Tell us about key points and any concerns you have experienced in the process of replacing the teachers' PCs with thin client systems.

The key point that we have learned through the actual experience is to explain the plan to teachers as early and accurately as possible.

We described the installation of thin client systems to teachers about 2 months before the formal start of this project. "What is a thin client?" was their first response. After learning about thin client systems, they responded, "USB keys cannot be used any more. That bothers us a lot!" Later on, we patiently explained the advantages of a thin client system by saying that "This change is unavoidable to prevent data loss. If security is enhanced, teachers will be no longer responsible for data loss. This protects teachers as well." Eventually, they agreed to the project.

While we started talking with teachers two months before implementation, we should have started sooner – at least 6 months before deploying the solution. After deciding on project specifications at the Board of Education, first explain the project and collect more opinions from teachers, and then review the project based on those opinions. This procedure should have been completed initially to lead better understanding and acceptance by the teachers. Thin client systems enhance security. However, because convenience is reduced by not using USB keys, it is not surprising that teachers are less likely to support a thin client system initially. For municipalities which implement a thin client project, we recommend the following procedures when creating project schedules: explain to teachers, listen to objections, review opinions, and decide how to proceed.

Please summarize the project and point out any further expectations of NEC.

By introducing thin client systems in Gotemba elementary school and Fujioka elementary school, we have achieved an IT infrastructure that prevents the loss of confidential data including student grades. In the months ahead, the other remaining 14 schools in the Gotemba City will deploy thin client systems.

The Board of Education asks for NEC's on-going support to improve security with its superior technology, support, and proposals in years to come. In addition to this, we hope NEC will continuously provide us with suggestion for improving our educational system.

On-the-spot comments

Through the deployment of thin client systems for teachers, we have established a strong infrastructure to prevent data loss. Teachers are able to work more efficiently thus improving education without concern for data loss from their client systems. We hope to continue to enhance the whole system with greater convenience and security.

Gotemba elementary school, Principle
Ms. Fumiko Amano

Vice principle
Mr. Ryosaku Seto

Empowered by Innovation

NEC

Empowered by Innovation **NEC**

The Gotemba City Board of Education intends to replace all PCs for teachers with thin client systems by FY2012 to prevent the critical data loss. The plan includes all 16 elementary and junior high schools in the Gotemba City. After receiving the Board's request, NEC proposed its desktop consolidation solution called "**VirtualPCCenter**". As a result, the Gotemba City has already successfully deployed **VirtualPCCenter** in 2 schools, Gotemba elementary school and Fujioka elementary school. The other 14 schools will soon follow.

> **The Gotemba City plans to replace all PCs for teachers with desktop consolidation thin client systems in all 16 elementary and junior high schools. Deployment in 2 elementary schools has already been succeeded.**

PROFILE
Gotemba City

The Gotemba City Board of Education

Address	: 483 Hagiwara, Gotemba, Sizuoka Pref, Japan
Population	: 90,664 (March, 2009)
URL	: http://city.gotemba.shizuoka.jp/indexe.html

The Gotemba City Board of Education
Deputy General Manager of Education Department, and Manager of General Affairs Division
Mr. Akira Sugiyama (Center)

The Gotemba City Board of Education
Assistant Manager of General Affairs Division
Mr. Yoichiro Suzuki (Left)

The Gotemba City Board of Education
Senior Manager of General Affairs Division
Mr. Kazuo Yamazaki (Right)

Provide us with an overview of the "Thin client deployment project for schools".

In 2008, the Board of Education decided to replace all of the PCs with thin client systems at the 16 elementary and junior high schools in the Gotemba City. The project overview is as follows.

Items	Contents	Note
Target Schools	All elementary and junior high schools in the Gotemba City (16 schools)	10 elementary schools (10 schools and 1 branch school) 6 Junior high schools
Target PC	PCs in teacher offices and offices	–
Goal	Prevent data loss	The use of USB keys is prohibited by Board of Education policy
Implementation Timeline	Between FY2008 and FY2012	Every teacher in each school was previously provided with his or her own PC. Thin client deployment will be done gradually in accordance with end of support and lease agreements.
Others	The system must allow teachers to log-in to their own PC environment from any thin client, even from at home	Currently testing from February, 2009.*3 Initial implementation will begin in the spring of the same year.

*3 The network connection between the schools and the prefecture's data center, and thin client systems were already installed. Currently the VPN connection between the teachers' home and the data center have been tested.

Tell us about the Gotemba City and the elementary and junior high schools in the city.

The Gotemba City in the Shizuoka prefecture is located near Mt. Fuji, with a population of about 90,600. The city's name is derived from "Goten", which means a Japanese castle. This was named after Tokugawa Ieyasu, who was the founder and first Commander of the Forces of the Tokugawa shogunate back in 1600s. Today, there are 10 elementary schools[*1] and 6 junior high schools in the city. There are about 5,400 elementary school students and 2,500 junior high school students.[*2]

*1:10 schools and 1 branch school   *2:As of 2008

What is the reason for the "Thin client deployment project for schools"?

The project's goal is "to prevent data loss from the teachers' PCs."

Today teachers assume they will use PCs in their offices. Teachers use their PCs to create and review grade reports, create and manage text books, and build teaching plans.

Most teachers also do this work from home after teaching all day and completing other work at school. Currently most of them copy their data to external media devices such as USB keys which they take them home to continue their work. The next morning teachers bring their USB keys back to the school and resume their work there.

Teachers are eager to use PCs in this way for their

To begin this project, PCs at 2 elementary schools were replaced with thin clients by the end of 2008. The details are as follows.

Items	Contents
Target Schools	Gotemba elementary school (38 terminals) Fujioka elementary school (28 terminals)
Time	Started in December 2008
Type of thin client	Desktop virtualization
Software	VirtualPCCenter
Hardware	Thin client terminals US60·····························66 units Virtual PC Server Express5800/120Rj-2··· 4 units Management Server Express5800/120Rh-1·· 1 unit
Server location	Prefecture data center
Network design between the data center and schools	Gotemba elementary school : Optical communication Fujioka elementary school : 47MB ADSL

VPCC

NEC

Thin client usage scenes in Gotemba elementary school

daily work. From the standpoint of the data loss prevention, however, use of USB keys creates a vulnerability which cannot be ignored. This scenario could cause data loss incidents at any time.

To improve security, each school has set rules such as "Teachers are required to have the principal's permission to take USB keys home" and "Data in the USB keys must be encrypted". However, there is no guarantee that the teachers follow these rules. Therefore, even with rules, a better solution is necessary in order to protect the school's PC data from loss.

The Board of Education thought this potential security problem should be prevented by improving the IT infrastructure rather than by enforcing operational rules. They presented their requirements to NEC, as well as to local SI companies, and asked for "proposals for a new PC infrastructure to prevent data loss."

What were the requests to NEC and the local SI companies?

The Board of Education's requirements for a "PC infrastructure to prevent data loss" included:

1. No data storage on PCs
2. No use of external storage devices such as USB keys

3. Teachers can continue to work at home
4. The system design cannot limit the use of different types of software

As the first requirement
What does *No data storage on PCs* really mean?

Currently, the Gotemba City distributes a PC to each teacher. The teacher's work data is stored on their laptops. In other words, if a teacher loses his or her PC or if the PC is stolen, the data is lost or stolen as well.

To help mitigate this risk, today each school owns a file server for data storage and its use is required as a rule. However, as long as teachers can also store data on laptops, there is a high risk of data loss.

Therefore, the new IT infrastructure is necessary to meet the requirement to prevent data storage on PCs.

As the second requirement
What does *No use of external storages such as USB keys* really mean?

The acceptance of the USB key usage is a security concern based on the reasons outlined earlier. The new IT infrastructure must exclude the use of external USB keys.

As the third requirement
What does *Teachers can continue to work at home* really mean?

The exclusion of use for the USB key also excludes the teacher's ability to do their work at home. However, we did not want to reduce the teachers' enthusiasm about their jobs. Therefore, the new infrastructure solution must allow teachers to continue their work at home even without using external storage devices.

As the forth requirement
What does *The system design cannot limit the use of different types of software* really mean?

It is assumed that any new system that fulfills the previous requirements may introduce functionality restrictions. However, functional limitations must be avoided.

For instance, elementary and junior high schools in the Gotemba City use "Takechiyo", a student score management software tool. It is essential that teachers continue to use this software on the new

system. Moreover, teachers for each subject need to use the software appropriate for course materials used in their classes. Therefore, the deployment of the new system must allow the usage of any software originally designed to run on the PC so that there would be no disruption of teaching capability.

NEC and the local SI companies proposed the following four ideas after hearing these requirements, 1)A thin client system is the best solution in terms of data loss prevention, 2) Several types of thin client systems are available including "presentation virtualization", "net boot", and "desktop consolidation", 3) The desktop consolidation solution allows teachers to maintain their personal PC environment from any thin client devices, including from home, and 4) The desktop consolidation solution meets all of the Gotemba City's requirements.

To NEC:
How does NEC's desktop consolidation solution fulfill the all requirements of the Board of Education while presentation virtualization or net boot type do not?

(Answers from NEC):
Among the City's requirements, two of them – not storing data on PCs and prohibiting the use of external storage devices such as USB keys – can be solved by presentation virtualization and net boot type thin client systems. However, the net boot thin client system does not meet the third requirement which is to allow teachers continue their work at home. Additionally, presentation virtualization is not able to meet the fourth requirement to allow teachers to use different software applications. Presentation virtualization requires applications which support multi-user access which thus limits the available software.

To satisfy all of the requirements of the Board of Education, the best solution is a desktop consolidation system which builds multiple virtual PCs on a virtualization infrastructure. A desktop consolidation solution separates each virtual client and provides better

usability for teachers with fewer limitations on applications.

From these reasons, NEC proposed a desktop consolidation solution, "**VirtualPCCenter,**" to the Board of Education.

NEC's proposal, **VirtualPCCenter**, met all of the city's requirements. However, the Board of Education hesitated to adopt the solution without testing it first.

What caused the Board of Education to hesitate even though NEC's proposal met all requirements?

The biggest concern was that as far as we knew, there was no similar deployment of a desktop consolidation solution by a school system. NEC delivered a presentation and a demonstration. However, the demonstration and the actual deployment would differ in numerous details. The Board of Education was not sure if the proposed system would operate satisfactorily when many teachers used it.

How did you resolve your concern?

First of all, we learned about desktop consolidation solutions. Then we asked detailed questions to NEC and the local SI companies. NEC and the local SI companies responded with acceptable answers. Yet there was a concern that there were no similar implementations in a school, NEC's proposal satisfied all of our requirements in terms of logic and specifications. Moreover, preventing data loss was the most pressing issue in the education environment.

In August 2008, the Board of Education decided to introduce the desktop consolidation solution in Gotemba elementary school and Fujioka elementary school.

Three months have passed since the initial installation at schools in December 2008. How is the system working?

NEC has met all our requirements with **VirtualPCCenter.** There are no issues. The data loss prevention infrastructure is working well.

In this specification, the servers and clients are miles apart – servers are placed in the prefecture's data center and clients are located at schools in Gotemba. Have the thin client systems reduced the speed of PCs and printers?

As of today, there are no complaints about a time-lag.[*4] The network environment is optical communication for Gotemba elementary school and a 47 MB ADSL for Fujioka elementary school. There seem to be no problems with response times.

As for the printers, printer commands from thin client terminals are executed on the servers in the data center, and then this process returns to each teacher's printer. While this might seem indirect, this does not decrease speed. Moreover, there are no changes required on site for printer settings.
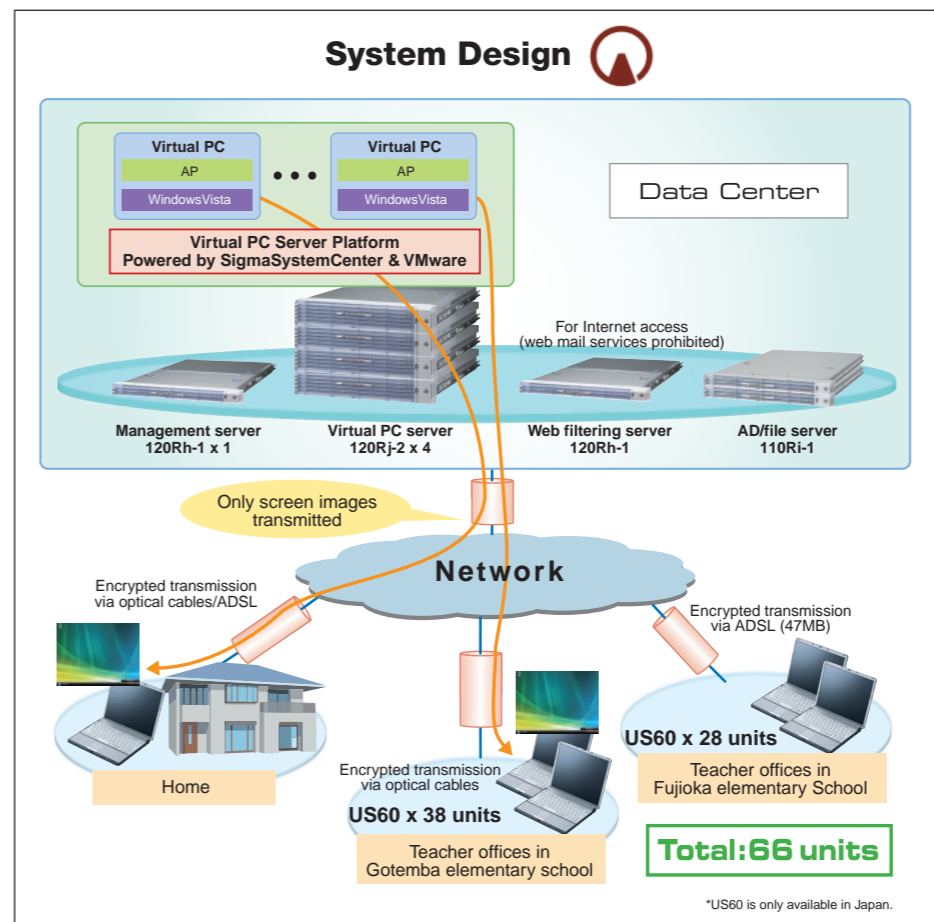
(Comments from NEC):
[*4] On thin client systems, information that is transmitted from clients to server is small. This information only includes the location information of mouse and input information from the keyboard.

Screen information also is transmitted from server to client. However this transmission only includes changes. Therefore it does not account for very much data.

If there is enough network bandwidth, operational speed never lags with thin client systems.

Why did you decide to place the virtual PC servers in the prefecture's data center rather than in the town hall?

The server room of the town hall is already full of servers and there was no room for new systems that might be needed for future growth. Furthermore, adding more servers might exceed the durable weight limitation of the floor in the town hall. It is also preferable to place servers in the datacenter, not in the town hall, because the data center offers better temperature control and security.

System Design

Virtual PC
AP
WindowsVista

Virtual PC
AP
WindowsVista

**Virtual PC Server Platform
Powered by SigmaSystemCenter & VMware**

Data Center

For Internet access
(web mail services prohibited)

Management server
120Rh-1 x 1

Virtual PC server
120Rj-2 x 4

Web filtering server
120Rh-1

AD/file server
110Ri-1

Only screen images transmitted

Network

Encrypted transmission via optical cables/ADSL

Encrypted transmission via ADSL (47MB)

Home

Encrypted transmission via optical cables

US60 x 28 units

Teacher offices in Fujioka elementary School

US60 x 38 units

Teacher offices in Gotemba elementary school

Total:66 units

*US60 is only available in Japan.