Readiness of Requirement Engineering towards Global Collaboration and Communication

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***Abstract*—Global collaboration is a very important key for nowadays industry integr**ation. **Projects fail because of lacks in Requirement Engineering (RE) practice. Software Engineering Education should be a kick-start to face the problem. The new technique develops for Requirement Engineering based on Project-Based Learning (PjBL) is suggested to encounter the problems through electronic Learning Industrial Environment (eLIN) system. Future work will be discussed on the eLIN system that will be proposed as a supportive tool to assist student to get feedback instantly from industry and to be a platform for core subject project's continuity and the effectiveness in using eLIN system as a supportive tool for PjBL in RE.**

***Keywords*—Requirement Engineering, Project-Based Learning (PjBL), global collaboration and communication, Software Engineering education, Higher Learning Education.**

I. INTRODUCTION

The Computer World 'Future of IT' panelists felt that global collaboration would be common place in the future. Stronger view can be found in the bestselling [10] book, The World is Flat: A Brief History of the 21st Century. It is based on extensive Friedman interviews and site visits with manufacturers and service organizations in the U.S., Europe, Japan, China and Taiwan; call centers in India; data entry shops in several developing nations; and software houses in India, China, Russia and other developing nations. It discussed on future world that would use global communications and overnight delivery services. It can enable cost-effectively outsourced anywhere in the world.

Cheng and Atlee (2009) highlighted the globalization from nine Requirement Engineering (RE) research hotspots which solutions are likely to have the greatest impact on Software Engineering research and practice. Challenges [5, 6] shown in Software Engineering.

II. ISSUE ON GLOBAL COLLABORATION AND COMMUNICATION READINESS

Nowadays research and learning of education is a platform to everyone in improving the knowledge, attitude and skill [24]. The research can be innovative or inventive that considers to past (history), present (the effective of current trend) or future trend (being a valuable to human being)[21]. In a past history, shown that in the beginning of Islam, the Companions and Rashidun Arrasyidin deepen their knowledge based on the Al-Quran and Sunna of the Prophet. They eager to learn, examine and investigate the various fields of knowledge. Muslims seeking knowledge by reading, researching and writing research results in various fields of knowledge wherever they are [1]. The impact of the history goes to current situation which communication and collaboration in globalization is undeniable fact. Every day, the research in Software Engineering works on to improve the SE maturity, human life and technology.

Therefore, some issue arise in accomplish the mission. The issues include increasing scale of software systems, tighter integration between software and its environment, greater autonomy of software to adapt to its environment and increasing globalization of software development. These trends reflect changes in stakeholders' needs. In particular, they directly affect RE processes and practices.

However, the new Software Engineers [22] are expected to shorten as much as possible their learning curve in order to lessen the costs borne by the company.

III. HIGHER LEARNING EDUCATION PARTICIPATION

In some cases, current technologies can accommodate the new trends in requirements. In other cases, the trends pose new research challenges in RE, or raise the priorities of longstanding research problems [6].

Academic Institution helps collaboration to be successful [16]. It can enhance the ability of a company to adapt changes and readiness for absorbing the changes in technology. The research can help to improve quality, lower costs, and create more value. It can also help develop new approaches for solving problems. The reason behind of this based on the fact, that as software engineers and managers may not be able to do this. The software engineer's work for using existing knowledge to provide a solution, and managers stick to proven methods to reduce risks. There is research that comes in to deal with scale and providing inputs to consulting practices where research inputs are useful [7].

A common theme in solutions to Software Engineering maturity barriers is to involve industry more in Software Engineering teaching and research. To do so, proactivity is needed on both sides (industry and HLE). A deep, sustained partnership will encourage the development of more effective Software Engineering education programs and ensure that university research will have more access to and influence on

industrial scale development [16]. The issue is actively discussed in Malaysia nowadays.

IV. Case study: In Malaysia

Malaysia is improving the collaboration and communication technology. Malaysia is a Developing Country. Under the 9th Malaysia Plan (2006 – 2010), economic activities within the field of Information, Communication and Technology (ICT) will be developed and further strengthened. Malaysia will continue to position itself as a preferred destination for shared services and outsourcing. In terms of new activities, the government will develop the local digital content industry. To support the growth of the ICT industry as well as bolster the general economic efficiency, an increasing number of highly skilled labor forces are required [14].

In Malaysia, the research and innovative capability of local institutions of higher education will be strengthened to develop capacity building, particularly in key technology areas and to nurture an innovative society with strong Science and Technology (S&T) capability.

Towards this end, Malaysia needs to invest more money on this program. The enrolment of students in S&T programs at all level will be increased to facilitate the creation of a critical mass of Research Scientists and Engineers (RSEs). This will provide the potential source for R&D activities and to meet the targeted ratio of 50 RSEs per 10,000 labour forces in 2010 and it would be increasing by year. Malaysia aim to have greater collaboration research that will be undertaken between public institutions of higher education and the local industry and research institutes. To support those activities, Malaysia encouraged also private institutions of higher education to collaborate in research with public institutions of higher education [14].

Malaysia can seek this opportunity that discussed in a cross-sectional propensity score matching estimator that applied to the Swedish Community Innovation Survey data over 1998-2000, which provides information about cooperation on innovation reported by 790 Research and Development (R&D) or innovation investing firms with at least 10 employees. Approximately twenty-five percent of these firms collaborated with universities on innovation projects. The results show that university/industry collaboration has a significant and positive influence on three measures of innovative activity. Firstly, the average R&D firm that cooperate on innovation with universities spend more money on R&D compared to an almost identical R&D firm (constructed by the two nearest neighbours) has not which collaboration with academic researchers. Secondly, collaborating firms have a larger propensity to apply for patents than other R&D firms. Finally, income from new product sales is considerable greater for a firm that have joint research projects with universities than for a non-collaborating twin firm [18].

A. *Problems in Producing Competence Graduate*

The quality of a nation's human capital is the most critical element in the achievement of sustainable development in the economy. To position the nation for long term economic growth, greater emphasis should be placed on productivity led growth [14]. However, Malaysia needs to address the following problems:

- increasing the number of highly skilled technical workforce;
- reducing the shortage of labour in the manufacturing,
- manufacturing-related services and agro-based sectors;
- overcoming the mismatch in the supply of and demand of human resources;
- matching education and training providers with industry requirements;

Every sector use technology as a medium in their activity. The industry need encounter the problem on technology change rapidly. Otherwise, they should employ new staff which have a good skill, knowledge and attitude [21]. Unemployment arise because the students lack of skills. This statement was agreed by many other researchers such as Boehm (2006) and Hoare (2006).

The employer frustrated with the quality of fresh graduate which need more training when they are hired. The industry expected the fresh graduates to perform and help industry increasing the productivity based on their expertise. The graduates should be an innovative person which can give a new ideas to the industry based on what they have learned from university. The higher learning education should educate them based on industrial need. If not, many things need to be considered by the industry before the graduates can become an expert, such as give in-house or send for special training locally or international that relates with company needs.

B. *Statistic of Malaysia Employments*

Population in Malaysia is 28.31 million which employment was at 11,032.8 million and 3.6 percent (percent of Labour Force) is unemployment rate [23]. From researcher observation there is an increasing unemployment at rate of 0.3 percent per annum from the period of 2007 to 2009 [21] although there is programme developed by Malaysian Government.

It based on the projection [19] from 2005 that Khazanah instituition was asked by Malaysian of Finance (MOF) to look into developing a programme to help increase the employability of Malaysian graduates after reports by various sources including Majlis Tindakan Ekonomi Negara suggested high unemployment among graduates in early 2006.

A step has been taken by a Malaysian Government in RMK9 to decrease unemployment and to ensure the fresh graduate will be employed to many industries. Malaysian Government was introducing many schemes such as MSC internship, Graduate Employability Management Scheme (GEMS), Graduate Employability Enhancement (GREEN) and others to students who interested to join after their

graduation [19]. Based on the Malaysia's statistic, education would be the best medium in giving a big impact to the industry especially to increase skills among students in Higher Learning education.

V. Readiness of Requirement Engineering Education

Requirement Engineering most effective implement the project from scratch. It will give better implementation in student project. In most industrial projects, the project is modifying existing project call reverse engineering. Capability Maturity Model Integration (CMMI) can be considered as one of the tool that help improve Software Engineering in working environment. Instead of a stand-alone system, the resulting application should require integration with several other applications or system parts to simulate projects involving multiple departments or enterprises. Students should use state-of-the-art Computer Aided Software Engineering (CASE) tools and programming environments as well as groupware and versioning tools [12].

The difficulties facing by educators are to fulfill the responsibility in lengthy curriculum review cycles, limited budgets, lack of hardware and software representing the latest technology, first time teach new course topics and no interaction between faculty and industry closely in which technological changes are taking place. Furthermore, these obstacles are further magnified when consider the ever changing demands of industry. Industry needs employee who is skilled in develops new application system, but they do not have the time or trainers to complete the training. Bernhart et al (2006) mentioned that if students fail to deliver a minimum quality at the beginning, succeeding phases may receive a reduced quality as a work basis. This may reduce the learning experience in later phases 14]. On the other hand, the academic institutions should have faculty with the expertise to provide the training needed by industry, but are unable to acquire the latest versions of hardware and software. Some researchers have concluded that businesses and universities share some similar challenges, thus increasing cooperation between the two entities will assist in shared solutions for both [8].

For cooperation in research to succeed, both sides must agree on the purposes of the project. Quality of education can come across from industrial involvement and advice and academia's long-term view. This emphasis on the long-term view is what differentiates the partnership in education from a training exercise [13]. The partnership should focus on helping universities arrive at the appropriate balance between fundamental knowledge and its engineering application. Many large companies have had to mount significant Software Engineering training programs. It is due to lack of Software Engineering education in college. They should be more than willing to assist in nurturing Software Engineering programs that emphasize developing core skills. Increased collaboration has many immediate benefits, such as reduced training costs for companies and more focused Software Engineering research for institutions [20]. Increased collaboration between academia and industry would substantially reduce serious mismatches in expectations. However, the new Software Engineers [20] are expected to shorten as much as possible their learning curve in order to lessen the costs borne by the company. The Project-Based Learning (PjBL) is suggested to help the RE education in establishing the collaboration between HLE and industry [19].

VI. Project-Based Learning in Requirement Engineering

Jazayeri (2004) indicates that teaching should integrate with projects. This is often recognized as very critical issue in SE education. Replaying the complexity of real-life projects in an educational environment can be impossible without the global collaboration and communication with the industry. Thus HLE need to find innovative ways of integrating project work in curricula [2, 17]. The project should be realistic, but students should be aware of the differences with the real life, in terms of team size, requirements for compatibility with legacy systems and unavailability of real stakeholders. At the same time, project work should exploit the opportunities (research methods or prototyping) that often unavailable in the industrial world [19]. Students may turn out to be carriers of innovation when they enter the business world. Ghezzi and Manrioli (2005) said that the educator should teach how to select/evaluate different methods and approaches.

The founder of Spiral model [5] describe that plenty in computational will enable new and more powerful Software Engineering approaches, self-monitoring software and computing via on-chip co-processors for assertion checking, trend analysis, intrusion detection, or verifying proof-carrying code. He also concern in higher levels of abstraction, the simpler brute-force solutions such as powerful software and systems engineering tools that provide feedback to developers, support show-and-tell documentation and much more powerful system query and data mining techniques should be in current trend research. Besides, it will support realistic virtual game-oriented systems in SE education and training [5].

VII. Conclusion

It can be concluded that Higher Learning education (HLE) can help to improve the industry for global collaboration and communication by using Project-Based Learning (PjBL). The PjBL would be successful if the industry give more opportunity to the HLE in helping them upgraded their services to the human life. Increased collaboration between academia, engineering institutes, and industry would substantially reduce serious mismatches in expectations. In addition, it can reduce the Malaysia cost in preparing the employee skill based on additional training and program. One practical way to bridge this gap is to have industry to invite and make use an academic institution / Higher Learning education that may have an interest in their problems to spend time at their facility, interacting with researchers and practitioners. Besides potentially making the research more useful, appreciation of industrial problems by academicians

can also help teaching. Further research will discuss on supportive tool for student in getting feedback instantly from industry.

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