BusinessView Maintenance Work Solutions Utilizing Smartphones

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Abstract

BusinessView (called CSView/Reception Management by NEC) is a contact center application by NEC Nexus Solutions that enables the centralized management of reception processes, starting from the reception of customer inquiries all the way to completion of processing. BusinessView Maintenance Work Solutions improve the efficiency of maintenance staff assignment and the response time to customer requests by performing location management (GPS information) of staff whereabouts and the management of their schedules. It also improves the efficiency of maintenance work by taking advantage of the functions of the smartphones carried by staff, such as searching relevant in-house documents, entering maintenance work data, and enabling printing of the maintenance completion reports from a mobile printer.

1. Outline of BusinessView

Companies are facing issues involving customer satisfaction with the improvement and efficiency of procedures in dealing with customers. BusinessView is a system as well as a service that is customized for the "contact center" to solve such issues. NEC Nexus Solutions has developed this business package system with a view to offering improved satisfaction to customers by enhancing the quality of customer service. It also serves to provide a seamless linkage to the relevant departments. Another consideration has been that the system was developed with the intention of providing optimum satisfaction to the "contact center" operators that use it.

Based on our experience in the development of a customer consultation system for an automaker in 1992 we have now been carrying out the development of packaged products and the construction of systems exclusively for use by "contact centers" for more than a decade. Our products have been used in various industrial categories and operational types such as manufacturing, retailing, service, financing, and local authority, thereby resulting in introductions to about 20,000 clients in about 250 companies in Japan.

We also started a contact center operation consignment service in 1996 that offers know-how for the "contact center" administration and systems integration engineering.

In addition, we provide templates for the food and medical/pharmaceutical industries, and for municipalities that are based on our business expertise.

Background of the Development of BusinessView Maintenance Work Solutions

We were entrusted with the development of a repairs request reception center system in 2003 and we subsequently assigned requirements as follows.

Requirement 1: The reception center should be able to assign staff when arequest is received and advise the scheduled visit time tothe customer.

Requirement 2: The reception center should be able to notify staff of thelocation to visit, appointed time, and repair request details.

Requirement 3: Staff should be able to report work progress including thetime of arrival on site and starting/finishing times of thework.

Requirement 4: The reception center should also be able to control the progress and results of the work.

Requirements 1 and 2 are functions that are essential for maintenance work where immediate action is a must, whereas Requirements 3 and 4 are functions that enable the reception center to control the handling situations. To achieve these requirements, we created a system that can notify work orders using i-mode mail and updates work status via i-mode connection to web servers.

BusinessView Maintenance Work Solutions Utilizing Smartphones

2. Smartphone Linkage

Accompanied by the proliferation of smartphones, the effectiveness of utilization of smartphones for business use has been attracting attention. When smartphones are used in maintenance work, they present the following benefits when compared to mobile PCs.

1) Lightweight and compact
Maintenance personnel need to minimize the belongings that they carry in addition to the essential tools and replacement components.

2) Operable when walking
Because maintenance staff check confirmation points and enter the results while performing inspection rounds, quick start-up and easy operations are required (the use of a mouse and keyboard is not desirable).

3) Cost of the terminal units
The cost of the terminal units allotted to all maintenance staff must to be kept low.

Against such a background, the smartphone compatible functions intended for maintenance staff were incorporated in BusinessView, resulting in the enhanced version of October 2011. This version was released as BusinessView Maintenance Work Solutions in order to target new markets in addition to the conventional market for contact centers.

2.1 The need for Environmentally Friendly Smartphones

As mentioned above, BusinessView works on the assumption that the PC screens of the customer contact representatives at contact centers are used. Therefore, it is necessary to overcome issues such as those relating to security when accessing from outside the company using a smartphone. The number of man-hours required to complete the development were also of concern. Such issues as these were targeted in creating business systems that were compatible with smartphones.

2.2 Considerations to be Observed When Adapting an Existing System to be Compatible with Smartphones

(1) Security considerations
Personal information such as customer names and addresses is handled in the maintenance of home electrical appliances for example. For this reason, a repair request reception center system is installed in the company intranet. In order

therefore to connect to such a system from a smartphone, it is required to use a platform that enables easy and secure connection to the intranet.

(2) Considerations of operability
When a web application optimized for existing PCs is displayed on a smartphone screen, the screen size may be restricted and the operability may be considerably deteriorated due to the inability to use a pointing device. This makes it necessary to develop displays that are specifically applicable to smartphones.

(3) Provision of a development environment that is independent of models and OSs of terminals
It is required that the reference/entry display applications of the maintenance work terminals be provided with screens that have been developed exclusively for particular businesses because requirements vary with customers. It is also required that the database information on the reception center side be referred to in real time.

To build such a business system, the dependency on terminals and OSs is high when developing a dedicated application for smartphones. This makes it necessary to redistribute applications to the terminals each time the system is expanded and to perform the development and evaluation according to the type and version of the OS of the targeted terminals. For this reason, we thought it would be ideal to develop a web-oriented application based on Java for the intranet application server.

Against this background, Smartphone Linkage Platforms (optional) have been commercialized as a standard platform in order to promote improvements in smartphone compatibility of existing business applications. This solution is indispensable when BusinessView Maintenance Work Solutions are used from smartphones.

2.3 Smartphone Linkage Platforms

The Smartphone Linkage Platform features module-type architecture as shown in the **Table** below and in **Fig. 1** .

2.4 Smartphone Compatible Functions of BusinessView Maintenance Work Solutions

(1) Functions on the repairs request reception center side
Displaying the whereabouts of out of office maintenance personnel on a map by using the GPS function of smartphones makes it possible to visually confirm the presence of any maintenance staff in the vicinity of the area from where the

Table   Modules of the smartphone linkage platforms.

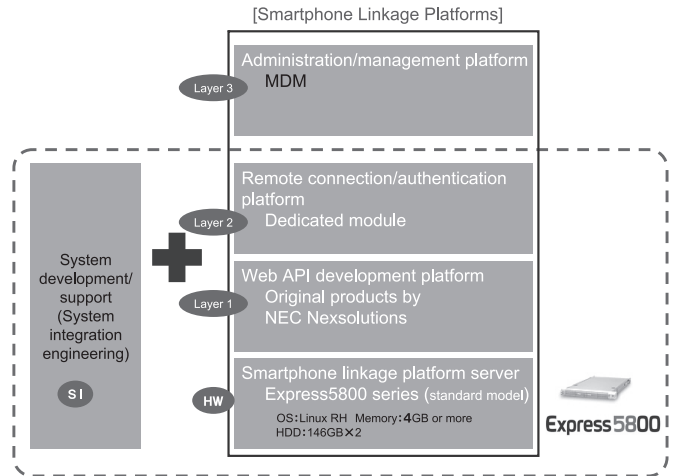| Layer	Basic Available Functions
Layer 1 Web API development platform	• Linkage with smartphones and web systems. • Development and implementation of smartphone-dedicated screens. * Using a development and implementation framework (based on jQuery Mobile) that was specifically created for smartphone web displays, we conducted standardization and efficiency improvements in the applications developments.
Layer 2 Remote connection/authentication platform	• Remote connection and authentication of in-house web systems via the Internet (including single sign-on). • Data is not left on terminals thanks to the web browser-oriented design. (Data leakage prevention function adopting a BYOD policy) * By taking advantage of a dedicated browser, connection is made to mail servers, application servers, and file servers using the connection authentication functionality (fixed passwords, one-time passwords, per-terminal authentication, etc.)
Layer 3 Administration/management platform	• Terminal management function (MDM) * Recommended service-oriented MDM software that is available on the Internet is used.

[Smartphone Linkage Platforms]

Layer 3 — Administration/management platform MDM

Layer 2 — Remote connection/authentication platform Dedicated module

Layer 1 — Web API development platform Original products by NEC Nexsolutions

System development/support (System integration engineering) SI

HW — Smartphone linkage platform server Express5800 series (standard model)
OS：Linux RH Memory：4GB or more
HDD：146GB×2

Express5800

Fig. 1   Schematic diagram of the smartphone linkage platforms.

Searching for the nearest service staff location
Maintenance staff located around the customer will be displayed on the business-dedicated Google Map. The most appropriate maintenance staff can be assigned so that a quicker recovery of the customer environment will be achieved
※Service personnel are required to carry mobile phones with a GPS function.

Sales staff status:
On work
Dealing with a customer
On travel
Returning to the office
Lunch/Having a rest

Work received side
An email to inform the selected service staff of the work occurrence will be dispatched.

Maintenance staff selection
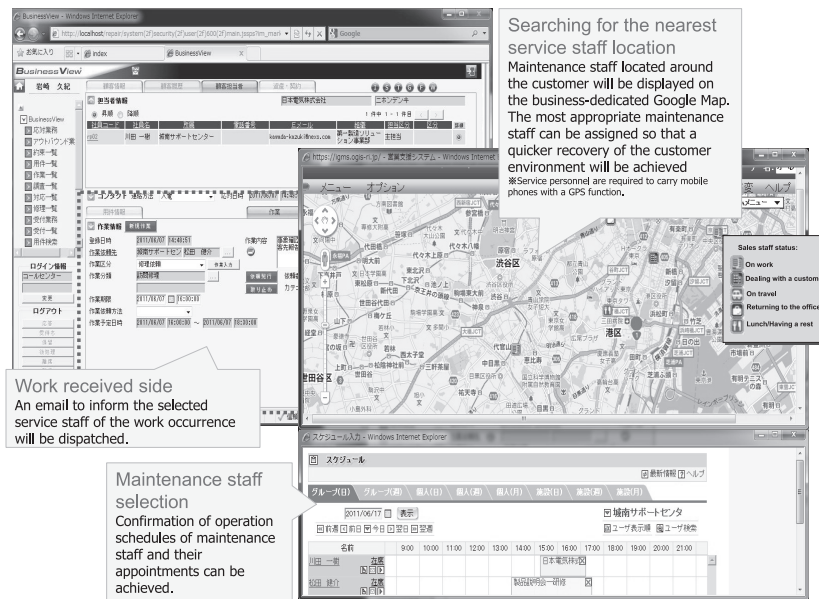Confirmation of operation schedules of maintenance staff and their appointments can be achieved.

Fig. 2   PC displays at the repairs request reception center side.

repair request has been made (**Fig. 2**). This enables efficient assignment of maintenance staff who can most quickly arrive at the location in question when immediate action is required.

Moreover, when this function is combined with a scheduler, confirmation of the operation schedules of maintenance staff and their appointments can be achieved, thereby ena-

bling the assignment of appropriate maintenance staff.

(2) Functions on the maintenance staff side

Creation of repair condition/result registration displays for smartphones makes possible confirmation of operations orders and registration of results while maintenance personnel are out of the office (**Fig. 3**). This means that it is no longer

necessary for them to create reports when they are back at the office after the task is completed.

Moreover, the site conditions both before and after a repair can be shot with a smartphone camera and uploaded to the server, and validation of completion of the repair can thereby be shared in-house.

Furthermore, reports can be printed out by a mobile printer using Bluetooth. The printouts may then be handed to

customers on the spot, thereby enabling immediate customer approval of the repair etc.

(3) Linkage with other systems

The BusinessView Maintenance Work Solutions support the tasks that maintenance staff need to perform when they are out of the office (**Fig. 4**).

1) Browsing of in-house documents

In case manuals need to be referred to during field-work, required information can be browsed when the in-house file server is accessed from a smartphone (shared folders and files on the Windows server may thus be viewed from outside).

2) Linkage with a sales force automation (SFA) system

As for the progress status of a maintenance task, this maintenance work system can be linked with an SFA system. This will allow sales reps to share the progress conditions and results and to update customer contacts.

3) Linkage with workflow tasks such as reimbursement of expenses

To increase the efficiency of payment procedures, submitting requests for payment of expenses such as transport expenses can be made from a smartphone. Moreover, the smartphone linkage platform enables the development of smartphone-dedicated applications equipped with workflow functions.
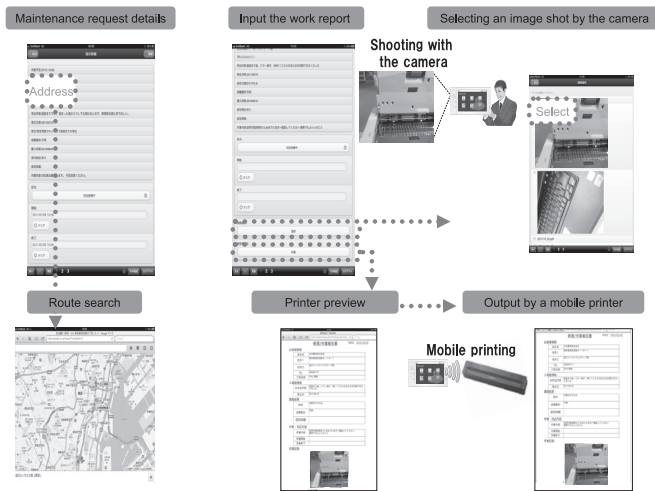

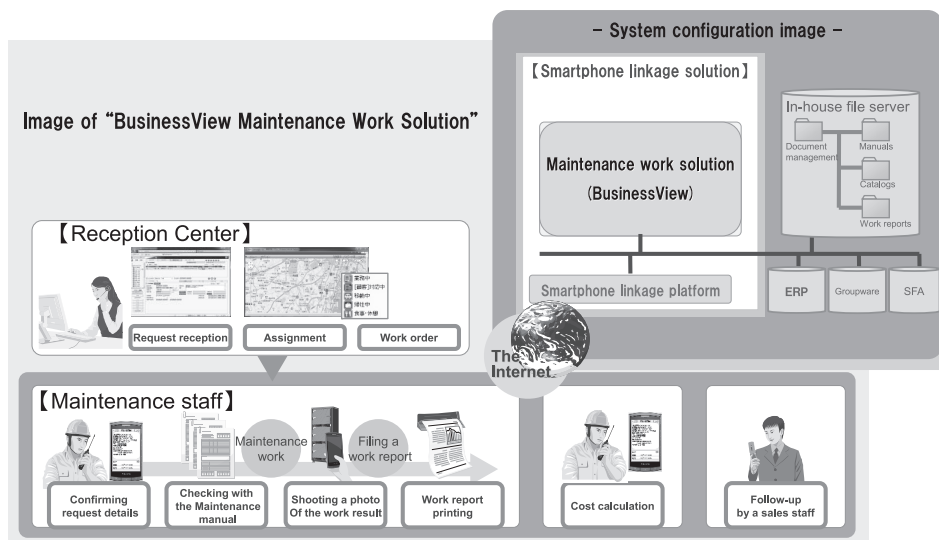Fig. 3   Smartphone displays at the maintenance staff side.

Fig. 4   Schematic diagram of BusinessView Maintenance Work Solutions.

3. Future Deployment

BusinessView Maintenance Work Solutions have been developed based on the expertise of BusinessView, a dedicated application targeting the "contact center." Therefore, they will feature the capabilities of customer inquiries (incidents) management and response history (process) management.

It has been more than a year since product sales started in October 2011, and demand was high in the field of equipment management. Therefore, the equipment management function was added in December 2012. This has enabled its use for equipment maintenance history management using serial numbers such as for plant facilities and heavy construction machinery as well as in the management of apartments for rent.

In addition, a study is currently underway for its application in the new fields that are expected to increase, such as M2M (Machine to Machine, e.g., GPS information and monitoring/alert processing of data of vehicle conditions transmitted from the electronic components of sensors installed in automobiles).

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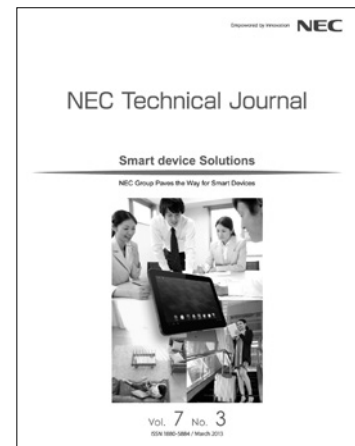
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