

# Analysis of Issues to promoting the Desktop OSS and its Solutions

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Japan OSS Promotion Forum Desktop Subcommittee  
Problem Extraction Task Force

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## Chapter1 Background and Purpose of This Document

In the server environment, utilization of *open source software* (OSS) has penetrated steadily in terms of cost advantages, stability, reliability, and scalability. On the other hand, utilization of desktop OSS has not progressed smoothly. To improve this situation, demonstration experiments for desktop OSS introduction have been conducted targeting schools, municipalities, and public offices. Most of these experiments were successful, and it was demonstrated that there would be no problems with migration to desktop OSS in many cases, but at the same time, disincentive for migration and the autonomous spread of desktop OSS were revealed.

The Problem Extraction Task Force established by the Japan OSS Promotion Forum Desktop Subcommittee reviewed results of the past demonstration experiments and organized disincentive to study solutions. In addition, the subcommittee conducted a questionnaire mainly targeting user companies and added an analysis about the priority of each problem. In light of the results, the subcommittee also studied approaches to eliminate the factors hindering the spread of desktop OSS (Figure 1.1).

We will report the results in this document and expect that the status of the spread of desktop OSS will improve as a consequence.

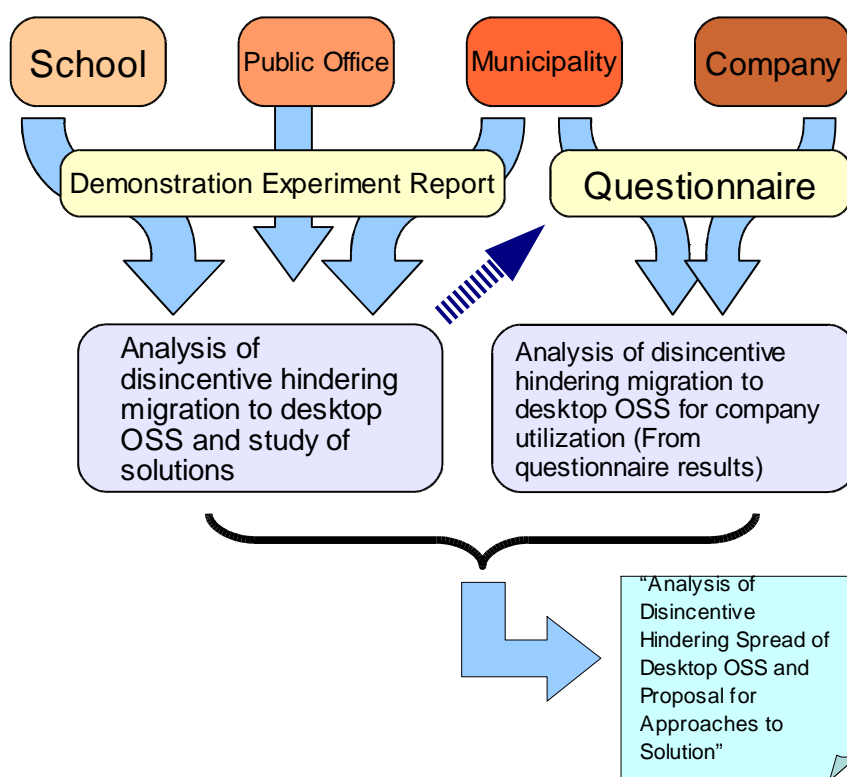


Figure 1.1 Work flow

### 1.1 Structure of This Document Problem

In this document, Chapter 1 outlines the background and purpose, and Chapter 2 explains how to analyze disincentive toward the autonomous spread of the desktop OSS. Chapter 3 describes a summary of studied solutions after organizing the disincentive from the demonstration experiment results. Chapter 4 reports questionnaire results targeting the examination of user companies. Finally, Chapter 5 presents some of the current approaches and suggests a future activity policy based on knowledge obtained from the current activity.

## Chapter2 How to Analyze Disincentive

### 2.1 Extraction of Disincentive from Demonstration Experiment Reports

First a method of extracting disincentive from the demonstration experiment report and the scale of demonstration experiments as an extraction source will be described.

#### 2.1.1 Operation Procedure

The following procedures were used to analyze the disincentive in the migration to desktop OSS and to propose solutions. This document is a summary of the following operations.

1. Extract problems forming disincentive for migration to desktop OSS from a variety of past demonstration experiment reports about desktop OSS introduction.
2. Classify the extracted disincentive into several categories, such as a technological factor, the systems environment, and problems of introduction and management.
3. Organize results of demonstration experiments conducted by school, municipality, and public office based on each category.
4. Focus on similarities or individual situations, then study and propose solutions if possible.

#### 2.1.2 Scale of Demonstration Experiments

Regarding the demonstration experiment at school, disincentive were extracted from the following reports:

- 2004 Open Source Software Utilization Infrastructure Development Project “Demonstration Experiment for Open Source Software Utilization in the School Education Field” of the Information Technology Promotion Agency, Japan
- Report of Results of Demonstration Experiment Utilizing Linux-Dedicated Desktop PC
- Report of Results of Demonstration Experiment Utilizing KNOPPIX
- 2005 “Open School Platform Research Study Report” of the Center for Educational Computing

The demonstration experiment targeting schools has been conducted for two years since 2004. Targeting a total of 25 schools in 13 areas, statistically over 10,000 students and teachers from elementary schools to universities participated in the experiment and evaluated desktop OSS.

Regarding a demonstration experiment targeting municipalities, focusing on analysis of an experiment conducted in Ninomiya-Cho, disincentive were extracted and solutions were studied. In Ninomiya-Cho, 139 staff members utilized an individually distributed desktop OSS PC and evaluated its function, operability, and problems about introduction and operation.

Regarding a demonstration experiment targeting public offices, analysis was added based on an evaluation of an experiment conducted by the Ministry of Economy, Trade and Industry. Although a report of the results from this experiment was undocumented, an outline was revealed in the following article.

- “Ministry of Economy, Trade and Industry adopted Linux desktops in the ministry to be used by staff for business routine,” Nikkei ITPro, March 31 2005,  
<http://itpro.nikkeibp.co.jp/free/ITPro/NEWS/20050301/156848/>

Information from the results of the following survey conducted in 2003 (somewhat out of date) was also added to the analysis of disincentive in public offices for further study.

- 2003 Open Source Software Utilization Infrastructure Development Project “Demonstration Experiment Feasibility Survey for Open Source Software Utilization in the Electronic Government” of the Information-technology Promotion Agency, Japan

## 2.2 Trend Analysis of Disincentive with Questionnaire

Next, procedures for analyzing the awareness in the trend of disincentive with a questionnaire and questionnaire items will be explained.

### 2.2.1 Operation Procedure

The following procedures were used to analyze the trend in disincentive for migration to desktop OSS with a questionnaire. This document is a summary of the following operations.

1. Create the plan for questionnaire items based on the results of disincentive extracted from demonstration experiment reports.
2. Consider and create a questionnaire for the Problem Extraction Task Force of the Japan OSS Promotion Forum Desktop Subcommittee.
3. Distribute questionnaires to member companies in cooperation with companies on the steering committee of the Japan OSS Promotion Forum and the Japan Users Association of Information Systems.
4. Compile collected questionnaires and analyze the trend in disincentive.

### 2.2.2 Questionnaire Items

The plan for the questionnaire items allowing for trend analysis of disincentive for migration to desktop OSS was created with the following information from companies that responded to the questionnaires.

- Business category and scale of introduction of computers, excluding ones used as servers
- Introduced and used OS/application
- Status of business processing dependent on particular platforms
- Availability of OSS introduction consideration
- Grasp of requests about peripherals in case of OSS introduction
- Grasp of priority when extracting results of disincentive from demonstration experiment reports

## Chapter3 Analysis of Disincentive

This chapter will describe disincentive for migration to desktop OSS actually extracted from demonstration experiment results and their solutions.

### 3.1 Technological Problems

First, disincentive based on technological problems are shown.

#### 3.1.1 Application

##### A Current Status and Problems

###### a) School

In the demonstration experiment, Windows-based applications were ported to the Linux platform. Some functions in Windows did not work on Linux, so the lesson progress method or the operational method had to be changed in some cases, causing teachers and students to complain.

In addition, as applications, such as Ichitaro Smile and Study Note, which pupils and students had used before were not available for Linux, a problem arose where students were not given time to learn the operation of different software.

More specifically, problems such as the following were found: an application necessary for school use (Intra Buckets by JR Shikoku Communication Ware Co., Ltd.) did not run in the Linux environment. In addition, the programming language Dolittle was not available for use in the Linux environment because this Java application internally calls native Windows APIs and some Windows applications that run under Wine had misleading file system interfaces. Additionally, custom applications developed by software vendors are still used for school use as necessary.

###### b) Municipality

It seems that necessary applications are insufficient compared to the Windows environment. For example, few GUI-based data compression/decompression tools released as OSS support Japanese. In addition, some commands, such as unzip, must be made to support Unicode (it is OK to only add S-JIS?) and respond to compression files in .exe format (how about LHA for Linux?). In addition, when killer applications that can be used on desktop OSS are compared to those in the Windows environment, in most cases software in the same category exists, but it does not have the same functions. Website design software is one such example.

###### c) Public Office

With regard to applications used for ministry business and commercial applications, proprietary applications for business needs exist, and such applications are developed with a dependence on functions specific to particular products, sometimes resulting in vendor lock-in. If there is not a Linux version of installed applications (or compatible applications), it is more difficult to change applications (although the application cost is low, the costs for recreating operation procedures, support structure maintenance, and staff reeducation are necessary), possibly disincentive hindering the introduction of OSS.

##### B Solution

Most specific applications used in schools are commercially developed by dedicated education vendors. It is necessary to study and promote measures to increase the business advantages of migrating to OSS or supporting Linux. There was also an opinion that enhancing the software already supporting Linux could solve the problem of software deficiency.

In fact, as educational materials that can be used with a web browser increase and more interactive e-learning content adopts a web-based system, the importance of educational software as a stand-alone application will decrease. There is a possibility that promotion of web system standardization will solve most of the

problems. It is desirable to promote formulation of a web system for educational applications.

### 3.1.2 Desktop Utility

One problem is that minor desktop utilities are not maintained or access to such information is difficult.

#### A Current Status and Problems

##### a) School

There was a case where software to capture sound to mark waveforms could not be used in class because it was not globalized. In addition, there are few kinds of software that can be used in class.

Another problem is that software responding to school units (supplied with a textbook or downloaded from educational contents) only supports Windows. In addition, globalization of software that people want to use has not been promoted (e.g. TuxPaint).

##### b) Municipality

Desktop utility software is insufficient compared to Windows software.

#### B Solutions

The number of small OSS desktop utilities is enormous, but most are not pursuing completion but stay at a level aiming to only meet the individual creator's needs. In addition, because personal use is sufficient, distribution of information about each application is inadequate.

It is desirable to research and study whether desktop utilities are sufficient, actualize information distribution measures, including the "Windows Forest" (further utilization of OSS information portals such as OSS iPedia), and supplement insufficient utilities.

### 3.1.3 WWW-Related Matters

Most educational materials in school are web based. In addition, there is a tendency to implement an intranet as a web application in municipalities and public offices, which cannot be ignored.

#### A Current Status and Problems

##### a) School

There are problems with websites that are dependent on particular browsers such as IE. Examples of specific problems are as follows:

- Plug-ins are only for Windows and cannot be used (Shockwave plug-in).
- Some pages contain tags that can only be interpreted in Internet Explorer (embedding of moving images using an object tag)/
- IE-specific vertical writing functions (writing-mode:tb-rl) are used.
- An applet in the parent frame is called from inside an inline frame, which operates only in IE.
- There are problems passing variables from Java to JavaString in J2SE 5.0, disrupting screen updates.
- A particular character (" - ~") is mapped differently in Unicode between Microsoft Java and Sun Java and is not properly interpreted.
- Messages are garbled because the appropriate character code is not specified.
- Use of a dynsrc tag disrupts the play of moving images.
- The speed of playback in .swf format (sound and moving images) is different between IE and Mozilla.
- The speed of playback in Mozilla is slow.
- An HTML tag for sound file embedding <BGSOUND> is used.
- JavaScript does not work because a reserved word is used for a form name.

## b) Municipality

The interface for a variety of information systems managed by the central ministries depends on IE, and many websites cannot be accessed with Firefox and Mozilla. For example, the Dell website causes a similar symptom to that of the central ministries and displays the message "Please use IE."

## c) Public Office

Content dependent on particular browsers exist for both web pages on the Internet and web pages on an intranet. Page creators check content using the same browser and are often not aware of problematic display using other browsers. There is also a case where staff members use an authoring tool from the same vendor as that of the browser to create content increase the web interoperability discrepancy.

## B Solution

Along with the development and spread of the CMS and development framework, problems with web interoperability discrepancy on the WWW and web applications tend to decrease. However, the problems have not been completely resolved and the above-described problem still exists, and some modifications to the past enormous amount of assets are needed.

As an approach to this problem, a system that mechanically corrects the problems has been developed, and a service to absorb the differences in display depending on web browsers has started. Action is also needed to educate authoring tool vendors, web designers, and website administrators and to promote the creation of web content in accordance with the standards collected via this service.

Some are of the opinion that slight problems can be ignored because teachers and students did not care about them. Vendors are beginning to voluntarily implement measures to address the problem of web interoperability discrepancy to requests from schools, proving that in addition to mechanical modifications, requests from users to vendors are useful in resolving the web interoperability discrepancy.

### 3.1.4 Simple Database

#### A Current Status and Problems

##### a) School

Applications, such as Kiri and MS Access, are used as specified by local authorities. There was a problem that changes in local authorities resulted in changes in the educational committee.

##### b) Municipality

MS Access, FileMaker, Kiri, and dBASE III are often used depending on the municipal organizations. These are utilized when staff members create an application for themselves to make non-routine tasks more efficient and are indispensable for performing tasks. Therefore, ways to migrate these applications are a major concern (although there are many requests for migrating in-house-developed applications created with MS Access to OpenOffice.org Base (particularly in the Revenue Department) in Ninomiya-Cho, compatibility is low at the present time, and it is difficult to give lectures to the staff).

### c) Public office

MS Access is often used. System operation to connect from MS Access to the center DB via ODBC and compiling data is also adopted.

### B Solution

In a feasibility survey conducted by the National Institute of Advanced Industrial Science and Technology in 2003, many people said that they could not migrate because there were no database applications corresponding to MS Access. Currently the situation is a little better because OpenOffice.org Base has been developed.

To migrate to OpenOffice.org Base, it is necessary to improve compatibility with existing databases such as Kiri, MS Access, and FileMaker, and develop and disseminate data migration tools from existing databases.

## 3.1.5 Compatibility of Office Document Data

### A Current Status and Problems

#### a) School

Regarding compatibility of individual tools, the following opinions were offered: compatibility of word-processing and spreadsheet programs is high, but there are no countermeasures when VB is incorporated with a macro; compatibility with PowerPoint is a problem (e.g. garbled animation or displays); and compatibility with WordArt is moderate, while that with AutoShapes is low. In addition, fonts disappeared when a file created with Windows was opened. In attempting to compensate for a problem in operation, for example, as ruled lines of Excel data created with Calc are garbled, changes in Excel data are OK but initial creation should be avoided.

#### b) Municipality

Migration of in-house applications customized with Excel VBA (including many added sheet functions rather than applications) is also a major concern.

### B Solution

When looking at the results of the demonstration experiment, some people are actually satisfied with moderate compatibility. However, on the whole, the level of satisfaction with compatibility is still low, and it is highly possible that it constitutes a major barrier to migration. Full compatibility is not necessary, but efforts to increase compatibility with office documents are required. Especially problematic points should be tackled intensively in terms of cost-benefit performance, and it is necessary to develop strategies for items with high compatibility needs, such as prevention of garbled layouts because of differences in handling line space and responses to applications with VBA.

## 3.1.6 Access to Server

### A Current Status and Problems

#### a) School

One important problem is access to the data stored on Windows servers. This problem has two cases: one capable of sharing data with Windows using the SMB client and the other requiring the ncp and ipxutil environment depending on distributors when using Netware.

One school reported a technological problem about a homework submission method that needed to be solved. An environment where users can use a system “whenever” and “wherever” increases convenience. Some measures are needed so that data can be stored via the network. However, this is not a only problem

for the OSS environment.

#### b) Public Office

Access to a variety of resources, such as a file sharing server with single sign-on, is required. There are differences in available characters for password authentication, and in some cases, this difference needs to be addressed during user environment migration or the cost for user reeducation (to make users thoroughly aware of the change in available characters). In addition, different servers, depending on the purposes, are recognized as a “drive” and used flexibly in that way, requiring measures to intentionally make them look like a “drive” or requiring user reeducation.

#### B Solution

Basically this is a problem that must be handled as an individual SI matter, but at least a framework for sharing information to achieve it is needed. One example is further utilization of OSS iPedia. In addition, it would be good to develop a method responding to specific examples that could cause problems for many sites, for example, the realization of seamless access to an environment with Active Directory.

### 3.1.7 C/S System

#### A Current Status and Problems

##### a) Public Office

Systems have been developed with Visual Basic and require installation of client software. For that reason, they cannot be used in the desktop OSS environment. In addition, JavaScript is often used in web-based systems, and supporting all browsers is considered difficult. It is necessary to establish common rules for system development and for disclosure of technology information.

#### B Solution

It is necessary to make users aware of the advantages of system construction in accordance with open standards and change systems that will be supported by the OSS at system modification. To do so, the above-described establishment of common rules and disclosure of technology information must be promoted in advance.

### 3.1.8 Character Code Problem

#### A Current Status and Problems

##### a) School

A character code problem was found in verification of compatibility with Windows files. As the Japanese locale only supports UTF-8 in JDS, handling of Japanese characters in an application supporting only EUC was limited.

##### b) Municipality

The Windows default code system is SJIS (CP932), with which all documents are created (file names and contents are written in SJIS code). When migrating to desktop OSS, seemingly using SJIS as a Linux code system can solve all the issues, but considering the obvious fact that UTF will be the de facto code system, a code change from SJIS to UTF-8 (UTF-16) and EUC to UTF-8 (UTF-16) and i18N of system commands, such as GNU tools, are essential. Although it is assumed that all PCs will accept a code change during the transition and migration because it is easy to expect that a mixed environment will be created, trouble-free usability in a mixed environment of SJIS and UTF is needed.

In the introduction demonstration in Ninomiya-Cho, the following problems were identified: the problem

with compression technology for files (it is believed that in most cases, Linux does not adopt an object-oriented architecture, unlike Windows, but implements direct system calls from the GUI and displays information via the exchange of arguments and returns the values from such commands), existence of platform dependent characters and ones with multiple correspondence relations such as “～,” and the problem where an automatic code change cannot be done with an NFS mounted volume.

In terms of migration from the Windows environment to the desktop OSS environment, it is believed that the character code problem must be emphasized the most. In addition, True Type fonts are used when migrating Windows Gaiji(external fonts) to the desktop OSS environment, but because there is not an allocation function for the Windows system code table, a problems occur in the application display and printing (refer to the Gaijisection, as well).

## B Solution

It is true that a gradual migration to Unicode is evident, but the fundamental solution is to migrate to Unicode aggressively at a certain point. In fact, the school demonstration experiment in the CEC project shows that some schools applied the code change to all existing contents for execution of the 2006 experiment and plan to integrate into Unicode in the future. However, to handle past assets, preparation of a converter is compulsory.

### 3.1.9 Gaiji (External Fonts)

#### A Current Status and Problems

##### a) Municipality

Japanese FEPs, such as Wnn and Canna, as well as ATOK, do not have an Gaiji creation/registration function.

##### b) Public office

It is not a problem, but there is administrative direction to replace Gaiji with JIS Level 1 and Level 2 characters when disclosing document management information.

## B Solution

We believe that there is no need to handle Gaiji for desktop OSS. As it is expected that the development cost of a desktop capable of handling Gaiji is high, conditions requiring Gaiji with business analysis and separate environments handling Gaiji are required, and on that basis, development of applications to handle Gaiji for necessary tasks or adoption in existing applications should be considered.

### 3.1.10 Print

#### A Current Status and Problems

##### a) School

On the whole, there are problems with printing (e.g. complete print failure, print failure of JPEG images with GIMP, and unknown printing methods). The print dialog for PDF printing is not globalized. There was also a malfunction where images were output but texts was not.

One example was that multiple pages could not be printed (depending on applications) with JDS, and such an inconvenience was avoided by changing the default print setting and changing the print number. Regarding this operation, it is necessary to enable users to easily change the operation settings.

##### b) Municipality

In Ninomiya-Cho, to support non-PostScript printers that are only compatible with Windows, the freeware

called RedMon is used to convert PostScript to an original driver and for redirection.

RedMon utilizes a driver for the PostScript printer when setting the redirect printer, but generation of printer-specific control signals passed to the original printer depends on the printer driver used when setting the redirect printer (accurate details are not clear), and there is a concern that directions from the application to a printer are not transmitted properly.

RedMon does not communicate status information to Linux, so a printer-specific detailed setting is not possible.

When printing a document with Windows, interfaces give work directions or report work progress conditions; for example, an icon showing a printing process appears in the taskbar, the print preview screen appears, or a print property opens, while in the desktop OSS environment, such structures are significantly insufficient and should be complemented. There is also a problem of proving whether Windows-compatible PostScript printers can be used or not.

### c) Public office

Although there are Linux-compatible printer drivers, and the printers can be used, the drivers support only some of the functions of the printers. If functions not supported by Linux-version drivers are included in procurement requirements, the requirements cannot be met, creating a disincentive to Linux introduction.

There are many needs for complex machines, but in most cases, there are restrictions; for example, only a print function can be used because there is no dedicated driver.

## B Solution

Print-related problems involve a variety of factors and further sorting out is needed. Currently, the problems are classified as follows:

1. Drivers for target printers do not exist.
2. Drivers exist, but cannot be used easily (unable to install or configure).
3. Drivers exist, but lack functions.
4. Drivers have sufficient functions, but the print framework cannot fully utilize the functions.

To respond to lack of drivers or functions, there is no other choice but to encourage printer manufacturers to develop drivers. To solve usability problems, maintenance of driver installers and development of a mechanism for easy adjustment of settings from the print framework are needed.

Regarding the point that the print framework cannot fully utilize driver functions, we want to support activities such as OpenPrinting and expect positive results.

### 3.1.11 Peripheral

#### A Current Status and Problems

##### a) School

Research on adaptation of PC peripherals (e.g. a USB memory, PC cards, scanners, and printers) and connection with home information appliances, such as AV devices (e.g. a digital camera and digital video) are essential, but problems, such as lack of drivers sometimes occur. There is a problem in the handling of devices (e.g. a USB wheel mouse, projector output, and SMART Board).

##### b) Municipality

In introduction demonstration experiments in schools and municipalities, OSS compatibility with printers as a peripheral in almost all departments was verified, but some peripherals were indispensable to some departments. Representative examples include scanners (the frequency of computerizing paper documents is unexpectedly high), OCR (partly used), bar-code printing/reading (essential to asset management), and capturing of digital camera images via USB connections (used for public relations, and some cameras can be directly mounted with the latest Linux distributions).

##### c) Public Office

Floppy disk needs for business applications still exist. If automatic mounting of floppy disks is impossible, and users must initiate the mount operation before use, users develop a negative image of operability.

#### B Solution

In the same way as a printer, problems include the absence of drivers, insufficient functions, and insufficient application compatibility. If general-purpose wrappers for Windows drivers, such as the NdisWrapper, which allows for using Windows wireless LAN drivers from Linux can be developed, driver-side problems of disincentive with regard to peripherals will be solved.

### 3.1.12 Clipboard

#### A Current Status and Problems

##### a) Municipality

It seems that some Windows systems have already been equipped with the clipboard function, but in many cases, this function is not supported by the application, and users complain about it.

#### B Solution

A clipboard is a topic discussed in the same framework as a common desktop component. Regarding this point, we want to expect the results of the “Technology Survey for Development of Common Component Basis and Service Coordination Basis” publicly sought as a theme type (survey) in the 2006 IPA Open Source Software Utilization Infrastructure Development Project.

### 3.1.13 OS Start

#### A Current Status and Problem

##### a) School

Boot-up is slow. Schools generally boot the PCs at the start of the lessons and shut down the PCs at the end

of the lessons, but because of the slow initiation, consideration for booting the PCs before lessons was needed. One shortcoming of the slow start of the OS and applications as a disadvantage of starting from a CD. This depends on the device loading speed and seek time after waiting.

## B Solution

There is an attempt to develop Accelerated-KNOPPIX to improve boot-up speed of systems that start from a CD.

### 3.1.14 PC Setting

#### A Current Status and Problems

##### a) School

Because changes to the setting files with an editor, not with a GUI, are sometimes still needed in case of problems or when changing the settings, operation by schools is very difficult with the current set of skills.

## B Solution

Current distributions have many settings with GUI tools. We should promote further development of general-purpose setting tools such as YaST. To simplify the concepts of settings and explanations about the methods of operation, it is also useful to establish guidelines providing a certain level of consistency with operability.

## 3.2 Problems about Operability, User Education, and Support

### 3.2.1 User Interface

#### A Current Status and Problems

##### a) School

Both KDE and GNOME desktops were tried in the experiment. As examples, GNOME was evaluated as simple and easier to operate even without an explanation, while KDE was considered complicated because of many menu items and the anxiety over problems that could not be solved if they occurred, creating resistance to use. There was also a comment that both had advantages if used appropriately. However, most people said that they wanted to use GNOME again.

The following represent specific problems about desktop OSS user interfaces:

- Device icons are not properly displayed.
- Keys on the PC do not work as marked (the kanji key and Fn keys cannot be used).
- Names and button positions are too different from those of Ichitaro and Word.
- “Open” command does not reach Network Computer.
- The mount operation for recording media, such as a floppy disc, is difficult for students.
- The flexible alignment sequence of taskbar sometimes impeded learning.
- Because the mouse pointer is not displayed during operations depending on the applications, it leads to clicking many times, and the software hangs.

##### b) Municipality

Although basic functions are implemented both at the OS level and an application level, information on common functions that have been provided for users in a familiar environment is not available because Linux does not have such functions. A problem related to key binding is especially apparent in applications like OpenOffice.org.

## B Solution

As problems with usability are directly related to operability and the evaluation of users, it is necessary to continuously research and develop a series of operations, such as document opening/closing and storing and print-related dialogs in terms of establishing and improving usability.

### 3.2.2 Japanese Input

#### A Current Status and Problems

##### a) School

As students were accustomed to Japanese input and procedures using Windows IME, most students spent time using Canna, which created a poor impression of operability.

As specific opinions, the following problems were identified:

- Conversion between English and Japanese is complicated.
- Input of a comma and symbols and allocation of function keys are different.
- Input of numbers is not easy because NumLock cannot be used.
- Japanese input is impossible.
- The conversion dictionary is undeveloped.
- Kana character input is impossible.

As a result of the questionnaires, about 40% of students answered that it was difficult to use. There was also a request for a function to input by mouse using a keyboard on the screen for junior students (junior students take time to input by keyboard and lessons do not proceed simply with input training, and Roman letter input is difficult until a Roman letter lessons start in the fourth grade).

##### b) Municipality

There were similar opinions as those from schools.

## B Solution

Japanese input is an interface on the front line of character information processing using Japanese and reflects a high level of interest and the very high need for interface integrity. Although a variety of efforts for research and development have improved the basic level to some extent, under the present circumstances, the requests have not been met. The consensus is to continue to support development in this field and strive to solve the above-listed problems one by one.

It is true that Japanese input is a Japan-specific problem, but there are other cultures requiring indirect character input, as well. This is especially noticeable in Asian countries, and it is necessary to strengthen cooperation with international communities and be careful not to be caught in the self-righteous development only for Japan.

### 3.2.3 Japanese Localizing Problem

#### A Current Status and Problems

##### a) School

Prompts displayed during Linux installation, most of which are text literally translated from English, were difficult for students who had no experience with Linux. In addition, some students pointed out that they were uncomfortable with applications with an English name or unfamiliar applications.

##### b) Municipality

It seems that desktop utilities are lacking in software localized for Japanese compared to Windows. For

example, desktop utilities such as time adjustment, paint function, tags, an IP messenger, photo editor, photo album, PDA synchronization, and data compression/decompression tools are easily listed. The same is applied to the GUI for the Windows system or software requiring detailed settings.

In fact, in Ninomiya-Cho, a situation developed where the English display interfered with utilization, although there were desired functions (in many cases, users gave up trying to adjust the settings as soon as they saw the English settings window).

## B Solution

Today, applications are often globalized at the toolkit level, and most of the cost of globalization is for the labor related to translation. As people unfamiliar with information technology can participate in the translation, it is meaningful to support translation of OSS application messages. In fact, events related to translation have started to take place and support for such activities is considered fruitful. However, the following situation was observed in the demonstration experiment in the education field, and attention is needed.

An indication is helpful that as early elementary school students learn to operate the menu by pattern matching, they do not have trouble using English interfaces at all, which suggests that if the content and applications are attractive, trivial difficulties with the interfaces do not become obstacles.

### 3.2.4 Support Insufficiency

#### A Current Status and Problems

##### a) School

In an evaluation experiment with GIMP and Photoshop, one opinion stated: "I feel the operability of GIMP is similar to that of Photoshop, and I think it will become sufficiently useful if I'm accustomed to it. However, there is a lack of help documents or manuals, and I cannot expect user support." There was also a request for "a sense of security" for use even if bearing the cost from the standpoint of users who select the applications. In addition, teachers were uncomfortable with the differences from the existing environment and anxious about support for the differences.

##### b) Municipality

As user interfaces and operability for software used in the desktop OSS environment are emphasized more than those for software used in servers, there is strong demand for enhanced and detailed FAQs. Therefore, it is necessary to promote an accumulation model for FAQs via the collaboration of users and user communities, not support in the one-company range ("users" here are not individuals but a group). This model is similar to the bazaar model espoused by Eric Raymond, and it is inferred that the increase in users can increase the FAQs as well.

## B Solution

It is important to establish a structure where communities, such as a user group reinforce the support for any insufficiency. In the introduction demonstration in Ninomiya-Cho, there is agreement for collaboration between OpenOffice.org Users Group Japan and Ninomiya-Cho to promote joint activities. It is ideal that such a collaboration proposal will be obtained in the future public solicitation, too, and it is important to promote such a proposal.

### 3.2.5 Literacy

#### A Current Status and Problems

##### a) School

In most cases, teachers do not have the skills to respond to problems. They have no IT skills about operating systems other than Windows (under present circumstances, there is even a comment that all they needed were a blackboard and chalk).

##### b) Municipality

It is a problem related to user education, but some users are at a measurable literacy level and other users have a digital divide problem in municipalities, and there are no clear criteria to divide them.

#### B Solution

It is necessary to establish clear criteria for judging the levels of a user's information and literacy. Such criteria can be reflected in employee evaluations and allow for improving the awareness of computer operations by staff members (which is considered especially necessary in municipalities). It is also necessary to maintain semi-custom-made education content to provide appropriate-level education for all individuals.

### 3.2.6 User Education

#### A Current Status and Problems

##### a) School

Quick understanding by students of the operation methods was expected to some extent, but it was found out that psychological resistance to new systems by teachers caused the most severe bottleneck.

This result developed even though KNOPPIX operations could be understood after a one-hour lecture, so teachers emotionally have difficulty challenging new things, not limited to KNOPPIX.

They hesitate because they cannot respond to irregular operation by students or they are not confident. Such hesitation hinders understanding and increases the possibility of problems arising. They are worried that if a problem occurs during class, they will be busy dealing with the problem and cannot complete the unit, so they are reluctant, which creates a vicious circle.

##### b) Municipality

As an organization that offers training in the utilization of desktop OSS, especially OpenOffice.org does not exist locally, support organizations are necessary to continue to improve operability and skills for practical business.

Ninomiya-Cho has a background where the adjacent 1 city and 5 towns have capitalized on a computer-related vocational school in the region, and this organization is used for training the Windows environment for staff members, but the school maintains the Window environment for training and does not have the desktop OSS environment.

#### B Solution

Important points from the experiment experience in Ninomiya-Cho are as follows:

- Establishment of a method to maintain the mixed environment of Windows and desktop OSS based on the Windows environment and creation of guidelines (specifically, it is desirable to introduce an environment for Linux on Windows, or at least to introduce OpenOffice.org on Windows).
- Establishment and maintenance of desktop OSS training programs centering on OpenOffice.org (training both for trainers and trainees).

It is necessary to package the above two points as a set for dissemination as a mechanism to continuously provide user education.

### 3.3 Problem about Security

#### 3.3.1 Staff's Personal Authentication IC Card

##### A Current Status and Problems

###### a) Municipality

A Linux driver for an IC card reader/writer is indispensable for using personal authentication IC cards, an IC card authentication library for Linux, and a Linux library capable of interpreting the authentication protocol with an authentication server, which not developed (do not exist). There is no application that authenticates IC cards, either.

Probably the main factor in this is that only a Windows-based driver for IC card readers for the authentication infrastructure is defined in the authentication infrastructure of e-municipalities (specifications for local government wide area network connection).

In the driver software media set for an IC card for authentication infrastructure (an IC card for LGWAN) defined in specifications for a local government wide area network connection, Windows 95, Windows 98, Windows NT 4.0 Workstation, Windows 2000 Professional (SP2 or later), and Windows XP Professional are sthelisted operating systems, and Internet Explorer 5.0, 5.01, 5.5, 5.5 (SP1), 5.5 (SP2), 6.0 (only after application of Internet Explorer High Encryption Pack and with the encryption intensity of 128-bit version),and Netscape 4.7X are listed as the compatible browsers.

An informal remark from the Regional Autonomy Information Center is that “as the penetration rate for Linux is low, the environmental arrangements have a lower priority.”

##### B Solution

It is necessary to coordinate with the relevant authorities and develop the infrastructure with a view toward future expansion into a system related to the resident registry network, for example, incorporating development of an IC card reader driver for authentication.

### 3.3.2 Electronic Signature

#### A Current Status and Problems

##### a) Municipality

Libraries and applications for electronic signatures to assure authenticity of documents have not been developed (do not exist). For example, with regard to Adobe Acrobat Reader, the Windows version has electronic signatures in the extended functions, while the Linux version does not.

#### B Solution

It is necessary to develop Linux applications with an electronic signature for documents, applications, or services to verify the electronic signature.

### 3.3.3 Supporting GPKI

#### A Current Status and Problems

##### a) Municipality

There is an IC card-related problem, but in the first place, electronic signatures that serve as official seals cannot be applied because there are no Linux-compatible applications supporting GPKI.

#### B Solution

It is necessary to develop Linux applications supporting GPKI.

### 3.3.4 File Encryption

#### A Current Status and Problems

##### a) School

If only for educational affairs, there is currently little need for file encryption (the spread of work submission by students or promotion of online examinations could cause problems). Encryption is essential for processing results for school business use, but there is a worry that Linux support might be weak. At present this is not included in the target range of the demonstration experiment, and there are no conclusions.

##### b) Municipality

Compression with ZIP or file compression programs or commands is just sufficient to encrypt document files, but applications that define this as a “file encryption” function do not exist. Apart from encryption, another cause for concern is that Linux-version Adobe Acrobat Reader does not have a function for assigning a password to PDF files.

### c) Public office

If libraries and applications do not support multi-platform file encryption, files encrypted in a mixed environment of Windows and Linux cannot be exchanged or utilized, hindering the introduction of Linux.

### B Solution

Although there are libraries and applications for file encryption on the Linux platform, they are for power users and not suitable for use by general users. It is necessary to develop a simple GUI, and if such an attempt already exists, a mechanism to introduce it should be considered and disseminated.

## 3.3.5 E-Mail Encryption

### A Current Status and Problems

#### a) Municipality

There are no simple methods to send encrypted files by e-mail. Generally a sender encrypts a file with a receiver's public key and the receiver opens it with a secret key. It's not that mailers supporting this do not exist at all, but introduction is not easy (in the first place, key exchange is inconvenient and difficult to understand for general users).

### B Solution

As it seems that the same is true for Windows at present, if a method to improve the operating environment of the e-mail encryption process on Linux can be established, it could be a killer function.

## 3.4 Problem about Surrounding Environment System

### 3.4.1 Problem about Direction from Upper Organizations (to Lower Organizations) and Requested Document Format

#### A Current Status and Problems

##### a) School

Educational boards at local authorities and prefectural governments specify MS Office or Ichitaro as the data format for submission of documents, or data sent is in those formats.

##### b) Municipality

The central government and prefectural governments send survey formats that use functions specific to particular products to municipalities throughout the year.

##### c) Public Office

Public solicitation guidelines and application forms for procurement or bidding in file formats of particular products are released or distributed.

### B Solution

A file with Excel macros is a representative example of this format problem. Regarding this, it is necessary to enrich OpenOffice.org functions in response to Excel macros or implement some measures for the central government and prefecture governments to correct the utilization of survey formats using functions specific to particular products. Unless this problem is solved, municipalities will continue to maintain the Windows

environment at the same time even after migration to desktop OSS, so countermeasures against this problem are important.

### 3.4.2 Environmental Problem about Data Distribution

#### A Current Status and Problems

##### a) School

Data is delivered to education bureaus in prefectural governments and educational boards, Information Policy Division, Facilities Administration Division, health care centers, and office associations of local authorities. Most data follow a specified form by each organization, and the data format is also specified.

##### b) Municipality

In municipalities, delivery of media or data to business contacts is frequent. In this regard, data format-related problems inevitably occur.

##### c) Public Office

File formats for attached documents in electronic applications are sometimes limited to specific products. It seems that for the reason for maintenance of the application environment is that they realistically prioritize supporting formats for products with a large market share, but early support of standard document formats is considered necessary.

#### B Solution

An introduction demonstration about securement of information distribution to not only closed workplaces, such as municipalities and schools, but also to associated organizations such as PTA and affiliated businesses is required. In addition, execution of an introduction demonstration involving associated business contacts triggers awareness centering on municipalities and public offices toward the local community environment and allows for maintenance of both the marginal environment where desktop OSS become easily widespread and municipalities and public offices themselves can continue to use the software and the potential educational environment for users.

### 3.4.3 Specification of Application

#### A Current Status and Problems

##### a) School

Students learn Excel in bookkeeping class on a routine basis at Tokai Commercial High School, and because of the reality that Excel is software students will actually use when they join the workforce, it is quite difficult to replace it with other applications. This can also be inferred from the questionnaire results in which a majority of students commented that they did not want to use KNOPPIX anymore.

#### B Solution

Some respondents stated that it could not be used in certification exams without modification as a specific obstacle. To solve this, it is necessary to ask organizations administering bookkeeping exams to correct exams based on the premise of using particular products and promote improvement of the situation.

The same problem exists in the subject “Information” in high school. Textbooks for “Information” are written assuming that MS Office products are used, though not expressed clearly. To improve that situation, the OSS Promotion Forum should make suggestions to relevant parties.

## 3.5 Problem about Introduction/Operation

### 3.5.1 Basic Problem about System Introduction

#### A Current Status and Problems

##### a) School

It is not OSS-specific, but there is a problem where basic ideas vary depending on the policies of the Information Policy Division in local authorities (however, if educational boards in local authorities can procure equipment, the situation would be different).

Linux is avoided for the reason that the Information Policy Division cannot implement measures when virus infection or a problem occurs. Even if introduction stayed within the current education IT budget, the Information Policy Division was reluctant to use the software because of the fear that introduction of an OS other than Windows would mean an increase in future support costs and cause problems.

Another reason is that local vendors cannot support Linux. There was a case where introduction was shelved because no local vendors could support the Linux/OSS support model or vendors for the local region did not exist. Some local authorities commented that they could not introduce the software unless the long-term support cost was the same as that for Windows.

Some respondents also stated that it was difficult to explain when answering questions in parliament because members of the local authority parliament did not know OSS. In addition, a network administrator in charge of OSS environment construction stated that OS installation and tuning imposed a heavy burden.

##### b) Municipality

Files defined in a specific format are created on an introduced system at the prefectural level, and local authorities are supposed to use those files, so they have no other choice but to introduce similar systems (such as electronic bidding, a construction cost estimation system, CALS, and GIS). System introduction is based on guidelines from the central ministries with variable elements, and each prefecture is given discretion to consider which system will be introduced. Support conditions depend on this discretion.

In the first place, in some cases, the wide-area Information-exchange system introduced by central ministries (e.g. Wide-area Information-exchange System for Health and Welfare Administration (WISH) and statistical information system (SWAN)) forces local governments to introduce specific applications, especially client software or functions that only run on Windows.

#### B Solution

In bureaucratic organizations, top-down direction is required and bottom-up approaches seldom promote reforms. In addition, as such organizations tend to be strongly conservative, many prior successful examples are required. We cannot remain at a demonstration experiment level for ever, so an approach like an OSS specific district is recommended, for example.

### 3.5.2 Operational Cost

#### A Current Status and Problems

##### a) School

The operational cost is not estimated in many education fields. There are many problems; for example, a teacher in charge takes care of IT devices as a volunteer, the operational cost is included in the introduction cost and is not exposed to light, and the operational cost is not budgeted from the start and the field is at a loss.

In such situations, the operational costs of the OSS environment and non-OSS environment cannot be compared because the cost of the non-OSS environment as a comparison target is not clearly specified in the first place.

## B Solution

In the school education field, the actual condition where IT environment operations using the current non-OSS environment has already worn out mainly because of the budgetary aspect must be corrected. Meanwhile if an IT environment capable of considerably reducing the management burden is provided in an OSS system, it is highly possible that the OSS environment can be introduced to schools without any thought for other migration barriers.

### 3.5.3 Information Acquisition

#### A Current Status and Problems

Information on drivers developed and maintained by community groups (not limited, though) is difficult for persons in charge of managing IT devices in school and municipality operation administrators to find. Therefore, usability considering this aspect must be ensured for self-reliant operation management.

#### B Solution

It is necessary to implement measures to ensure information distribution between information sources of existing communities or IT groups and persons in charge of operation management in a user department.

## Chapter4 Analysis of Disincentive with Questionnaires

### 4.1 Questionnaire Simple Tabulation Result

First, the questionnaire simple tabulation results will be reported.

The questionnaire for companies was conducted from the middle of September to the middle of October, and there were 44 valid answers. Questionnaires were distributed to the following target companies/people:

- Companies participating in the Japan OSS Promotion Forum
- JUAS member companies
- Visitors to the IPA Forum (held on October 24, 2006)

First, answers for questions about computer utilization will be shown.

The rate of utilized computers is as follows:

- Less than 100            23%
- 100 to 999            20%
- 1,000 to 9,999        34%
- 10,000 or more        23%

Regarding the OS, most respondents answered that they used Windows at the rate of more than 90%. As representative utilized software, Internet Explorer, Firefox, Outlook (Express), Eudora, Thunderbird, MS Office, Adobe Acrobat, and OpenOffice.org were listed.

The rate of self-developed software utilization is 84%, and the platforms are as follows:

- Windows                72%
- Mac                      5%
- Linux                    21%
- Java VM                37%
- Web                     43%
- (IE only)               43%
- Other                    8%

Because of the parent population's characteristics, the status of Linux PC introduction is relatively positive as shown below.

- Already introduced    46%
- Under consideration   0%
- Considered            9%
- None                    36%
- No idea                 9%

The rate of peripherals that require support is as follows:

- Printer                 73%
- Scanner                48%
- PC card                41%
- External HDD          32%
- Digital camera        25%
- Video                   18%
- Mobile AV player      11%
- Wireless LAN          59%
- Data communication   48%
- Mobile phone          20%
- IC card reader        43%
- Biometric equipment   34%
- Other                    18%

Awareness of the level of importance for various problems will be shown in the table on the next page. The value of each item indicates the ratio to the whole.

Based on this simple tabulation result, problems are ranked in order of importance by giving points to items from “Considered seriously problematic” to “Considered not problematic.” As a result, the top five problems considered important are as follows:

1. There is is problems in exchanging data with other companies or organizations.
2. There are few available printers.
3. Print-related problems sometimes occur.
4. Documents are incompatibility between OO.o and MS Office (4th place with the same rate).
5. There are differences in character codes between Linux and Windows, causing problems in Japanese input/output (4th place with the same rate).

On the other hand, problems considered not so important are as follows.

1. The voice recognition function does not exist.
2. Functions that aid persons with disabilities such as automatic speech do not exist.
3. Application start is slow.
4. It is difficult to use because of the different usage after connecting to a file server (e.g. an idea of the drive).

General Desktop Environment					
	Seriously problematic	Problematic	No opinion	Not problematic	No answer
Application start	6.8	20.5	45.5	27.3	0.0
Bad operability	25.0	54.5	11.4	9.1	0.0
No Japanese localization	29.5	52.3	15.9	2.3	0.0
Insufficient information	25.0	52.3	18.2	4.5	0.0
Absence of educational institutions	27.3	20.5	29.5	22.7	0.0
Insufficient fonts	22.7	38.6	34.1	4.5	0.0
Gaiji problem	20.5	29.5	31.8	18.2	0.0
Accessibility	6.8	13.6	50.0	29.5	0.0
Voice recognition	2.3	13.6	50.0	31.8	2.3

Compatibility with Windows					
	Seriously problematic	Problematic	No opinion	Not problematic	No answer
IE-dependent Web content	34.1	45.5	9.1	9.1	2.3
Incompatibility of office document data	43.2	36.4	15.9	2.3	2.3
No Japanese localization	31.8	45.5	18.2	2.3	2.3
Character code/Japanese input and output	43.2	38.6	11.4	4.5	2.3
Font incompatibility	25.0	52.3	18.2	2.3	2.3

Application					
	Seriously problematic	Problematic	No opinion	Not problematic	No answer
Insufficient absolute number	29.5	36.4	20.5	11.4	2.3
Insufficient plug-ins	18.2	47.7	22.7	9.1	2.3
Non-unified file dialog	9.1	52.3	31.8	4.5	2.3
Unsupported clipboard	20.5	40.9	29.5	6.8	2.3
Lack of simple DB	15.9	36.4	29.5	15.9	2.3

Business Operation					
	Seriously problematic	Problematic	No opinion	Not problematic	No answer
File server connection problem	27.3	38.6	18.2	13.6	2.3
SSO environment construction problem	13.6	43.2	31.8	9.1	2.3
File server usage	6.8	22.7	45.5	22.7	2.3
Personal authentication system	25.0	45.5	20.5	6.8	2.3
Electronic signature tool	18.2	45.5	22.7	9.1	4.5
File encryption tool	22.7	50.0	20.5	4.5	2.3
Content protection function	11.4	43.2	36.4	6.8	2.3
Simple encryption e-mail tool	22.7	27.3	38.6	9.1	2.3
Antivirus measures	29.5	29.5	22.7	15.9	2.3

Print					
	Seriously problematic	Problematic	No opinion	Not problematic	No answer
Insufficient number of supported printers	52.3	29.5	11.4	4.5	2.3
Insufficient available printer functions	43.2	36.4	13.6	4.5	2.3
Non-unified print dialog	22.7	29.5	36.4	9.1	2.3
Print-related serious problem	45.5	36.4	13.6	2.3	2.3

Information Exchange/Business Cooperation with Outside World					
	Seriously problematic	Problematic	No opinion	Not problematic	No answer
Problem in data exchange	56.8	20.5	20.5	0.0	2.3

## 4.2 Questionnaire Analysis

This section will analyze the questionnaire results to study how each problem is recognized within each organization and what approaches should be taken.

### 4.2.1 General Trend

To see the general trend of respondent companies, we evaluated the correlation between the scale of the utilized amount and peripherals considered to require support and the awareness of the level of importance for the various problems.

Figure 4.2 Scale of Utilized Amount and Peripherals/level of importance for Problems plots the scale of utilized amount (Windows use rate) on a horizontal axis and peripherals considered to require support and the level of importance of various problems on the vertical axis.

- Horizontal axis: Scale of utilized amount
  - The utilized amount increases to the left side.
  - If the scales of the utilized amount are the same, the Windows use rate increases to the left.
- Vertical axis (upper part): Peripherals considered to require support.
  - Peripherals considered to require support in answers were marked as “1” and items were sorted in order of the number of answers.
- Vertical axis (lower part): level of importance of problematic items
  - The level of importance was indicated with graphic symbols and colors.
    - ⊙ Red background: Considered seriously problematic
    - ○ Yellow background: Considered problematic
    - — Colorless background: No opinion
    - × Green background: Considered not problematic
  - The number of answer “Considered seriously problematic” (weighting of 1.5) and the number of answer “Considered problematic” were summed up and items were sorted in order of the number of answers.

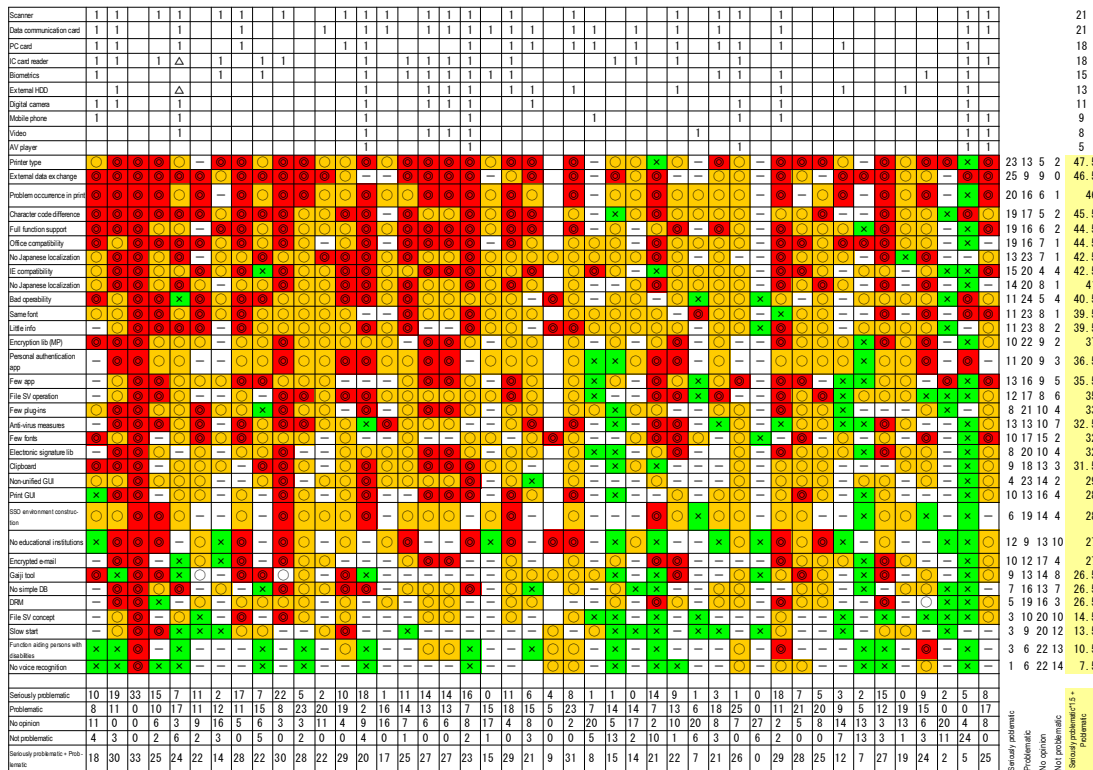


Figure 4.1 Scale of Utilized Amount and Peripherals/level of importance of Problems

Peripherals considered to require support correlate weakly with the scale of the utilized amount (Windows use rate), and the majority of respondents gave the following answers:

- Printer 73%
- Wireless LAN 59%
- Scanner 48%

Regarding the level of importance of problems, there is a trend for users with a higher scale of the utilized amount to have more items considered problematic, and users with a lower scale of utilized amount to have fewer items considered not problematic. Items considered problematic are classified into the following three major groups:

A Item considered problematic at a high rate regardless of a scale of the utilized amount (in order of the number considered problematic)

All respondents unanimously answered that further improvement of a part related to document compatibility and exchange (paper documents, electronic data, browsers, character fonts) was important.

- There are few available printers.
- The MS Office format is often used for exchanging data with other companies or organizations and problems sometimes occur when exchanging data.
- Print-related problems sometimes occur.
- There are differences in character codes between Linux and Windows, causing problems in Japanese input/output.
- Even if some printers are available, they sometime do not support all supplied functions (such as double-side printing).
- Office software for Linux (such as OpenOffice.org) has a problem with compatibility with MS Office and is difficult to use.
- Some utilities or help documents are not localized into Japanese, hindering utilization.
- Web contents dependent on Internet Explorer sometimes cannot be displayed properly (as intended by producers).
- Operability is poor (difficult to use).
- It is difficult to use the same fonts as those for Windows.

B Item considered problematic with some bias depending on the scale of the use

This is a functional group that generated differences in the level of importance between users with a large scale of utilization who often work in a group and users who construct a work environment for a small group.

The keywords were operation, security, and file server-related matters.

- The amount of obtained information is small even when researching how to operate or use.
- Libraries or applications (supporting multi-platforms) for file encryption do not exist.
- Personal authentication systems (applications) do not exist.
- The method to connect to a file server is complicated, hindering utilization.
- There are few plug-ins for web browsers (such as Shockwave) and sometime web contents cannot be displayed.
- There are few anti-virus solutions for Linux.
- There are few available fonts.
- Libraries or applications for electronic signatures to ensure authenticity of documents do not exist.
- Some applications do not support a clipboard.
- There is no unification of file input/output dialogs depending on applications, causing confusion.

### C Item considered less problematic for users with a small scale of utilization .

This is similar to the Section B functional group that generates differences in the level of importance between users with a large scale of utilization who often work in a group and users who construct a work environment for a small group. This functional group is required especially by large-scale users and not as required for utilization by a small group.

The keywords for this functional group include single sign-on, a file sever, Gaiji tool, simple database, and functions for physically-challenged people.

- There is no unification of print dialogs depending on applications, causing confusion.
- It is difficult to construct a single sign-on environment for a file server.
- There are no institutions that offer user education about operation methods.
- There are no simple methods to send encrypted files by e-mail.
- There are no systems to create, register, or search Gaiji.
- Simple databases (e.g. MS Access and Kiri) used in the office do not support Linux.
- A content protection function does not exist.
- It is difficult to use because of a different usage after connected to a file server from Windows (for example, a concept of “drive” does not exist).
- Start of Linux (OS) or applications is felt slower than that of the same hardware OS.
- Functions that aid persons with disabilities such as automatic speech do not exist.
- A voice recognition function does not exist.

## 4.2.2 Characteristic Problems

When looking at the questionnaire in terms of the scale of respondent organizations (the number of PCs), answers were obtained from each organization scale almost evenly as follows: 23% from the small scale (1 to 99 PCs), 20% from the medium scale (100 to 999 PCs), 34% from the large scale (1000 to 9999 PCs), and 23% from the giant scale (10000 PCs or more). However, as the organization scale generally has a greater impact on operation policy of the organization's information system, it is obvious that points treated as problems for OSS introduction vary depending on the scale of the organization. Considering this, we studied this questionnaire in detail by scale of the organization and organized what we noted as problems in each organization as shown below.

### A Difference in Business Environment Depending on Organization Scale

First, we compared the business environment for each organization scale in terms of the rate of utilized OS, utilized browsers, utilized e-mail software, and utilized office software, and simply organized differences in OSS introduction conditions.

#### a) Rate of Utilized OS

More than 70% of organizations of any scale use Windows. However, more than 10% of small- and medium-scale organizations use Linux, proving the existence of organizations who strategically introduced Linux. On the other hand, large- and giant-scale organizations avoid introducing Linux, inferring that the larger the organizations, the more difficult it is to introduce Linux.

		Organization Scale (Number of PCs)			
		99 or less	100 – 999	1000 – 9999	10000 or more
		(%)	(%)	(%)	(%)
Rate of utilized OS	Windows	71.60	84.40	84.33	99.27
	Mac	1.00	0.13	0.18	0.11

#### b) Utilized Browser

The utilization rate of Internet Explorer (hereinafter called as IE) is 88% in medium-scale organizations and 100% in large- and giant-scale organizations, and there's no doubt that IE is utilized by companies as the standard browser. However, organizations of small, medium, and large scales who use only IE remain at about 60%, showing that these organizations use browsers other than IE, as well. Giant-scale organizations who use only IE totaled 80%, and measures should be implemented to encourage them to introduce an OSS browser.

		Organization Scale (Number of PCs)			
		99 or less	100 – 999	1000 – 9999	10000 or more
		(%)	(%)	(%)	(%)
Browser	IE only	50.00	62.50	57.14	80.00
	Firefox only	40.00	12.50	0.00	0.00
	IE and other browsers	10.00	25.00	42.86	20.00
	IE utilization rate	60.00	87.50	100.00	100.00

#### c) Utilized E-mail Software

The rate of Internet e-mail use in small- and medium-scale organizations takes more than 75%, while the rate in large-scale organizations is 53% and the rate in giant-scale organizations even decreases to 20%. On the other hand, the utilization rate of Exchange (Outlook), Notes, and Cybozu as groupware allowing for e-mail

use as well is high in large- and giant-scale organizations. Recently e-mail for business use has become essential, and every organization has an e-mail environment, but it is clear that the larger organizations, the less they use OSS, and this situation must be improved for promoting the dissemination of OSS as well.

		Organization Scale (Number of PCs)			
		99 or less	100 – 999	1000 – 9999	10000 or more
		(%)	(%)	(%)	(%)
E-mail	Internet e-mail	77.78	75.00	53.33	20.00
	Outlook	11.11	50.00	66.67	40.00
	Notes	11.11	12.50	20.00	30.00

		Organization Scale (Number of PCs)			
		99 or less	100 – 999	1000 – 9999	10000 or more
		(%)	(%)	(%)	(%)
Groupware	Exchange/Notes/Cybozu	33.33	87.50	80.00	90.00

\*In the above table, organizations who utilize Outlook, Notes, and Cybozu in questionnaire answers are counted as “organizations using groupware.”

#### d) Utilized Office Software

Organizations on any scales who utilize MS Office exceed 80%. In addition, it should be noted that 100% of giant-scale organizations answer that they use only MS-Office.

		99 or less	100 – 999	1000 – 9999	10000 or more
		(%)	(%)	(%)	(%)
Office software	MS-Office only	70.00	75.00	66.67	100.00
	OOo/SS only	10.00	0.00	6.67	0.00
	MS/OOo/SS	10.00	25.00	26.67	0.00
	MS Office utilization rate	80.00	100.00	93.33	100.00

### B Difference in Focus Depending on Organization Scale

As shown above, it was found out that OSS introduction conditions varied depending on the organization scale numerically, too. Next, we will organize how each scale-organization interprets problems in OSS introduction.

#### a) Peripheral That Should Be Supported for Linux PC Spread

First, when looking at peripherals that should be supported for dissemination of Linux PCs,” organizations of any scale generated a similar result. In conclusion, support for printers, wireless LAN, and scanners were demanded.

	Organization Scale (Number of PCs)							
	99 or less		100 – 999		1000 – 9999		10000 or more	
		(%)		(%)		(%)		(%)
1 <sup>st</sup>	Printer	60.00	Printer	66.67	Printer	80.00	Printer	80.00
2 <sup>nd</sup>	Wireless LAN	50.00	Wireless LAN	66.67	Communication card	73.33	Scanner	70.00
3 <sup>rd</sup>	External HD	30.00	PC card	55.56	Wireless LAN	60.00	IC card	70.00
4 <sup>th</sup>	Scanner	20.00	Scanner	44.44	Scanner	53.33	Wireless LAN	60.00
5 <sup>th</sup>	PC card	20.00	Communication card	44.44	PC card	46.67	PC card	40.00
6 <sup>th</sup>	Video	20.00	IC card	44.44	External HD	46.67	Communication card	40.00
7 <sup>th</sup>	AV player	20.00	Biometrics	33.33	Biometrics	46.67	Camera	30.00
8 <sup>th</sup>	Communication card	20.00	External HD	22.22	IC card	40.00	Biometrics	30.00
9 <sup>th</sup>	Mobile phone	20.00	Camera	22.22	Camera	33.33	External HD	20.00
10 <sup>th</sup>	IC card	20.00	Mobile phone	22.22	Video	26.67	Mobile phone	20.00
11 <sup>th</sup>	Biometrics	20.00	Video	11.11	Mobile phone	20.00	Video	10.00
12 <sup>th</sup>	Camera	10.00	AV player	11.11	AV player	13.33	AV player	0.00

## b) General Linux Desktop Environment

Next, when looking at problems about the “general Linux desktop environment,” the ranking on any organization scales is similar, too; problems such as “bad operability,” “Japanese localization of help documents or others,” “little information about operation methods,” and “few available fonts” rank high. However, large- and giant-scale organizations recognize each problem to be more serious, showing that they emphasize such problems compared to small- and medium-scale organizations.

	Organization Scale (Number of PCs)							
	99 or less		100 – 999		1000 – 9999		10000 or more	
		(Average mark)		(Average mark)		(Average mark)		(Average mark)
1 <sup>st</sup>	Operability	2.30	Japanese localization	2.11	Japanese localization	1.67	Operability	1.60
2 <sup>nd</sup>	Japanese localization	2.30	Little information	2.22	Operability	1.87	Japanese localization	1.70
3 <sup>rd</sup>	Font	2.30	Font	2.33	Little information	1.87	Little information	1.70
4 <sup>th</sup>	Little information	2.40	Operability	2.56	Education	2.20	Font	1.70
5 <sup>th</sup>	Gaiji	2.50	Extended character	2.89	Font	2.40	Extended character	2.00
6 <sup>th</sup>	Education	2.80	Aid for persons with disabilities	2.89	Gaiji	2.53	Education	2.10
7 <sup>th</sup>	Slow start	3.00	Education	3.00	Slow start	2.73	Slow start	2.60
8 <sup>th</sup>	Aid for persons with disabilities	3.10	Voice recognition	3.11	Aid for persons with disabilities	2.93	Aid for persons with disabilities	3.20
9 <sup>th</sup>	Voice recognition	3.10	Slow start	3.56	Voice recognition	3.07	Voice recognition	3.30

\*Evaluation with 1 to 4 marks: “Seriously problematic = 1,” “No opinion = 3,” and “Not problematic = 4”

## c) Compatibility with Windows

Next, “compatibility with Windows” is recognized as a problem by organizations of all scales, and again, the larger organizations, the more they recognize this point to be seriously problematic. Giant-scale organizations focus on two problems of “difference in character codes between Linux and Windows” and “data compatibility between MS Office and OOO” very much. In addition, large- and giant-scale organizations emphasize all problems about “compatibility with Windows.”

		Organization Scale (Number of PCs)										
		99 or less		100 – 999		1000 -9999		10000 or more				
		(Average mark)		(Average mark)		(Average mark)		(Average mark)				
1 <sup>st</sup>	Office	2.00		Office	2.00		HP for IE	1.50		Character code	1.10	
2 <sup>nd</sup>	Font	2.00		Japanese localization	2.00		Japanese localization	1.71		Office	1.30	
3 <sup>rd</sup>	Character code	2.10		Character code	2.22		Character code	1.71		Font	1.60	
4 <sup>th</sup>	Japanese localization	2.30		HP for IE	2.33		Office	1.79		HP for IE	1.70	
5 <sup>th</sup>	HP for IE	2.40		Font	2.33		Font	2.00		Japanese localization	1.70	

\*Evaluation with 1 to 4 marks: "Seriously problematic = 1," "No opinion = 3," and "Not problematic = 4"

#### d) Problem about Application

Regarding problems about “applications,” apprehension is very different between organizations of small/medium scale and organizations of a large/giant scale. It seems that small- and medium-scale organizations focus on the point of “few plug-ins for web browsers” relatively more frequently and do not focus on other aspects very much. On the other hand, large- and giant-organizations emphasize all problems in this “application” item, especially “few available applications,” “clipboard unsupported,” and “few plug-ins for web browsers.”

		Organization Scale (Number of PCs)										
		99 or less		100 – 999		1000 – 9999		10000 or more				
		(Average mark)		(Average mark)		(Average mark)		(Average mark)				
1 <sup>st</sup>	Little app	2.50		Little app	2.11		Clipboard	1.93		Little app	1.70	
2 <sup>nd</sup>	Dialog	2.50		Small plug-ins	2.44		Small plug-ins	2.00		Clipboard	1.70	
3 <sup>rd</sup>	Clipboard	2.60		Dialog	2.67		Simple DB	2.14		Small plug-ins	1.80	
4 <sup>th</sup>	Small plug-ins	2.80		Clipboard	2.89		Little app	2.21		Dialog	2.00	
5 <sup>th</sup>	Simple DB	2.90		Simple DB	2.89		Dialog	2.21		Simple DB	2.10	

\*Evaluation with 1 to 4 marks: "Seriously problematic = 1," "No opinion = 3," and "Not problematic = 4"

#### e) Business Operation of Linux Desktop

It seems that large- and giant-scale organizations have a strong interest in the following four problems about “business operation of Linux desktops”: “Personal authentication systems do not exist,” “A method to connect to a file server is complicated,” “Libraries or applications for file encryption do not exist,” and “There are few anti-virus solutions.”

		Organization Scale (Number of PCs)										
		99 or less		100 – 999		1000 – 9999		10000 or more				
		(Average mark)		(Average mark)		(Average mark)		(Average mark)				
1 <sup>st</sup>	Personal authentication	2.20		Cont. protection	2.11		FS connection	1.86		Virus	1.60	
2 <sup>nd</sup>	File encryption	2.30		FS connection	2.22		Personal authentication	1.93		File encryption	1.70	
3 <sup>rd</sup>	E-signature	2.40		File encryption	2.22		File encryption	2.07		SSO	2.00	
4 <sup>th</sup>	Encrypted e-mail	2.50		Encrypted e-mail	2.22		Virus	2.07		Personal authentication	2.00	
5 <sup>th</sup>	Cont. protection	2.60		Personal authentication	2.33		SSO	2.14		E-signature	2.00	
6 <sup>th</sup>	FS connection	2.70		E-signature	2.38		E-signature	2.21		FS connection	2.10	
7 <sup>th</sup>	Virus	2.70		SSO	2.44		Encrypted e-mail	2.36		FS utilization	2.30	
8 <sup>th</sup>	SSO	3.00		Virus	2.78		Cont. protection	2.50		Cont. protection	2.30	
9 <sup>th</sup>	FS utilization	3.40		FS utilization	3.22		FS utilization	2.64		Encrypted e-mail	2.30	

\*Evaluation with 1 to 4 marks: "Seriously problematic = 1," "No opinion = 3," and "Not problematic = 4"

#### f) Print

Large- and giant-scale organizations emphasize all problems about “print,” again. Of those problems,

especially the following three points are considerably emphasized: “There are few available printers,” “Not all printer functions can be used.” and “Print-related problems sometimes occur.”

	Organization Scale (Number of PCs)							
	99 or less		100 – 999		1000 – 9999		10000 or more	
		(Average mark)		(Average mark)		(Average mark)		(Average mark)
1 <sup>st</sup>	Few printers	1.70	Problem occurrence	1.89	Few printers	1.43	Problem occurrence	1.40
2 <sup>nd</sup>	Problem occurrence	2.10	Printer function	2.00	Printer function	1.50	Few printers	1.50
3 <sup>rd</sup>	Printer function	2.30	Few printers	2.22	Problem occurrence	1.57	Printer function	1.50
4 <sup>th</sup>	Dialog	2.70	Dialog	2.67	Dialog	1.93	Dialog	2.20

\*Evaluation with 1 to 4 marks: “Seriously problematic = 1,” “No opinion = 3,” and “Not problematic = 4”

### g) Information Exchange with Outside World

In a section of “information exchange with the outside world,” organization on any scales recognize a point of “Problems sometimes occur in the exchange of data in MS Office format” to be problematic, but most giant-scale organizations recognize this to be seriously problematic.

	Organization Scale (Number of PCs)							
	99 or less		100 – 999		1000 – 9999		10000 or more	
		(Average mark)		(Average mark)		(Average mark)		(Average mark)
Other organizations use MS Office.		1.70		2.00		1.71		1.10

## C Questionnaire Retabulation Result by Scale

When organizing problems in OSS introduction by organization scale as shown so far, it seems possible to classify recognition of level of importance of problems into two major cases: a small-size organization with 1 to 999 PCs and large-size organization with 1000 or more PCs. Considering this, we extracted organizations who “use only IE as a browser” considered reluctant to introduce OSS and classified them into a small-size organization with 1 to 999 PCs and large-size organization with 1000 or more PCs, then tabulated the questionnaire results again and sorted each problem. The results are as follows (problems with the average mark of less than 2.5 are listed in order of the level of importance).

### ●Peripheral That Should Be Supported for Linux PC Dissemination

Small-size organization: Printer and wireless LAN device

Large-size organization: Printer, scanner, wireless LAN device, data communication card, IC card reader, and PC card

	Utilized Browser : IE only			
	Organization Scale (Number of PCs)			
	1 – 999		1000 or more	
		(%)		(%)
1 <sup>st</sup>	Printer	70.00	Printer	81.25
2 <sup>nd</sup>	Wireless LAN	60.00	Scanner	75.00
3 <sup>rd</sup>	PC card	40.00	Wireless LAN	62.50
4 <sup>th</sup>	Scanner	30.00	Communication card	62.50
5 <sup>th</sup>	IC card	30.00	IC card	56.25
6 <sup>th</sup>	Biometrics	30.00	PC card	50.00

### ●General Linux Desktop Environment

Small-size organization: Japanese localization of help documents, little information of operation methods,

few available fonts, and poor operability

Large-size organization: Japanese localization of help documents, poor operability, little information of operation methods, few available fonts, user education difficulty, and no systems to create/register/search Gaiji

Utilized Browser: IE only				
Organization Scale (Number of PCs)				
1 – 999			1000 or more	
		(Average mark)		
		(Average mark)		
1 <sup>st</sup>	Japanese localization	2.20	Japanese localization	1.63
2 <sup>nd</sup>	Little information	2.30	Operability	1.75
3 <sup>rd</sup>	Font	2.30	Little information	1.81
4 <sup>th</sup>	Operability	2.40	Font	2.00
5 <sup>th</sup>	Gaiji	2.60	Education	2.19
6 <sup>th</sup>	Aid for persons with disabilities	2.90	Gaiji	2.44

\*Evaluation with 1 to 4 marks: "Seriously problematic = 1," "No opinion = 3," and "Not problematic = 4"

### ● Compatibility with Windows

Small-size organization: Data compatibility between MS Office and OOo, display problems in HP for IE, Japanese localization of utilities and help documents, unable to use the same font, and difference in character codes between Linux and Windows

Large-size organization: Display problems in HP for IE, difference in character codes between Linux and Windows, data compatibility between MS Office and OOo, Japanese localization of utilities and help documents, and unable to use the same font

Utilized Browser: IE only				
Organization Scale (Number of PCs)				
1 – 999			1000 or more	
		(Average mark)		
		(Average mark)		
1 <sup>st</sup>	Office	1.80	HP for IE	1.38
2 <sup>nd</sup>	HP for IE	2.10	Character code	1.38
3 <sup>rd</sup>	Japanese localization	2.10	Office	1.44
4 <sup>th</sup>	Font	2.30	Japanese localization	1.63
5 <sup>th</sup>	Character code	2.40	Font	1.81

\*Evaluation with 1 to 4 marks: "Seriously problematic = 1," "No opinion = 3," and "Not problematic = 4"

### ● Application

Small-size organization: Few available applications, no unification of file input/output dialogs, and no simple database

Large-size organization: Few plug-ins for web browsers, clipboard unsupported, no simple database, few available applications, and no unification of file input/output dialogs

Utilized Browser: IE only				
Organization Scale (Number of PCs)				
1 – 999			1000 or more	
		(Average mark)		
		(Average mark)		
1 <sup>st</sup>	Little app	2.50	Few plug-ins	1.63
2 <sup>nd</sup>	Dialog	2.50	Clipboard	1.63
3 <sup>rd</sup>	Simple DB	2.50	Simple DB	1.75
4 <sup>th</sup>	Few plug-ins	2.70	Little app	1.94
5 <sup>th</sup>	Clipboard	2.70	Dialog	1.94

\*Evaluation with 1 to 4 marks: "Seriously problematic = 1," "No opinion = 3," and "Not problematic = 4"

### ● Business Operation of Linux Desktop

Small-size organization: No libraries or applications for file encryption, no content protection function, complicated connection method to a file server, no personal authentication system, no libraries or applications for electronic signatures, and no simple ways to send encrypted files by e-mail

Large-size organization: No libraries or applications for file encryption, no personal authentication system, complicated connection method to a file server, few anti-virus solutions, difficult to construct a single sign-on environment, no libraries or applications for electronic signatures, no simple ways to send encrypted files by e-mail, different file server usage from Windows, and no content protection function

		Utilized Browser: IE only	
		Organization Scale (Number of PCs)	
		1 – 999	1000 or more
		(Average mark)	(Average mark)
1 <sup>st</sup>	File encryption	2.20	File encryption
2 <sup>nd</sup>	Cont. protection	2.30	Personal authentication
3 <sup>rd</sup>	FS connection	2.40	FS connection
4 <sup>th</sup>	Personal authentication	2.40	Virus
5 <sup>th</sup>	E-signature	2.44	SSO
6 <sup>th</sup>	Encrypted e-mail	2.50	E-signature
7 <sup>th</sup>	SSO	2.80	Encrypted e-mail
8 <sup>th</sup>	Virus	2.90	FS utilization
9 <sup>th</sup>	FS utilization	3.30	Cont. protection

\*Evaluation with 1 to 4 marks: "Seriously problematic = 1," "No opinion = 3," and "Not problematic = 4"

### ●Print

Small-size organization: There are few available printers, not all printer functions can be used, and print-related problems sometimes occur.

Large-size organization: Print-related problems sometimes occur, there are few available printers, not all printer functions can be used, and there is no unification of print dialogs.

		Utilized Browser: IE only	
		Organization Scale (Number of PCs)	
		1 – 999	1000 or more
		(Average mark)	(Average mark)
1 <sup>st</sup>	Few printers	1.80	Problem occurrence
2 <sup>nd</sup>	Printer function	2.10	Few printers
3 <sup>rd</sup>	Problem occurrence	2.10	Printer function
4 <sup>th</sup>	Dialog	2.60	Dialog

\*Evaluation with 1 to 4 marks: "Seriously problematic = 1," "No opinion = 3," and "Not problematic = 4"

### ●Information Exchange with Outside World

Both organizations: problems sometimes occur in data exchange in the MS Office format.

		Utilized Browser: IE only	
		Organization Scale (Number of PCs)	
		1 – 999	1000 or more
		(Average mark)	(Average mark)
Other organizations use MS Office.		2.00	1.25

\*Evaluation with 1 to 4 marks: "Seriously problematic = 1," "No opinion = 3," and "Not problematic = 4"

To encourage possibly reluctant organizations to introduce OSS, problem solving should be promoted keeping in mind that focused problems vary depending on the organization scale as shown in above results.

### 4.2.3 Approach by Company Scale

There were six companies with a higher rate of Linux PC introduction than a certain value (more than 30%) in the questionnaire.

We will compare these six companies to the total calculation result to study characteristics of companies

with a high rate of Linux PC introduction and approaches required for Linux PC spread. These six companies consist of five with less than 100 PCs and one with 100 – 999 PCs. Results after comparison of the questionnaire data of these six companies and total data from Question 3.2 to Question 4.6 are as follows:

#### A Question 3.2 About Peripherals

##### a) Total

1 <sup>st</sup> Printer	32 companies
2 <sup>nd</sup> Wireless LAN device	26 companies
3 <sup>rd</sup> Scanner and data communication card	21 companies

##### b) 6 Companies

1 <sup>st</sup> Printer and data communication card	5 companies
2 <sup>nd</sup> Scanner, mobile phone, and biometric equipment	4 companies

Regarding peripherals considered to require Linux PC support, a printer ranks first in both total and 6 -company cases, proving that many people think print-related support is insufficient. In addition, as a characteristic result, a mobile phone and biometric equipment rank second in six companies. Organizations that have already introduced Linux have higher needs for connection with mobile phones (data management) and biometric equipment as countermeasures against information leakage, and the support for these devices is also very important in promoting Linux PC introduction in companies.

#### B About Question 4

In Question 4, items with differences in questionnaire results between <total> and <six companies> were focused.

The following value is an average of the total average minus that of six companies.

Automatic speech	▲0.69
Voice recognition	▲0.47
Few applications	▲0.31

For the above three items, six companies take a higher value than the total (six companies have a higher problem awareness). It is proven that organizations who have already introduced Linux have a higher awareness of user-friendly functions including automatic speech and voice recognition or require such functions.

Office compatibility	0.73
Simple database	0.53
File server connection	0.81
Single sing-on	0.63
Anti-virus measures	0.74

Of items for which the total has a higher value than six companies (total has a higher problem awareness), above 5 items have a large difference (more than 0.5 difference). It can be considered that these 5 items are not so much trouble for companies who already introduced Linux or who have already solved the problems somehow.

For the file server connection, single sign-on, and simple database might not be problematic as the scale of these six companies is relatively small.

The cause of differences observed in the questionnaire results is that although anti-virus measures are sufficiently available for Linux PCs, the method is not officially known.

From the above results, organizations with a high Linux PC introduction rate have solved most of the problems generally considered intrinsic to Linux PCs, and the data differences seen in Question 4 between

the six companies and the total actually might result from a prejudice or lack of information of organizations who have not introduced Linux PCs.

Maintaining Linux PC introduction know-how of organizations with a high introduction rate and propagating it widely are necessary approaches to increase Linux PC utilization in the future.

### 4.3 Comparison to Other Related Surveys

As a survey aiming to clarify factors promoting or disturbing Linux desktop spread in the same way as this questionnaire, there is the “Desktop Linux Client Survey” conducted by the OSDL Desktop Linux Working Group (hereinafter referred to as DTL) in October 2005 and November 2006.

The Survey by DTL was conducted in a form of online questionnaire and survey targets are not strictly limited. Instead, many answers were obtained (more than 3300 in 2005 and more than 2500 in 2006). Although the mother population of both surveys is considerably different, we will compare the DTL survey to this questionnaire as a similar survey.

#### A Problem about Application and Peripheral Support

A factor severely hindering Linux desktop introduction in the DTL survey is the lack of applications. In the 2005 DTL survey, e-mail ranked first and the browser and database ranked higher as important applications. On the other hand, in the 2006 DTL survey, these three applications disappeared, showing that improvement of the application environment has advanced. However, a lack of applications in the main field starting with office software is still pointed out and it still remains as an important problem.

Support for peripherals including a printer is cited as another major disincentive. A wireless LAN device and storage media such as a USB memory also rank higher as peripherals. As was expected, there are a significant number of requests for devices that have been spread, and insufficient support for those devices would become a disincentive.

Regarding the above point, the same trend can be seen in this questionnaire and it is considered that this is an inevitable problem for Linux spread.

#### B Problem about Localization

It might be natural, but the DTL survey does not cover problems specific to Japan, such as Japanese localization, Japanese input, and handling of Gaiji. A localization problem could be unnoticeable depending on surveys, but it is easy to imagine that it becomes a very serious disincentive in terms of spread in each linguistic area. Regarding such a problem, the larger the scale of development community activities, the lower priority of development as a minority request, with the result that improvement tends to be late. Conducting a survey like this questionnaire and openly disclosing the results abroad as well could make development communities or other groups recognize the localization problem, resulting in promotion of Linux desktop dissemination in Japan, too.

#### C Survey Continuity

As the Japan OSS Promotion Forum Desktop Subcommittee, we conducted a survey about disincentive and questionnaires for the first time. As stated above, the DTL survey was conducted for the second successive year, and it was helpful in highlighting the improvements and the trends in problems to be solved next more clearly.

We will study the effects on future promotion of Linux desktop dissemination based on the current results, and if needed, we want to consider continuing to conduct surveys and making proposals.

## Chapter5 Approach to Solution

Finally, this chapter will survey the current approach condition and recommend plans for future necessary approaches to eliminate disincentive based on the obtained organized conditions.

### 5.1 Current Approach Condition

#### 5.1.1 IPA's Approach to Desktop OSS

The IPA has made efforts for OSS infrastructure development such as development by public solicitation in the Open Source Software (OSS) Utilization Infrastructure Development Project since 2003. The IPA internally established the OSS Center (<http://www.ipa.go.jp/software/open/oss/index.html>) as an OSS dedicated organization in January 2006 and now practices activities centering on “spread promotion,” “infrastructure development,” and “information aggregation and transmission” of OSS.

##### A Spread Promotion

For spread promotion, the IPA proposes measures against legal problems for OSS use, offers best practice cases, and operates educational campaigns including a seminar in not only the server field but also in the desktop field.

##### B Information Aggregation and Transmission

For information aggregation and transmission, the IPA has constructed OSS iPedia (<http://ossipedia.ipa.go.jp/>) as an OSS information transmission database in the OSS Center and releases collected information on the web. OSS iPedia stores and releases a variety of information about OSS including desktop OSS. It also cooperates with foreign OSS-related organizations, exchanges information with various communities, and builds a cooperative relationship with the government and related organizations.

##### C Infrastructure Development

For infrastructure development, the IPA has conducted software development proposed by the general public in a form of proposal-type public that started from 2003. Many software programs introduced below are developed and improved by proposal-type public solicitation (<http://www.ipa.go.jp/about/jigyoseika/index.html>).

In addition to this proposal-type public solicitation, the IPA has started theme-type public solicitation from 2006 in which development is operated based on problems in OSS utilization, future direction surveys, and knowledge obtained from the survey results, tackling problems in OpenOffice.org and an Gaiji problem.

##### D Introduction Demonstration

In parallel with the development project, the IPA has conducted an OSS introduction demonstration since 2003. Starting with a feasibility survey before the 2003 desktop OSS demonstration experiment, desktop OSS were introduced to 13 educational institutions in 2004 (<http://www.ipa.go.jp/software/open/2004/stc/eduseika.html>) and the practical business fields of the Sapporo Waterworks Bureau (Hokkaido), Ninomiya-Cho (Tochigi), Tsukumi-City (Oita), and Urasoe-City (Okinawa) in 2005, verifying that desktop OSS are usable for practical business. This result can be seen on the IPA home page (<http://www.ipa.go.jp/software/open/2005/stc/report/index.html>). An introduction demonstration was conducted in 2 prefectures, 1 city, and 1 town in 2006 as well, and this result will be released later this year.

## 5.1.2 WWW-Related Thing

This and the next sections will describe circumstances surrounding WWW-related technology considered especially important for desktop OSS utilization and OpenOffice.org that is a representative example of office suite applications (productivity software).

### A Web Browser

The web browser was originally developed as a means to access content from all over the world from a desktop via the Internet, but due in part to the necessity and effectiveness of information through the network and easy operation for browsing, it is now used not only on the Internet but also on closed in-house networks as a means to offer public services and a function essential for mobile phones. Thus, the web browser is utilized not only as an IT task tool but also a general, ubiquitous tool, and it is expected that services offering via web browsers will increase in the future, as well.

The fact that user-friendliness is important for web browsers has not changed since the beginning of development. Therefore, it is desirable that the usage be similar regardless of devices or OS (operating systems) and the same if possible, and it is not desirable for them to depend on particular functions specific to devices or operating systems. Considering this, the W3C (World Wide Web Consortium) has defined the technology standards and guidelines for web access.

In theory, if a website provides content in accordance with the standards, it can be seen the same way and be accessed by any web browser, but in reality, a web browser implementation problem hinders this.

There are a variety of software programs as web browsers, and a famous one as open software is Firefox provided by Mozilla.org (Mozilla Foundation).

Mozilla.org has been promoting development aiming at W3C standard compliance, and Firefox is known for its minimal dependence on particular devices or operating systems. As the usability of Firefox is nearly the same whether it is a Windows version or a Linux version, users enjoy the benefit of fully utilizing Firefox with different operating systems immediately. However, Windows has the incorporated standard IE (Microsoft Internet Explorer) and the high rate of Windows use is proportional to the utilization rate of IE, so the dissemination rate of Firefox that is needed to be introduced later has not increased much. Firefox supporting Japanese is provided by Mozilla Japan, and a volunteer community for consumers called the Mozilla-gumi exists.

#### References:

About Web Standardization Activity in W3C

[http://www.kri.sfc.keio.ac.jp/ja/press\\_file/orf2002\\_press6.html](http://www.kri.sfc.keio.ac.jp/ja/press_file/orf2002_press6.html)

About Mozilla

<http://ja.www.mozilla.com/ja/firefox/about/>

Mozilla Japan

<http://www.mozilla-japan.org/>

The Mozilla-gumi

<http://www.mozilla.gr.jp/>

### B Recommended Web Browser

Normally, websites need to be created considering accessibility in line with web standards so that they can be accessed by various OS environments or with web browsers, but in reality, because of various website-related reasons, there is a case that particular recommended browsers are specified as a necessary environment for site browsing and users (viewers) have to select the recommended web browser (even recommended OS in many cases) for a technical reason.

Such recommended browsers are often selected from ones installed with the OS or ones with a high market share. Therefore, IE is used as a recommended browser the most.

#### References:

Browser Market Share Trend

<http://marketshare.hitslink.com/report.aspx?qprid=3>

## C Vendor Lock-in

As a user retention strategy by specific vendors, “vendor lock-in” has been used for a long time. It is clear that it is unreasonable for the Internet or web browsing, as well as open source software (OSS). However, because of technology/implementation-related problems as mentioned above, the website content is dependent on recommended browser implementation, not web standards, and in fact, there are websites that cannot be displayed or viewed because of garbled display or system malfunction if accessed with Firefox from Mozilla.org, which is supposed to be compliant with web standards.

## D TouchUpWeb Project

There was the Web Standard Spread Project by the Mozilla-gumi in the past. This was less-restricted in that websites difficult to access with Mozilla products were simply asked to follow web standards (or support Mozilla).

In TouchUpWeb project, a Firefox extended function is used to find websites with vendor lock-in, and if found, a database at the server side searches for past problems, and if JavaScript that has tried to solve problems exist, the JavaScript is applied to try if that is valid.

If there are no past assents in the database, users can create JavaScript that makes websites follow web standards by themselves and register it with Bugzilla of the TouchUpWeb project. If the effectiveness of scripts registered with Bugzilla is confirmed, they are stored in the database of TouchUp project and shared for everyone.

Thus, the TouchUpWeb project does not remain at just “asking” problematic websites to follow web standards but with the possibility of contact about concrete countermeasures.

### References:

TouchUpWeb Project

<http://www.touchupweb.org/ja/>

Dynamic Touch-up of Imperfect HTML

<http://codezine.jp/a/article.aspx?aid=534>

Survey about Web Content Compatibility Improvement Useful for Desktop OSS Spread (Mitsubishi Research Institute, Inc)

[http://www.ipa.go.jp/software/open/oss/2006/result\\_t2.html](http://www.ipa.go.jp/software/open/oss/2006/result_t2.html)

## 5.1.3 OpenOffice.org

### A Office Productivity Improvement

Along with the appearance of personal computers (PCs), dedicated software, such as word-processing and spreadsheet programs appeared, and improvement of office work efficiency attracted attention. Today, office work without these programs is unimaginable, and they have become indispensable tools for improving office productivity and information sharing (that is why they are called office productivity suite of integrated office software).

To promote office software migration as OSS dissemination approaches, it would be necessary to consider improvement of office environment productivity. Software migration or file format changes considering only OSS introduction costs ends up causing confusion on the site and does not bring advantages to users.

However, it is doubtful whether the latest versions of software, not limited to OSS, has the power to change the present situation. The possible reasons are as follows:

- There is a heavy dependence on previous versions of integrated office software (MS Office series has many versions, too).
- Proposal for office productivity improvement triggering migration to new integrated software is unfamiliar.
- There is lock-in because of the circumstances surrounding integrated office software such as introduction education, support, and document management tools.

## B Integrated Office Software (Office Suite)

Problems with office software such as word-processing and spreadsheet programs disseminated with PCs were the price of each program and increase the work rate of introduction education and support. The cost to buy a series of tools amounted to as much as 100,000 to 200,000 yen. In addition, regarding introduction education and support, different operations depending on each office work program needed to be learned.

Then, office software that combined each office work program into one and integrated functions appeared. Currently, the Microsoft Office series is the de facto standard for integrated office software. In addition, as a word-processing program, Ichitaro from JustSystems cannot be ignored.

The situation that existing (currently-used previous version) integrated office software has a major presence has no small effect on Microsoft. Most desktop PC users are familiar with the functions, usage, and support of existing (currently-used previous version) integrated office software, and unless considerable improvement in productivity is promised, they do not need to buy and introduce the latest version. Therefore, even with the advantage of pre-installation, a situation where the latest version of Microsoft Office itself cannot be disseminated to users of existing desktop PCs continues.

## C File Format

As a factor in the major presence of existing office suites, lock-in by a file format cannot be ignored. Low compatibility by version is sometimes identified, but under the present circumstances, as municipalities, companies, and schools request business partners to mutually use the same file format they use, the file format cannot be changed unilaterally nor easily.

What is about to change this situation is an XML-based file format for integrated office software that has made mutual conversion relatively easy. It is an attempt to attain supremacy by not exclusively utilizing a file format, but conforming to open standards.

As such file formats, the following two receive attention:

- OASIS OpenDocument (ODF)
- ECMA OfficeOpenXML Format (OOXMF)

## D Rise of Document Management Tools

Along with the spread of word-processing and spreadsheet programs, labor to manage files created with these programs has been increasing, raising the need for solutions to manage these files. As an easy example, there is the introduction of a file server for shared files. In this field, Samba is something to be reckoned with as the OSS. In addition, the spread of Cybozu and Lotus Notes as groupware has been promoted. Microsoft Exchange Server and SharePoint Server have a certain reputation, too. An approach to put integrated office software and document management tools on the Internet such as Google Docs & Spreadsheets has also attracted attention.

As one of the possible factors that hinder migration of integrated office software is dependence on these document management tools.

At present, document management tools from various companies start to support ODF and OOXMF, and it is possible that the exchange between these two file formats will greatly improve file interoperability. However, it is undeniable that they start late as OSS.

## E OpenOffice.org

There seems to be no question that OpenOffice.org is very important presence as open-source integrated office software. Its development has been promoted by the OpenOffice.org Community centering on Sun Microsystems, and it is highly evaluated for its compatibility with Microsoft Office and advanced file interoperability with ODF.

However, it does not have sufficient power to change the current situation in terms of compatibility, file exchange convenience, introduction education, and support structure. Comprehensive and multidimensional approaches are needed in the future, as well.

## References:

OpenOffice.org Japan Users Group

<http://ja.openoffice.org/>

Japanese Native Language Project

<http://wiki.services.openoffice.org/wiki/Ja.openoffice.org>

Compatibility Laboratory

<http://oooug.jp/compati/2.0/>

## F Solved Problems in OpenOffice.org 2.1

- Multi-Monitor Available in Impress Slide Show  
<http://oooug.jp/faq/index.php?faq/1/204>  
[http://wiki.services.openoffice.org/wiki/Impress\\_presenter\\_mode\\_specification](http://wiki.services.openoffice.org/wiki/Impress_presenter_mode_specification)
- Strengthening of Calc's HTML Export Function  
[http://ja.openoffice.org/issues/show\\_bug.cgi?id=66439](http://ja.openoffice.org/issues/show_bug.cgi?id=66439)
- Strengthening of Base's Access Support  
[http://ja.openoffice.org/issues/show\\_bug.cgi?id=42048](http://ja.openoffice.org/issues/show_bug.cgi?id=42048)
- Quick Start Available for Linux  
[http://ja.openoffice.org/issues/show\\_bug.cgi?id=57872](http://ja.openoffice.org/issues/show_bug.cgi?id=57872)
- Fix of Defect That “MS P Mincho Font” Is Not Displayed in Windows Version  
[http://ja.openoffice.org/issues/show\\_bug.cgi?id=62174](http://ja.openoffice.org/issues/show_bug.cgi?id=62174)  
<http://oooug.jp/faq/index.php?faq/4/45>

## G Improvement Activity

At present, with theme-type public solicitation “Creation of Development Specification Proposal about OpenOffice.org for Japanese Users” by the IPA's 2006 first half Open Source Software Utilization Infrastructure Development Project, a research team called Kamome Research Team summarizes defects and requests about Japanese. The table below is a list of the number of requests by field registered by the end of 2006.

Category	Number of Requests
Calc spreadsheet	105
Impress presentation	87
Writer word-processing	86
Whole	62
Base database	11
Other	9
Draw figure drawing	8
Installation	4
Linux version	3
HTML editor	2
Math numerical formula editor	2
Total	379

## 5.2 Summary and Future Approach Plan

Finally, as a conclusion of this report, a summary about activities by the Problem Extraction Task Force and future activity plans required to promote desktop OSS dissemination will be proposed. We strongly hope that this proposal will be utilized as a future guideline for promotion of desktop OSS dissemination.

### 5.2.1 Summary of Activities by Problem Extraction Task Force

The Problem Extraction Task Force of the Japan OSS Promotion Forum Desktop Subcommittee is a group that was established developmentally from a team to summarize disincentive spontaneously in its predecessor Desktop Subcommittee Marketing Task Force. Sorting out problems from demonstration experiment reports introduced in chapter 3 is based on the results of activities by the Marketing Task Force at that time.

Started officially in the Desktop Subcommittee held on July 20 2006, the Problem Extraction Task Force joined a questionnaire team in the Marketing Task Force at the same time and started to analyze disincentive toward the autonomous dissemination of desktop OSS.

The questionnaires targeting user companies was conducted in cooperation with Japan OSS Promotion Forum and JUAS. Answers were also obtained from participants in the IPA Forum. We would like to take this opportunity to thank the organizations and individuals who cooperated for this questionnaire.

To extract and organize problems from the demonstration experiment reports, analyze questionnaire results, and write this document, the Problem Extraction Task Force meeting took place eight times in total. This document was compiled as a result of discussions in the meeting held nearly one or more times a month. We would like to thank the task force members for their efforts, as well.

The questionnaire targeting municipalities, which was derived from one targeting user companies, was also conducted. Questionnaires were sent to each Japanese municipality at the end of 2006, and answers from 197 respondents were obtained from persons in charge in each municipality by February 2007 (the total number of sent questionnaires is 1973 and the collection rate is 10.0%). Count and analysis work of the questionnaire targeting municipalities has not been completed yet, but the collected data is to be analyzed in the successive task force or Desktop Subcommittee activities, and the future effective utilization is expected. We deeply appreciate the persons in charge in each municipality who responded to the questionnaire.

### 5.2.2 Proposal about Future Approach

As a closing to this document, we will propose activities that should be tackled actively in the future. These proposals are based on results discussed in the light of the past work by the Problem Extraction Task Force.

**A** Discussions based on a use case should be conducted to propose concrete spread measures.

A variety of attempts for promotion of the OSS spread have been operated for the past two to three years, bringing various successful examples and concrete knowledge for OSS introduction. However, obtained results are organized only sporadically, and it is somewhat doubtful whether they can be effectively utilized. It is time to organize information by purpose to make effective use of these results, too. Information offering assuming a use case should be promoted, for example, how can desktop OSS be introduced by a few units while confirming the effect and what should we do to use desktop OSs other than OSS but use OSS applications at the same time.

To do so, this document is useful to find possible disincentive toward spread related to particular cases and study solutions. We hope that this document will be used as a dictionary about problems related to individual utilization conditions.

**B** Many utilization patterns based on successful examples should be presented.

An approach to promote information based on the above-mentioned concrete examples and at the same time organize and present various utilization patterns based on successful examples is also effective. This is a strategy that by showing typified utilization patterns on a certain level in parallel with offering concrete individual information, a multidimensional information is offered.

Regarding user interfaces, this method is not necessarily the only solution. However, at present, a user interface about a particular OS is virtually the correct answer for users with relatively low literacy. To

change this situation, it is necessary to let people know that there are multiple correct answers by showing many utilization patterns based on particular successful examples.

In a field where OSS is used for education, the Open School Platform (OSP) project currently operated by the Center for Educational Computing (CEC) is helpful. In this project, the 2006 goal is to offer results from demonstration experiments about desktop OSS utilization in the school education field, which was conducted for three years, including the period operated by IPA, in the form of an OSP package.

The OSP package here does not remain a mere software package, but aims to become a series of packages with a support structure, introduction and operation methods, training methods, and construction of business models, and as a goal of 2006 results, packaging on a level so that it can be developed to other areas immediately after 2007.

This OSP methodology is applicable to not only the school education field but also others, and such development is considered very effective. That is, creation is considered for a variety of packages for small and medium-sized enterprises, family type operations, hospitals, public offices, and municipalities. This is an exact presentation of various utilization patterns based on successful examples.

### C Publicity and support activities should be enriched.

Generally, publicity for OSS is weak as was expected because of a fundamental problem wherein commercial software vendors can allocate an abundant budget to advertising, while the OSS cannot. To supplement this, it is necessary to widely disseminate information about OSS and offer education opportunities. It is also necessary to change the nature of IT literacy education currently dominated by courses about how to use commercial products.

One specific measure is to add information about desktop utilization to OSS iPedia that mainly stores information for servers. It would also be necessary to prepare a place to collect information in the Japan OSS Promotion Forum.

As well as publicity, an approach to cultivate support companies is important.

One of problems is that users do not know where to inquire about desktop OSS utilization. It is considered necessary to establish a mechanism where inquiries are unified and the required support is mutually provided as needed. One of ideas to actualize this is to establish a task force to research and examine the nature of such a support business in the Desktop Subcommittee as the first step.

### D Granularity of information reported to users should be standardized and then a reporting method should be devised.

Although there are wonderful OSS projects, such as peripheral utilization and individual applications when considering an individual approach, general users unfamiliar with technology continuously complain that they cannot understand the current situation (e.g. the connection status of peripherals, printer or storage status, and application operating status), and the software is difficult to use.

One of reasons for this is that the detailed user interfaces are still imperfect. A great deal of effort by OSS developers have achieved a variety of functions, but efforts to bring information to end-users are still insufficient. The topic of user interface standardization is one example. For instance, entry-level users can easily obtain the necessary information if help documents are standardized, but there are few cases where application developers consider this if at all.

However, unification of user interfaces includes a difficult problem. First, it is necessary to promote standardization about the level of information that must be unified, that is, the level of information to be offered. Too detailed information ends up confusing users, while too little information is not helpful for users.

It is good to standardize the level of information offered, then entrust how such information is presented to individual development efforts. Developers need to be always be aware of efforts to provide users with information. This is especially obvious in desktops utilized by various-level users under various conditions.

### E Development of functions requested by users regarding desktop OSS utilization should be accelerated.

Demonstration experiment reports and questionnaire analysis proved that development of the following

functions were required. The development of these functions needs to be accelerated for promotion of desktop OSS dissemination.

- Improvement in the compatibility of database applications and development of data migration tools for existing DB
- Further strengthening of office application compatibility (including support of VBA macros)
- Document converters for Unicode and applications to handle Gaiji
- Maintenance of installers for various drivers and offering of GUI to simplify various settings
- General-purpose wrappers to Windows drivers
- Research and development to endure and improve usability
- Higher-quality Japanese (multilingual) input method
- Creation of IC card readers for Linux
- Electronic signature/electronic signature verification applications (or service) and applications supporting GPKI
- Encryption/decryption applications (including simplification of e-mail encryption environment and password addition to PDF)

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