Revolutionizing System Support in the Age of Electronic Medical Records

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To allow its customers to use electronic medical record (EMR) systems with peace of mind, Fujitsu began providing a One-Stop Medical Support Center service in May 2009 in Japan. Although an EMR system can be complicated, it must be accessible at any time (24 hours a day, 7 days a week), and system maintenance requires broad product knowledge and a significant amount of labor. Designed to reduce the burden on customers, this service shook up the traditional per-product support system and the traditional support scheme centered on on-site systems engineers. As part of this service, a round-the-clock specialized staff was created for handling and responding to questions and problems related to all Fujitsu healthcare products (from hardware to application packages): an industry first. This made it possible to prevent problems by monitoring customers' systems through a secure line and achieve speedy problem resolution through remote maintenance. This paper introduces the One-Stop Medical Support Center service, which robustly supports customers in using their systems safely and securely.

1. Introduction

Fujitsu feels that maintaining stable operation of customer systems is a vital requirement since systems that it deploys should provide ongoing value exactly as expected in actual usage scenarios. There are times, however, when hardware failures or other factors create problems or when system changes have to be made owing to revisions to medical systems or other external factors. System operations management and maintenance work have consequently become necessary to maintain stable operation of a system over the long term. A brief history of maintenance support services provided by Fujitsu in the healthcare field in Japan is given below.

Fujitsu has been providing packaged healthcare products to hospitals for some time. These products began with department-specific systems centered on Fujitsu's HOPE series of medical accounting systems in the 1970s and continued with the HOPE/EGMAIN series of medical order entry systems in the 1980s and the HOPE/EGMAIN-EX series of electronic medical record (EMR) systems in the 1990s. These conventional systems—while based on common packaged products—were often customized to meet specific customer needs. This led to different customers running different systems. As a result, maintenance support for these disparate systems involved the provision of separate services overseen by systems engineers (SEs) familiar with the specifications of a particular system. In short, maintenance support took various forms dictated by contract.

Consequently, on entering the 2000s, Fujitsu sought to integrate and standardize the specifications of its existing systems and enhance the generality of its packaged products. These efforts culminated in the provision of a

medical one-stop solution as a product system offering a group of subsystems for the variety of administrative functions in a hospital centered on an EMR system as well as a set of maintenance support services.

In this paper, I begin by describing the issues surrounding system operation and maintenance for customers who have introduced EMR systems in their facilities. Next, I consider the service product system for the operation and maintenance phase in Fujitsu's conventional medical one-stop solution and the problems associated with that system. I then outline the products of Fujitsu's Medical One-Stop Support Center service launched in May 2009 and describe how this service is solving operation and maintenance issues. Finally, I touch upon Fujitsu's future plans for enhancing one-stop support.

2. Current state of operation and maintenance in EMR age and associated issues

First, I examine the issues surrounding system operation and maintenance for customers who have deployed an EMR system. In general, a system that a customer has received will be operated and maintained by the customer as a hospital asset. In many cases, however, hospital staff without expertise in such work will operate and maintain the EMR system in addition to their primary duties. Moreover, the following issues have arisen in the EMR age.

1) Detailed and careful operations management is needed to ensure that an EMR system is available 24 hours a day, 7 days a week (24/7).
2) The customer's work load associated with operation and maintenance increases as the EMR system increases in scale and complexity. On the whole, an EMR system is an aggregate of departmental systems (EMRs, medical accounting, etc.), and as more and more departments adopt information technology, the specialized skills required to operate and maintain the system become increasingly diversified and the amounts of information that must be managed and work that must be performed become enormous. This problem is only compounded when multiple systems from different vendors have been introduced. In this case, the customer must carry out different operation-and-maintenance tasks for each vendor's system while coordinating among those vendors: all of this requires considerable time and effort.
3) Operation and maintenance is work of a type that must be performed continuously over the long term. Since a hospital system will generally be used continuously for five or more years, the work involved in its operation and maintenance must be performed on an ongoing basis during that time. Moreover, the longer a system is used, the greater the amount of maintenance work becomes because physically unavoidable equipment failures, software obsolescence, and the need for new security measures must be handled.

Thus, EMR system introduction steadily increases the work that a customer must perform to operate and maintain the system both quantitatively and qualitatively and becomes a major factor driving up the customer's system maintenance cost. As a result, figuring out how to operate and maintain an EMR system reliably and efficiently in a form that reduces the load on hospital operations has become a major issue for the customer.

3. Conventional operation-and-maintenance products and related problems

Next, I describe Fujitsu's conventional operation-and-maintenance products supporting its medical one-stop solution and the problems associated with those products. Fujitsu provided the following four services in the operation

and maintenance phase of its medical one-stop solution.

1) ME&S (application maintenance service)

Maintenance, Enhancement, & Support (ME&S) was an information-provision service targeting administrative application packages like the HOPE/EGMAIN-GX EMR system. It provided, in particular, information related to the upgrading of application packages.

2) Product service

The purpose of this service was to maintain hardware (servers and other equipment) and related software (operating system, database software, and other types of middleware).

3) Maintenance SE service

This was an on-site service in which SEs engaged in various support activities on the customer's premises as part of regular briefings or in response to system emergencies. This service brought Fujitsu into close contact with its customers.

4) Management service

This was a help-center type of service that received calls at a national support center to answers questions posed by customers or provide help with problems they encountered. However, the help provided by this service was general in nature as it originated from a Fujitsu support center servicing not only the healthcare field but also other fields. As a result, support staff could not always offer expert advice on healthcare-related problems, and customer needs could not always be satisfied. This service was actually able to help only some customers.

In theory, these four services in combination should have been able to support the operation of customers' systems in the operation and maintenance phase of the medical one-stop solution. In reality, however, they did not function as a true contact point for the customer. Despite the best efforts of SEs to provide adequate support, customers sometimes could not make contact or problems took too long to be resolved. In other words, there were times when operation and maintenance support for customers' EMR systems could not be sufficiently provided.

4. Design of new operation and maintenance service

With the aim of solving the abovementioned problems and improving the quality of operation and maintenance support for customer EMR systems, Fujitsu abolished its conventional management service. Instead, it studied a new service based on a support center for centrally managing operation-and-maintenance support information related to customer EMR systems and providing the support that customers actually need. This new support center service marks a return to basics in which the purpose of system operation and maintenance work is to meet customer needs. This will be achieved by totally redesigning those service functions deemed necessary for customer support.

At Fujitsu, a system referred to as the "operation and maintenance practices model" has standardized the work that customers should perform in system operation and maintenance by utilizing the vast amount of know-how that Fujitsu has accumulated over the years. The design of the new support center service is based on this standard model. To make this service immediately useful to customers in their operation and maintenance work and to make it functionally meaningful, Fujitsu selected and commercialized functions that reduce the customer's workload by targeting work that requires a high degree of system-related technical expertise or work that imposes time constraints on the customer.

Specific functions include question-and-answer (Q&A) support, unified problem reception and remote problem response, execution of preventive measures through system monitoring, and incident management and reporting. These functions are provided in combination with existing operation and maintenance service products (**Figure 1**).

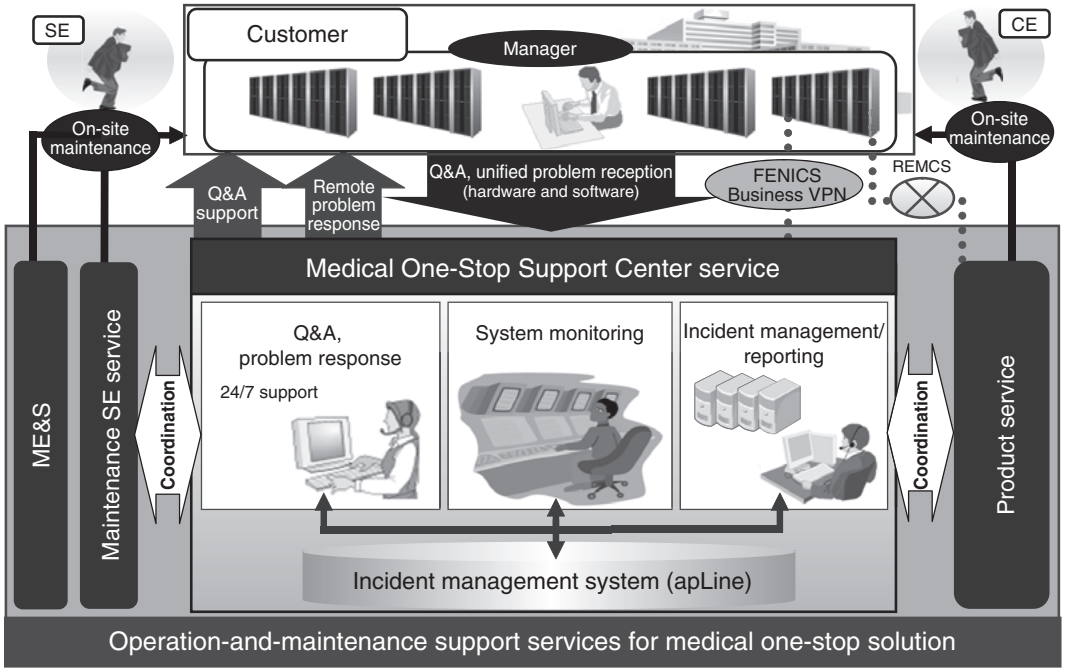


Figure 1
Maintenance support organization centered on Medical One-Stop Support Center.

In the above way, the Medical One-Stop Support Center service was launched in May 2009 with the aim of reducing the workload of system operation and maintenance and supporting stable system operation for customers who have deployed EMR systems. The following section describes how this service can be useful to customers in their operation and maintenance work.

5. Medical One-Stop Support Center service

To smoothly and efficiently support customer operations and maintenance work, the Medical One-Stop Support Center service provides the support services introduced in the previous section through several support functions. To enable these functions to demonstrate maximum effect, they require that various types of information about the customer's system requiring support be collected and organized and that this information be managed so that it can be used at any time. To this end, we have standardized various types of information and an information collection and management system in combination with the design of each support function. Moreover, an environment configuration service is always executed before the start of the support in combination with the collection of diverse customer information based on these standardized designs and the required infrastructure construction. Starting daily operation-and-maintenance support services only after completion of the environment configuration service enables sufficient support to be prepared beforehand with the result that total customer support can be provided.

Below, I introduce the environment configuration service and the support functions.

5.1 Environment configuration

A network environment that enables remote monitoring of an EMR system is set up. A wide variety of support information (system configuration diagram, managers' contact information, etc.) needed for operation and

maintenance work is organized and compiled into a support document (known as the "Service Operation Guidebook") that can be shared with the customer, and the document is delivered to the customer for reference. This information, which can be updated at any time, becomes a "bible" that should be shared not only between the customer and support center but also among SEs, customer engineers, and sales personnel. It can also be used as material to be passed on to new managers on the customer's side when personnel changes occur.

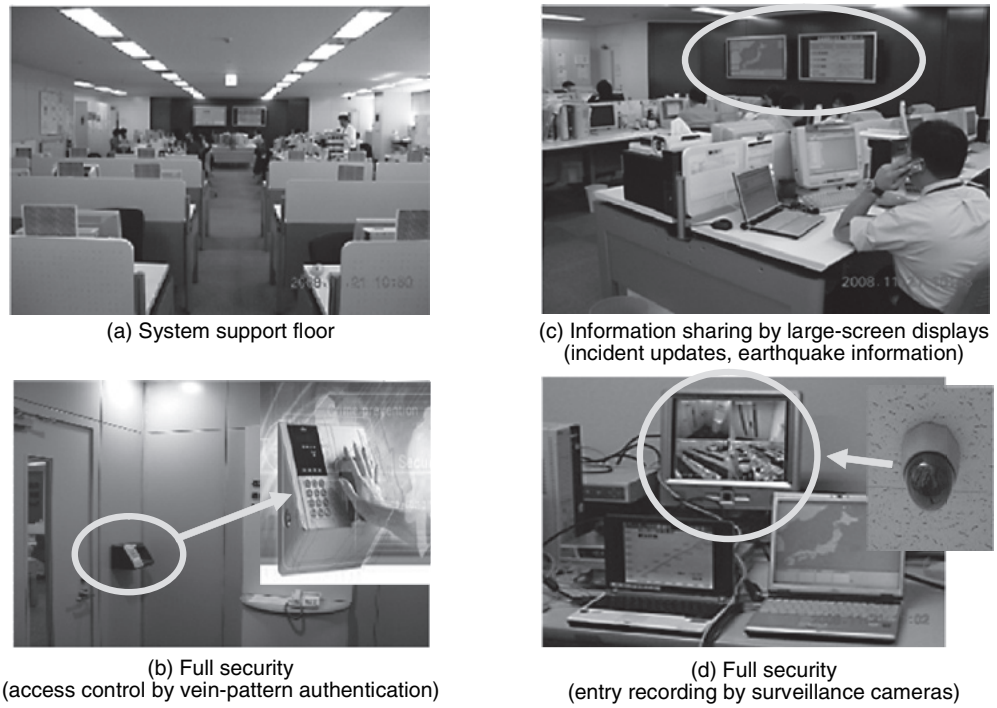
5.2 Support functions

Once environment configuration has been completed, the Medical One-Stop Support Center service goes into operation. It supports the customer's operation and maintenance work through the following three support functions originating from a highly secure support center (**Figure 2**).

1) Q&A and problem response

The purpose of this function is to respond to questions or problem reports received from customers by telephone or E-mail. These questions and problems are handled on a 24/7 basis by staff who specialize in medical systems: this represents an industry-first and is very different from past support systems. This function also integrates the previously separated contact points for hardware and software, thereby preventing the customer from getting lost in a maze of people to contact. As a result of this function, past problems such as the difficulty of providing help late at night or on holidays or responding quickly to remotely located customers—which could not be adequately handled solely by the SE in charge—have been mitigated and overall maintenance support has been significantly enhanced.

The remote connection between the customer's EMR system and the support center is achieved through the use of FENICS Business VPN Service, a network service provided by Fujitsu that provides a secure network through IPSec-VPN network-security



(a) System support floor

(c) Information sharing by large-screen displays (incident updates, earthquake information)

(b) Full security (access control by vein-pattern authentication)

(d) Full security (entry recording by surveillance cameras)

Figure 2
Facilities of Medical One-Stop Support Center.

technology as recommended in the Guidelines on Secure Management of Medical Information Systems by the Ministry of Health, Labour and Welfare (VPN: virtual private network).[1] This technology lets the support center immediately make remote connections with the customer's system to check system status and support problem resolution.

In addition, the new FENICS II Universal Connect network service has made it possible to connect the support center with regional SE support centers and construct a nationwide medical one-stop support network. This network lets an SE directly access the customer's system from a remote location, thereby shortening SE response time and ensuring that problems are resolved promptly.

2) System monitoring

This function monitors the state of the customer's EMR system from a support center via the abovementioned network. It also links up with Fujitsu's existing Remote Customer Support System (REMCS), which has a hardware message reporting function, that enables integrated monitoring of the system over a wide range of system components from applications to hardware. This makes it possible to detect signs of a major system problem and either prevent it from occurring or minimize its effects on the system if such a problem should somehow occur.

3) Incident management/reporting

This function registers all incident information including questions and notification of problems received from customers in the "apLine" incident management system at the support center and manages them in a unified manner. The progress made in responding to all incidents can therefore be shared among those in charge, enabling continuous support to be provided.

In addition, the customer is advised of all incident information for this system through monthly briefings presented by the sales personnel or SEs in charge. These briefings can be useful to the customer in its management operations. The information accumulated at the support center is also analyzed to provide feedback that can be used to create products of even higher quality.

By providing these three support functions, Fujitsu's Medical One-Stop Support Center service helps to resolve the issues surrounding the operation and maintenance of customers' EMR systems. Specifically, the service can provide 24/7 support and technical support for a large-scale, complex system, and it can help to reduce the work load of ongoing maintenance.

6. Conclusion

This paper described Fujitsu's Medical One-Stop Support Center service. Looking forward, Fujitsu aims to further improve the quality of its operation-and-maintenance support for its customers' EMR systems and make system operation even more stable while expanding the lineup of service products. Fujitsu also plans to develop new services in conjunction with the fast-approaching Cloud-based society so that customers will have almost no need to be conscious of operation and maintenance tasks. From here on, Fujitsu will apply the full power of its expertise from system construction to operation and maintenance to provide safe and secure solutions that meet its customers' expectations.

Reference

1) Ministry of Health, Labour and Welfare: Guidelines on Secure Management of Medical Information Systems. (in Japanese).
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