IT Infrastructure of Data Center Services Based on ITIL

● Kazuo Tomoda

Fujitsu's data center services have been received favorably by customers and are growing steadily. As customers' businesses become more dependent on IT, however, their demands have increased and diversified to include a higher quality of service, enhanced security and support for internal control. In addition, now that the reduction of IT costs has become a key challenge for customers, they have higher expectations for data center services as a means of reducing operational costs, which account for 70% of their IT-related costs, and there are the conflicting demands of a better service level and lower-cost services. This paper presents the improvement and standardization of service processes based on ITIL that we have worked on to address the above-mentioned challenges. It also covers the establishment of a new service infrastructure to assist with and manage the reliable implementation of standardized processes.

1. Introduction

Fujitsu's outsourcing services have been favorably received by customers as shown by the services' No. 1 ranking in the Japanese outsourcing market for five years running.[1] Data center services, which are Fujitsu's major outsourcing services, are growing steadily as a business. As customers' businesses become more dependent on IT, however, their demands for data center services have increased and diversified to include a higher quality of service, enhanced security and support for internal control. In addition, the optimization and reduction of IT costs has now become a key challenge for customers. Customers now have higher expectations for data centers as a way to reduce their operational costs, which account for 70% of IT-related costs,[2] so that they can divert investment to new development.

In this way, Fujitsu's data center services have needed to meet the conflicting needs of providing services at costs accessible to customers while improving the service level. To do this, it has been necessary to improve and standardize service processes and build a new service infrastructure (IT infrastructure) to help reliably and efficiently implement standardized services.

This paper presents the details of our reworking of the processes in Japan described above. We have reworked them for the new annex of the Tatebayashi System Center located in Gunma Prefecture in Japan that started operation in autumn 2009. The aim was to establish a service infrastructure.

2. ITIL-based infrastructure required in data centers

The IT Infrastructure Library (ITIL), a framework of best practices of service management, started to disseminate in Japan around 2003. ITIL has now become essential for IT system departments of companies to build business processes, and utilizing its know-how is extremely important in designing the service

processes of data center services.

The data center service department of Fujitsu was among the first to work on applying ITIL. This is exemplified by its activities to develop human resources, such as the department's efforts to have all its members acquire ITIL Foundation Certification and encourage them to acquire the ITIL Practitioner Certification and the ITIL Service Manager Certification. It is also exemplified by its application of ITIL to the on-site business processes of the Practical SDEM Standard "IT Service management, Maintenance, & Operation Process (ITSMOP)," which integrates Fujitsu's operation and maintenance know-how and reflects the concept and expertise of the ITIL, and gives feedback on on-site know-how.

The present IT infrastructure has focused on the following three types of infrastructure that support configuration and change management and incident and problem management, which are especially important in the data center service implementation phase among the ITIL processes (**Figure 1**).

1) Configuration management infrastructure
2) Incident management infrastructure
3) Customer portal

Needless to say, these infrastructures have been constructed and utilized from an early stage, but they have been built individually for each center and customer. For that reason, it has been necessary to establish an infrastructure that can be shared by the four major centers (Tatebayashi, Akashi, Tokyo, and Tokyo No. 2) in Japan. This is because there are a greater number of customers who use more than one center as part of their disaster contingency planning, and there will likely be an increase in those who operate systems in ways not bound by physical centers. This will be possible because of the advancement of virtualization technology, and a reduction of infrastructure operation costs. In addition, we expect a rapid increase in the number of customers who make hybrid use of the conventional data center services and Cloud services, which has been another reason why we need a new service infrastructure that supports both services.

To construct this infrastructure, it was necessary to satisfy the following requirements of data center service vendors in addition to the requirements of an infrastructure used for IT management in individual companies.

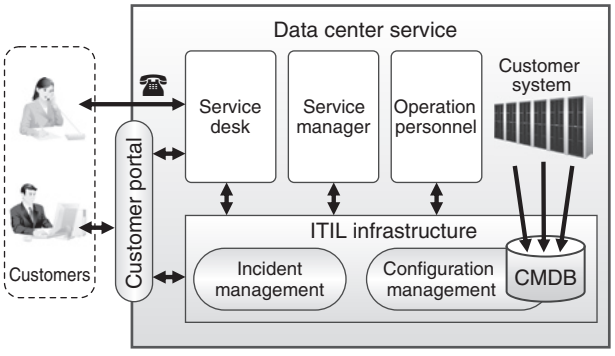

Figure 1
Data center services based on ITIL.

2.1 High scalability

Data center services are supported by a staff of nearly 1000 people. They include service managers who watch over all the services, customer service engineers (CSEs) who give instructions to operators for controlling the entire operation, and center facility engineers in charge of the building, electric power, and air conditioning, in addition to operators engaged in day-to-day operations at the center. A data center is operated by a large number of people in this way and runs over 10 000 servers, which requires the service infrastructure shared across the center to have high scalability and accommodate future service expansion.

2.2 Strict access control

Data center services are operated by a large number of people as described above and involve handling many customer systems. Accordingly, strict access control must be enforced on the

information of individual customers, to prevent any personnel other than those who are in charge of a particular customer from viewing or revising that customer's information and thereby minimize the risk of information leaks.

The following sections introduce three types of infrastructure that have been newly created.

3. Configuration management infrastructure

3.1 Background to project

The "Service Asset and Configuration Management," "Change Management" and "Release and Deployment Management," which are included in the domain of Service Transition with the ITIL V3, are major processes also defined by the ITIL V2 and are extremely important in data center services that operate customer systems and hardware assets on a daily basis.

The reason for this is that if operators have an accurate understanding of the hardware configuration information of customer systems currently in operation at a data center and information about the software including the middleware and applications running on the hardware, they can reliably handle events that may significantly impact continued operation to be reliably handled. This handling includes promptly and appropriately responding to any problem generated, conducting error-free maintenance and stably replacing devices of customer systems.

Configuration management information was traditionally managed as customer-specific electronic data. This had problems in view of maintaining accurate information that did not diverge from the real system and applying the stored information. For that reason, there were needs to build a configuration management database (CMDB) capable of centrally managing the performing assets of all centers.

3.2 Method of realization

To construct a configuration management infrastructure, configuration items (CIs) that needed to be managed with data center services were first identified and defined.

The CIs defined covered various types of information besides hardware and software information managed by a general CMDB. They include facility information such as installation locations in the center and numbers assigned to the power supply outlets to connect to. They also include basic information in relation to services including the agreement details and service level agreement (SLA) conditions that were necessary for providing data center services. This meant that a large number of CIs ranging from hundreds to tens of hundreds per system needed to be managed. In conjunction with defining CIs, we reviewed day-to-day business processes regarding the registration, revision and deletion of CIs.

Through these processes, we found that the following conditions must be satisfied in building a configuration management infrastructure:

1) Centralized management of the large number of CIs (initially for 20 000 servers and ultimately 50 000 servers) of the systems in operation in all centers.
2) Provision of a workflow function that runs the business processes of the change, addition and deletion of CIs.
3) Setting of access control in accordance with the security policies of the services.
4) Function to collect configuration information from the real system to update and take an inventory of information and synchronization of configuration information with the infrastructure CAD (infrastructure configuration design tool that uses CAD technology).

Systemwalker IT Change Manager V14g (hereafter "ITCM") is operation management software for standardizing, automating and visualizing change management, release and deployment management and configuration management processes based on the ITIL as

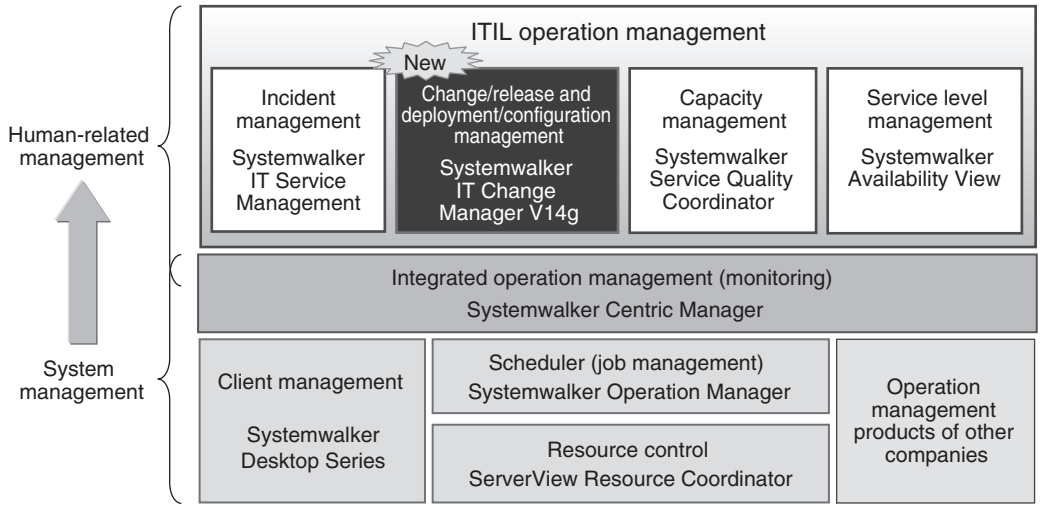

Figure 2
Scope of Systemwalker ITCM.

shown in **Figure 2**. To build a configuration management infrastructure, we have used this software from the commercialization stage, thereby reflecting the on-site needs of data center services in the product. The workflow function of the ITCM has allowed us to control and improve the CI management and work operation processes.

We address the need for functions that are not universal and are required only by data center service vendors by externally creating the applications to be linked.

3.3 Results of adoption and future development

Using the configuration management infrastructure has produced the following effects as compared with the conventional configuration management by customer-specific electronic data:

1) When CEs were sent for to handle a hardware failure, the information required for the arrangement (such as the serial no.) could be checked without going to the actual machine, which meant that maintenance could start quicker.
2) The times of purchase were also centrally managed and the timing of replacing consumables could be easily found.

In the future, we intend to improve functions for simpler registration and maintenance of updated configuration information, strengthen the link with the facility information management system and enhance operation functions to make use of the registered configuration information for service management. In addition, we are also considering how to implement configuration management that combines virtual and physical environments, which are required by Cloud services that offer virtualized servers, storage, OS and middleware, in response to requests from customers.

4. Incident management infrastructure

4.1 Background to project

The importance of incident management in IT management does not require special explanation. To provide high-quality data center services, prompt operation without omission based on reliable incident management and operational improvement making the most of accumulated incidents are very important.

The incident management of Fujitsu's data

centers has used different incident management systems for different centers and customers. However, the building of a new framework capable of centrally managing the incidents generated at all centers has been required for the reason described above.

4.2 Method of realization

An outline of the incident management system is shown in **Figure 3**. To construct the system, first we identified and classified incidents generated in data center services. This was followed by redefining business processes associated with the individual incidents.

Table 1 shows the representative types of incident handled by data center services. We have decided that, as the first step, requests for non-regular operations from customers to the center (such as message monitoring inhibition and server reboot) should be covered initially and the types of incident covered should be increased gradually. By studying the system to be built, we have concluded that we must establish a scheme combined with a portal site that allows customers to create incident slips by themselves and check the progress of the response, in view of the following points:

- Posting incidents (requests for center operation) received from customers to the incident management system may lead to delayed response and erroneous response due to recording errors.
- Making the progress of response visible to customers is as important as prompt and reliable response to incidents.

In addition, to improve service quality and operational efficiency by further automating operations, we have also decided to provide the

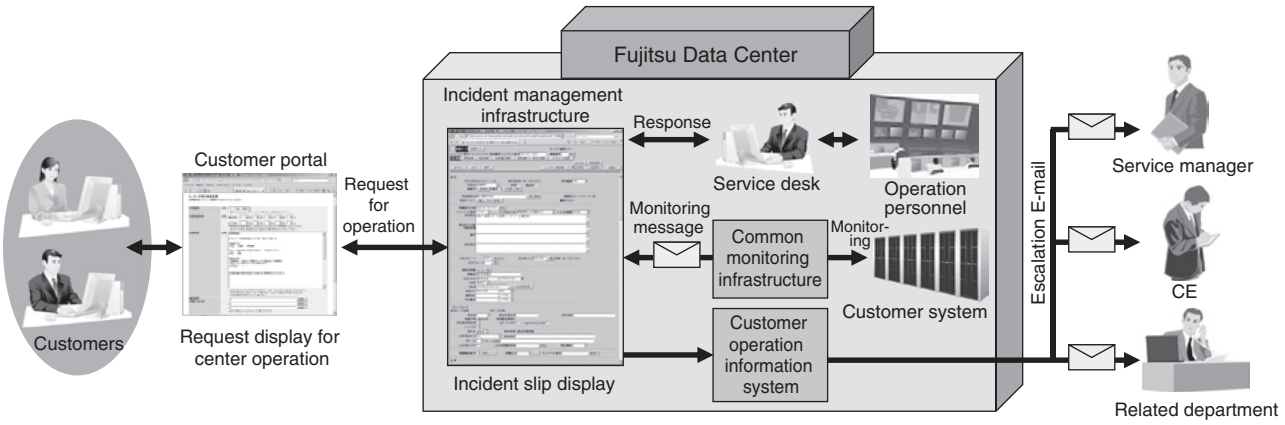

Figure 3
Outline of incident management system.

Table 1
Types of incident.

Classification	Incident type	Description
Customer incident	Problem	Hardware failure, application error, operation error, etc.
	Request for center operation	Request for operation generated on an irregular basis such as server reboot and message monitoring inhibition
	Demand/FAQ	Inquiries, complaints, or such like regarding services
	Request for operation change	Request for operation change from customer
Internal incident	Problem	Center facility failure, security accident, etc.

following two functions:

1) A function combined with the integrated monitoring system (see "Service Value Maximization with Evolving Operational Service Platform" contained in this issue)[3] for taking in monitoring messages from the operation management server that monitors the customer system to create incident slips automatically.
2) A function to enable the incident slip display to issue a problem escalation E-mail for notifying related departments in Fujitsu of any problem generated in the customer system via E-mail (linked with the critical service infrastructure "customer operation information system").

To reliably implement the incident management process, it is essential to have a service desk in charge of recording and monitoring the progress of incidents and to develop IT infrastructure. Accordingly, we have started to work on establishing a service desk as a single point of contact (SPOC) for customers, which has been partially put to use.

4.3 Results of adoption and future development

We are currently in the phase of gradually increasing the number of customers to be covered by the incident management system. This system has already brought about the following effects:

1) Requests for operation from customers and problem incidents can be associated with incidents on slips automatically created from monitoring messages for management, which has allowed response based on the overall situation.
2) Incidents from more than one customer are handled on the same infrastructure, which has improved the efficiency of operations conducted by personnel of the service desk and simplified management by the service manager.
3) The accumulated incidents have become available as the basis for carrying out improvement and proposal activities suited to customer-specific needs.

In the future, we intend to increase the number of customers and types of incidents covered by the management. We also will work on analyzing incident descriptions to make use of accumulated incidents. We will do this by turning them from data to information and mutually exchanging incidents with the incident management infrastructure of other services.

5. Customer portal

5.1 Background of project

We have decided to establish a customer portal to use as infrastructure combined with the incident management infrastructure, as explained in the previous section. The purpose is to announce to customers the situations of acceptance of and response to requests for operations from customers to the center and their results. Other reasons why a customer portal needs to be established include:

1) Customers' opinions such as complaints about an inability to see the service status and wish to check the service status more often than can be done with regular meetings.
2) Risk of security accidents caused by use of fax and E-mail.
3) We need opportunities for Fujitsu to offer new services.

5.2 Method of realization

Based on customers' opinions sent to the service manager, we have decided, as the first step, to initially offer the basic menu (content) shown in **Table 2**. We have embarked on activities including standardizing the content to be offered by each menu item and defining the business processes for ID issuance and content registration.

Of these, this subsection describes the function to request center operation. The aim

Table 2
Menu of customer portal site (content).

Menu name	Outline
Request for center operation	Provides functions of acceptance of requests for operations from the customer to the data center and confirmation of progress of operation.
Service report	Shows reporting materials for the customer created by CSE/service manager.
Service documents	Shows documents signed between the customer and Fujitsu for the provision of the service.
Important notice	Shows customer-specific important notices.
Center information	Shows notices in relation to center facilities (such as engineering work and inspection).
Site information	Shows notices in relation to the customer portal site (such as maintenance schedule).
Inquiries to the site	Acceptance of opinions and requests regarding the site and questions in relation to the site
Application for entry to the center (scheduled for provision)	Allows user to apply for entry to the center.

of this function is to accept requests for non-regular operations from customers at the center and allow customers to check the progress, as explained earlier. The point of contact in the center receives requests for operation via the incident management infrastructure as described in the previous section.

The display provided for a customer to request operation contains the following items:

1) Type of operation: Type of operation requested can be specified.
2) Desired date of operation: Operation start and end times can be specified.
3) Description of operation: Specific details of the operation can be provided here.
4) Attachment: Documents and files required for the operation can be attached.

Of the items above, type of operation can be provided with customer-specific options and the display is designed to automatically show one of the different predefined text templates according to the type of selected operation in the description of operation field.

This function helps customers to accurately and simply describe the type of operation they want.

5.3 Results of adoption and future development

We launched a primary system of the customer portal in April 2010, and we are in the process of gradually expanding the scope of its application through discussions with individual customers, so that ultimately we can provide the portal to customers for direct use. In the future, the following effects can be expected:

1) It will be possible to make requests and check situations while on a business trip or at home.
2) It will be possible to send requests to the center via the customer portal site, which will eliminate the danger of sending an E-mail to the wrong person. In addition, we have received many requests regarding this infrastructure including those asking for functions to be improved and new services to be provided, indicating the high degree of expectations.

From now on, we plan to increase the number of customers while incorporating these comments from customers and opinions of internal users. We also intend to work on providing new services premised on the use of a portal site such as the publication of incidents generated in the center to customers and a dashboard function to allow real-time viewing of the state of the customer

system.

6. Conclusion

In this paper, we have presented details of the establishment of an ITIL-based IT infrastructure for service management, an area we have worked on for the new annex of the Tatebayashi System Center. All infrastructures mentioned in this paper have just been put to use for customer applications and we are only beginning to expand the scope of use including the Tokyo System Center, Tokyo No. 2 System Center, and Akashi System Center. For this reason, the effects of establishing the infrastructure are still limited and we would like to give a detailed report on the effects on another occasion.

We are committed to making further contributions to customers' businesses in the future by strengthening the infrastructure for data center services and building a new infrastructure as well as expanding to new services based on data centers such as Cloud and SaaS.

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