Toward Human-oriented Office

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OVERVIEW: It is indispensable to make offices more human-oriented and improve intellectual productivity in order to provide for a future knowledge creating society. The requirements placed on IT systems have been changing from improving the efficiency of routine operations to support for non-routine and value added operations, and IT systems are required to provide office workers with an easier working environment with advanced functions that support knowledge creating activities while satisfying basic requirements such as reliable operation and flexibility and boundary conditions such as compliance and security. Hitachi aims to meet these needs with a platform system based on the concept of "Harmonious Computing" and secure office solutions as well as drastically improving the knowledge creativity of office workers by using the "KaaS model" to transform huge volumes of data into knowledge.

INTRODUCTION

OFFICE workers make up the majority of the working population and the office is a place where output is created through intellectual work and is where these office workers spend their working hours, and therefore most of their working life. Higher intellectual productivity in the office should allow organizations to create higher quality added value in a sustainable way and contribute to social development and the self-fulfillment of the workers. Using IT (information technology) to make offices more human-oriented in order to transform the office into a place of high intellectual productivity that is safe, secure, and easy for workers to go about their
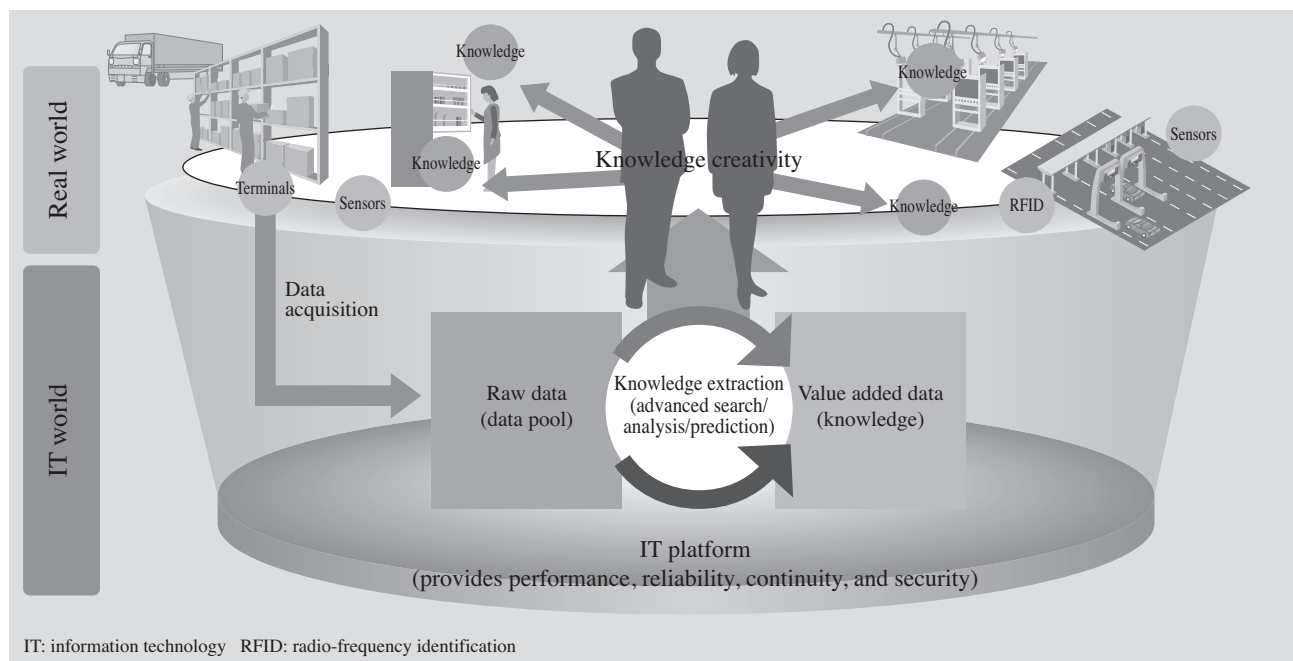

IT: information technology   RFID: radio-frequency identification

Fig. 1—IT Configuration Supporting Human-orientated Offices.
High-level support for improving the productivity of intellectual tasks can be provided by analyzing real-world data acquired from terminals and sensors on highly reliable and flexible IT platforms and then feeding the knowledge so obtained back to office workers.

work is a major challenge for Hitachi in its aim of realizing a knowledge creating society.

The following perspectives are believed to be important for future IT systems if they are to make offices more human-oriented.

(1) Core contemporary requirements for carrying out office work such as performance, reliability, continuity, and environmental performance should be incorporated into systems and achieved without increasing the burden on office workers and IT managers

(2) Provision of a working environment that places few restrictions on time or location while also satisfying security and compliance requirements to create an easier working environment for office workers and provide them with a proper work-life balance

(3) Support for an intrinsic improvement in the intellectual productivity of office workers by providing advanced functions that support knowledge creating activities such as data acquisition and the accumulation, sharing, and analysis of knowledge

This article outlines the product development and research being undertaken by Hitachi to meet these requirements and gives some examples of how these technologies are being applied (see Fig. 1).

CHANGING IT NEEDS

IT platforms for supporting office workers have in the past been designed and introduced with an emphasis on improving the efficiency of routine operations and lowering costs. Although such needs will continue to exist in the future, their value is decreasing as IT becomes commoditized and more universal. What is needed instead if we are to realize a knowledge creating society are qualitative contributions to non-routine and value added tasks.

(1) From ownership to utilization

Rather than owning an IT system that can be configured in our own way, routine operations will be performed using standardized external services in the form of SaaS (software as a service) or the operations themselves outsourced to an external agency.

(2) From greater efficiency to higher added value

The trend to the strategic direction of IT investment toward fields in which the organization can further expand its competencies or create new services or businesses is strengthening (see Fig. 2).
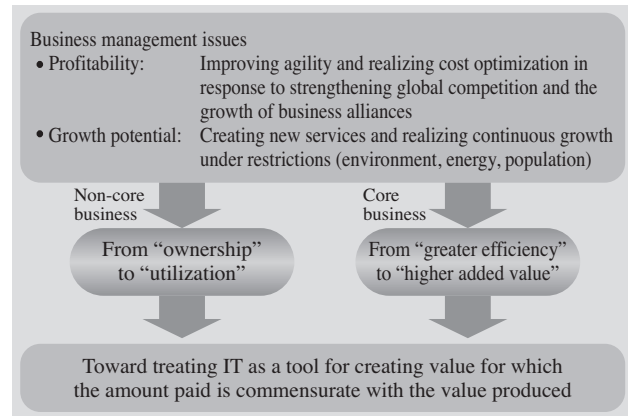

Fig. 2—Changing IT Needs.
In order to improve profitability and growth potential within finite limitations, the need for a shift from ownership to utilization and to achieve greater added value through the use of IT will expand.

IT PLATFORM SUPPORTS KNOWLEDGE CREATION
Securing Flexibility and Scalability

Future IT platforms will need to incorporate the flexibility and scalability to grow in step with the increasing sophistication of the tasks being undertaken in order to handle the greater complexity and volume of data, information, and knowledge.

Hitachi has for some time promoted the concept of "Harmonious Computing"[1] and is working on the development and commercialization of IT platforms that can adapt to changes as they occur. In recent times in particular, it has become possible to provide high quality IT solutions that do not increase the
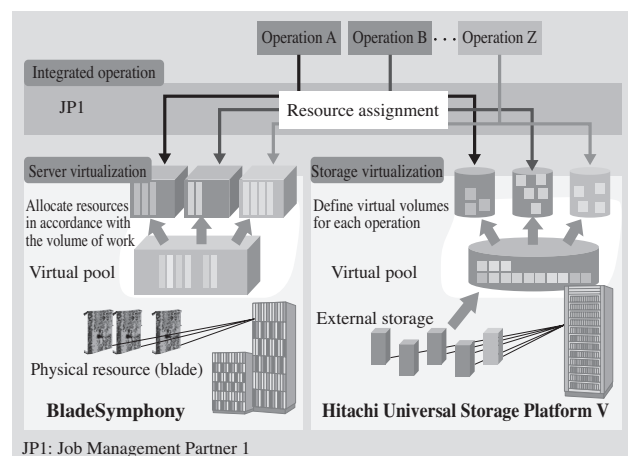

Fig. 3—Obtaining Flexibility through Harmonious Computing.
IT management middleware makes extensive use of storage and server virtualization mechanism to implement functions such as those for reducing power consumption and coping with variations in load.

burden placed on IT managers by making extensive use of the advanced virtualization mechanisms provided by the IT management middleware in IT equipment to incorporate features such as scale out support to react to rapid changes in IT loads, optimization of resource usage, and power saving functionality that minimizes power consumption without compromising performance (see Fig. 3).

Securing Continuity and Sustainability

Along with the high reliability of individual products and functions such as the N+1 cold standby feature of "BladeSymphony" and the remote copy and disaster recovery capabilities of "Hitachi Universal Storage Platform V," Harmonious Computing products provide systematic business operation continuity and reliability at the platform level. The continuity of business operation provided by these systems is becoming increasingly important as a core function for supporting office work in the future.

SECURE OFFICE SOLUTIONS

Work is underway on developing secure office solutions that minimize restrictions on time and location while satisfying requirements such as security and compliance with the aim of establishing an IT environment that boosts office worker productivity[2].

Security PCs and Client Blades

The key concept behind a secure office solution is "significantly reduce information leaks and security incidents unless data is taken outside the system." In making this a reality, Hitachi has developed architecture that consists of three core components. These are (1) disk-less SPCs (security personal computers) that do not contain any hard disks or other storage devices, (2) CBs (client blades) that integrate the main PC functions in a compact blade unit and allow information to be stored centrally at a data center, and (3) key style security devices that store each office worker's identification information and personal profiles and allow reliable authentication and connection between SPCs and CBs [see Fig. 4(a)].

A high level of security can be ensured by having workers use SPCs which allow them to perform their office work anytime and anywhere but always store the results of this work at the center. Because connection information and personal profiles are
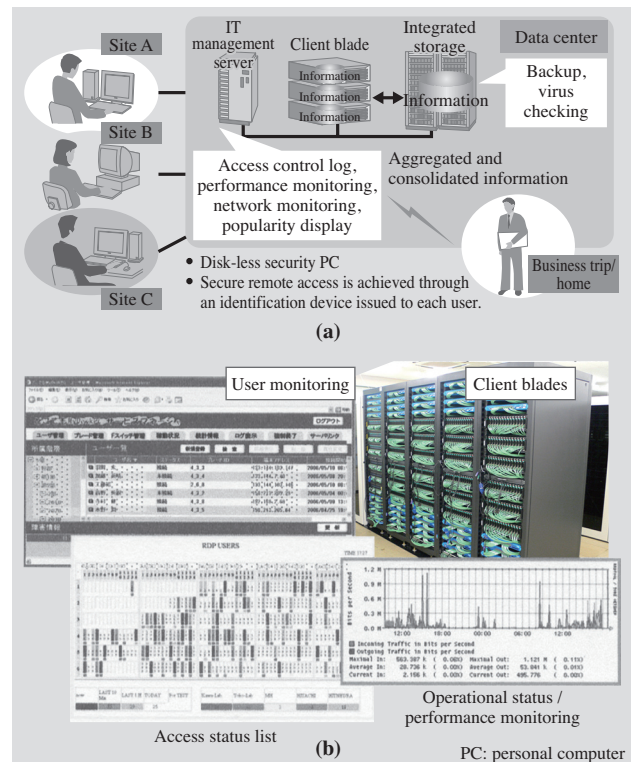

Fig. 4—Secure Office Solution.
A secure and highly flexible office environment can be provided using a combination of disk-less client PCs and client blade machines located at the data center.

stored in the key style security device, workers only need to carry this device with them to be able to continue their work in the same computing environment even if they are in another office or outside the company.

IT Management System

Storing the personal PC environment for each user at the center provides more integrated IT management of internal PC use, and sharing information on common disks, collection of access logs to ensure conformity with compliance rules, and real-time collection of information about worker presence can improve the quality of support for office workers through services such as management of utilization time [see Fig. 4(b)].

Realizing Free-address Office Environments Using Secure Office Solutions

Hitachi has worked actively to establish and utilize a secure office environment internally[3] and in addition to introducing SPCs throughout the company, including for use as desktop terminals, the company is working toward using the functions of the key style security device to establish a free-

address office environment. A free-address office sets out to provide an IT environment that supports dynamic organizational changes and gives workers the flexibility to switch desks as the situation requires in response to changes in team makeup while also bringing consistency through policies relating to office operations, software, and other practices such as strict use of paper-less processes, the introduction of portable cabinets, and the use of seat configuration display systems.

KAAS

Use of KaaS Model for Knowledge-oriented Services

Operational logs and journals that grow in size with time can be accumulated at the data center through the use of a centralized IT configuration such as a secure client solution. In addition, by improving the performance of various types of sensors and making them smaller, real-world sensing can be performed with high precision and over a wide area, including in offices. Using extensive IT resources to process the large amounts of information obtained from these sensors is expanding the potential for creating innovative new services and other businesses. It is anticipated that, rather than just improving operational efficiency, future IT environments aimed at generating a high level of added value will feature the following characteristics.
(1) Collection of "large volumes of data" at the data center through the use of conventional operations and keeping this data as an asset
(2) Utilization of this large volume of data to create information (knowledge) with a high level of added

Fig. 5—KaaS Model.
Creates new knowledge-oriented services by adding value to large volumes of raw data derived from conventional services and operations.

value that can be used for new services
(3) Configuring and maintaining "platforms" suitable for these services at its own expense

Hitachi uses the term "KaaS" (knowledge as a service) for new business models that feature these characteristics and is working on research and development aimed at implementing them in practice[4] (see Fig. 5).

Example KaaS Implementations

A number of potential examples exist of applications in which the KaaS model could be implemented, including the provision of real-time pricing information to retailers based on data for placing/receiving orders acquired from a traceability system or generating data for pinpoint CRM (customer relationship management) from a railway operator's electronic ticket records. Possible applications for KaaS in the office include correlating the access logs, presence logs, operation logs, and other records from the secure client solutions described earlier and linking these to office worker productivity. In the future, this information could be further overlaid with data collected from sensor devices attached to the office workers to obtain a measure of improvements in team creativity.

Knowledge Processing Architectures

Past approaches to knowledge processing have included expert systems and data mining. In the future, it will be necessary to apply knowledge processing systematically to real-world data. Not only is real-world data significantly larger, more diverse, and uncertain than data used in the past, it also often includes analog data or personal information which requires careful handling. Another important processing requirement is to be able to perform continuous real-time detection of trends and exceptions. A knowledge extraction infrastructure that implements KaaS needs to bring consistency to the handling of these requirements.

Fig. 6 shows the architecture of a knowledge extraction infrastructure currently being investigated. The three steps that comprise this architecture are primary processing to convert the large volume of actual business data into structured data, extraction processing to extract models and rules from this data, and application processing that uses models to derive knowledge from this real-time fact stream flow. Other essential functions are a data processing infrastructure able to process large volumes of data at
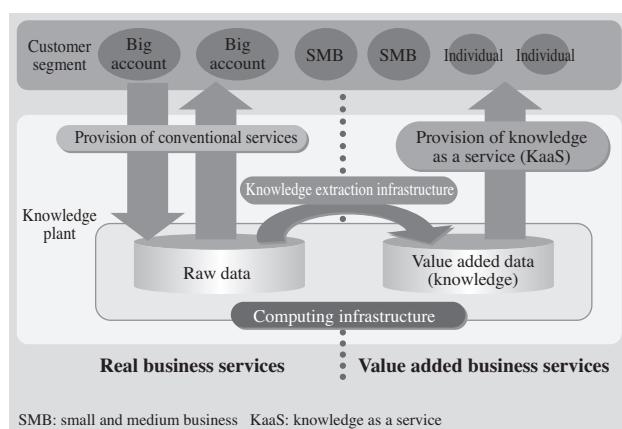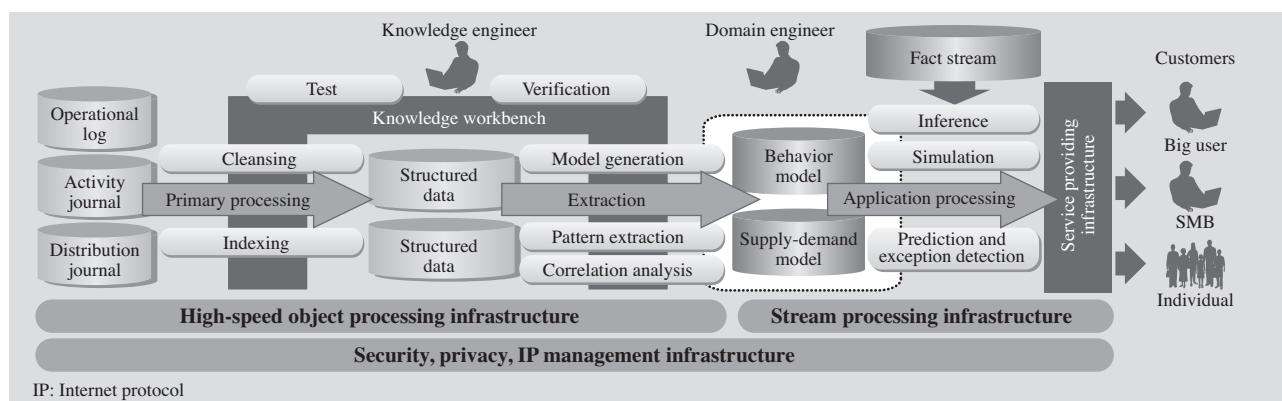
Fig. 6—Architecture of Knowledge Extracting Infrastructure.
Three-stage processing supports the structuring of large amounts of diverse raw data, the extraction of models, and their use in actual services.

high speed and a security management infrastructure able to deal with access management and privacy problems.

KaaS as Social Infrastructure

Society is overflowing with data, and while the requirement placed on IT has been to use this data effectively to support knowledge creation by workers and improve the sustainability of society, it is believed that KaaS is also one of the solutions. Embedding KaaS methodologies into the social infrastructure will allow the integration of knowledge across the boundaries between different industry and business sectors and open up a path to a framework for solving global-scale issues such as the environment, energy, and the balance between work and life.

CONCLUSIONS

This article has outlined product development and research being undertaken by Hitachi with the aim of making offices more human-oriented and from the perspectives of IT systems equipped for the coming knowledge creating society, and given some examples of how these technologies are applied.

Hitachi intends to continue contributing actively to the development of IT and solutions to realize a well-balanced and human-centered society in the future.

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