Service Value Maximization with Evolving Operational Service Platform

● Masanobu Uda ● Ryo Adachi ● Gentaro Takehara ● Ryouji Kai

Fujitsu's data centers have a framework called an operational service platform at the core of customers' IT system operations. It provides the high-value-added operational services of security, safety and stability centered on humans and technology. It consists of human-technology collaboration and know-how, including a system monitoring function, in which the center operator constantly monitors the entire IT system for the customer, and also implements operations required for maintenance and failure recovery. In today's severe economic environment, there has been an increasing sense of disparity between the value provided by services and the value that customers recognize and demand. Customers want to use operational services that are higher-value-added and lower cost than ever. With the opening of the Tatebayashi System Center's new annex, located in Gunma Prefecture in Japan, we formulated a concept of a next-generation operational service platform to address these demands. This paper presents that overall concept and gives details of Fujitsu's specific activities for it.

1. Introduction

In today's severe economic environment, there has been a divergence between the value provided by data center (hereafter "center") services and the value that customers expect. Customers want to use operational services that are higher-value-added and lower cost than ever and further obtain the benefits of the services.

To address these demands, in conjunction with the opening of the Tatebayashi System Center's new annex, located in Gunma Prefecture in Japan, we formulated a concept of a next-generation operational service platform that would evolve the operational service platform for IT system monitoring of the center. In addition, we worked on developing an integrated monitoring system and digitizing and computerizing the operational know-how as the first step.

2. Concept of next-generation operational service platform

The concept of a next-generation operational service platform is to build a high-quality platform allowing rapid provision of high-value-added services at low cost for continued coexistence and co-prosperity with customers. The point is to minimize the number of personnel at centers in various parts of the world and integrate the personnel for IT system monitoring and operation at control centers. In this way, it will be possible to centralize customer contact functions, improve service quality and save labor at the same time, and create new service value as well (**Figure 1**). The following subsections describe an outline of this concept.

1) Evolution of system monitoring function [Step 1-(1)]

Traditionally, it was necessary to construct a dedicated operation monitoring server

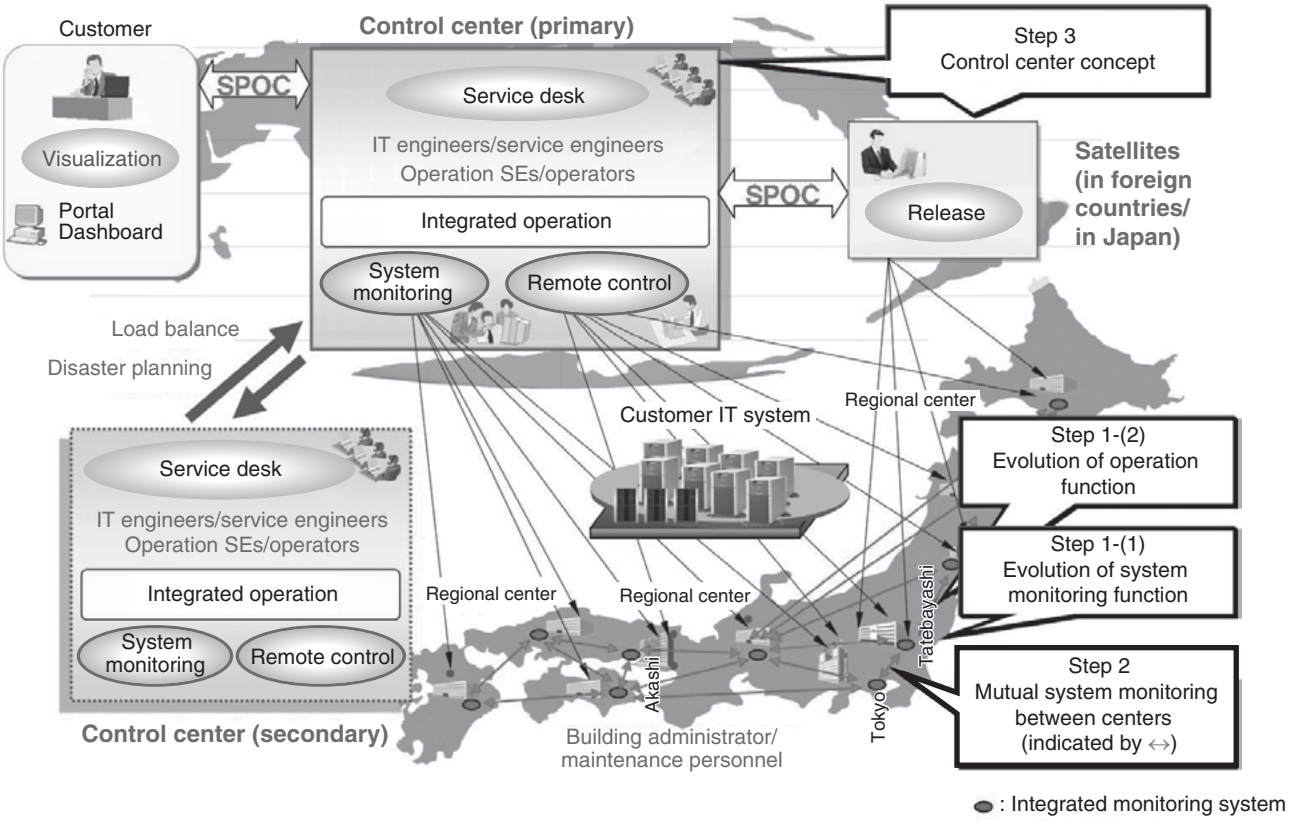

Figure 1
Concept of operational service platform.

(monitoring console) for the respective customer IT systems. This required preparation time and cost for construction and is not the optimum solution by any means. These servers should be consolidated into an integrated monitoring system capable of monitoring more than one IT system with one monitoring console. This will allow one operator to supervise more systems and reduce the lead-time as well (see the next section for details).

2) Evolution of operation function [Step 1-(2)]

Operation instructions to operators (such as extension of online processing time and unscheduled batch start) and know-how on managing backup media entrusted by customers should be computerized to improve the quality and efficiency of work. This will allow customers to gain an understanding of the state of operation and service level achievement and IT resource status in a timely manner via a portal screen (dashboard). This will also make it possible to grasp how end users are using IT resources and to conduct audit trail management in a timely way.

3) Mutual system monitoring between centers (Step 2)

The integrated monitoring system addressed in Step 1-(1) should be deployed in the centers in Tokyo and Akashi, as well as the Tatebayashi System Center, to produce an effect similar to that of the Tatebayashi System Center.

Developing this further by coordinating between the centers and achieving seamless mutual monitoring will allow the operators of each center to monitor other centers according to the operator load of the respective center. This will streamline the operator load balance and staffing of each center. This also will allow

measures to be taken effectively in the event of an emergency (such as a disaster or pandemic).

4) Control center concept (Step 3)

While the system described in 3) above is effective in terms of quality and cost, it requires personnel to stay on site. Accordingly, except for the building administrators and IT equipment maintenance personnel, other personnel should be integrated into the control center to eliminate the need for on-site personnel for operation.

The control center should employ a dual-center system (with primary and secondary control centers) for improved reliability.

Meanwhile, satellites with security ensured should be deployed at many points to eliminate the need to travel to the center and thereby improve convenience.

The control center should be equipped with a service desk function and also staffed with IT engineers capable of high-tech work and service engineers who provide services in line with changes in customer business environment, thereby achieving a single point of contact (SPOC) in a true sense.

That will enable us to keep up with the market and business changes in view of the future and technological innovations and achieve coexistence and co-prosperity with customers.

3. System monitoring function (integrated monitoring system)

As the standard monitoring platform of the centers, an integrated monitoring system has been built to start providing a monitoring service.

The integration of monitoring systems allows centralized management of incidents generated as well as the consolidation of know-how, and the deployment of measures across centers can be expected. The following subsections describe the objective of the integrated monitoring system, method of realization, and its functions and measures for internal control.

3.1 Objective

The integrated monitoring system is intended to allow us to offer low-cost services to customers while improving monitoring quality and reducing the lead-time needed for building a monitoring environment. To accomplish the objective above, we have carried out activities based on the following policies:

1) Improve the monitoring quality by using Systemwalker,[note 1)] the standard monitoring tool for the center, and standardizing the operation rules
2) Ensuring hardware resources based on estimated demand and reducing the lead-time needed for providing a monitoring environment by reusing standard monitoring environment templates

3.2 Method of realization

For the monitoring servers, we have ensured security between customers by using the VMware guest OS and assigning a dedicated guest OS to customers. We have also built independent VLANs for individual customers for the network to allow logical separation. The monitoring servers, which were separately prepared for individual customers in the past, are maintained as resources on the VMware so that they can immediately respond to a customer's application for the service.

As a measure for reducing the period required for building a monitoring environment, templates, which are provided as a feature of VMware, have been used to apply the templates set up for monitoring servers. This has successfully halved the period needed for building a monitoring environment. Carrying out these measures has allowed us to reduce the lead time from the conventional period of about one month to one week.

In addition, the categories of monitoring,

note 1) Fujitsu's integrated operation management software that supports the development of business and corporate compliance.

which were different for each system, have been sorted out and consolidated into three types: the Economy menu including alive and port monitoring alone, the Standard menu that conducts event log and process monitoring and the Premium menu that is customizable according to individual needs such as application monitoring (**Table 1**).

This consolidation allowed us to clarify the service level of each monitoring system and provide services that are easy to understand for customers. Furthermore, we have standardized the operations conducted by operators for each menu, which has improved and equalized the monitoring quality.

For an integrated monitoring system, which integrates the monitoring environments of two or more customers, the design of the interface used to indicate the state of monitoring is important. The integrated monitoring system has integrated the interface so as to show information about more than one monitoring system on one screen, and this allows an operator to monitor the status on a single screen.

For the integrated interface, we have adopted a design that is capable of clearly indicating the monitoring server where a given incident occurred. The interface integration has also reduced the console mounting space as well as the operational costs.

At the same time, the capability to promptly respond to any failure generated in the monitoring system itself is also important as a monitoring service. The integrated monitoring system has allowed recovery from a failure in the monitoring server by means of VMotion,[note 2)] a feature of the VMware. This has significantly reduced the downtime of the monitoring service from the past method in which recovery occurred after the faulty parts had been replaced, and has improved availability.

Figure 2 shows an overview of the integrated monitoring system.

Table 1
Monitoring menu.

Menu name	Description of monitoring
Economy	Alive monitoring, port monitoring
Standard	Alive monitoring, port monitoring, system log monitoring, SNMP trap monitoring, threshold monitoring, process monitoring
Premium	Individual services including application monitoring in addition to the monitoring items for the Standard menu

3.3 Functions

There has long been a demand for real-time failure notification to be provided by a monitoring system, which is required to immediately monitor any failure generated. The integrated monitoring system has a mail server dedicated to failure notification and is capable of notifying all customers using the monitoring service of failure by automatic E-mailing. By providing automatic E-mail notification, we can expect to reduce the time between failure detection and initial response, leading to a reduction in the time required for failure recovery.

The system also has a function to automatically register with the incident management system the incidents reported by the automatic failure notification, which further expedites incident response and helps to improve the service quality.

3.4 Measures for internal control

The system monitoring platform is equipped with functions related to internal control. That platform is designed so that any system operation by an operator from the integrated control room is conducted via a device such as an authentication firewall (hereafter "authentication FW"). In addition, with the present new platform, assigning an arbitrary ID to an operator has allowed us to put in place two-way security management.

note 2) Hot migration feature to migrate a virtual machine that is powered on from one host server to another host server without incurring downtime.

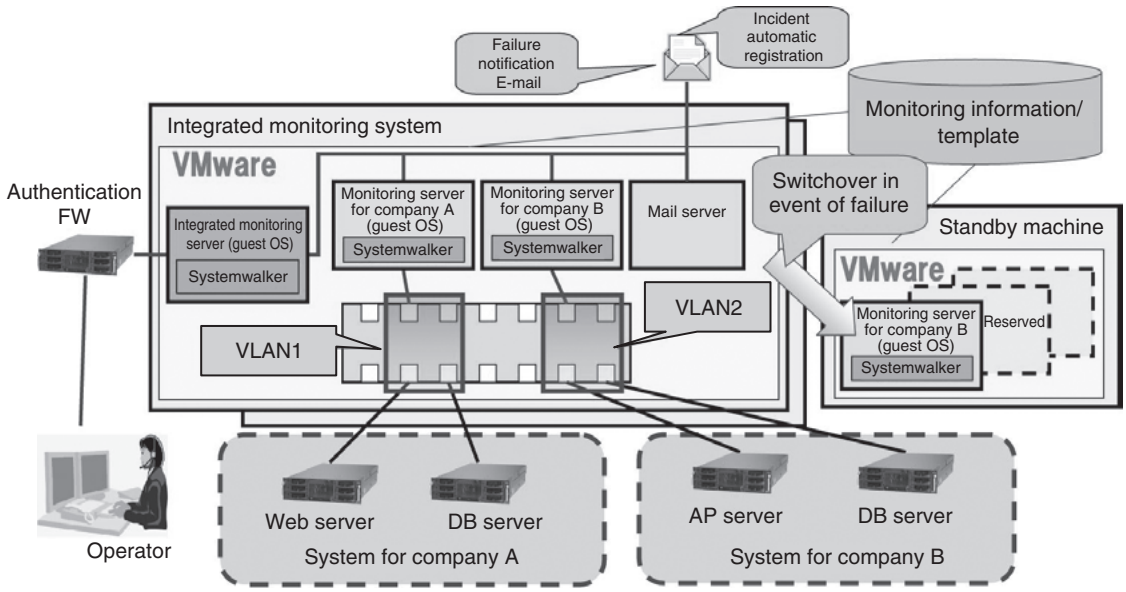

Figure 2
Overview of integrated monitoring system.

One way to implement security is to control permission to access the system to be operated. Generally, operators divide the customer systems to be handled among a few members of a team. Accessing the system through the authentication FW allows an operator to only access the customer system he or she has been assigned to operate. In this scheme, an operator first logs into the authentication FW, followed by control enforced with the authentication FW when the operator subsequently selects a customer system and attempts to access it. The authentication FW, which has predefined information about the relationships between the operator IDs and systems assigned, gives permission to access the relevant systems only. This function prevents operators from inadvertently accessing customer systems that are not relevant.

Another way to ensure security is to use an access log collection function. The authentication FW maintains an audit trail log of operators' access to customer systems in the procedure described above, which has made it possible to manage the information of who accessed with which customer system and when. The operations by operators after the access are also collected into a log until the initial operation (start of a specific program or piece of console software, for example) is conducted. This log allows effective internal control and we also expect it will be effective for identifying the cause of any problem generated (**Figure 3**).

4. Operation functions (digitization and computerization of operation know-how)

4.1 Computerization of backup media management

In operating a center, handling backup media involves the following procedures:

1) Taking the media in and out of the depository
2) Regular inventorying (60 000 tapes)
3) Mounting on and unmounting from information devices

Quality maintenance requires high labor costs. Of the procedures above, the focus was placed on taking the media in and out of the depository, and regular inventorying and a media

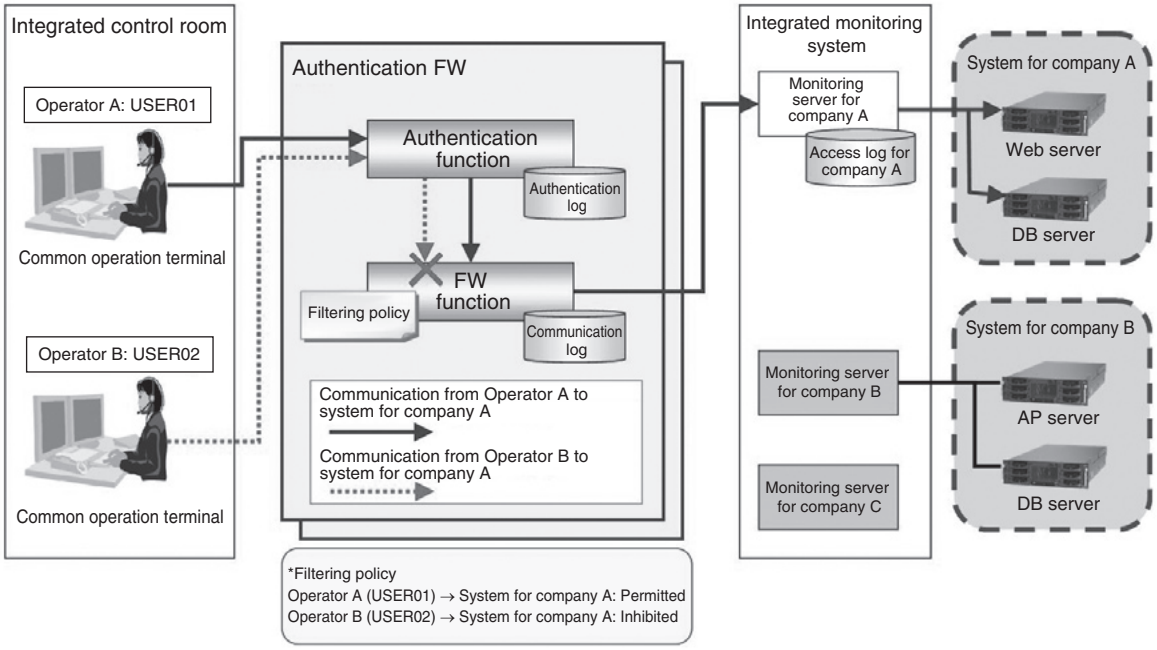

Figure 3
Authentication firewall.

management system that makes use of color barcode technology has been built. Technology has begun to be applied to prevent human errors such as a mix-up of media.

4.1.1 Reason for adoption of technology (color barcode)

Unlike the conventional barcode, a color barcode is capable of verifying data by image recognition and automatic recognition of the code in an image. This function has allowed the verification process, which was manually carried out for each medium in the past, to be handled collectively by the system (**Figure 4**) and has improved quality and considerably reduced workload.

4.1.2 Effect of media management system

Introducing the media management system has brought about the following effects:

1) The number of human errors generated while taking the media in and out of the depository has been reduced to one-third.
2) Building the system and connecting to the network has allowed the workload to be indicated in real time.
3) Building the system has reduced security risks such as information leakage due to inefficient work including paper-based operations and manual processes and loss of paper media.

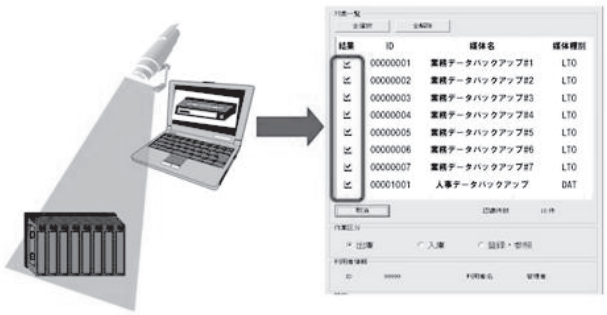

Figure 4
Conceptual diagram of backup medium confirmation.

4.1.3 Future plans for application of new technology

We intend to use the color barcode technology for applications other than backup

media management as well, and further apply the technology to the management of assets entrusted by customers. In addition, we are considering expanding the use of the technology to customers by proposing it as an IT solution based on the successful results achieved at the annex of the Tatebayashi System Center.

4.2 Digitization and computerization of operation instructions

For monitoring customer systems and conducting operations at a center, written operation instructions are used. Paper-based operation instructions were suited to the work because of their operability and versatility. With operations becoming increasingly complicated, however, written instructions have proved to have their limits, and this has necessitated an urgent computerization of the instructions.

4.2.1 Functions of electronic operation instructions

For the present computerization, the existing tools and tablet PCs have been utilized for increased versatility. In addition, we have made efforts not only to simply computerize written instructions but also to incorporate operator assistance functions into the operation instructions themselves. These are functions for checking and preventing operational problems such as omitted and erroneous operations. For example, they include a function to notify an operator of any omitted operation and manual link function. These functions have allowed us to control and prevent problems in ways that were not possible with the conventional written instructions. All of these are recurrence prevention measures that have been learned from past failed cases (**Figure 5**).

4.2.2 Effect of computerization of operation instructions

1) Various operator assistance functions have led to the elimination of operational risks and improved operation quality.
2) The work results can now be made into electronic data, which has allowed us to visualize the state of operation.
3) The computerization has made possible an annual reduction of 400 000 sheets of paper if applied to all systems.

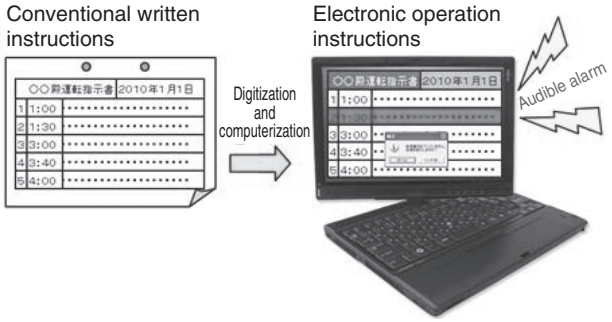

Figure 5
Conceptual diagram of electronic operating instructions.

4.2.3 Future plans

We expect that analyzing the work result data will make it easier to optimize the stationing of operators, and this will likely contribute to efficient operations. Furthermore, linking with other systems will allow the timely visualization of the state of operation at a center.

5. Conclusion

Currently, digitization and computerization of the integrated monitoring system and operational know-how have been realized as Step 1, which has produced good results. We intend to steadily carry out Steps 2 and 3 in the future.

To that end, we will strive to ensure mutual monitoring between centers by taking advantage of remote operation technology. Regarding the linking between the control center, individual centers and satellites, we will establish a structure for visualization and sharing that makes use of autonomous information (such as the state of services and IT resource status of the individual centers) made available by sensor

network technology.

Furthermore, we plan to combine our track record of over 25 years in providing outsourcing services with rich human resources, experience and know-how and ultimately apply the approach to centers in various parts of the world as well as Japan. Through these activities, we will realize world-class operational service quality and optimized cost performance so that we can maximize the service value for customers and aim to be a global leader trusted around the world in the upcoming Cloud age.

Masanobu Uda
Fujitsu Ltd.
Mr. Uda belongs to the Tatebayashi Center Operation department in the Operation Management division. He is engaged in general operation services in the Tatebayashi System Center.

Ryo Adachi
Fujitsu Ltd.
Mr. Adachi belongs to the Service Support department in the Integration Management division. He is engaged in planning and developing integrated operation services provided by data centers.

Gentaro Takehara
Fujitsu Ltd.
Mr. Takehara belongs to the Tatebayashi Center Operation department in the Operation Management division. He is engaged in operation management in the Tatebayashi System Center.

Ryouji Kai
Fujitsu Ltd.
Mr. Kai belongs to the Tatebayashi Center Operation department in the Operation Management division. He is engaged in operation management in the Tatebayashi System Center.