Development of a Business Systems Template for Use with Smart Devices

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Abstract

NEC Soft has developed a System Integration (SI) template for business systems that makes use of smart devices to support periodical inspections and checks. The template utilizes Android terminals and is equipped with functions that allow it to be suitable for a variety of business types. An interchangeable components system has been prepared in order to improve the system development efficiency. The template is designed to support global applicability of multi-language compatibility and to promote its deployment in China and Southeast Asia. With a demonstration site built in the OSS cloud-based environment, it is expected to contribute to the discovery by customers of reformed business ideas using smart devices.

Keywords

smart device, Android, global, usability, inter-business, inspection
meter reading, maintenance, open source

1. Introduction

Recently, interest in and inquiries regarding business applications of smart devices, including smartphones and tablet PCs have been increasing in the enterprise markets. Several survey firms report that the number of units will grow greatly in the coming five years, and the sales departments/ SEs (system engineers) of NEC are actually receiving an increased number of inquiries that already assume the use of smart devices.

Nevertheless, the majority of prospective customers who want to utilize smart devices by extending applications to support functions other than in-house mailing/scheduling are still seeking operational situations in which smart devices can be actively utilized. Consequently, at NEC soft we are often requested by NEC to make optimum proposals as an SI vendor and to offer business systems that can actually be practiced in customers' businesses. As business SIs utilizing smart devices are also a prominent topic at NEC Soft, we have proceeded to the development of business applications that can be used as the basis for responding to such needs from the customers, sales departments and SEs of NEC.

As a part of these efforts, we have developed an SI template for business systems (hereinafter simply referred to as "the template") for supporting periodical checking operations. For example for periodical maintenance in the field that is still based on paper and with which the introduction of IT is expected to offer a significant contribution [*1] .

2. Outline of the Template

The template is an SI component for use in developing a system that can perform periodical inspections and checks of equipment in buildings and facilities; such as business buildings, apartment houses, stores and factories and of the service situations of employees. It uses a single smart device terminal. The introduction of such a system is expected to bring about the following advantages.

- Improved portability by decreasing the number of items to be carried, such as the check lists for each facility, drawings and digital cameras etc.
- Improved man-hour efficiency in transferring data from the check list to the management database (including Excel, etc.) after checking (**Fig. 1**).

[*1] The patents for the next templates pending as of December 2012 are: "Equipment Inspection Support System, Server, Client Device and Equipment Inspection Method and Program" and "Equipment Inspection Support Device, Equipment Inspection Support Method and Program."

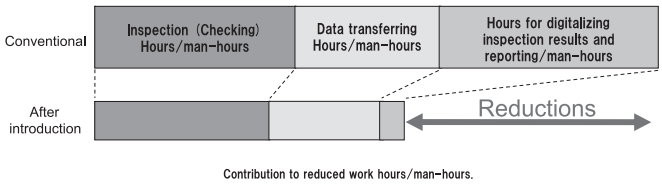

Fig. 1 Contribution to reduced work hours/man-hours.

- Possibility of accurate data collection via linkage of pictures and checked positions at the time of data input. That is, you can collect accurate data of records easily as the data is archived at the time of inputting.

2.1 Template Business Use Situations

The template can contribute to various types of business activity by performing periodical inspections and checking operations. Possible business situations include the following.

(1) Periodical inspection of installations and equipment at large facilities

In large-scale buildings, apartment houses and public facilities such as water supply and sewage treatment plants, thousands of installations are inspected during safety management patrols. If the inspection/maintenance personnel carry terminals and input historical data and photographic records, the consequent speedy collection of accurate data can contribute to improved safety management.

(2) Store survey of retail industry

In enterprises that run shop chains such as supermarkets, convenience stores and rental shops, the area supervisor visits each shop to check the situation. If the area supervisor carries a terminal and records shelf contents, shop cleaning and clerk services etc., the information will contribute usefully to improvements in the client services.

(3) Inspection and checking of products flowing on the production lines

The system based on the template is not only to be used in periodical checking of facilities and equipment in premises, but it may also be applied to inspections of products flowing on the production lines. By checking the measurement results, failures and defects during inspections and sharing the data across the system, the data can contribute to quality improvements due to the early discovery of defective articles at the production stage.

2.2 Configuration of the Template

The template is composed of a server-client type system. It uses an AP server and a DB server to record checked items, organize schedules and assign staff (**Fig. 2**).

Workers can log in the system via smart devices and download the checking operations to be conducted according to the authority of each person via Wi-Fi. The template is designed to permit the stand alone offline use of a smart device because checking may also be performed out of reach of radio waves such as underground or in a tunnel (**Fig. 3**).

After completing all of the checks, the Worker uploads all of the checked results data to the server. The data history is output in the CSV format from the server.

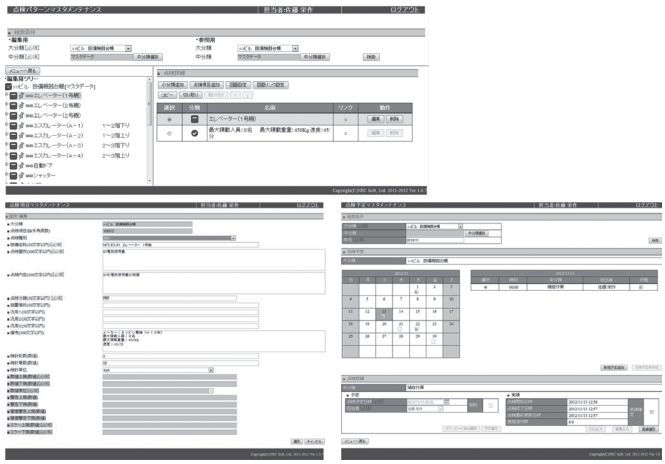

Fig. 2 Examples of server displays.

Fig. 3 Examples of smart device displays.

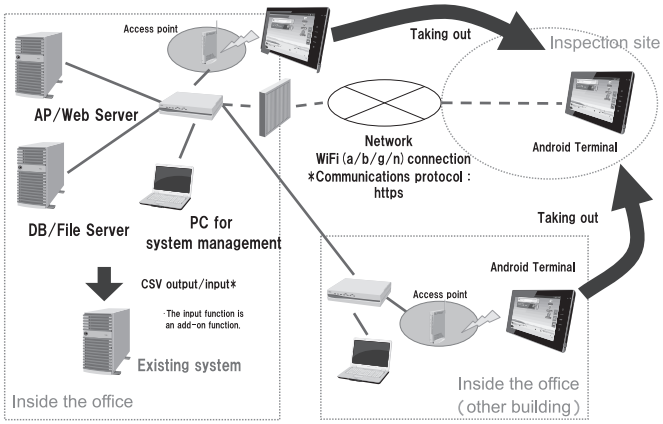

Fig. 4 System configuration.

The template provides the access point for the data entry. Since the requirements of the history management after the CSV output vary between each customer, these operations are not developed under common specifications. As a result, after the history data output stage, our basic policy is to take the SI operations as according to the requirements of each customer, for example to input the data into the customer's existing system or to auto-output data in the specified format (**Fig. 4**).

2.3 Android OS Compatibility

The template is currently compatible with the Android OS. It has been developed as an Android-native application for the following reasons:

- Since the template will be applied to operations conducted outside the office and in unfavorable environments, the terminals need to be tough, dustproof, waterproof and shock resistant.
- Considering those customers that need terminal portability more than screen size as well as those that prefer to browse using a large screen, it is necessary that a wide variety of screen size options are provided (4, 7, 10-inch, etc.).
- Comfortable operability should be implemented so that the terminals are easy to use, even by those who are not accustomed to them.

We decided to develop the template as an Android application because there are abundant options of terminal types in the business field in which the template is used and for which Android enables linkages with various sensors.

3. Template Features

The features of the template can be broadly classified into three major features.

3.1 Preparation of Interchangeable Component System

The Android terminal has limited processing speed and memory capacity compared to the PC. Considering this constraint, we prepared functions as listed below. The use of this template-interchangeable component system can contribute in improving efficiency compared to develop a system from a scratch and makes the template applicable to other domains than that of periodical inspection and checking (**Fig. 5**).

Interchangeable system

- Terminal inventory (OS version, MAC address) information acquisition.
- File encryption (obfuscation).
- Camera control/image processing.
- SD card management.

Sample source system

- Auto updating to latest programs.
- Terminal data erasure under control from the server.
- Permission for connection only from specified terminals.
- Encryption of terminal-server communications.
- Enlargement/reduction of images (drawings).
- Branching of processing into online and offline by checking the Wi-Fi communication status.

Since data is retained in the terminal during business operations, technical measures are adopted that consider assurance of security on smart devices. If a higher security level is required, it is important to propose and introduce the system by combining the smart device management system (MDM: Mobile Device Management).

3.2 Global Deployment Measures

The periodical inspection and checking operations to which

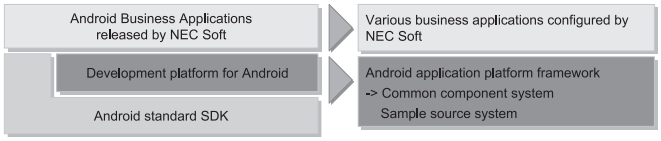

Fig. 5 Concept of Android application business platforms.

Fig. 6 Examples of Chinese (simplified character) displays.

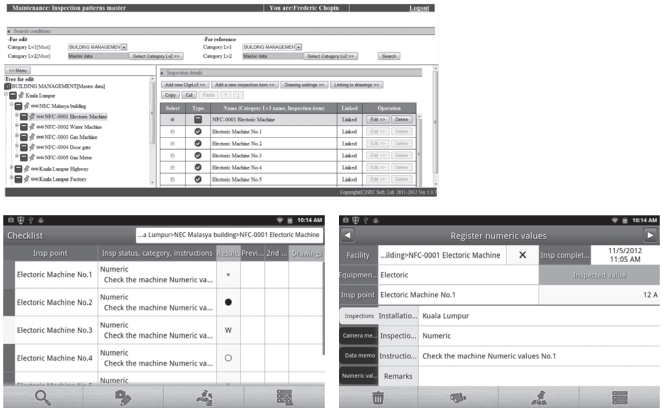

Fig. 7 Examples of English language displays.

the template is applicable are not specific to Japan but the same needs are also to be found overseas. Particularly, the potential for strong desirability is expected in Asia where the economy is showing significant growth and infrastructures are being prepared at a rapid pace.

Therefore, we have provided the template with a function for switching the language settings of both the server and the smart device display between displaying Chinese (simplified characters) and the English language (**Fig. 6** and **Fig. 7**).

In China, we have already started the technology transfer to local affiliated corporations so that they may deploy and support the system by themselves. In Southeastern Asia, we have started building demonstration environments and technology transfer systems in Malaysia, Singapore and Indonesia. We are planning similar deployments in China to these countries and we are making preparations with a view to offering the service to advanced enterprises in other Asian countries.

3.3 Enhancement of Usability

The users of periodic inspection and checking operations applying the template are expected to extend from the senior to the younger generations as well as to non-Japanese workers in consideration of the global deployment plans. This means that the smart device functions of the template should be used by a wide range of people and that a user interface that can deal with all of them should be prepared.

At NEC Soft research department (VALWAY Technology Center) we have staff that are exclusively researching the usability, who are investigating easy to use user interface systems on a day to day basis. With the present template development project, we have staff participate in the project from the initial phase in order to advise on display layouts and icon positions etc. As a result, we were able to package globally-applicable interchangeable designs in the colors, currencies, date formats and icons, and of succeeding in implementing display images that are easy to use for a wide range of people.

4. NEC Group Confidently Proposes to Aim at Business Systems

We have already prepared demonstration/trial sites of the template on the OSS cloud-based environment. That can be tried by prospective customers and sales personnel/engineers of the NEC Group for a limited period.

In addition, since we at NEC Soft possess proprietary sensor technologies including M2M and excellent voice and image recognition technologies, combining these technologies with the template is expected to lead to wide ranging business improvements.

We will be very pleased if the use of these tools can contribute to the discovery of new business improvement ideas using smart devices across a range of business types. At NEC Soft, we are determined to continue our endeavors to develop excellent systems for our customers that can contribute to an improved commercial environment.

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*Excel is a registered trademark or trademark of Microsoft Corporation in the U.S. and other countries.

*SD is a trademark of SD-3C, LLC.

*Wi-Fi is a registered trademark of Wi-Fi Alliance.

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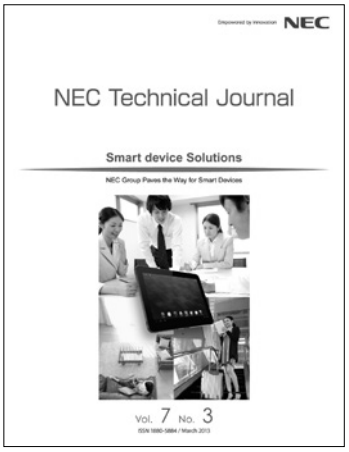

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