Fujitsu's Approach to SaaS in Japan —Fujitsu SaaS Platform—

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Software as a service (SaaS) and related services have appeared in recent years as an evolution of the application service provider scheme. SaaS enables corporate users to use services that are already being provided instead of constructing and owning business systems on their own. This has an immediate positive effect on business value such as reduced IT investment and new market development. The concept of Cloud computing, which makes use of new virtualization technologies, has also just emerged and an expansion toward Cloud services that encompass conventional data-center services and SaaS-related services is under way. This paper describes Fujitsu's approach to SaaS business in Japan as a first step toward global expansion, focusing on a SaaS platform that will provide core service functions to support this transition from existing SaaS to future Cloud services.

1 Introduction

The mid-1990s saw the launching of the Internet for general users and the appearance of application service providers (ASPs), utility computing, and related services. Then, in the mid-2000s, as the system infrastructure environment ranging from terminals and cell phones to networks, servers, and storage expanded and matured and as open source software flourished and application creation and deployment technologies such as Java, Ajax, and mashups evolved dramatically, the software as a service (SaaS) concept appeared. The aim was to overcome the weak points of ASP and improve the practical use of over-the-network services in business. In recent years, system vendors have provided application execution platforms and services covering the range from application to operation from their data centers in addition to the traditional provision of system infrastructure. Furthermore, as customers have expressed a desire to utilize services only when they are needed and to pay for only those portions of services that are used, the concept of Cloud computing has appeared as an approach that provides extremely high scalability (**Figure 1**).

Against this background, the business environment is changing greatly. First, it is becoming difficult to secure personnel because of the effects of the aging society and other structural changes in society. Both customers and vendors are experiencing problems in securing the personnel required for planning, developing, and operating systems as a result of, for example, a mismatch between the skill set required for designing, developing, and operating legacy systems and that required for today's open source systems. Second, infrastructure and technology are changing dramatically in the information technology (IT) environment. This is being manifested in the shift toward a ubiquitous society, the explosion in data, and the consolidation of systems in data centers. And

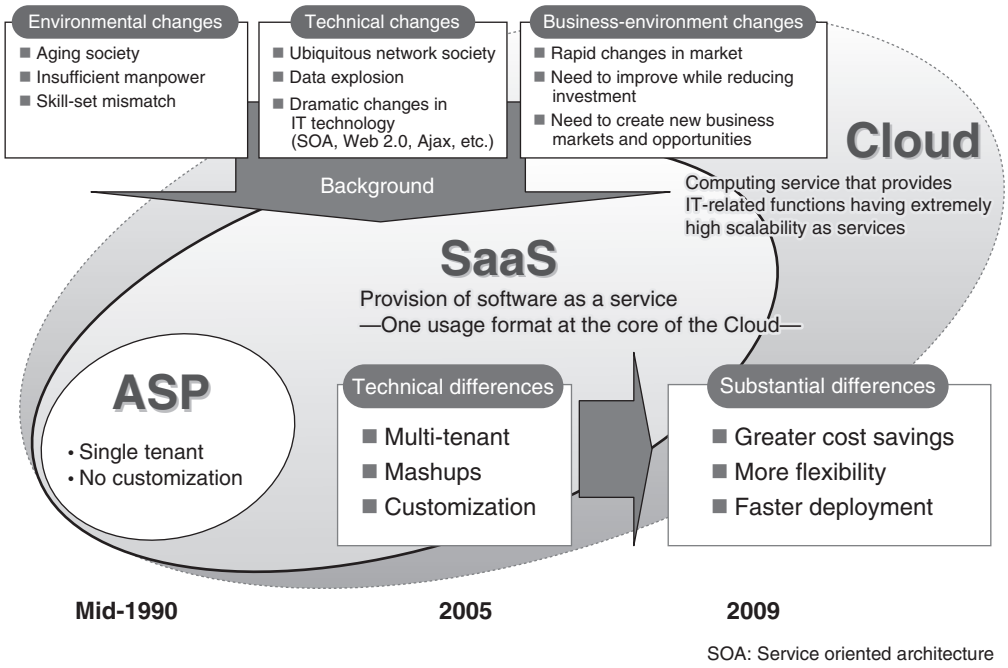


Figure 1
Evolution from ASP to SaaS and Cloud.

third, as the market environment undergoes rapid changes in combination with the first two factors, corporate management is being asked to improve productivity while reducing investment and to create new business markets and opportunities. Accordingly, effective utilization of IT is also needed from the viewpoint of managerial reform.

2. Fujitsu's approach to SaaS

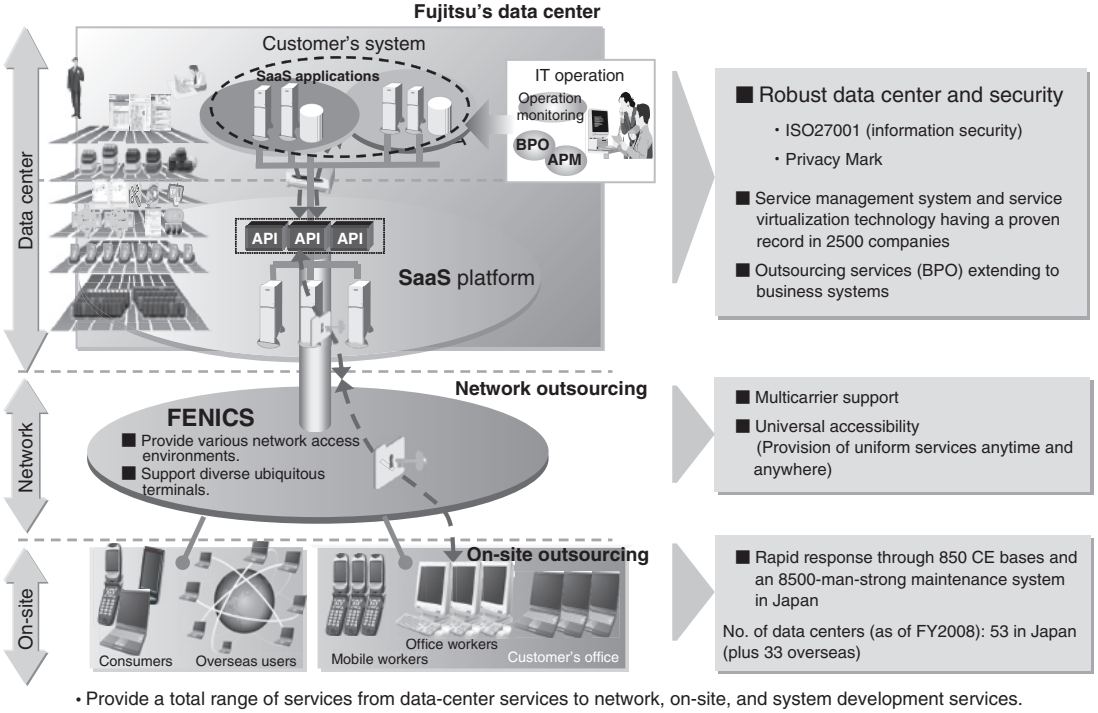
In this section, we introduce Fujitsu's overall concept of software services and describe, in particular, its approach to SaaS, the SaaS platform providing core functions, SaaS applications, and Fujitsu's service menu.

2.1 Overall service concept

The overall concept of Fujitsu's service provision is shown in **Figure 2**. Fujitsu's software services provide a connection between our customer's business and the service users such as the customer's internal users and the customer's customers, i.e., general consumers. Fujitsu provides the facilities, IT systems, and management and operation personnel that lie between that business and those users in the form of either separate or en bloc services. Fujitsu's service concept consists of three layers. The first is the "on-site" layer consisting of the customer's office environment and users' access devices such as cell phones and personal digital assistants. The second is the "network" layer that provides carrier networks, access support for diverse ubiquitous terminals based on those networks, and network virtualization. The third is the "data center" layer for constructing the SaaS platform, SaaS applications, and customer systems and for providing business process outsourcing such as application execution/monitoring, call-center functions, printing, and forms delivery as well as IT operation management.

2.2 Positioning of SaaS services in the Cloud

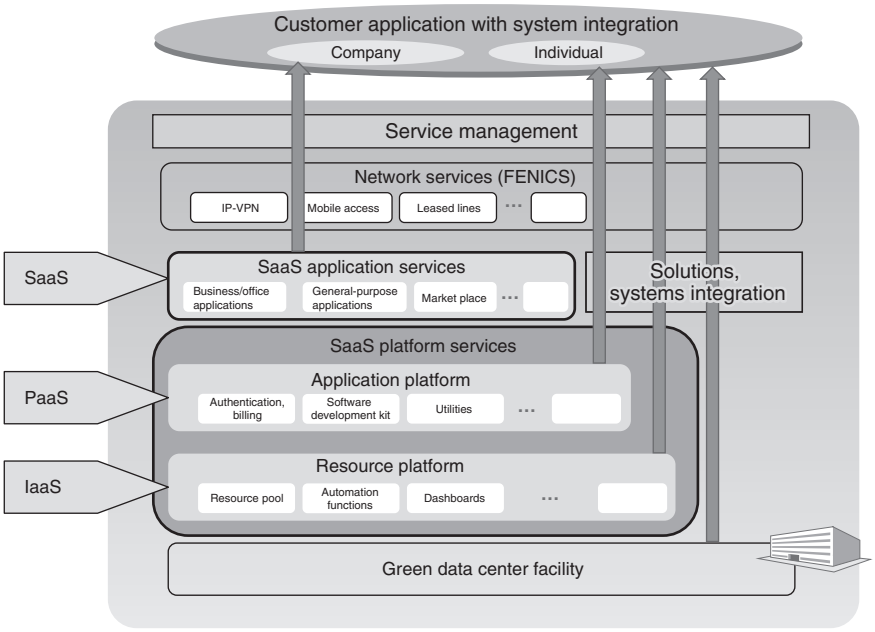
Figure 3 shows how various elements are positioned in the Cloud on the basis of the commonly used concept of a service stack: it shows not only the positioning of SaaS, infrastructure as a service (IaaS), and platform as a service (PaaS),



• Provide a total range of services from data-center services to network, on-site, and system development services.
• Provide high-reliability services from a data center incorporating energy-saving and high-security measures.
• Develop SaaS business for customers based on an extensive track record in ASP, outsourcing, and system development.

API: Application programming interface
APM: Application portfolio management
BPO: Business process outsourcing
CE: Customer engineer
FENICS: Brand name of Fujitsu services[1)]

Figure 2
Fujitsu's service provision concept.



IP-VPN: Internet protocol virtual private network

Figure 3
Positioning of services in the Cloud.

but also the positioning of SaaS services provided by Fujitsu. Here, Fujitsu SaaS platform services consist of resource-platform and application-platform services, which are categorized as IaaS and PaaS, respectively. Fujitsu SaaS application services are categorized as SaaS.

2.3 SaaS services

The service menu for the SaaS platform and SaaS applications can be divided into three service types (**Figure 4**).

1) SaaS platform services

SaaS platform services constitute the basic components of the SaaS services provided by Fujitsu and may be used to support customer development of SaaS business or to construct a company's internal IT infrastructure. They consist of resource- and application-platform services as core service functions and include utilities, development/testing services, and security services as supplementary services.

2) SaaS application services

Fujitsu provides general-purpose applications and business applications as SaaS application services. General-purpose applications consist of various types of common services such as e-learning, groupware, and E-mail that are independent of the business fields. Such services are currently being provided. Business applications, meanwhile, consist of services specific to different types of business such as application submittal and procurement in local governments and administrative tasks in medical care. These services are being rolled out progressively.

3) SaaS business outsourcing services

SaaS business outsourcing services are directed at companies that are developing new SaaS business or companies that are reconstructing their own systems while utilizing SaaS. They can be provided en bloc from Web system development to operation management

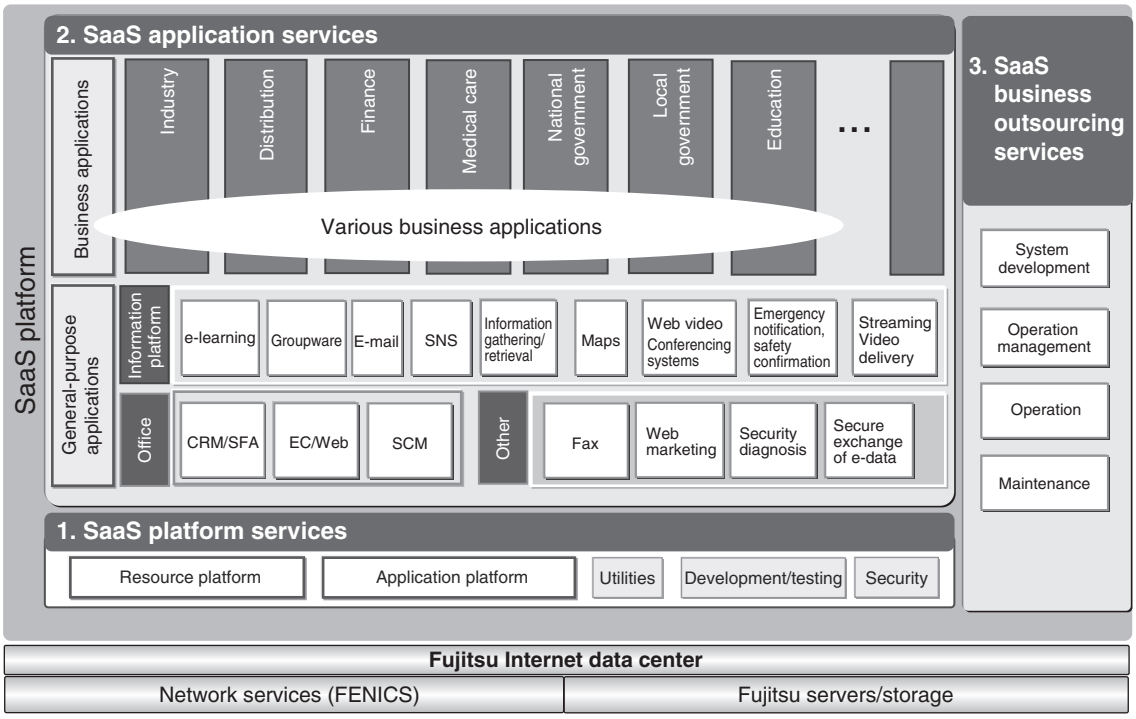


Figure 4
SaaS services.

and actual operations.

2.4. SaaS service targets

SaaS services target a wide range of corporate customers from small and medium-sized enterprises to major firms. Two cases for the use of SaaS services can be envisioned here: (1) construction of a company's own IT infrastructure to raise the efficiency of a mixed system resulting from the addition and upgrading of facilities in a company with separate-work systems and (2) launch of new SaaS or PaaS business as part of new business development. The latter is especially attractive to independent software vendors, system integrators, carriers, and the information systems department of large companies. These cases are depicted in **Figure 5**.

2.5 SaaS platform

An overview of Fujitsu's SaaS platform is shown in **Figure 6**. It shows the positioning of related network services, development and testing services, and SaaS applications running on the SaaS platform. As a platform for loading and executing applications to be provided as SaaS, the SaaS platform consists of two components.

1) SaaS resource platform

This platform provides system resources such as servers and storage including access security from the Internet as an on-demand hosting environment. The servers come equipped with a wide array of software from basic operating systems to open-source middleware. After performance testing and security checks have been performed, the servers are provided to customers. They constitute an environment that can be used immediately after applications have been loaded. In contrast to existing on-demand services, in which performance and security must be tested at the construction stage in relation to the basic system, the SaaS resource platform is superior in terms of quick startup and safety.

2) SaaS application platform

Fujitsu provides the SaaS application platform to transform business applications to Web services, execute them as SaaS applications, and manage the services so provided. This platform consists of two core functions: "SaaS application execution control" for controlling the actual execution of SaaS applications and "SaaS service execution management" for managing in an integrated manner the operation of various types of services that provide multiple SaaS

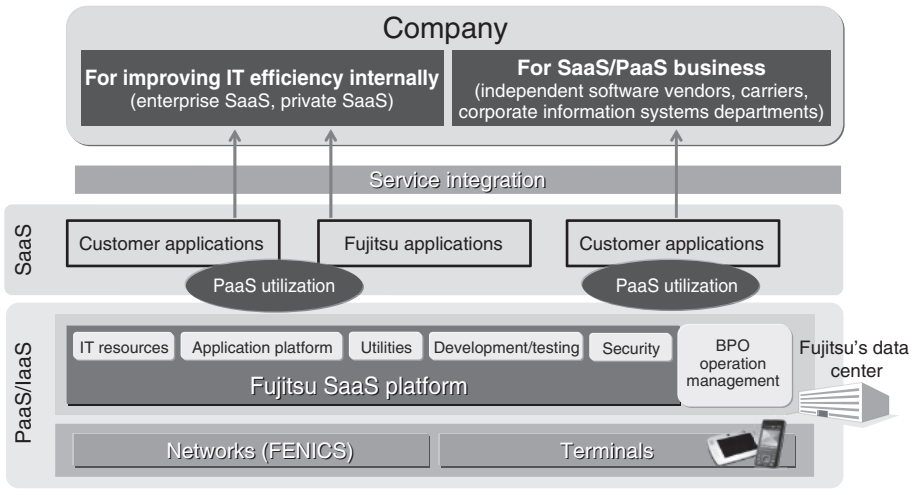
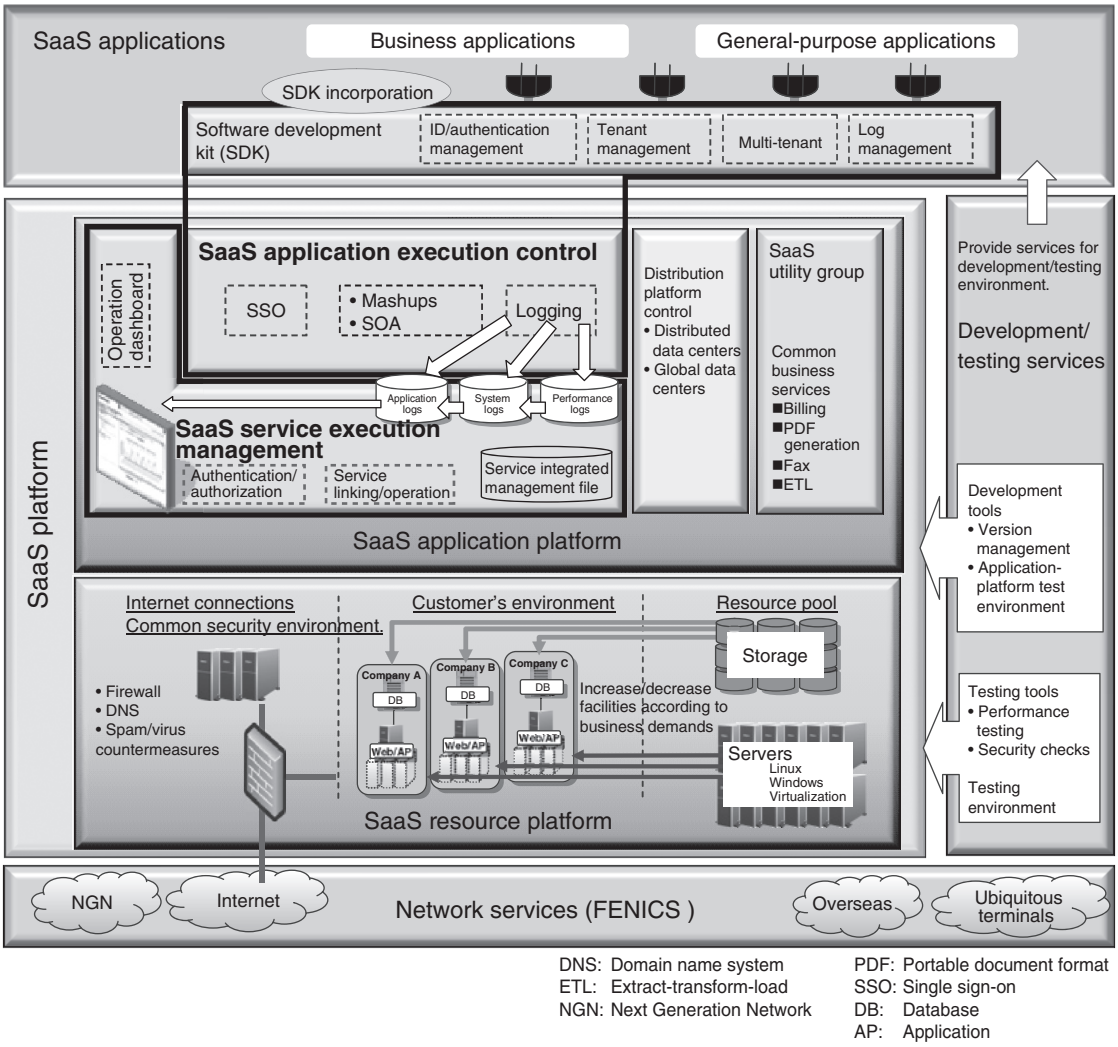


Figure 5
SaaS service targets.



DNS: Domain name system
ETL: Extract-transform-load
NGN: Next Generation Network
PDF: Portable document format
SSO: Single sign-on
DB: Database
AP: Application

Figure 6
Fujitsu SaaS platform.

applications. These two functions are described below.

SaaS application execution control targets business and general-purpose SaaS applications and provides user authentication functions appropriate to the access rights of logged-in users, identification (ID) management functions for each corporate user (tenant), screen allocation for each tenant, multi-tenant control functions for switching between database areas, and logging functions. Here, a software development kit, which is provided as part of the "SaaS application control" function, is incorporated as an application programming interface on the SaaS application side to control the execution of SaaS application functions.

SaaS service execution management provides integrated management of user data, enterprise data, authentication information, and other control data that must be shared between multiple SaaS applications; controls function linking between applications; and provides service catalog/linking functions available for use as Web services and process-data management functions for execution services. Also provided are functions for SaaS service managers. These include log management functions that provide various types of logs for billing, examining system

operating conditions, tabulating availability, etc. and integrated service operation functions such as for integrating Web screens in the form of operation dashboards.

Looking forward, Fujitsu is also studying the provision of a "distributed platform control" function for linking SaaS applications that are distributed among multiple sites. There are also plans to expand "SaaS utility" functions as a supplementary function group of SaaS applications. SaaS utilities consist of business packages and business applications that are deemed to be necessary when providing SaaS applications. They are prepared beforehand and provided as a Web service function group. The plan is to prepare an extensive array of functions, from billing, settlement, and operation-monitoring functions that are needed to manage a business to form-creation, fax-delivery, Web-crawling, and search functions as a supplement to business functions and data-backup functions as a supplement to system operation. The various functions provided by the SaaS application platform are generally released and provided in the form of application programming interfaces based on the extensible markup language (XML) and the simple object access protocol (SOAP) or representational state transfer (REST) protocol.

3. SaaS problems and countermeasures

Software services have been provided for over 25 years—a period that has seen the progressive rollout of data center services, ASPs, and the like. However, it has been only about four years since the beginning of SaaS-related activities, and even in the meantime, new concepts such as Cloud computing have emerged. Below, we describe points that customers should keep in mind when setting out to utilize SaaS and problems and countermeasures that Fujitsu must consider in relation to SaaS.

3.1 SaaS concerns

There are four main points that customers should keep in mind when applying SaaS: there may be tradeoffs between enjoying SaaS benefits and satisfying business requirements, the overall service level may drop if multiple services are used in combination, quality itself will not necessarily be improved by the application of SaaS, and business might be interrupted if the SaaS provider withdraws.

1) Tradeoffs

Under the assumption that SaaS cannot meet all business-function requirements, the customer's organization should have individuals who can decide the pros and cons of applying SaaS from a business viewpoint.

2) Overall service level

Although the capability of mashing up services is a key feature of SaaS, customers should perform a thorough survey of how the use of multiple providers or multiple services in combination may affect the performance, support, and general service level of the services in question. They should also perform integrity verification of the total service level.

3) Quality improvement

When considering the application of SaaS, customers must think realistically about the expense, time, and staff required to obtain service functions and quality equivalent to that of internally developed services.

4) Business interruption

Finally, when investigating the use of a SaaS function for which no alternative services exist, the selection criteria should include the financial condition of the SaaS provider and alternatives should be studied.

3.2 Countermeasures

Here, we describe countermeasures that Fujitsu should take to avoid the abovementioned concerns and problems that occur in relation to SaaS. This is not a transient activity. Instead, it is an ongoing effort to raise the value of services

by conferring with the customer and developing a common awareness of problems in conjunction with the actual provision of services.

1) Visualizing the direct effects of using SaaS

The use of SaaS can have various direct effects depending on the purpose of application and the business targeted. Although uniform evaluation is difficult, we consider here the possibility of evaluating the use of SaaS from the two viewpoints of business system functions and standard criteria.

- Business system functions: business functions (applications), system functions (system infrastructure), and operation functions (operation management, operations)
- Standard criteria: quality (service, load reduction, and availability), performance, safety (security and continuity), operability, implementability/extensibility (speed, data linking, etc.), maintainability, ease of evaluation, and cost

2) Reforming service provision style

Upon setting out to provide SaaS services, Fujitsu realized that it had to revise the way it deployed and provided services, in particular, the way that it defined system business requirements, designed user interfaces, constructed systems, and managed operations all on the basis of knowledge gained from constructing conventional separate work systems and performing outsourcing. Fujitsu seeks self-reform in provision techniques and style with the aim of launching high-quality services quickly based on a SaaS service platform. One example of such a change would be to apply services to the customer's business and then compensate for differences on the basis of fit/gap analysis.

4. Direction of envisioned services and future developments

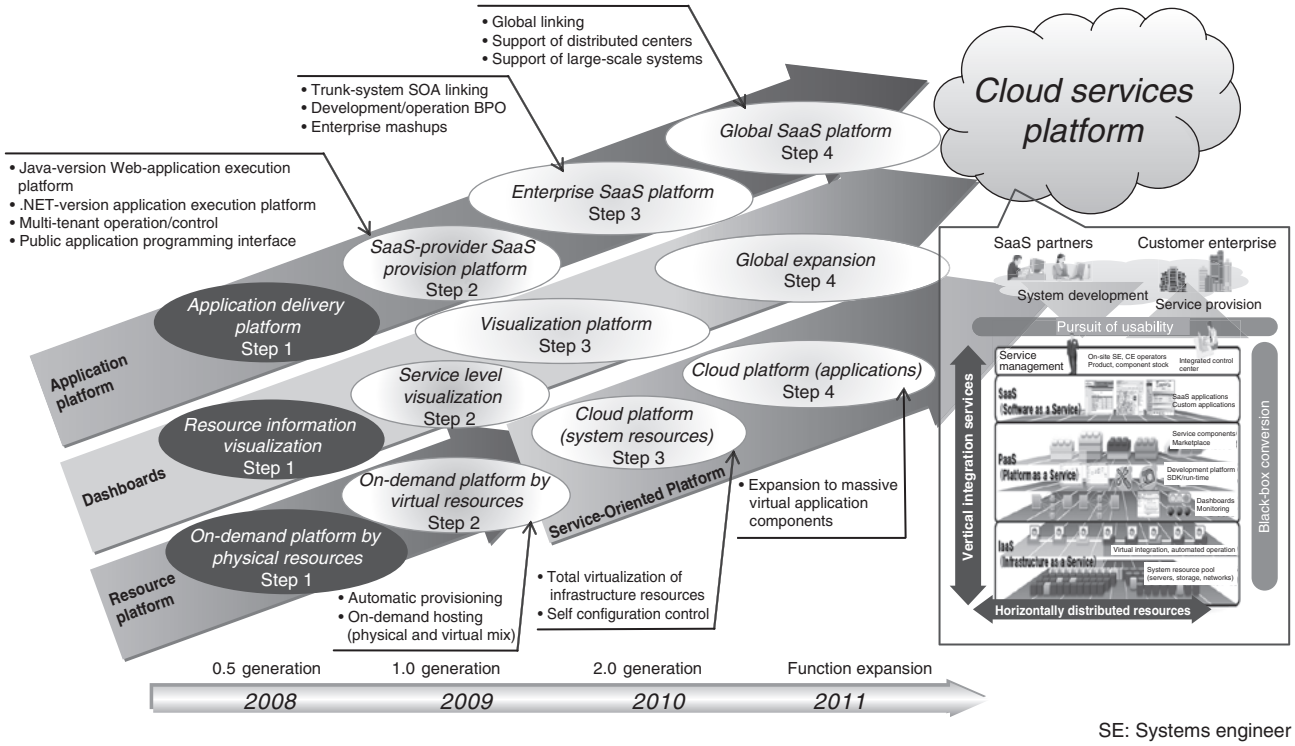
4.1 Direction of envisioned services

As described in section 2.4, SaaS services target a broad range of companies, from small and medium-sized enterprises to major firms. In addition, their usage format can be broadly divided into two contrasting cases: providing standardized services widely in their original form and incorporating individual needs while adhering to the framework of standard services. Although both cases correspond to Cloud services, the former represents the public Cloud while the latter represents a private or enterprise Cloud (or private SaaS). However, in both cases, Fujitsu aims to incorporate the latest technology while taking into account the market needs of both. For the latter, in particular, Fujitsu would like to develop a better understanding of the customer's business and extend the service functions to be provided in accordance with customer needs. However, it is difficult to make a big contribution to business and management for customers of various corporate sizes by simply combining functions. As a countermeasure to this problem, Fujitsu would like to become an even greater part of the customer's business and expand its offerings to total business outsourcing in a form that combines business process outsourcing such as call center operations and print delivery and on-site outsourcing such as network management and management of the customer's office equipment.

4.2 Future developments

The development roadmap for resource-platform, application platform, and service-visualization functions as the main functions related to the SaaS platform is shown in **Figure 7**.

The period up to 2008 focused on studies of the business model and target market for SaaS



SE: Systems engineer

Figure 7
Future developments.

services and the selection of products for business expansion, platforms using those products, and SaaS applications like e-learning. It was a period of preparation for full-scale expansion. For software vendors, as well, it was a period for making sense of a new situation, that is, for differentiating the new business model from that of the existing one for selling packaged software, for sorting out target customers, and so on. The year for the genuine launch of SaaS is considered to be 2009. First, to promote SaaS services to small and medium-sized enterprises, 2009 will see the launch of the SaaS Platform Project for Small and Medium-sized Enterprises promoted by the Ministry of Economy, Trade and Industry (METI). This project is expected to encourage software vendors to turn their efforts toward SaaS development. Second, with regard to SaaS services, the need to make the SaaS platform into a corporate IT platform is being felt, which signals a transition in the target market from small and medium-sized enterprises to major firms and enterprise SaaS. To this end, the resource platform will come to provide hosting services based on virtual servers in combination with the conventional scale-out type of on-demand services based on physical servers. Moreover, in terms of application platform functions, a platform for loading Java-version and .NET-version Web applications as PaaS will be provided. The period up to and including 2009 can be regarded as first-generation SaaS using existing Fujitsu products and separately constructed systems.

2010 will be the beginning of second-generation SaaS featuring the introduction of new technologies. For the resource platform, the objective will be to have the customer himself select a configuration of servers, storage, and other system resources that best meets business needs and to have him use virtualized services. For the application platform, the objective will be to provide total services by incorporating a Web-

based service oriented architecture platform and service mashup technologies as well as business process outsourcing services for application to corporate IT. Looking forward, the plan is to support service execution from multiple distributed service centers and to extend functions and services with an eye to global expansion.

5. Conclusion

In this paper, we described Fujitsu's approach to SaaS, problems and countermeasures in SaaS development, the direction that services are expected to take, and future developments, in Japan as a first step toward global expansion. The coming of new services like SaaS and Cloud services should bring about drastic changes not only in the format of IT systems, but also in business style. These services, however, have only just begun; they are at various stages within each company in which customer expectations and provider-proposed concepts and ideas precede service concepts, service definitions, functions, service levels, etc. In other words, SaaS services are now in a state very much like an expanding Cloud. Both customers and providers need to throw off the illusion that these services will be able to cover all types of corporate business. On the provider side, we are obsessed with learning more about the customer's business and place top priority on solutions where the application of SaaS or Cloud services will be most effective. Instead of beginning with server mechanisms, Fujitsu stresses establishing a trusting relationship and partnership with customers while remaining committed to adding value to the customer's business. Our plan is to standardize and release SaaS service functions that fully reflect customer needs.

Reference

1) FENICS. (in Japanese).
http://fenics.fujitsu.com/networkservice/

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Fujitsu Ltd.
Mr. Satake joined Fujitsu Ltd. in 1982 and worked on the development and deployment of electronic data interchange packages. In 1985, he started to develop and deliver a network application service platform, which was the ancestor of the SaaS business. In 1990, he led the IT outsourcing business, which provides system operation services for customers. In 2003, he directed ASP services and Web system integration. He has directed SaaS business since 2006.