Model for Global Software Engineering Project Life Cycle and How to Use it in Classroom for Preparing Our Students for the Globalization

Sheikh I. Ahamed
Marquette University, Milwaukee, Wisconsin, USA
iq@mscs.mu.edu

Abstract
Global software engineering projects are reality today. Since people from different countries participate in global projects, we need to prepare our students for this global environment. This paper addresses the challenges and required skill set to prepare students for globalization. The author also shares his experience in teaching a course which focused on global software engineering project life cycle.

1. Introduction
Considering global software development is both a reality now and a future trend, how can we prepare our students so they are ready to work in the global environment? The essential skills to work in this environment are: business process design, architecture development, knowledge of leading edge technology, requirements analysis, project management, compliance monitoring, financial and accounting skills, contracting, negotiation, and leadership and communication skills. Some of these skills are directly relevant to our students, and they need to become good at them to become successful in this world of globalization. Although some of these skills seem to be general, there are differences due to this environment. As of now, university initiatives in this area have been limited; the focus has not been on globalization. The 3M Foundation research group at Marquette University has done some initial work by gathering input from industry, faculty, alumni and students. In this paper, we focus on the input provided by the alumni on the global software development life cycle. We have provided a model for software development life cycle for a global project. This model provides our students with an appreciation of the global environment. It prepares them with the skills of computation (Analysis, Modeling and design, Problem solving) as well as skills for a computer related career (Project management, Communication, Teamwork, Application).

2. Our approach
We invited alumni and friends from industry to learn about the future directions and challenges of IT globalization. Participants were from all levels of senior managers to entry-level programmers. We heard from them about their professional experience and how the skills from school have helped them in their careers. They discussed the difficulties they faced after joining in the company. The meeting with MU alumni and friends helped us identify the strength and limitations of current graduates. We learned about the type of skills needed in their companies to cope with globalization. Primary challenges include training students with technology such as CASE tools, enhancing their team skills, individual accountability, leadership, negotiation, as well as risk management skills, quality assurance skills, cost estimation skills, and in general finding opportunities in a global setting so they become familiar, exposed and prepared for a real global environment right after graduation. Alumni have suggested a model for global software engineering projects shown in Figure 1. They suggested our students should use a similar software development life cycle in their team project. From this recommendation, we proposed a model (shown in Figure 2) as a part of MU’s 3M Foundation project, which can easily be used in the classroom for a global software development project. In this model, the requirements come from an existing project in industry. The requirements addressed the evolution part of the existing software product. Students need to become familiar with a company’s software and then develop components so that the components can be integrated with the company’s existing software. Students may also need to learn new technologies and a new software development kit (SDK). Students complete the project in a team. Industry and instructor both monitor students’ progress. In this way, students can be prepared for the global environment. We have incorporated this model in our COSC 162 Component Based Software Development class at Marquette. Thus, we can train our students in a realistic environment where project requirements are provided by the participating company and a component of the project is developed by our students. Students will be able to understand the benefits and risks of offshoring project components, experience the management of and collaboration with teams, and identify challenges and opportunities posed by global markets. This improves students’ communication, leadership skills, quality assurance, risk management, and negotiation skills for global projects. Students are able to recognize the legal, technical, and communication boundaries for
conducting global business, recognize criteria for vendor selection, and negotiate and manage vendor contracts since they will receive requirements from the industry and industry monitors them continuously. Students’ team-building skills are advanced and individual coping skills are developed for working in a global environment. Surveys are given to the students at both the beginning and end of the semester as to their skill set. The results of the two surveys are compared. We have seen improvement in the skillset of the students. In this way, we have seen the effectiveness of our model. The availability of our analysis results makes it possible to pursue various inter-disciplinary research and prepare our students for the new globalization era.

The result will be made available on MU’s 3M Foundation website[1] to share with the colleagues of Marquette University and other universities soon.

Acknowledgement
This work is partially supported by MU’s 3M project. The author appreciates suggestions of George Corliss, Monica Adiya, Craig Struble and Kate Kaiser. The author personally wants to thank Paula Stroud for her assistance to improve the paper.

References
[1] 3M project: http://www.eng.mu.edu/innovate4job