

**GC 2009-80: BUILDING EFFECTIVE PARTNERSHIP WITH INDUSTRY VIA  
DEVELOPMENT OF AN INTELLIGENT HEALTH-CARE ICT SYSTEM FOR  
ENGINEERING EDUCATION**

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# **Building Effective Partnership with Industry via Development of an Intelligent Health-Care ICT System for Engineering Education**

## **1. Background and motivation**

The healthcare ICT system is highly related to multidisciplinary and interdisciplinary knowledge, for solving different problems which including medicine, nursing, biomedical engineering, and information technology. Therefore, when we use this point to view students of Information Technology (IT), training of healthcare ICT system for these students thus becomes a significant challenge on engineering education.

A feasible way to fulfill the knowledge demands from both IT and healthcare fields in a four-year college span is to make the students learn from a practical project by developing a health-care ICT system for industry. This is via the so-called learning-by-doing method.

M. Inc. is well-known large-scale system Integration Company, the company locates in Taiwan. In 2009 summer, the chairman was invited to a forum of industry-university as a keynote speaker by Meiho Institute of Technology (abbreviated Meiho), his topic was the “Relevance of IT industry and Health industry”, after his speech, and he said M. Inc. can provide platform of distance health care for Meiho as a platform of industry and university.

Meiho according to his suggestion to organize a project team for matching this great opportunity on industry-university cooperation, and based this industry-university cooperating project, Meiho could thus start to plan how to put the practical and industrial platform into engineering education of IT, then training students of IT under a real case.

Our motivation in here is thinking how to propose a concrete cooperating framework for building effective partnership, and then based on this concrete cooperating framework, Meiho and M. Inc. thus have different benefits as following:

- For Meiho’s students of IT thus not only learning multidisciplinary knowledge in classroom or textbook, but also have a practical environment as a learning factory to practice and simulate different methodologies.
- For M. Inc. thus obtains academic resources from the Meiho such as professors and students, Meiho’s professors provide their individual expertise, and also these professors advise students of IT how to conduct the problems after using platform of distance health care.

Therefore, industry and university cooperation are intangible providing win-win opportunities for Meiho and M. Inc, especially industry thus creating free employees to be a human resources of research and development (R&D), and to assist industry solving and improving products-services problems.

## **2. What was done? Methods used and why?**

In recently years, some topics are discussed both between health care and ICT, the primary reason is the health-care process with much important information, and these information are all related to which treatment has been applied to which patient.

Therefore, we are reviewing a few research works with respect to health care and ICT as following:

In [1] though hospital information system (HIS) can record all the clinical procedures, and through information system each patient record can thus be generated, transmitted, analyzed, and stored in one hospital or clinic.

The Most of papers were discussed about information system and their successful experiences, however in [2] attempted to construct a sociotechnical network around an executive information system in health care. In his investigation, not only discussed about information technology, but also discussed about human factor how to effect on system implementing phase, eventually, the result of project was failure on different human and non-human factor.

As information technology accompanies WWW also has developed new application. In [3] proposed a common interface to communicate and access the medical records residing in a smart card, through a highly mobile health management system the patient's medical records can be caught even patient still moving.

In [4] discussed about the relationship of health care management and information systems security, because in his research thought hospital conducts many data which from patient's treatment, in addition to the hospital is not close-network environment, sometime managers need to access Internet under the different network such like internet and intranet, therefore, how to build and train the manager of health care establishments thus become very important.

Despite some issues are discussed about the technologies in health care industry how to be applied, but [5] had still do a different research work in discussed a lot of literatures review.

Therefore, in [5] thus proposed some useful key points for future 2013 to reference. The following are their suggestions of research work:

- Patient-centered recording and use medical data for cooperative care;
- Processes-integrated decision support through current medical knowledge;
- Comprehensive use of patient data for research and health care reporting.

From above mentions, we know ICT plays an important role for information delivery, but it also could be a good communication tool as bridge for connecting different roles in health care industry. For deeply understanding the problems of health care industry, we also review some research works on health care supply chain, the following contexts thus provide detailed descriptions.

In [6] thought a supply chain of business not only needs to face the problems of information flow, but also needs to face problems of products flow. More and more businesses are considered to use an integrated concept for improving processes of information and materials from the upstream and downstream of business between different areas.

We know that SCM for health care industry also plays quite similar role for hospital like a business, because in hospital also has its upstream such like pharmaceutical manufacturers as suppliers, in its downstream is patients or small clinic as customers.

Therefore, from SCM viewpoint to view information technology was a tool, which can connect different roles of SCM each other, even the ICT also can approach the same goal like other IT.

In [7] their investigated using Australia's health care industry as an example to explain the IT and telecommunications with e-commerce strategies for improved cost-effective services to its key stakeholders. And in [7] also shown the pharmaceutical industry supply chain which connected manufacturers, wholesalers, suppliers and hospitals.

So far as inventory management be concerned, in [8] pointed out the hybrid pilot project at Eastern Hospital as a case study, and then to explain the benefits for health sector supply chain integration.

In their research work excepted the method of stockless was important, the healthcare quality improvement should be extended current supply chain into the patient care units.

In [9] also proposed another viewpoint for health care industry in Singapore. Because, their research thought the cost can reduction in logistics and supply chain management in medical of supplies. And in the result of research they found through process reengineering can reduction activity costs, to eliminate nonvalue-added activities.

Therefore, when we reviewed above research works we find they had provided some useful viewpoints for assistance us to propose a concrete cooperating framework on building effective partnership.

### 3. Results, i.e., include some evidence and analysis. What was found?

From a view of university is difficult to simulate and learn from all of situations on health-care industry. The primary reason is the supply chain management of health-care industry is highly related to multidisciplinary knowledges, including medicine, nursing, biomedical engineering, and information technology. Based on this reason, we thought set up an industry-university oriented cooperation is quite necessary.

Therefore, we based on a real-case experience which from industry-university cooperation of Meiho and M. Inc, then thus can start drawing a practical framework for building an effective partnership both industry and university. A practical framework is contenting both two-way communication in industry-university cooperation, and the bridge was using distance health-Care ICT platform. The figure 1 was shown the effective partnership based on a practical industry-university framework.

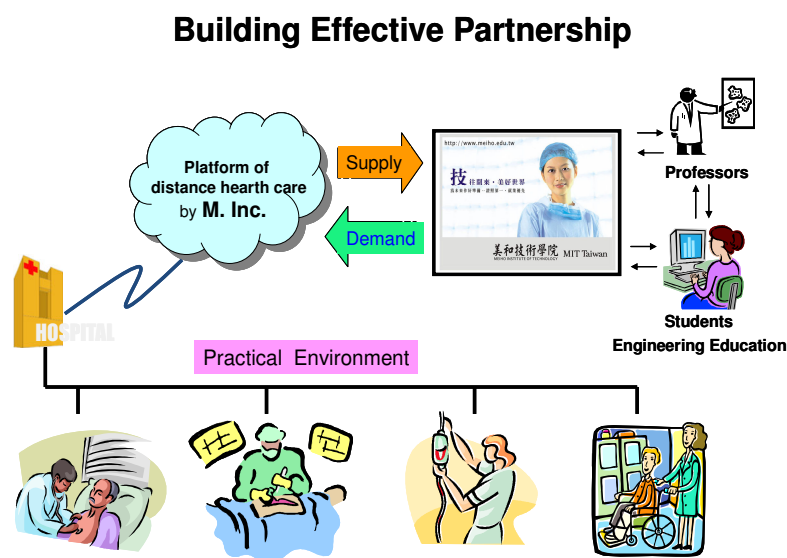


Figure 1. Building effective partnership based on a practical framework of industry-university with using distance health-Care ICT platform.

For engineering education, we thought a practical environment could enhancement the experiences and capabilities for students on learning by doing. In figure 1, we can find the key is in the center of figure, which is between M. Inc. and Meiho, including two functions which are supply and demand. Two functions are also represented to our goal of industry-university cooperation.

### **Function of supply**

In here is M. Inc., which is represented industry that means industry to be a supplier can provide industrial experiences for university. That is very important for university, because M. Inc. provide real-case experiences from their customers.

The customer of using distance health-Care ICT platform in M. Inc. is hospitals, and one of hospital is represented to a practical environment of health care.

In a practical environment of health care is including many healthcare operating processes.

- For doctors, they have to prepare clinical process for each patient.
- For nurses, they have to prepare nursing care process for each patient, if different diseases were required different nursing care processes.
- For patients, they have to prepare a good psychological situation for themselves, because when they arrive hospital are usually spent a few time in clinical process for a doctor, sometime are spent a long time for waiting, or inspecting process.

When we know that a hospital existing some different operating processes in healthcare, we could thus understand the healthcare also including the systemically framework.

From a view of hospital also can find the health-care environment like a supply-chain system. For example, for treatment a patient has to input different medical persons, such like doctors, nurses, examine staffs, anesthetists, and dispensers.

And then these professional persons require suitable places and equipments for treatment each patient when they need health care.

Therefore, building an institute of medicine is not easy to do, actually, that is also impossible for each university when they are want to train students of information technology, thus university connecting with industry becomes a important task.

### **Function of demand**

In here is Meiho Institute of technology, which is represented university that means Meiho to be a demander. Meiho requires some impacts from industry, because sometime the impact will become a requirement of technology.

Meiho in this project of industry-university cooperation also based on this concept, and then cooperates with M. Inc.

For a long-term cooperation, M. Inc. provides their distance health-Care ICT platform free uses for Meiho, and then through the process of use, Meiho's teachers (professors) have thus an opportunity to access a practical health-Care ICT platform.

When professors using distance health-Care ICT platform, thus can understand the functions of system design, after the use functions of system professors could create some little projects for training students.

The big problem for education of information technology always only face the computer, and no any real case study or opportunity to try the capabilities in problem solving.

A great contribution in the project of industry-university using distance health-Care ICT platform is education for student. Because of traditional education of information technology is training student in classroom; however, in our framework of industry-university cooperation, students and professors are not only teaching and learning in classroom, they are but also based on the concept of learning by doing, go to hospital understands what problems and requirements appearance on healthcare, then could clearly understanding healthcare supply chain.

#### **4. Conclusions and significance, including wider application.**

In this paper we description that we how to build an effective partnership both with industry and university for using distance healthcare ICT platform, and we thus provide a practical framework of industry-university based on healthcare supply chain.

The first part is university, we describe our university how to plan the learning-by-doing method for students and teachers, because, we know from the cooperated project of industry-university will create some impacts from industry.

The second part is related to industry, we describe our partner M. Inc. is how to operate their distance health-Care ICT platform for hospitals (their customers), and then they are how to provide their e-Services for their customers.

The third part is final users (hospitals) of distance health-Care ICT platform, we describe the final users (hospitals) is existed which health-Care problems, and then when hospital after using distance health-Care ICT platform, the hospital will receive which benefit.

Finally, in this paper a practical framework of industry-university for supply chain management of health-care industry with using distance health-care ICT platform thus is provided completely.

**Keywords:** Building Effective Partnership, Engineering Education, Expert System, Health Care, Information and Communications Technology (ICT)

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