Outline of Fujitsu's Quality Information System and Its Companywide Application

● Shigehiko Suzuki ● Yasunori Ushio ● Yoshino Miyazawa

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To support the ongoing openness of IT systems, we recently started using components conforming to global standards in our IT products and had to develop a new system for their quality control. We have also developed a companywide quality information system (QIS) whose aim is to ensure our hardware products have the highest quality and reliability to meet our customers' need for 24/7 operation of IT systems. QIS integrates the management of information covering the entire lifecycles of Fujitsu products, from design to recycling. This paper outlines QIS and describes the company-wide improvements we have achieved through its use.

1. Introduction

Fujitsu's quality information system (QIS) has been in use since 1977, the year after operations began at our Numazu Plant. It was developed for the inspection and electrical testing of components (LSIs, etc.) on printed circuit boards and mother boards incorporated in M Series mainframes that were being made by the plant at the time for quality management purposes. The objectives of the system were early detection of faulty components and to prevent the shipment of "alarm lots". Afterwards, its application was widened to include the quality management of all other computer parts (units, power supplies etc.) and through the accumulation of historical data from the evaluation, assembly, testing, and shipping processes, QIS became able to rapidly determine the impact of faults at the time of detection and provide swift responses to them.

However, with the advent of open systems, the functions of computers have been enhanced and their mode of use has changed so system failures have a major effect on daily life. In response to these changes, in 1999 Fujitsu expanded the scope of QIS to include information from product planning and design processes, and client system maintenance information, as well as to all other products besides mainframes.

In this paper, we cover the integrated management of process quality from the planning stage up to the design process, management of historical quality information, and follow-up when faults are detected for mass produced products, as well as integrated management for customer system operation information. Regarding the visualization of quality status, we look at the statistical analysis of accumulated data as well as the quality reporting service that consists of functions for the automatic preparation of monthly and other reports. Finally, we consider the efforts made to expand the use of such functions companywide.

2. QIS functions

As shown in **Figure 1**, QIS consists of design quality, mass production quality, maintenance information, and quality information

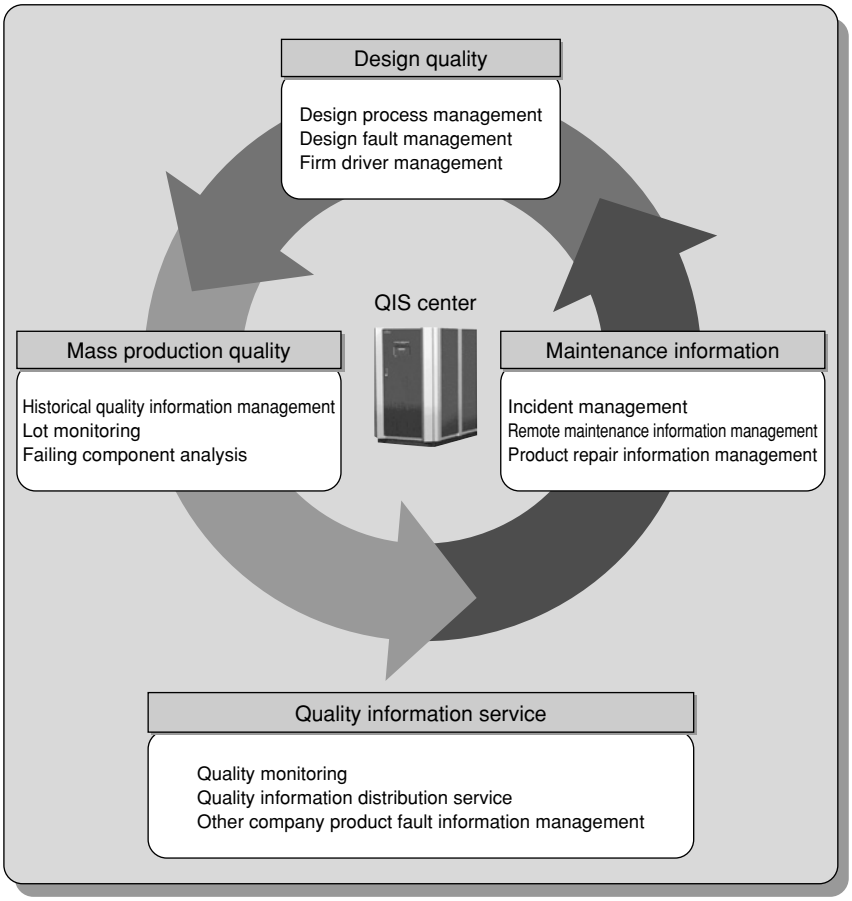

Figure 1
Composition of QIS.

service. In the following, we explain the major functions of these parts.

2.1 Design quality

The functions that design quality performs are design process management, design fault management, and firm driver management. Design process management and design fault management are further described below.

1) Design process management

This function manages development process plans and results from design to shipping so that the progress status can be known in a timely manner, and process delays avoided.

- Visualization of progress status
- Development process plan and results management
- Integrated management of progress between division and plant
- Management of plan preparation, registration, and approval in development process

2) Design fault management

The purposes of design fault management are the management of testing and evaluation items at the design and testing stages, the management of detected faults, and speeding up the process from the detection of faults to their resolution by making the drafting of testing and evaluation item sheets more efficient and sharing know-how. Under design fault management the following are managed.

- Final status of design faults

- Preparation of evaluation items and work procedures sheets from model
- Automated preparation of testing procedures plans/results and fault status progress
- Fault registration, responses, registration of results of checks, notifications and requests made by E-mail
- Expansion of common problems to other types of equipment and their effective resolution

A typical test item sheet and a progress report are shown in **Figure 2**.

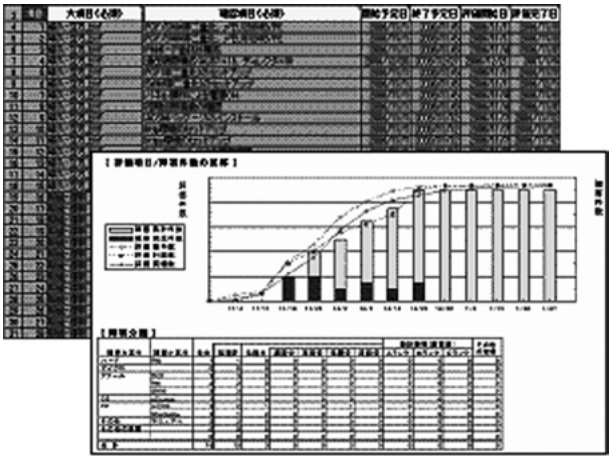

Figure 2
Progress report (front) and typical test item sheet (behind).

2.2 Mass production quality

Mass production quality covers historical quality information management, lot monitoring, and failing component analysis. Historical quality information management is explained in the following.

Mass production quality manages quality information for all processes from evaluation, through manufacturing and testing to shipping. Consisting of the following types of management, its purpose is to speed up the determination of the impact of faults experienced by customers and development of countermeasures.

- Evaluation history: quality evaluation of materials, components, units, etc.
- Manufacturing history: plant manufacturing process, manufacturer, etc.
- Testing history: product mass production testing details and results (tester, testing date, results of testing, etc.)
- Shipping composition history: composition by device unit number; device version number, manufacturing date, serial number, etc.

2.3 Maintenance information

Maintenance information covers incident management, remote maintenance information management and product repair information management. Incident management and remote maintenance information management are explained in the following.

1) Incident management

Incident management aims to maintain uniform operation in client systems by speeding up the process from the receipt of incident information from the customer and the support division to the response. It covers the following.

- Incident receipt, response management, requests and notifications
- Responder dispatch, approval management

2) Remote maintenance information management

The purpose of remote maintenance information management is to monitor the operation of systems covered by remote maintenance agreements and prevent faults from occurring in customer systems by carrying out preventive maintenance. It involves the following.

- Real-time monitoring of customer systems
- Automatic application of repair patches
- Automatic analysis of events and abnormal log information

2.4 Quality information service

Quality information service covers quality monitoring, quality information distribution service and other company product fault information management, which are explained in the

following.

1) Quality monitoring

The purpose of quality monitoring is to maintain uniform operation in customer systems by analyzing customer quality information by customer and system, rapidly detecting quality abnormalities and dealing with them swiftly. It has the following functions.

- Monitoring of quality status based on individual customer and product quality information management indicators and alarm notification
- Management of measures in response to alarms and monitoring their results
- Automatic generation of quality control charts (graphs etc.)
- Trend analysis for events and countermeasure details

Figure 3 shows a quality control chart and results of trend analysis.

2) Quality information distribution service

The purpose of this service is to speed up the process of work by distributing the necessary quality information to the people who require it from a PUSH-type portal site. It achieves the following.

- Faster collection of information by acquiring it as soon as it is generated
- Accumulation of tacit knowledge as explicit knowledge using "conversational site" which supports knowledge creation

3) Other company product fault information management

This function rapidly accesses fault information for other company products and swiftly assesses the impact of such faults on Fujitsu products.

- Automatically accesses fault information within quality information published on other company websites
- Assesses the impact on Fujitsu products and disseminates this information in-house.

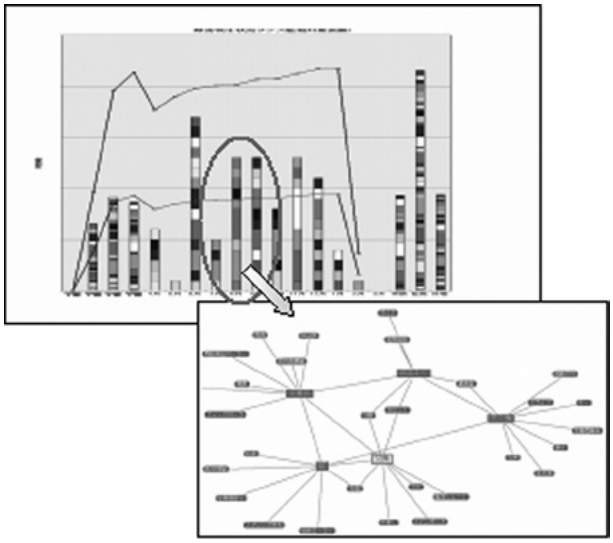

Figure 3
Trend analysis sheet (front) and quality control chart (behind).

3. Companywide application

In this section, we will look at the efforts that have been made to apply the system companywide, as well as in associated companies, through the use of the QfinityBANK[note)] and QfinitySaaS environments. We first give a brief explanation of QfinityBANK and QfinitySaaS and then describe the flow of operations.

1) QfinityBANK

The objective of QfinityBANK is to keep IT investment in check. This is done by having each division of Fujitsu register systems they have developed, sharing information and disseminating case reports and application examples. It has the following functions.

- Registration, search, and provision of usage rankings and application examples
- Registration of developed systems through linkage with Qfinity projects.

2) QfinitySaaS

Using the QfinitySaaS environment enables work services to be used immediately without the

note) QfinityBANK is an information system, which accumulates example data, developed in Qfinity quality improvement activities.

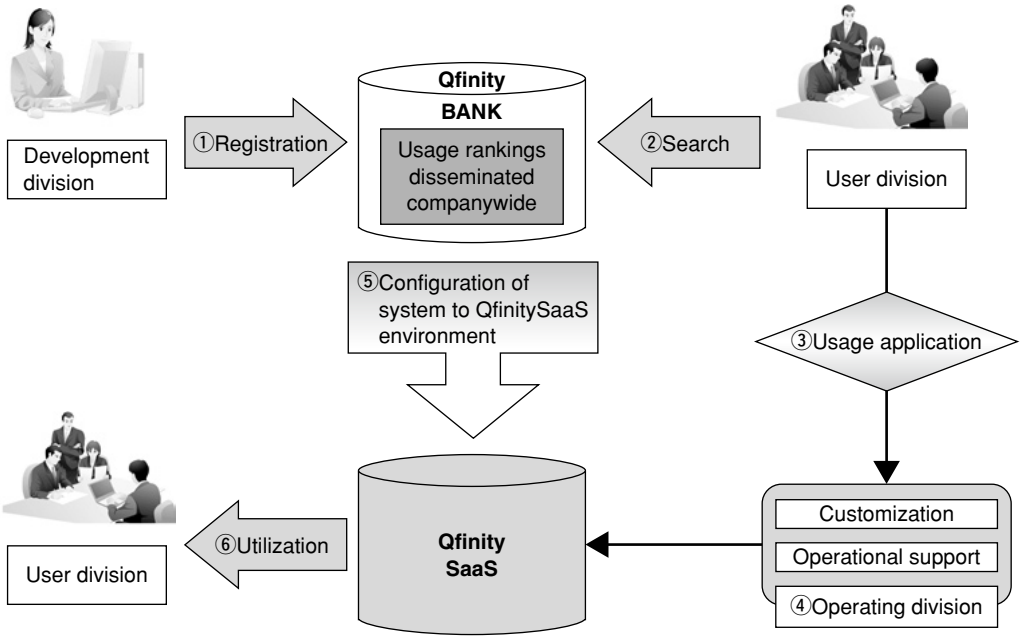

Figure 4
Flow of QfinityBANK and QfinitySaaS.

need for initial system investments (hardware, software, other equipment), which speeds up work. QfinitySaaS has the following functions.

- Immediate use possible on filing QfinitySaaS usage application
- Multiple requests from user divisions can be incorporated in services
- Cost savings through centralized operation (fault monitoring, data saving, Q&A)

3) Operational flow of QfinityBANK and QfinitySaaS

The operational flow of QfinityBANK and QfinitySaaS is shown in **Figure 4** and is explained in the following. The development division registers systems it has developed in QfinityBANK (①). Other divisions investigate systems and study their use (②). If introduction is feasible, they make a usage application to the operations division (③). The operations division customizes the system, responds to FAQs, and provides other support (④). Systems registered in QfinityBANK whose introduction proves effective and are introduced frequently are configured to the QfinitySaaS environment (⑤). User divisions use systems under the Qfinity SaaS environment (⑥).

In addition, systems are publicized companywide through E-mail magazines and meetings are held to explain the results of introducing systems to divisions using actual examples, with the objective of expanding the use of these systems.

4. Conclusion

In this paper, we focused on the functions of QIS and its introduction companywide. In recent years it has become impossible to gauge the impact of system stops on daily life and with this in mind, Fujitsu aims to keep customer systems operating uniformly through the exhaustive use of quality information in system proposals, the rapid detection of quality problems and prevention of malfunctions.

Shigehiko Suzuki, *Fujitsu Ltd.*
Mr. Suzuki graduated from Shiroishi Technical High School, Miyagi, Japan in 1971. He joined Fujitsu Ltd., Kawasaki, Japan in 1971, where he has been engaged in research and operation of Fujitsu's quality information systems.

Yasunori Ushio, *Fujitsu Ltd.*
Mr. Ushio received the B.E. degree in Engineering from Shizuoka University, Shizuoka, Japan in 1983. He joined Fujitsu Ltd., Numazu, Japan in 1983, where he has been engaged in research and development of Fujitsu's quality information systems.

Yoshino Miyazawa, *Fujitsu Ltd.*
Ms. Miyazawa graduated from Kyoritsu Women's Junior College, Tokyo, Japan in 1985. She joined Fujitsu Ltd., Numazu, Japan in 1985, where she has been engaged in deployment of Fujitsu's quality information systems.