Building Effective Partnership via RFID for Engineering Education in Health-Care Industry

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Abstract

In this paper describes patient's service quality or experience is a critical concept why important using in health care industry in the first; the second is when health care industry would like to improve patient's service quality, they are usually consideration to use or implement information technology, therefore, the health care industry thus creates the requirement or opportunity for software providers or industry-university cooperation with professors; the third thus using an real case to describe the teacher of university how based on the methodology of engineering education training students via software project of Radio Frequency Identification (RFID); and finally the contribution in here is the university building effective partnership with health care industry, because the health care industry can save more time and workload in software project, moreover, the professor of university can also thus training students via software project with method of engineering education.

Keywords: Engineering Education, Software Project, Health Care Industry, Effective Partnership, Radio Frequency Identification (RFID)

INTRODUCTION

To date, health care is one of popular issues and industry for people, the major reason is the scope of health care relevant different science and knowledge, including medicine, medical, patients, nursing and various life controlling system and information technology.

The health care industry is more complexity than other working places. Because from the perspective of operations management, the most inputs such as medicine, medical, nursing and various life controlling system and information technology are operating for the one goal of output is how to care or treat people more healthily.

To care or treat people more health thus becomes an important challenge in health care industry. Although, health care the most tasks are conducted about people health, and people they are called patients in health care industry, however, they are also called customers at the same time.

Wilde-Larsson & Larsson (2008) provided a concept in "quality from the patient's perspective" with method of questionnaire. Because in their navigation, patients' service quality perceptions can be considered into four dimensions: carers' medical-technical competence, care organization's physical-technical conditions, degree of identity-orientation in the carer' attitudes and action, and the care organization's socio-cultural atmosphere.

Although, the concept of quality from the patient's perspective is very important in health care industry, however, which critical conditions in care organization's physical-technical are not mentioned clearly.

Bleich et al. (2009) though patient experience was significant associated with satisfaction with the health-care system. Their study thus explained the information technology is one of critical conditions in care organization's physical technical.

When information technology is one of care organization's physical technical, health care industry thus creates the requirement or purchasing opportunity for software or hardware of providers, or industry-university cooperation with professors for saving cost from software or hardware of development or purchasing.

Lo (2009) proposed a practical framework of Industry-University for solving problem of supply chain management in health-care industry. In Lo's study described a real case about university how to cooperating with company of software in using distance health-care ICT platform.

However, in Lo's study was not discussion about the teacher of university how based on the methodology of engineering education training students via software project.

Therefore, this paper aims to build the process of effective partnership. The rests of this paper are organized as following: to understand what relationship

between patient's experience and information technology in health care industry in Section 2; to understand health care industry how to cooperating with university via the process of software project in Section 3; to understand university how to training students via software project based on the methodology of engineering education Section 4; Section 05 thus proposes process of building effective partnership and a real care to explain our process of building effective partnership; and conclusions are discussed in Section 6.

PATIENT'S EXPERIENCE AND INFORMATION TECHNOLOGY

Patients whether re-visiting care organization usually make the decision under their experiences. However, patients' experiences are related to patient's service quality that provided by care organization. Some relevant works are reviewed as below.

Leonard (2004) used method of interview from physicians and patients themselves in a simulation environment with Electronic Patient Record (EPR). In the result was found EPR can enhance the patient's experience through the use of information technology.

Wilde-Larsson & Larsson (2008) found approximately 10 per cent hesitated about continuing to visit the same care provider. They though service quality is related to two conditions: 1) the care organization resource structure, and 2) the patients' preferences. The care organization resource structure is including physical and administrative environmental quality.

Hikmet et al. (2008) they collected 98 Florida hospitals, then demonstrated the hospital size, system membership, and tax status are systematically related to healthcare information technology (HIT) adoption.

In their study found smaller hospital may lack of financial, infrastructural, and human resource to affiliate their hospital system or network.

Bleich et al. (2009) in their study was data collected from 21 European Union countries. They found patient's experience was significant associated with satisfaction with the health-care system and explained 10.4 % of the variation around the concept of satisfaction.

Eastaugh (2010) though information technology can help to control hospital costs without harming service quality or staff moral. Because information technology can enhance the marginal value product of nurses and staff, therefore, nurses and staff can concentrated their workday around patient care activities.

Based on the above mention we know that information technology can enhance the patient's experience, and it is also significant associated with satisfaction with health-care system. Moreover, the information

technology also is able to be the one of physical and administrative environmental quality in care organization resource structure.

In particular, because of smaller healthcare organization lack of financial, infrastructural, and human resource to affiliate their hospital system or network, therefore, when they need software or system will consider cooperation with software providers or university.

Therefore, healthcare organization how efficiency and effective on software project cooperates with software providers or university thus becomes an important issue.

In next section we thus introduce to relevant works of software project, and also to explain the relationship in engineering education.

SOFTWARE PROJECT AND ENGINEERING EDUCATION

Despite information technology plays an important role in healthcare industry to connect with patient's experience and satisfaction, however, in case healthcare industry would like to implement healthcare system or information technology is not package software or system, thus, they will face the critical issue is how to manage the software project (or called software development and management).

The software project itself is complicated and consist of multiple professional knowledge at the same time, therefore, a good software project thus based on the different training and education before students become a software engineering.

Software Project Management

Boehm and Ross (1989) proposed a concept for software project management should be simultaneously simple, general, and specific.

In their study, the structuring software product was guided including process planning, process control, risk management, process involvement, and product structuring. And the goal of guideline is finally wish to make everyone a winner.

Paynter and Ahmed (2000) found many software projects were not successfully completed or can not meet the user requirements, the major reason is project management shortcomings. They though some key points have to be carefully:

- Staff should be deployed timely ;
- Project should not be considered as a training venue for unskilled;
- The project manager has big impact on the project with knowledge, expertise and leadership style;

● The project manager should be well trained in software development projects

From the study of Paynter and Ahmed (2000), we know that project manager plays an important role in the process of project management, especially, in their professorial training.

A reviewed study has been proved our view. Jorgensen (2004) though that expert estimation process is usefully for software practitioners, based on estimation principles which can provide good guidelines for software organization. One of the estimation principles is provide estimation training opportunities.

It is very interesting for us to know and learn, because from the view of business everything is emphasis in efficiency, save time is save money.

However, to training a software project manager is not easy work, except need enough professional knowledge and skills, and also has needed different project experiences to support themselves estimation competence.

However, to be a software project manager should be trained when he/she is software engineer, and has enough software engineering education.

Software Engineering Education

Boehm et al. (1998) applying different stakeholders into win-win approach for software engineering education. In their study stakeholders are including students, industry, class-project clients, software engineering community, and instructors/teaching assistants, and they are with different Win conditions.

Boehm and Egyed (1998) improving the life-cycle process in software engineering education. They though software project whether success or not is highly depend on the stages of the life-cycle process.

Two mainly functions (Life Cycle Objectives and Life Cycle Architecture) are contenting in five milestone elements as following: definition of operational concept, definition of system requirements, definition of system and software architecture, definition of Life-Cycle plan, feasibility rationale.

In, Boehm, and Deutsch (2001) they are based on their previous study (win-win approach for software engineering education), then progress applying WinWin approach to quality requirement. They found users and customers are more active instating win conditions, whereas developers are more active in working toward resolutions.

Their finding is explanation why conflicts are frequently appearance in procedure of software development, and

finally can not meet the requirements from the clients.

Blake and Cornett (2002) though students the first experience working on large-scale software development projects is via an intern position or their first full-time position. And software engineering education has been developed the practical application of coursework in a large team setting.

The foundation of software engineering education is provided students opportunity in participant a project team, and then can know about the conflict, requirements, architecture, and stakeholders of software development.

Training a project manager or students with methodology of software engineering education, then make people enhance themselves professional capacity, however, to cooperate with industry is not easy work, because the university has to think how to Win-Win in both sides.

Therefore, how to build an effective partnership between industry and university thus becomes a serious problem for software engineering education. In next section thus dependents on this critical issue proposed the process of effective partnership.

BUILDING EFFECTIVE PARTNERSHIP

For building an effective partnership and cooperation with industry, therefore, not only students have opportunity can participate in a real project team to enhance or improve their skill or capacity, but teachers also have opportunity can practice software engineering education.

Process of Building Effective Partnership

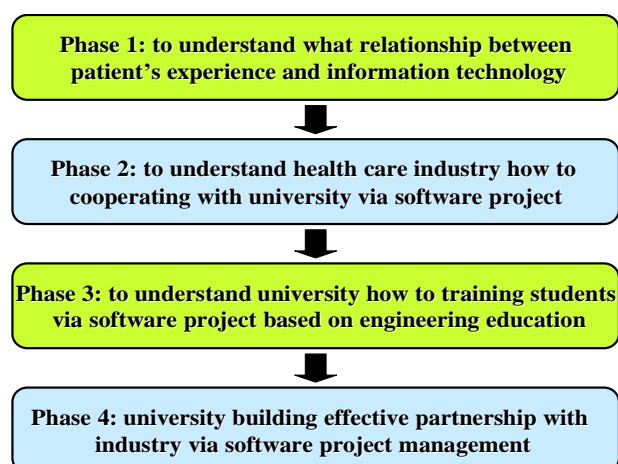Figure 1 shown the process of building effective partnership, detailed explanation as blow:

Figure 1: Process of Building Effective Partnership

● Phase 1: to understand what relationship between patient's experience and information technology in

health care industry;
- Phase 2: to understand health care industry how to cooperating with university via the process of software project;
- Phase 3: to understand university how to training students via software project based on the methodology of engineering education;
- Phase 4: university building effective partnership with health care industry via software project.

The proposed process of building effective partnership is integrated different researchers whose key points have been discussed previous Sections; however, each related work is individual discussed in single area or topic, and not showed the relation in each other. Table 1 shows the related relationship between each phase.

Table 1 Related relationship between each phase.

Phase	1	2	3	4
Industry (patient / manager)	★	★		★
Information Technology	★	★	★	★
Software Project management		★	★	★
University (students)			★	★
University (teachers)			★	★

In this proposed process can thus easy find the related relationship between industry (patient) information technology, software project management, and engineering education in students and teachers.

A case study in Taiwan's health care center

The proposed process of building effective partnership is considered about different situations of industry and university, therefore, a real case study of health care center goes through all phases, then can examine and explain all phases.

A case study of building effective partnership thus according to each phase and describe in below:

This project was beginning from Aug. 2009 to Jan. 2010, and the project name was RFID implemented project. The initial requirement proposed by director of department of healthcare information technology, based on the training requirement, director has to find one company which willing industry-university cooperation with their department and students.

- Phase 1: to understand what relationship between patient's experience and information technology in health care industry;

A healthcare center, they don't want to provide true name, locate at Neipu Hsiung, Ping Tung, in South of Taiwan. When director contacted with president of healthcare center, the president agreed to cooperate with director.

The president willing to provide an experimental environment for cooperated project. Why the cooperated

project can accept by president?

The major reason is president want to improve the problem of patient's safety, because some patients sometime they are difficult to know where they are, and then this situation thus cause nurses more pressures on care patients, even, they are active in area of healthcare center.

On the other hand, miss care time also will cause the unhappy experience from patients' family. Because, patients' family will think that you can not provide good service quality in care patient's process.

Therefore, the healthcare center thus can through implemented project of Radio Frequency Identification (RFID) to know each patient where they are, then make sure patient's position.

The relationship of patient's experience and information technology in health care industry thus is understood.

- Phase 2: to understand health care industry how to cooperating with university via the process of software project;

At the same time, director of department of healthcare information technology also contacted with software provider, because, usually software provider can provide RFID tag for university.

Why director has to find RFID software provider? Because of FRID is contenting two major parts. One part is related to the hardware such as reader and tag. And the other part is software. The software can through the application programming let the RFID tag creates different functions or information.

The software provider can thus play tow functions in industry-university cooperation. The first one is provided reader and tag to university when university lack of RFID technology. And the second is provided commercial experiences for university when director needs references of implementation in healthcare industry.

Therefore, a software provider, they are a professional software provider and located in Kaohsiung city thus joint to this project.

And they are also kind to provide their solutions and experiences as implementing references for director, and thus via the cooperating process let students can have opportunity to participate software project and practice the application programming into RFID.

- Phase 3: to understand university how to training students via software project based on the methodology of engineering education;

The department of healthcare information technology, one of departments in Meiho Institute of Technology, they are training students via different disciplines from the first year to the forth year.

When last year, they are trained at set up a team and work together to a project. And each team will find a teacher as their advisor by themselves. When they encounter many problems during the training period, the team members should solve their problems by themselves, or seek solution or advices from teacher.

In this real case, when president of healthcare center agree their requirement of industry-university cooperation, the RFID project thus beginning.

Students visited healthcare center, then interview some related managers such as nurses, social worker, and president. And thus they acquired requirements and have opportunity can assess their problems closely.

- Phase 4: university building effective partnership with health care industry via software project.

That is practical experience on solving the problems of industry. Because, after students collect information from healthcare center, they must back to department of university and discuss with professor, what problems that they find, know, and understand.

And then professor guides them the situation where they are, and which function they should consider writing into programming, and can combine their programming language together in RFID tag, and then let RFID tag with the functions that healthcare center want.

During the progress of programming development by software, teacher and software provider should provide professional and technical communication, and sometime guide them how to find related solutions when they are lack of skills or knowledge.

Training students via RFID with engineering education thus have been approached the goal. And finally, the team of project also needed to visit healthcare center to test and make sure the results after set up RFID into the area of RFID examined area.

After evaluation of RFID examined area, the project was nearly finished phase, and then director thus visit healthcare to check whether satisfaction or not, in care no any complain from president thus university is building effective partnership with industry.

CONCLUSION

In this paper proposes the process of building effective partnership, it is not only reviewed previous different related works, but also integrated different related areas that are separated in different disciplines. Therefore, this paper is contribution a practical and useful process for building effective partnership between industry and university.

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