

Bach Mai Hospital, Hanoi, Vietnam

# Summary Report

Vietnam

## Pilot Survey for Disseminating SMEs Technologies for the Telemedicine Cooperation Using Information and Communication Technologies (ICT)

October, 2015

Japan International Cooperation Agency

ViewSend ICT CO., LTD.

## 1. BACKGROUND

Health indicators in Vietnam have been improving since the implementation of Doi Moi (Renovation) Policy in 1986. The Policy aimed at the creation of socialist-oriented market economy with structural improvement for introduction of foreign capital enhancement of international competitiveness, etc.. As a result, Vietnam has witnessed high economic growth with steady growth in GDP per capita in recent years. This has also led to increase budget for Health Sector. Together with both financial and technical assistances from donor partners, core health indicators such as Infant Mortality Rate (IMR) and Maternal Mortality Rate (MMR) have declined significantly.

However, such improvements are mainly taking place in urban areas, and health indicators in rural areas have not been improved sufficiently. One of the causes for this discrepancy is due to unequal access to and use of health services in rural area. Because patients are aware that rural hospitals are not well equipped and the number and/or quality of health service providers in rural area are inadequate, patients hesitate in using rural health facilities. In order to attract patients to health facilities in rural area, it is crucial to improve the quality of health service providers in rural areas. In addition, other issues, such as ineffective referral systems in which patients can go directly to higher hospitals, lead to low use of rural health facilities.

Another significant change in health sector in Vietnam is the change in disease structure. Incidence of communicable disease have been decreasing, wherein incidence of non-communicable diseases and traffic accidents have been rising. Though non-communicable disease, such as cancers, and traffic accidents often require diagnoses with MRI, CT and DR, such equipment are only available at relatively higher level health facilities (i.e. central and provincial hospitals). However, at provincial level, it is often difficult to diagnose patients with complex cases due to lack of well-trained specialized doctors. Therefore, patients tend to concentrate at central hospitals with high diagnostic capacity.

All these factors lead to constant overcrowding patients with various stages of diseases at central hospitals. Therefore, central hospitals have difficulties in performing its role of treating patients with most difficult diseases. Vietnam's *Socio-Economic Development Strategy for 2011-2015* lists relieving the overload of large hospitals as one of health sector's tasks. This requires (1) reduction in discrepancy in quality of health services between urban and rural health facilities, and (2) improvement of quality of health service providers in medical image diagnoses at lower level hospital.

## 2. OUTLINE OF THE PILOT SURVEY FOR DISSEMINATING SME'S TECHNOLOGIES

### (1) Purpose

- 1) To reduce the concentration of patients at the central hospitals
- 2) To fill the gaps in quality of health service between urban and rural area
- 3) To enhance the capacity of health service providers in medical image diagnoses at lower level hospital.

### (2) Activities

- 1) To properly install and operate Picture Archiving and Communication System (hereinafter referred to as "PACS") at Bach Mai Hospital.
- 2) To properly install and operate Telemedicine System at Bach Mai Hospital and its two Satellite Hospitals (Bach Ninh Provincial Hospital and Ninh Binh Provincial Hospitals):

Since the proposed Telemedicine System is new to Vietnamese hospitals, an implementation manual and training guideline will be prepared.

- 3) To examine effectiveness of the proposed PACS and Telemedicine System:  
The effectiveness of the model is measured through baseline and end-line surveys, monitoring, and training /workshops. The results of the examination will be shared with the Ministry of Health and three target hospitals.
- 4) To support building a framework for the Telemedicine System in Vietnam:  
In order to support telemedicine cooperation in Vietnam, the Survey will include training of Vietnamese personnel in Japan and propose a roadmap for regional telemedicine cooperation framework.

### (3) Information of Product/ Technology to be Provided

The Pilot Survey introduces the medical imaging software consists of mainly PACS and telemedicine systems to Bach Mai Hospital and its Satellite Hospitals (Bach Ninh Provincial Hospital and Ninh Binh Provincial Hospitals).

#### 1) PACS at Bach Mai Hospital

PACS allows users to save medical pictures from DICOM compatible devices such as CT and MRI to a server (archiving). And then the users can access to the medical pictures over online network. The Survey aims to improve work efficiency of the target hospital, as well as reduction in hospital service expenses.

2) Telemedicine System at Bach Mai Hospital and its Satellite Hospitals

Telemedicine System is a technology that allows image diagnoses involving two or more parties that simultaneously manipulate digital images from medical devices such as CT and MRT, archived and controlled via PACS in a server. This technology provides an environment where a specialist doctor can remotely diagnose a case based on CT images from another medical facility. This distant medical cooperation has helped in remote areas in Japan where doctors are scarce.

(4) Counterpart Organization

Bach Mai Hospital

(5) Target Area and Beneficiaries

Bach Mai Hospital,  
Bac Ninh Provincial Hospital, and  
Ninh Binh Provincial Hospital.

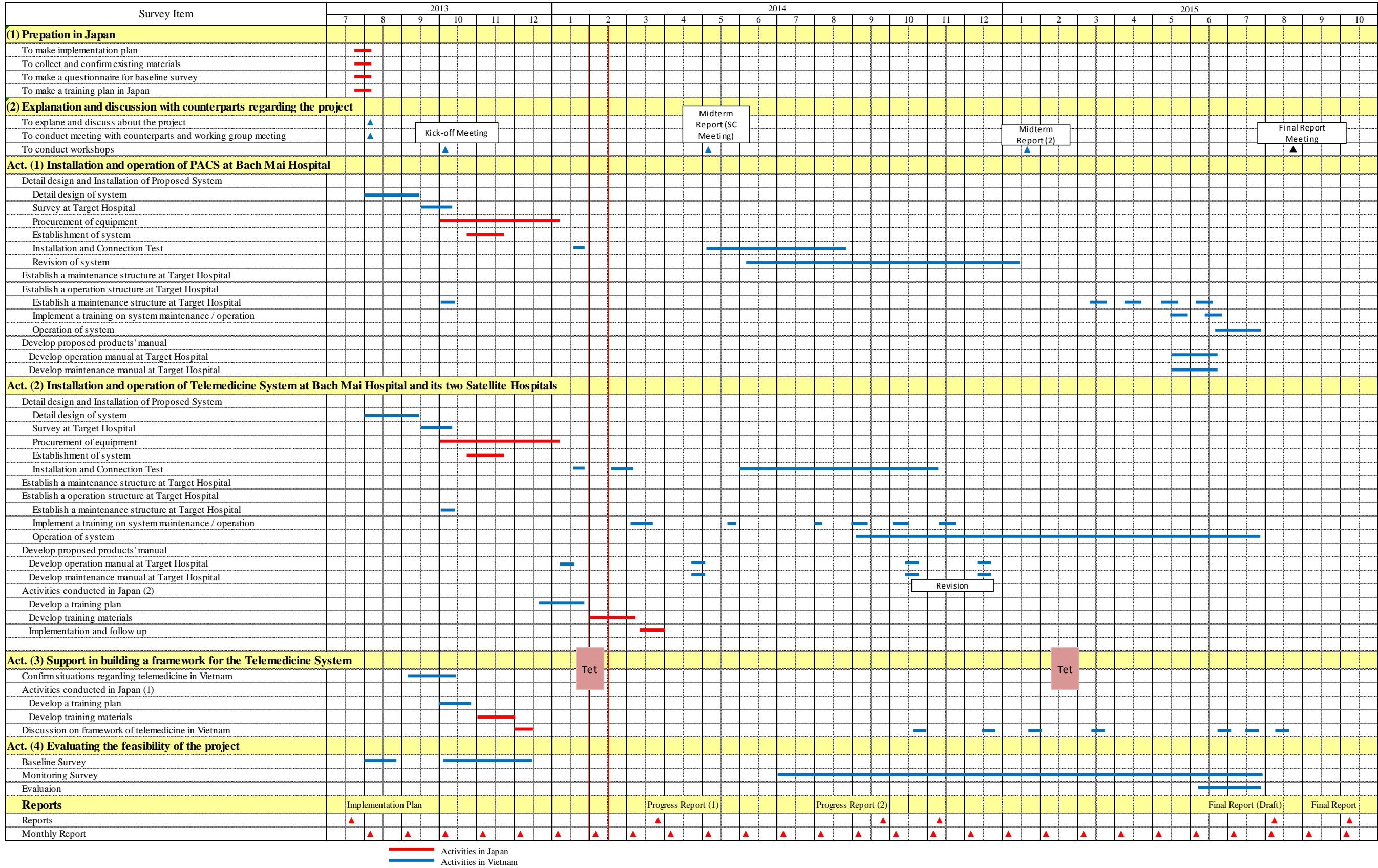
(6) Duration

From August 2013 to October 2015.

(7) Progress Schedule

The Survey will be carried out over 27 months from August 2013 to October 2015. The following table shows the specific plan of operation of the Survey.

Plan of Operation



# (8) Manning Schedule

Manning schedule for the Survey is shown on the next page.

Manning Schedule																																
Title	Name	Organization	2013年						2014年												2015年										Vietnam	Japan
			8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10			
Team Leader	tsuhiro Ogiwa	ViewSend ICT Co. Ltd.	14 8/6-19		5 10/1-5								5 4/14-18	4 5/14-17				13 9/1-13	11 10/13-23			5 1/20-24					5 1/20-24			2.07		
Teleradiology System	Yuji Nakajima	ViewSend ICT Co. Ltd.		67 8/6			65 11/25			26 2/10	3 3/7		38 5/13	6 6/28				13 9/1-13	10 10/2-11											7.30		
Teleradiology System	Norihiro Kawai	ViewSend ICT Co. Ltd.																9 10/2-10	15 11/12-26		10 1/20-24		7 7/7	7 7/7		7 7/7			1.83			
Chief Advisor / Project Promotion	Kenji Okada	System Science Consultants Inc.	24 8/6-29		25 9/25			12 1/14-25				14 4/6-19				16 8/19-9/3											3 1/20-24			3.13		
Telediagnosis / Medical Cooperation	Takayuki Asao	Gunma University Graduate School	10 8/14-23		8 10/1-8							7 5/14-20															5 1/20-24			1.00		
Training Plan / Health System	Chie Honda	System Science Consultants Inc.			26 10/1-26							12 4/6-17																		1.27		
Training Plan / Health System	Shinichiro Takeda	System Science Consultants Inc.														15 8/30	13 9/13		13 10/13-25											0.93		
Baseline Survey / Monitoring & Evaluation	Daigo Sano	System Science Consultants Inc.	19 8/6-24									27 5/11-6/6		16 7/30	8 8/14		11 10/21-31	18 11/12-29	15 12/10-24	(23) 1/6-28			(7) 1/20-24		(7) 1/20-24	4(21) 1/20-24	(7) 1/20-24			3.67		
Implementing Organization (Man / Month)																												11.20	--			
External Experts (Man / Months)																												10.00	--			
Team Leader	tsuhiro Ogiwa	ViewSend ICT Co. Ltd.																													0.00	
Teleradiology System	Yuji Nakajima	ViewSend ICT Co. Ltd.			16(20) 10/14-11/18																										1.80	
Chief Advisor / Project Promotion	Kenji Okada	System Science Consultants Inc.	3 8/1-5												3 8/14-18																0.30	
Telediagnosis / Medical Cooperation	Takayuki Asao	Gunma University Graduate School			24 11/13-12/16					4 3/24-3/27	4 5/12-22							6 1/6-28									4 1/20-24				2.10	
Training Plan / Health System	Chie Honda	System Science Consultants Inc.	4 8/1-6		14 11/21-12/10					10 3/14-28																					1.40	
Baseline Survey / Monitoring & Evaluation	Daigo Sano	System Science Consultants Inc.	3 8/1-5		5 12/5-11																										0.40	
Implementing Organization (Man / Month)																													1.80			
External Experts (Man / Months)																													4.20			
Implementing Organization (Man / Month) / Total																												11.20	1.80			
External Experts (Man / Months) / Total																												10.00	4.20			
Total Man Month																												21.20	6.00			
Legend:  :Vietnam  :Japan  :Expenses paid by Implementer																																

 Vietnam
  :Japan
  :Expenses paid by Implementer

## (9) Implementation System

To implement the Survey, Mr. Katsuhiro Ogiwara, Director of ViewSend ICT Co., Ltd. (ViewSend), takes responsibilities of overall activities as the Survey team leader. All of the activity reports and outcomes are put together by him. In addition, Engineering Department, Sales Department and General Affairs Department of ViewSend give appropriate advice to the practitioners in accordance with each role. Furthermore, Gunma University Graduate School and System Science Consultants Inc. engage in the Pilot Survey as external experts, and conduct risk management in close cooperation with ViewSend. The following figure shows implementation structure of Plot Survey Team, and implementation structure of product procurement and management.

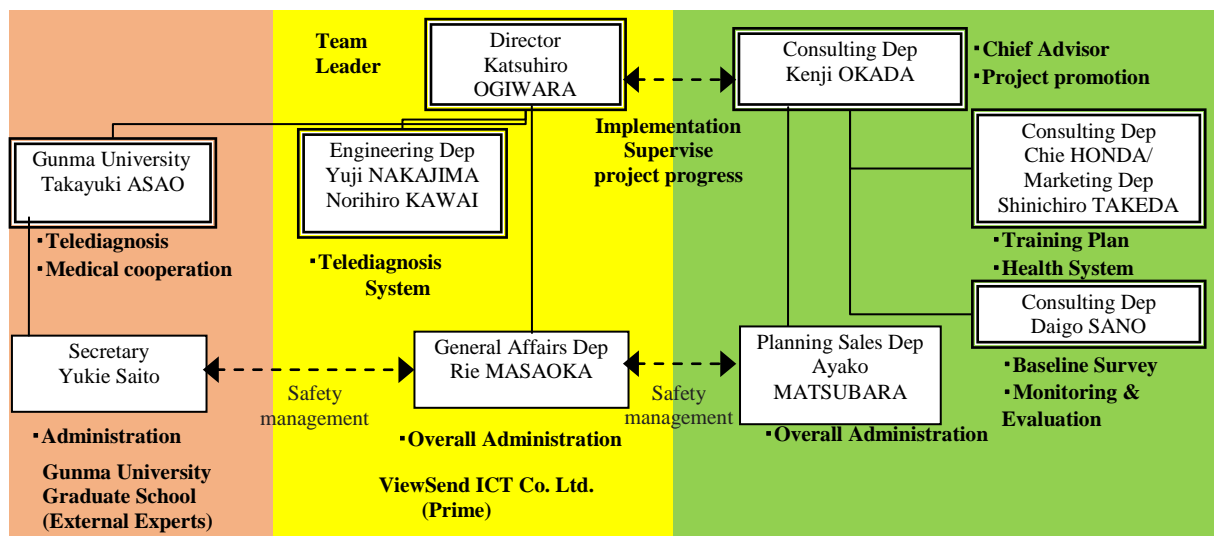


Figure 1: Implementation Structure of Pilot Survey Team

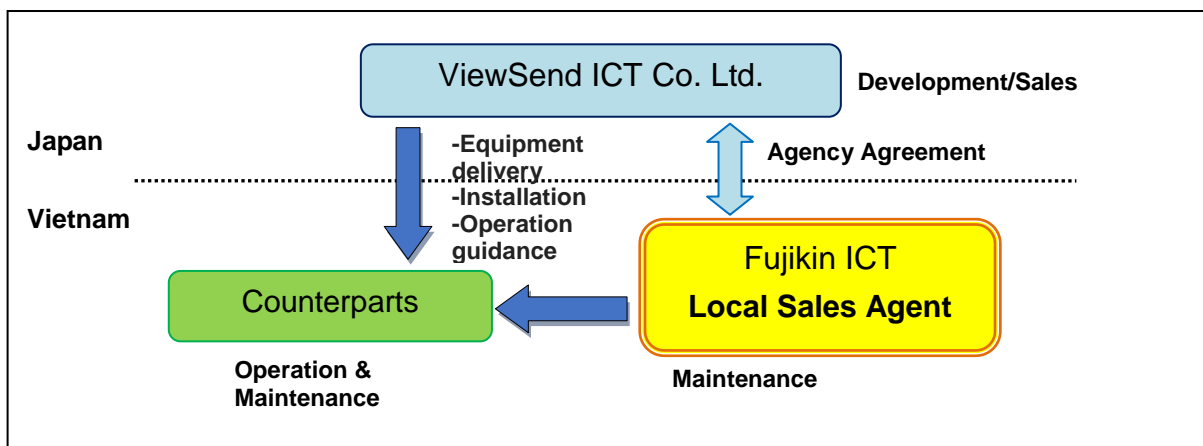


Figure 2: Implementation Structure of Product Procurement and Management

### 3. ACHIEVEMENT OF THE SURVEY

#### (1) Outputs and Outcomes of the Survey

- 1) To properly install and operate Picture Archiving and Communication System (hereinafter referred to as “PACS”) at Bach Mai Hospital.

#### **Development of the Products (PACS)**

In October 2014, detail specifications of ViewSend PACS (VS PACS) were agreed between Bach Mai Hospital and ViewSend. The major changes from the original plan were A) to increase the storage capacity of a main server from 5TB to 50TB, and B) to additionally provide a backup server (5TB), in order to meet increasing demand of Radiology Dept. at Bach Mai Hospital in near future. The equipment was procured accordingly, and installed in Bach Mai Hospital in January 2015.

**Table 1: Equipment for PACS**

Main server	1 set
Backup server	1 set
ViewSend Viewer for PACS	4 set

#### **Operation / Maintenance Structure**

Operation and maintenance structure was agreed according to “Regulation for Picture Archiving and Communication System (PACS)” in June, 2015. Trainings were also given with operation and maintenance manual/guideline developed by the Survey team.

**Table 2: Operation and Maintenance for VS PACS**

Operation	VS PACS is used for training and education purposes for resident doctors and students under the supervision of Bach Mai Hospital’s radiologists.
Maintenance	System and software maintenance is done by IT Dept. of Bach Mai Hospital. In case IT Dept. could not handle problems, Fujikin ICT and ViewSend Tokyo will provide necessary service.

**Table 3: Manuals and Guidelines for PACS Implementation**

Operation Guideline	1. Regulation for Picture Archiving and Communication System (PACS) (Vietnamese and English)
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Operation Manual	1. PACS Operation Manual (Vietnamese) 2. Summary of PACS Operation Manual (English)
Maintenance Manual	1. PACS System Equipment List (English) 2. Trouble Shooting for PACS Operation (English) 3. How to Register Users to VS PACS (Vietnamese) 4. System Configuration of PACS (English)

## **Operation of PACS**

### Test Operation

Test operation was started in January 2014. Soon after radiology doctors started using the software, some recommendations were raised. This was mainly due to the fact that doctors compared functions of VS PACS with those of other companies' PACS software which had been installed at Radiology Dept. for its trial use. After careful discussion, it was agreed that ViewSend will improve those functions as it would also lead to better sales with improved functions in future business.

### Main Operation

After the revision ended in January 2015, Bach Mai Hospital agreed to use it from March 2015 (after Tet Holiday in February). During installation of VS PACS from March to June, small revisions were done in order to further meet the demand of radiologists. It was also agreed that VS PACS would be used for training of resident doctors and students as the Radiology Dept. continuously accept trainees from other hospitals and medical schools. And finally, VS PACS operation fully started from June 2015.

- 2) To properly install and operate Telemedicine System at Bach Mai Hospital and its two Satellite Hospitals:

### **Development of the Product (Telemedicine System)**

In October 2014, detail specifications of ViewSend Telemedicine System (VS Telemedicine System) were agreed among Bach Mai Hospital, Bac Ninh Provincial Hospital, Ninh Binh Provincial Hospital and ViewSend. It was agreed that each of three hospitals receive one set of ViewSend RAD system. Procurement was done accordingly and the equipment was installed at each hospital in March 2014.

### **Operation / Maintenance Structure**

As telemedicine was new concept in Vietnam, it was necessary to develop a

guideline for the users (i.e. radiologists, radiology technicians, and IT staff) to understand their roles and responsibilities. A general guideline, “Operation Management Regulation for Telemedicine Equipment”, was developed by the Survey team in April, 2014. In addition, in order to follow precise steps for telemedicine activities, additional guideline, “Detailed Operational Guideline for Telemedicine System”, was also developed for the users. Operation and maintenance of the system was generally agreed as follows:

**Table 4: Operation and Maintenance for VS Telemedicine System**

Operation	Two functions (reporting and tele-conference) of VS Telemedicine System are used by Radiology Dept. of three target hospitals according to the guidelines.
Maintenance	System and software maintenance is done by IT Dept. of three target hospitals. In case IT Dept. could not handle problems, Fujikin ICT and ViewSend Tokyo will provide necessary service.

Based on the agreed operation structure, trainings and manuals were given to Radiology Dept. and IT Dept. at each of the target hospitals.

Operation Guideline	1. Operation Management Regulation for Telemedicine Equipment (Vietnamese and English) 2. Detailed Operational Guideline for Telemedicine System (Vietnamese and English)
Operation Manual	1. Tele-radiology Operation Manual (Vietnamese) 2. Tele-Conference Operation Manual (Vietnamese)
Maintenance Manual	1. Tele-radiology System and Software VPN Configuration (English) 2. Equipment Configuration of Tele-radiology (English) 3. Trouble Shooting for Tele-radiology Operation (English) 4. IP System Configuration (English)

### **Operation of System**

Operation of the system was officially started in September, 2014. Although the number of requests was lower than initial expectation, tele-radiology requests have been sent regularly up to date (July, 2015). However, as for tele-conference function, connection and quality of conference are instable due to the Internet instability.

### **Training in Japan**

Between 23<sup>rd</sup> and 30<sup>th</sup> March, 2014, training in Japan was done to seven participants from three target hospitals in order to become core users of VS Telemedicine System. The participants learned how VS Telemedicine System was used and maintained in actual hospital environment. At the end of the training, the participants developed “Operation Management Regulation for Telemedicine Equipment”.

#### **3) To Examine effectiveness of the proposed PACS and Telemedicine System:**

Effectiveness of the proposed PACS and Telemedicine System were measured through baseline survey (BLS), end-line survey (ELS) and monitoring. Following are major issues found in the Survey.

##### Effectiveness of VS Telemedicine System

- **Precise and stable diagnoses at lower hospital**

Before installation of VS Telemedicine System, tele-radiology was done with free internet software and service, therefore, quality of medical images was low and stability of the service was also with a problem. With VS Telemedicine System, some cases, which could not have been able to be diagnosed through free internet software and service, can be diagnosed because the system can send high quality images. And as a radiologist at lower level hospital does not have to rely on his/her personal connection at higher level hospital, a diagnosis is provided stably.

- **Training for radiologists at Satellite Hospitals**

As radiologists at lower hospital is exposed to high level diagnoses from higher level hospital (Bach Mai Hospital), doctors at lower hospital can increase their knowledge and skills. With VS Telemedicine System, patient diagnostic data is also available for future reference unlike other methods (such as a free internet software) where data will not be kept.

From the point of view of management, directors of Radiology Dept. can study series of requests from its department to find the level of diagnostic skills at his/her department and provide necessary training. This is possible because VS Telemedicine System can save and store the requests (i.e. request date and time, parts, initial diagnosis at requesting radiologist, etc.) and results (an answer from higher level hospital) as the data.

- **Less financial burden for patients**

Considering travel time and waiting time at higher level hospitals,

patient's financial burden is considerably high. VS Telemedicine System can provide high quality diagnoses to patients within a few hours after request sent by lower level hospitals.

- **Stronger cooperation between hospitals**

Prior to the Survey, tele-radiology request was done by personal connection among radiologists at Bach Mai Hospital and its satellite hospitals. After Survey, as tele-radiology activities facilitated cooperation between three hospitals instead of personal connection, some positive activities were seen such as active participation of Bach Mai Hospital's doctors in diagnosis and treatment at Satellite Hospitals.

#### Effectiveness of PACS

4) To support building a framework for the Telemedicine System in Vietnam:

As the Survey is one of the first telemedicine project in Vietnam, guidelines and manuals were not officially developed at Ministry of Health (MOH). As of July 2015, such guidelines and manuals have not been developed yet. However, the result of the Survey has been shared with counterpart personnel at MOH for them to work on the guideline in near future.

#### **Training in Japan**

Between 2<sup>nd</sup> and 8<sup>th</sup> December, 2013, training in Japan was done to seven participants from MOH and three target hospitals in order to share Japanese experience in telemedicine system such as strengths and weakness of telemedicine, background of development of telemedicine in Japan, policy and actual implementation of telemedicine at hospital environment.

(2) Self-reliant and Continual Activities to be Conducted by Counterpart Organization

Under continuous technical support from ViewSend, it is expected that three hospitals continue following activities.

#### **Telemedicine System**

It is expected that both Bac Ninh Provincial Hospital and Ninh Binh Provincial Hospital continue to send tele-radiology requests to Bach Mai Hospital via VS Telemedicine System. And Bach Mai Hospital continues to provide diagnostic support to those hospitals.

As for tele-conference function, it is expected that three hospitals cooperate to hold a tele-conference regularly. However, due to technical instability of the system, these hospitals may find it difficult. Accordingly, ViewSend will continue to contribute for solving the problems on system instability of tele-conference function.

It is also expected that hospitals will prepare budget to continue tele-radiology activities. One is the internet cost which was covered by ViewSend during the Survey period. Another issue is diagnostic fee charged by Bach Mai Hospital. Diagnostic fee has been free of charge during the Survey period in order to facilitate its usage. It is expected that Bach Mai Hospital will start its charge again, and therefore, both Bac Ninh and Ninh Binh Provincial Hospitals should cover the diagnostic fee.

## **PACS**

It is expected that all equipment provided by the Survey will continue to be used after the completion of Survey for training and education purpose for resident doctors and students.

#### 4. FUTURE PROSPECTS

##### (1) Impact and Effect on the Concerned Development Issues through Business

###### Development of the Product/ Technology in the Surveyed Country

Since benefits of hospital level, doctor's level, and patient level are mentioned under "3. (1), 3) To Examine effectiveness of the proposed PACS and Telemedicine System (page 10)", this section focuses on the impact and effect at national level. These are mainly A) to reduce the concentration of patients at the central hospitals, B) to fill the gaps in quality of health services between urban and rural, , and C) to improve quality of health service providers at lower level hospital. All these issues are related to health development issues in Vietnam as described in "Five-Year Health Sector Development Plan 2011-2015".

###### **To reduce the concentration of patients at the central hospitals**

Telemedicine System contributes to the reduction in the concentration of patients at the central hospitals. The system enables provincial hospitals to correctly diagnose patients without physical referral. Therefore, patients can receive proper care at provincial level. Even when physical transfer is needed after the diagnosis, both hospitals can provide necessary treatment and preparation before the referral, saving a lot of time for central hospitals.

Telemedicine System can support to enhance skills and knowledge at lower level hospitals as doctors are rapidly exposed to higher level diagnostic skills. Therefore, lower level hospitals will not have to rely on central hospital for diagnoses eventually, reducing work load of central hospitals.

###### **To fill the gaps between quality of service**

Equipment at provincial hospitals can satisfy diagnostic demand at provincial level. But as most of specialists concentrate in central hospitals, sometimes provincial hospitals cannot provide appropriate diagnoses to patients. Especially, there is not often enough health personnel for MRI at provincial level. With VS Telemedicine System, provincial hospitals can provide the same quality of diagnoses as the one provided at central hospital.

###### **To improve quality of health service providers at lower level hospital.**

As mentioned under "3. (1), 3) To Examine effectiveness of the proposed PACS and Telemedicine System (page 10)", Telemedicine System has training effect to radiologists at lower level hospital. Individual radiologists can learn from central level radiologists through reporting and tele-conference. Radiology

department can also provide effective trainings to its doctors by examining pile of request data which is available within VS Telemedicine System.

## (2) Lessons Learned and Recommendation through the Survey

### 1) Lessons Learned

#### **Users' attitude toward IT security and management**

Users (i.e. radiologists, radiology technicians, and IT staff) of Vietnamese hospitals still have less understanding on information security and management. In Japanese case, use of any workstations in a hospital is strictly managed under information security regulations set at each hospital. However, the Survey team observed that the use of ViewSend workstations for private use, such as surfing on the Internet or installation of unnecessary software. This has caused virus infections or system conflicts to the ViewSend workstations several times, which sometimes resulted in serious situations where ViewSend system cannot run properly. In such a case, radiology departments should report the case to IT department immediately, and IT staff should identify and fix the problem accordingly. However, this maintenance structure sometimes did not work promptly due to lack of awareness at the radiology department and/or the IT department.

Another issue of IT management is that users tend to change system configurations of the ViewSend system at randomly, which have caused serious problems to ViewSend workstation where system cannot run properly.

### 2) Recommendations

#### **Strengthening of system stability through both users' and provider's efforts**

The situation described above does not occur in Japan as the use of computers is strictly managed, and in case of any system errors, they are solved immediately by IT department and a technical support of a maker.

At the same time the Survey vividly identified the importance of on-time technical support by ViewSend, it is recommended that IT security and management should be strengthened at hospital level. For example, (1) use of computers for private and unofficial use should be strictly prohibited, (2) change of system configuration should be avoided, or should be reported or consulted with ViewSend beforehand, (3) system failures should be reported to IT department immediately and if the problems consist, it should be reported to ViewSend technical support immediately. It should be also considered for ViewSend to reinforce the system stability with or without users' attempt to change

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