in the DX market in its 2024 Mid-Term Management Plan, the expansion of GlobalLogic is positioned as a growth investment to strengthen its business by leveraging IT, operational technology (OT), and products, and to make a leap forward in Lumada business.

GlobalLogic will continue to provide better services to its customers by accelerating to expand its access to the strong digital talent base spread around the world.

4 Microservices Platform Fusing GlobalLogic and Hitachi Know-how

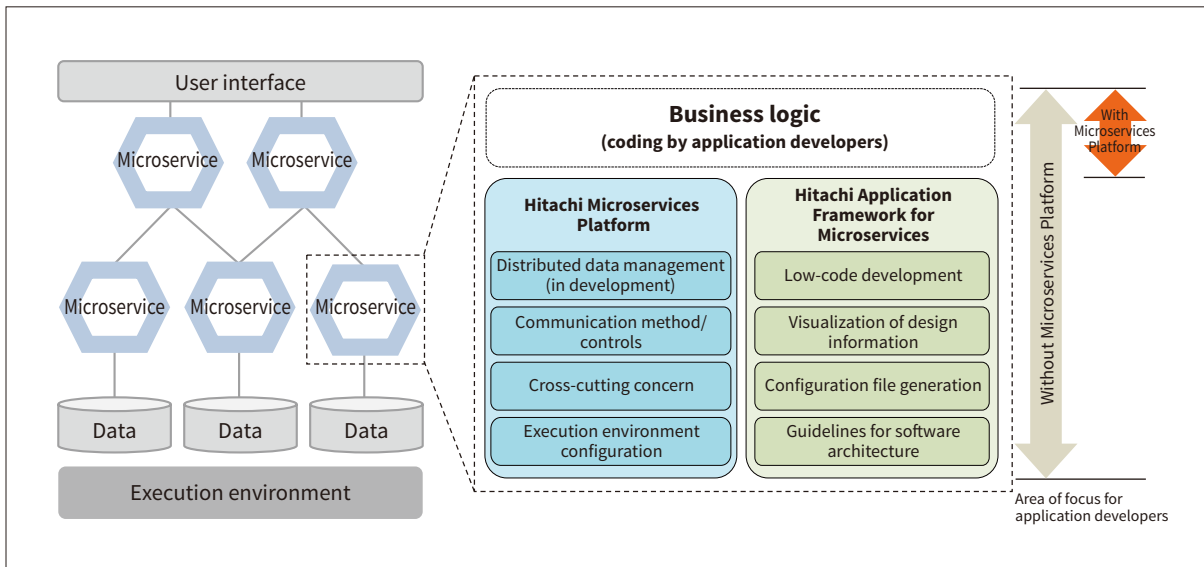
Microservices architecture is one approach to quickly realizing DX-led business transformation. This architecture divides the overall system into multiple, loosely coupled services and connects each one through communication to enable speedy system improvements and easy scale-out according to the processing volume.

Hitachi now offers the Hitachi Microservices Platform for use in Japan, an enhanced version of the Microservices Accelerator from GlobalLogic, the experts in cloud-driven development, and the Hitachi Application Framework for Microservices, a development tool that supports microservices applications in large-scale projects. This platform combines various common components developed based on GlobalLogic's development know-how and Hitachi's distributed data management technologies, design, and development know-how cultivated in Japan.

Utilizing this platform vastly simplifies the development of common functionalities in microservices, which are difficult to implement, allowing engineers to focus on business logic, which is the true value of the system, resulting in speedy, high-quality development. With this platform at the core, Hitachi supports system modernization at corporations engaging in enterprise-level agility improvement.



3 A meeting between GlobalLogic President and CEO Nitesh Banga (left) and the Spanish prime minister (The plan to open engineering centers in Spain was officially announced there.)



4 Overview of microservices platform

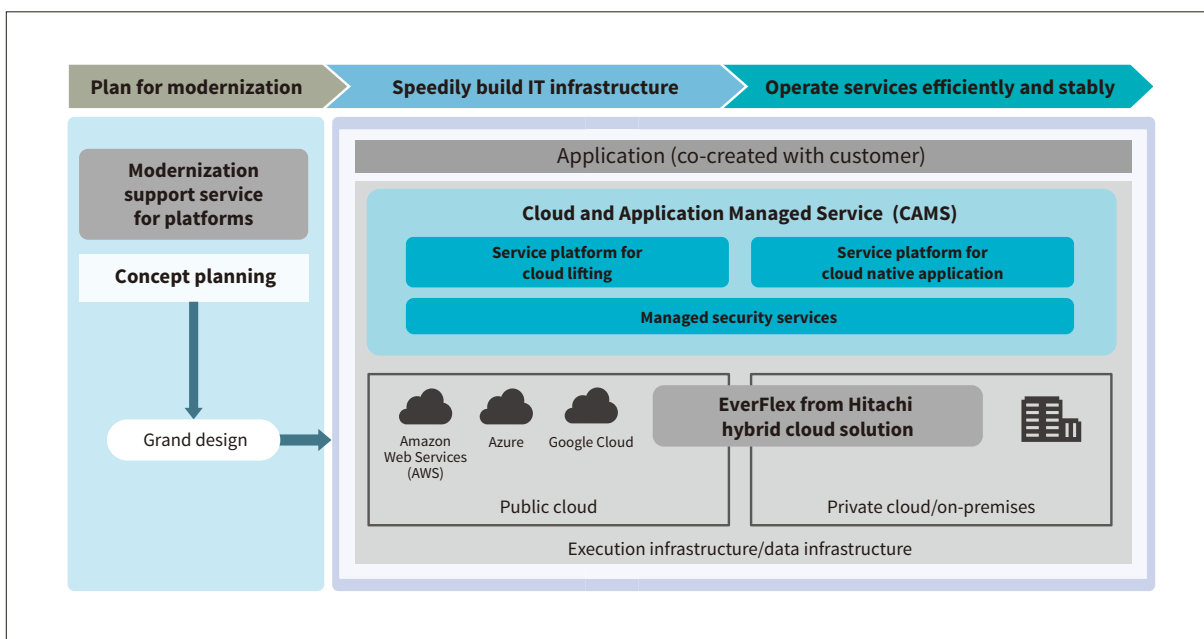
5 IT Platforms and Operation Enhancement Offerings to Accelerate the Modernization of IT Platform

This offering is a one-stop service covering everything from consulting to design, construction, and operation in IT infrastructure modernization tasks based on the best practices Hitachi has cultivated over the years in the construction and operation of both public cloud and mission-critical systems.

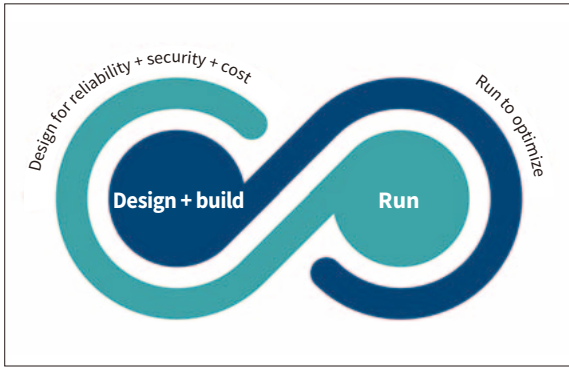
Consultants with a wealth of experience work together with highly-skilled engineers to craft a grand design covering concepts, overall policies, and promotional programs to modernize IT infrastructure from the

viewpoint of management strategy, human resources, and IT. Additionally, Hitachi supports asset utilization SI via service platform usage and advanced operations including security environments with its cloud and application managed service, which delivers comprehensive managed services for IT infrastructure in multi-cloud environments. Furthermore, this offering supports gradual operational automation using advanced artificial intelligence (AI) and coding technologies for continuous operational streamlining.

These services help with strategic modernization of IT infrastructure and contribute to improved customer business agility and the promotion of DX.



5 Overview of the IT platforms and operation enhancement offerings



6 Engineering-led operations to extend Dev and Ops integration

6 Hitachi Application Reliability Centers

The cloud is accelerating data-driven innovation and business agility, but capturing the full business value from the cloud has been a challenge. The complexity of today's hybrid and multi-cloud operating models is contributing to unexpected costs, outages, and compliance and security risks.

Hitachi Application Reliability Centers (HARC) is Hitachi Vantara's comprehensive integrated portfolio of cloud professional and managed services offering. HARC brings together best-in-class tools, frameworks, and automation with access to cloud experts to co-create customers' cloud transformation journeys and deliver the

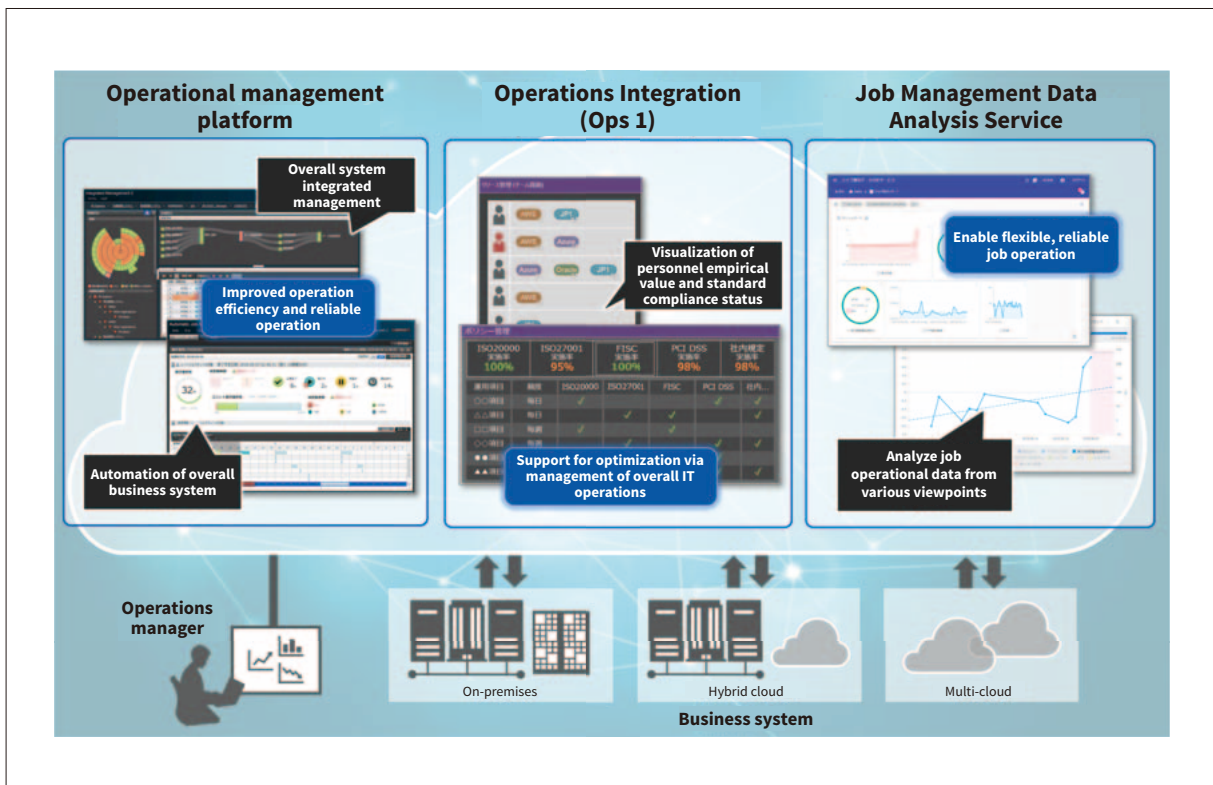
most advanced cloud workload operations management and support. HARC consists of geographically dispersed physical and virtual centers of excellence where cloud applications are monitored and optimized by its professional engineers to ensure client-defined key performance indicators (KPIs) are consistently achieved. Each site brings together best-in-class frameworks, design patterns, automated tools, and people to deliver SRE as-a-service and 24-hour/365 cloud management and operations.

The result* is significant improvements in application availability with up to 25%* improvement in the time it takes to detect and recover from faults, and 15%* improvement in change failure rate. Working with HARC, customers achieved a 35%* reduction in the ongoing cost of operations, 60%* reduction in business risk, 30%* improvement in their productivity, and 360-degree observability of their cloud assets.

*The improvement rates presented here are based on specific cases, not applicable to every application. The effectiveness of adopting HARC varies on a case-by-case basis. Results may vary depending on the customer's use-case.

7 JP1 Cloud Service for System Operational Efficiency and Reliable Operation

JP1 Cloud Service is a software as a service (SaaS) that integrates IT systems and operations on one platform. It



7 JP1 Cloud Service for system operational efficiency and reliable operation

aims to achieve IT operations that do not rely on human intervention by automating business operations on complex, diversified systems in hybrid cloud and multi-cloud environments, cohesively managing various types of data, relevance, and knowledge for standardization of overall operations. The features of the service are as follows.

(1) Operations Integration (Ops I)

By integrating IT operations that have been siloed by system, standardizing overall operational tasks across systems, and managing overall operations by facilitating the sharing of operational personnel, both efficiency improvements and quality assurance can be achieved overall for continuously evolving systems.

(2) Operational management platform

Job management that automatically executes operations in on-premises and multi-cloud solutions according to plan, and integrated management with bird's-eye-view monitoring of the overall system, achieves increased operational efficiency and reliable operation.

(3) Job Management Data Analysis Service

Automatically collecting, accumulating, analyzing, and evaluating job operation data, visualizing the health and maintainability of job operations facilitates improvements to achieve flexible and reliable job operations.

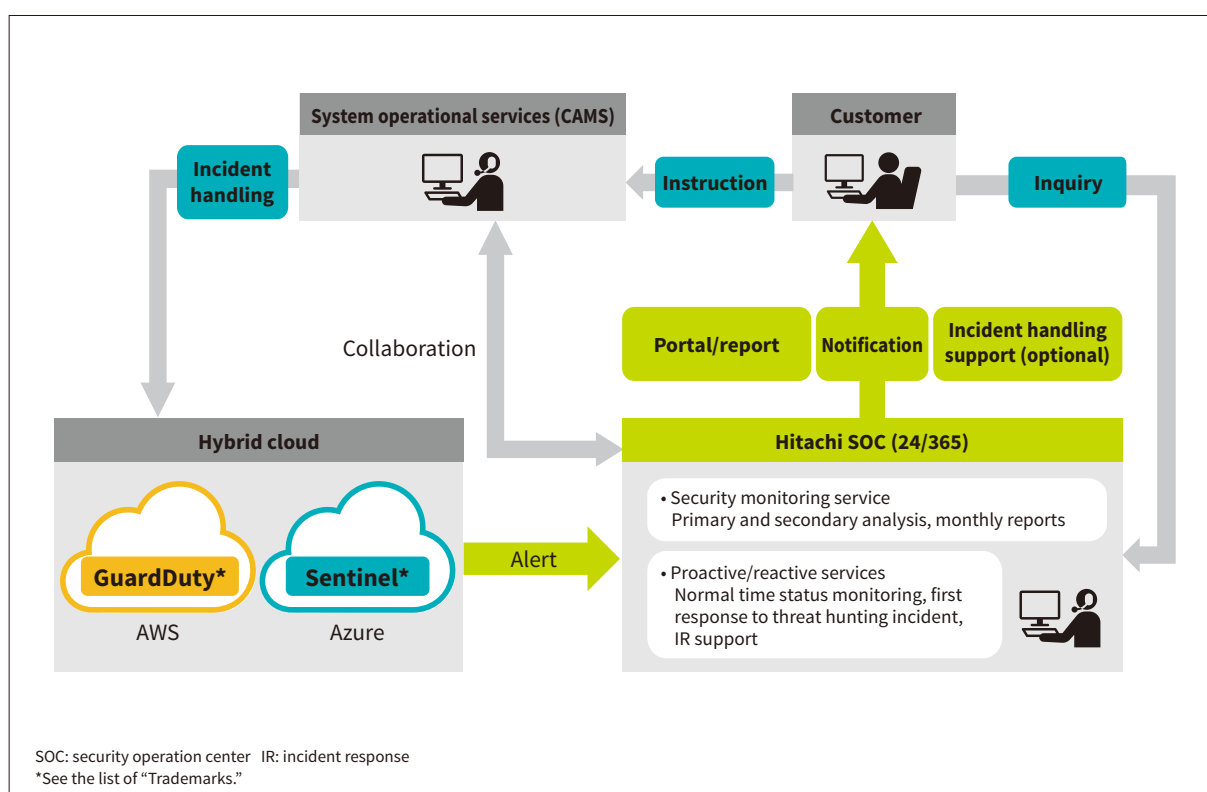
These features enable integrated IT system and operation management.

8 Outlook for Hitachi MSS

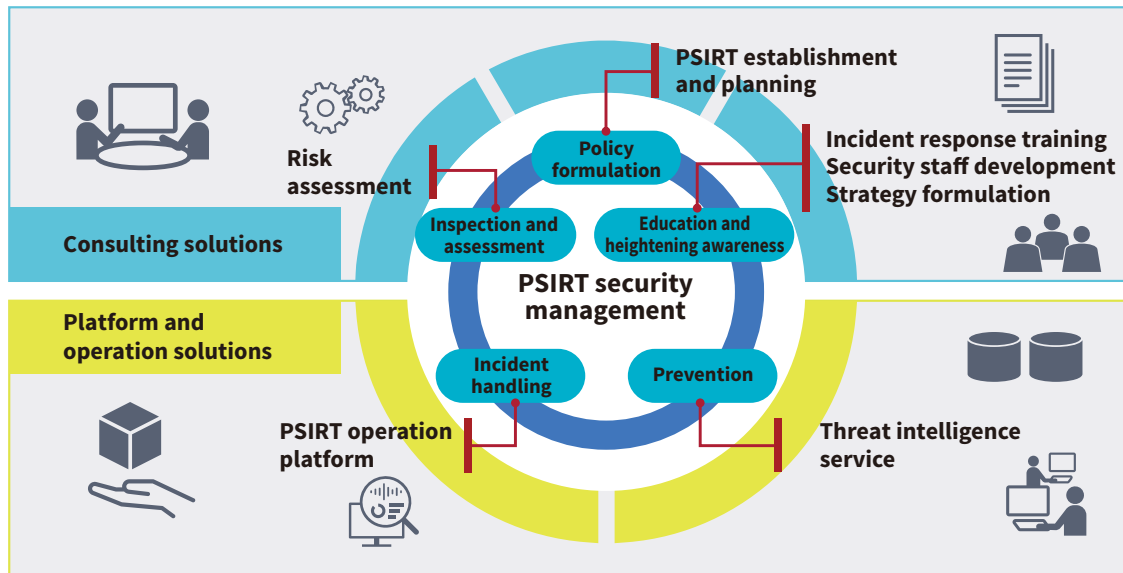
With security measures growing ever more important due to increasing cyberattacks, cloud lift and shift (L&S), and tightening regulations, Hitachi launched hybrid cloud and Zero Trust-network-compatible managed security services (MSS) and began offering them in December 2022. Based on Hitachi's track record of service to over 150 companies and over 20 years of operation services, MSS offers high-quality security monitoring and analysis services by analyzing the latest attack and threat information, in-house incident information, and implementing it in detection rules, all.

The services provide not only conventional security monitoring, but also an integrated security operation cycle support menu (proactive/reactive services) that covers all situations from normal operation to emergencies, helping lighten customers' workloads.

Additionally, MSS can be coordinated with the cloud and application managed service, the comprehensive managed service for IT infrastructure mentioned earlier, contributing to faster incident handling, and minimizing the area of impact through comprehensive monitoring analysis. Even customers without sufficient security personnel that are well versed in cloud solutions can feel safe and secure in their multi-cloud operations.



8 Overview of managed security services



PSIRT: product security incident response team

9 Hitachi PSIRT solution

9 PSIRT Security Solutions Bolstering Security Management

With the growth in Internet-connected home appliances and connected cars, comes increased cyberattacks on Internet of Things (IoT) devices using open-source code and other technologies. Furthermore, compliance with global security regulations to ensure product and service security is called for, with strong demands on companies to develop frameworks for investigating and dealing with security incidents and with vulnerabilities in their own products and services, and promptly disclosing information on such.

With a proven track record in providing solutions as an IT vendor and utilizing its knowledge in building security organizations and managing governance as a manufacturer, Hitachi offers PSIRT solutions helping customers bolster security risk management across the entire product life cycle from development to manufacturing, and introduction to the market, as well as the supply chain.

This solution consists of a one-stop consulting solution to support PSIRT management to strengthen governance in customer companies and a platform and operation solution that delivers a framework for threat and vulnerability information analysis and centralized management and rapid incident handling, and eliminates personnel-dependent factors.

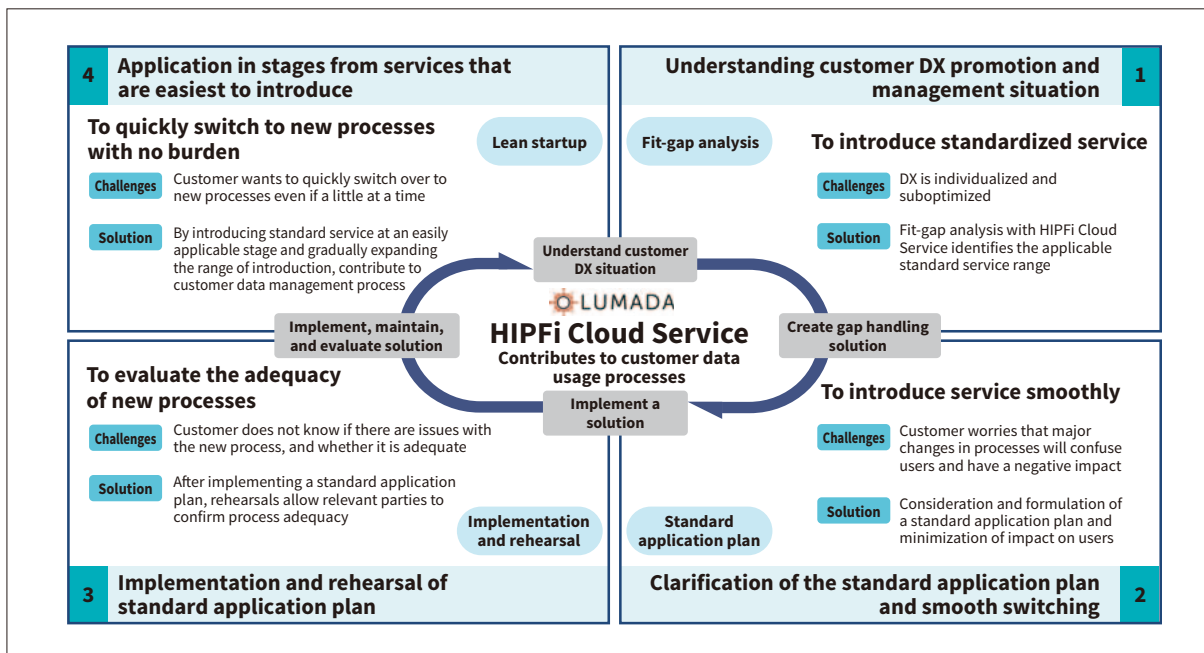
10 HIPFi Cloud Service Facilitates Customer Resource Shifting and DX

Together with Hitachi Construction Machinery Co., Ltd., Hitachi, Ltd. began offering support for construction machinery maintenance service (Global e-Service) in 2012, collaborating on the IT aspects in this endeavor.

HIPFi cloud service* was proposed and adopted in 2022 as part of Lumada solutions to enable business process reengineering and to support the development of its platform. This solution was adopted because various customer business operations such as data management required for DX promotion were included in the HIPFi Cloud Service menu, allowing Hitachi to offer total services without any preparation on the part of the customer, and because it provided a cost advantage over handling the task on its own.

To introduce HIPFi Cloud Service, the scope of services provided was gradually expanded by a repetitive process of (1) fit-gap analysis of customer desires with the HIPFi Cloud Service, (2) application planning for smoothly introducing the service to fill the gap, (3) implementing and rehearsing the application plan, and (4) launching the service. By offering the services in stages, the impact on operational business and users was successfully minimized, resulting in safe and secure introduction of the HIPFi Cloud Service.

* See "Hitachi IoT Platform for industry Cloud Service," *Connective Industries: Industrial Digital Solutions No. 5* (p. 74 of this issue)



10 HIPFi cloud service introduction methodology

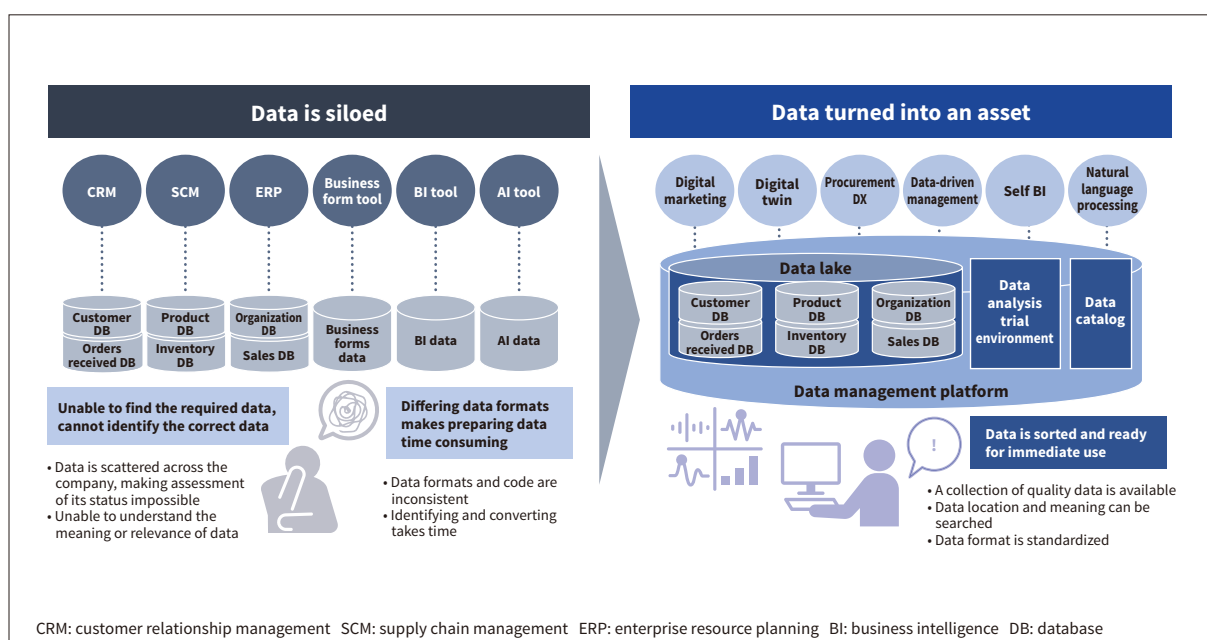
11 Data Management Services Using Scattered Data as Resources to Build a Management and Operation Platform

Lately, data management platforms that manage data as a resource are in demand as a way for companies to use their data. Construction of a data management platform is a particularly urgent need in promoting DX.

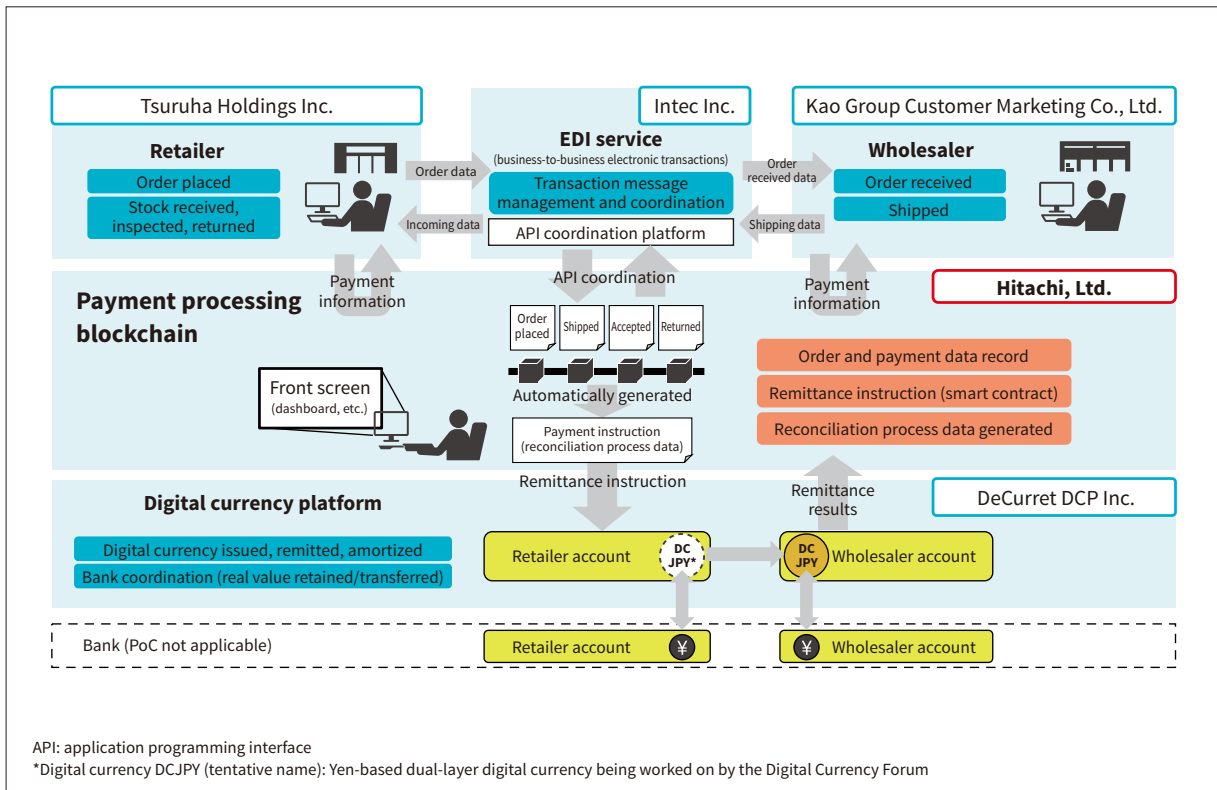
Existing business systems are built according to organization, business, and purpose, resulting in data silos that are optimized individually. This results in various issues when beginning DX efforts, such as the inability to

find the desired data, the inability to identify the correct data, and the time required to prepare data that exists in various formats.

To resolve such problems, Hitachi builds data lakes for storing a variety of data and prepares data catalogs that show where specific data is stored. Also, providing a data analysis trial environment that enables data management allows Hitachi to support the construction of data management environments for immediate data utilization, from planning to design, construction, operation, and maintenance.



11 Turning data silos into data assets



12 Overview of PoC

12 Proof of Concept Using Digital Currency in the Distribution Supply Chain

Together with sponsoring companies from the Digital Currency Forum Retail and Distribution Subcommittee, on June 2022 Hitachi conducted a proof of concept (PoC) about an integrated commercial and currency flow that completes the entire supply chain process between retailers and wholesalers, from ordering to payment, digitally.

In the retail and distribution industries, the transfer-of-funds cycle is long due to commercial practices, resulting in various issues such as delays in receiving payments the further along in the chain a supplier is, and the necessity of human intervention to perform payment confirmation despite the prevalence of electronic data interchange (EDI). In the PoC, EDI data in the distribution business message standards (BMS) used in business-to-business transactions were stored in the blockchain in near real time, resulting in automatic payment using digital currency immediately after receiving the acknowledgment data.

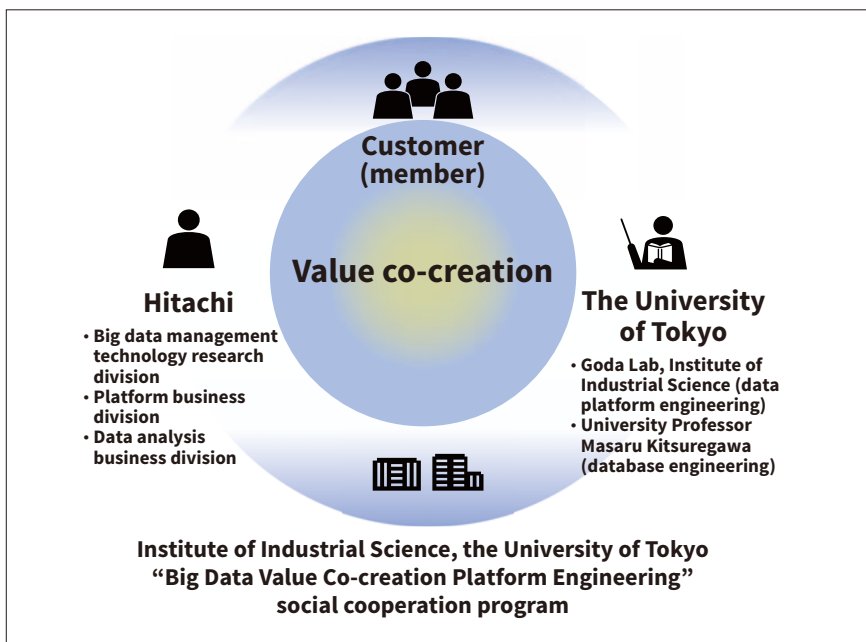
The PoC was successful in shortening the transfer of funds and reducing the number of steps in the process by linking transaction information and payment information through digital currency in the payment process. The beneficial characteristics of blockchain, such as authenticity, transparency, and automatic processing, add value

to business-to-business transactions, showing promise in new commercial possibilities in view of the coming Web 3.0 era.

13 UTokyo-IIS and Hitachi Set up “Big Data Value Co-creation Platform Engineering” Social Cooperation Program

Expectations for using data as a source of value for corporations and society is on the rise. The realization of digital innovation that creates value from onsite and business data is an urgent issue for sustainable growth in customer business. Toward achieving a sustainable society for happy and affluent life, Hitachi has promoted a digital solutions business called “Lumada” with its customers and partners; the aim is to create value from data by exploiting advanced digital technology, such as artificial intelligence.

Starting in 2021, Hitachi and the Institute of Industrial Science, the University of Tokyo (UTokyo-IIS) jointly launched the Value Co-creation Program Utilizing Big Data to promote co-creation initiatives in partnership with companies and organizations working with big data. In April 2022, they set up the “Big Data Value Co-creation Platform Engineering” social cooperation program* with the aim of establishing powerful data



13 Value Co-creation Program Utilizing Big Data

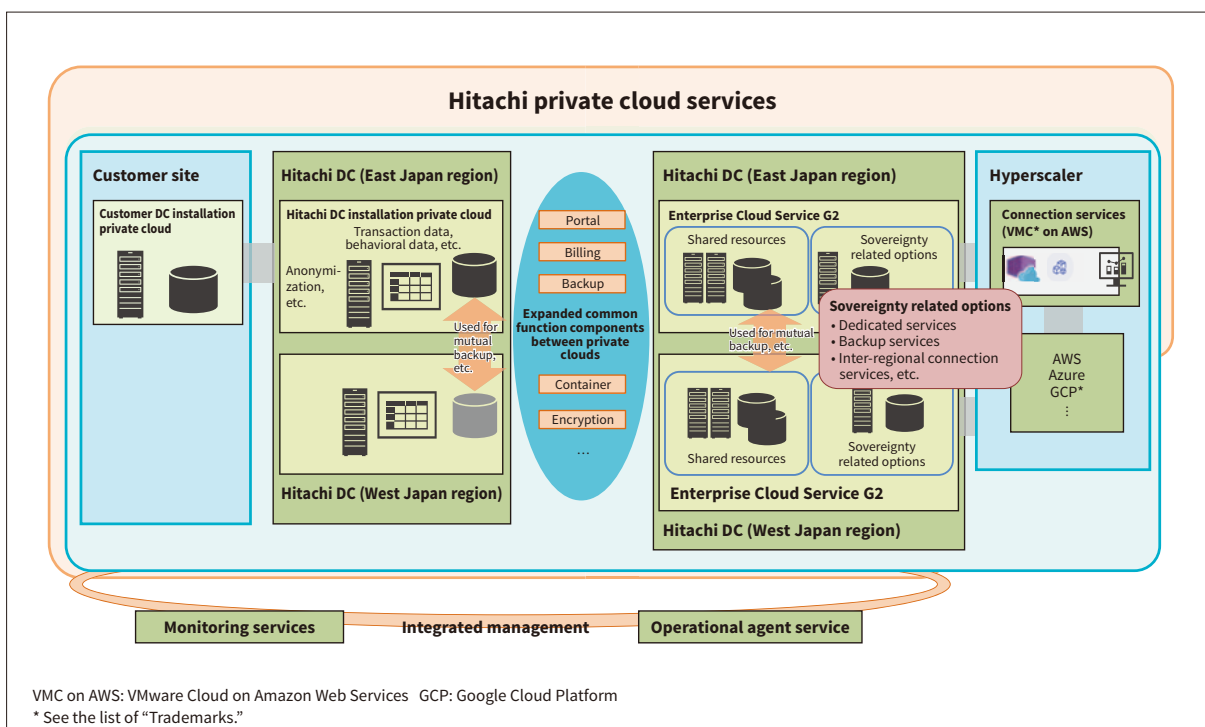
platform technology that allows in-depth analysis of the large-scale data being generated globally.

UTokyo-IIS and Hitachi will continue to promote value co-creation with industry and other stakeholders and offer solutions that accelerate digital innovation through IT, OT, and products.

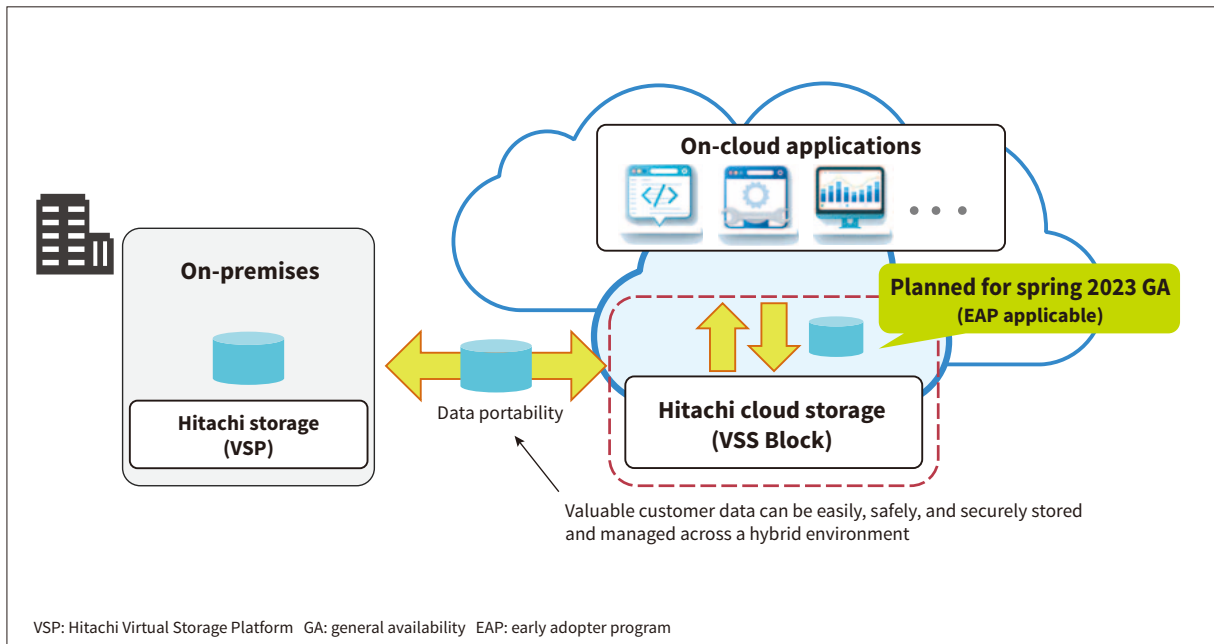
* A research division established to enable the University of Tokyo and private institutions to engage in joint research on common issues with a high level of public interest.

14 Hitachi Private Cloud – For Better Customer Convenience

With conventionally stable operation and carryover of past assets, expectations for private clouds are shifting to multi-cloud and hybrid cloud configurations, ushering in a new era. Hitachi views such changes as an opportunity and is attempting to transform its conventional private cloud offerings to deliver options that provide better customer convenience.



14 Hitachi private cloud services



15 Hybrid cloud use with Hitachi storage

Until now, Hitachi has offered Enterprise Cloud Service G2 capable of handling data that requires sovereignty using dedicated services while remaining a multi-tenant service, single tenant private cloud solutions installed at a Hitachi data center, and private cloud solutions installed at the customer's data center. Such cloud services are conventionally operated and managed individually, however, integration of a portal for common functions, billing, monitoring, and operational services can improve customer convenience. Hitachi also believes that providing transparent services such as countermeasures and reporting during failures will allow private cloud use that provides better customer convenience.

Reference: International Data Corporation (IDC), "Japan Private Cloud Forecast, 2022–2026" (Nov. 2022), #JPE47882322

15 Early Adopter Program Delivers Advance Access to Highly Reliable Hitachi Cloud Storage

In recent years, more customers are considering hybrid cloud solutions that utilize cloud and on-premises features to place the workload and data in the right place at the right time.

In co-creation efforts with Amazon Web Services (AWS), Hitachi developed Hitachi Virtual Storage Software Block (VSS Block), using in-house know-how on proven mission-critical systems expanded to the cloud. Hitachi's original data protection technologies and a strong support framework driven by Hitachi and AWS

enables safe, secure data management of key systems in the cloud. The early adopter program* was launched to allow customers to experience it through operation verification ahead of the official spring 2023 release in the Japanese market.

Hitachi plans to improve usability further and provide optimal hybrid cloud environments to customers by strengthening on-premises software and data collaboration and by expanding collaboration between databases and containers.

* A program that allows customers to connect to the application and verify operation by using actual data before the official release.

16 Global Evaluation of Hitachi Storage that Supports EverFlex from Hitachi

With accelerating use of data in recent years, Hitachi storage has supported developments in customer digital business through various unique technologies based on the EverFlex from Hitachi data platform, a hybrid cloud solution. Storage virtualization, a typical example of unique Hitachi technology, enables transparent data management and operations on multiple systems, including the cloud. Also, data compression processing performance improvement technology^{*1} maintains high-speed data access, delivering efficient management of the ever-increasing amount of company data while contributing to reduced environmental impact.

Hitachi provides such storage solutions globally. And the 2022 Gartner^{*2} Magic Quadrant^{*2} for Primary

Storage^{*3} (hereinafter, research) issued by Gartner, Inc. has recognized US subsidiary Hitachi Vantara as a Leader for four years running. In 2022 Gartner Critical Capabilities for Primary Storage^{*4}, a supplementary report issued along with the research, Hitachi Virtual Storage Platform (VSP) 5600 was ranked second out of five use cases.

*1 “Hitachi’s storage patent (Japanese Patent JP6802209), Compressed Data Write-processing Switching Method, won the Japan Patent Office Commissioner’s Award at the Kanto Local Commendation for Invention” in Japanese (Nov. 2022), <https://www.hitachi.co.jp/products/it/storage-solutions/pressroom/award/chiatsu2022/index.html>

*2 See the list of “Trademarks.”

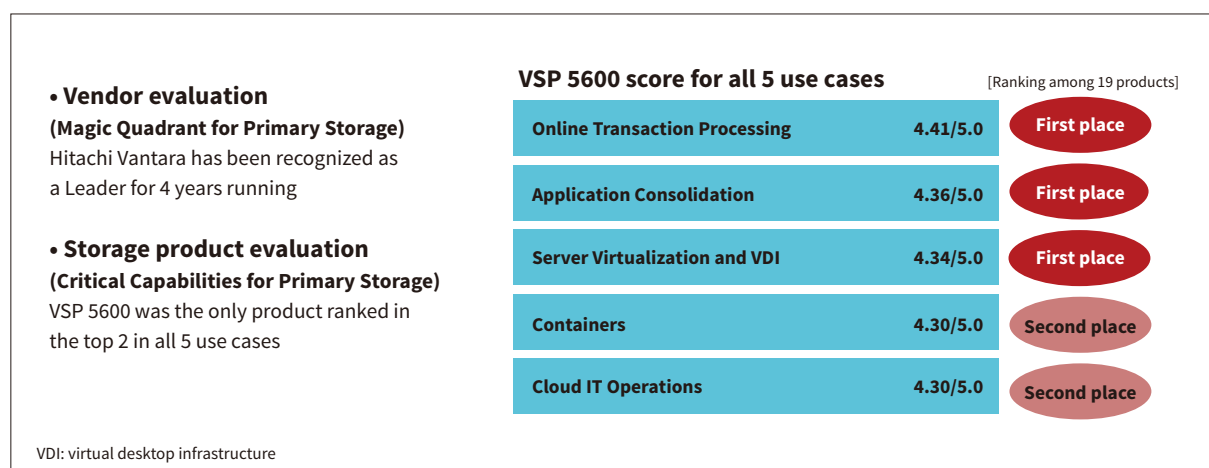
*3 Jeff Vogel et al., “Magic Quadrant for Primary Storage,” Gartner (Oct. 17, 2022)

*4 Jeff Vogel et al., “Critical Capabilities for Primary Storage,” Gartner (Oct. 17, 2022)

*5 Chart created by Hitachi based on Gartner research.

*6 Gartner disclaimer

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16 Global evaluation of Hitachi storage by Gartner, Inc.^{*5}