Quality-Driven Competition: Uniting Undergraduates, Graduates and Professionals on Global Software Development Projects

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Abstract

This short paper describes an innovative project-based learning experience for Software Engineering Education and Training. A global software development project is currently underway to unite students from across the globe, with widely different backgrounds and learning objectives, in distinct project roles that are designed to leverage skill sets and foster overall quality and success. The background to this project is summarized in this paper, along with the motivation, set-up and governance model. A number of achievements from three years of sustained collaboration across the institutions make this educational model possible, and these are described together with the on-going challenges we are facing.

1. Project Description

Over the past three years, Pace University has been collaborating with the Institute of Technology of Cambodia (ITC) and the University of Delhi in India to bring students together to work on distributed software development projects as part of a capstone Software Engineering course. In the process, we have been exploring models to incorporate subcontracting across continents and to integrate support networks of quality mentors and auditors. Our work to date has been reported in a number of papers [1-5].

In 2007, we focused on bringing all these students together to work on a single project to be deployed into operation in a Cambodian setting, a library system (called MultiLIB) to replace the paper-based system of the Cambodian school. However, MultiLIB did not get completed or deployed in 2007, due to time delays in compiling requirements and design integration problems. Therefore, the 2008 project is re-examining the requirements, re-designing the system and planning to take this project through to completion. It is doing this in an original manner that calls for friendly competition and also involves students from Thailand, a second Cambodian school and professionals from a New York City bank.

The team arrangements for the project are illustrated in Figure 1 and the roles and responsibilities for each constituency are explained below:

Client Team – Undergraduates from ITC, Cambodia. A team of five full-time Computer Science students who own and manage the requirements. This team solicits candidate software systems to meet their requirements from multiple development

teams, tests each software system, selects that of highest quality, then deploys it in Cambodia. This team is supported by a team of *quality coaches*.

Development Teams – Five teams from four different countries. Teams of four to six full-time students from India, Thailand, Cambodia and two sites in the US (New York City and Pleasantville) who work to deliver a software system to satisfy the requirements. All the teams are junior/senior level Computer Science undergraduates, except for the Indian students who are Masters students specializing in Computer/ Database Applications. Each development team is sponsored by a dedicated Cambodian client as its project sponsor and supported by a *quality coach* and *auditing* team.

Quality Coaches – Graduates from Pace, US. Five part-time students mentor the client team, helping them to baseline the requirements, manage changes to requirements, ensure they function as responsive project sponsors and formulate test plans. Five part-time students also mentor the five development teams to inject quality into their work. Coaches are a mix of Computer Science and Software Design and Engineering students.

Quality Auditors – Graduates from Pace, US (all bank employees and part-time students). Fifteen auditors (five teams of three students each) independently check the processes and products of each development team, providing timely feedback to assure and improve quality. One student acts as the SQA manager to coordinate efforts. All these students are specializing in Software Design and Engineering.

Socialization Team – Graduated students from RUPP, Cambodia. A team of two recently graduated Computer Science students who are charged to do everything possible to introduce one of the US teams (Pleasantville) to Cambodian life and culture.

An extended project team thus comprises the development team and its quality coach (development-side), the project sponsor and their quality coach (client-side) and three dedicated auditors (for quality oversight and objective timely feedback).

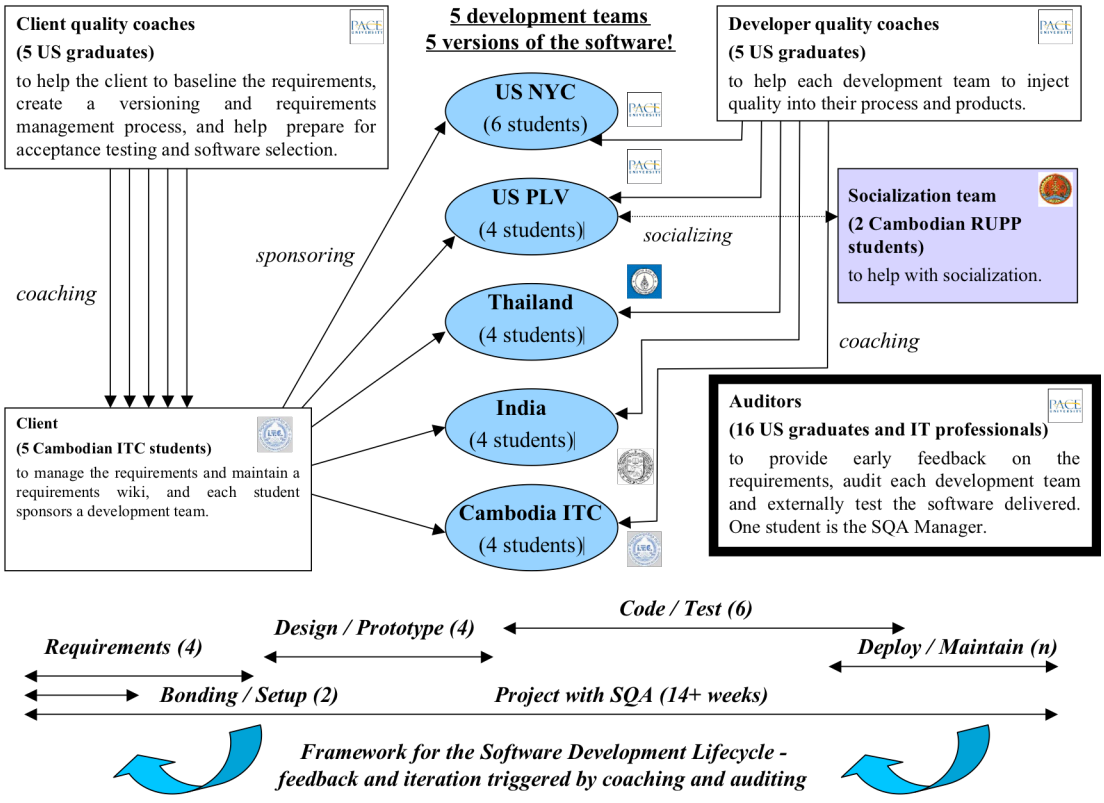

Figure 1. International roles and responsibilities for global project teams.

2. Project Governance

The governance model for the overall project involves the two US-based instructors meeting once a week to track the project. Each international instructor provides a weekly status report on a shared mailing list. A project board for each development team, comprising the coach of the client sponsor, the coach of the development team, a representative from its audit team and the relevant instructors, meets four times during the project. The client-side coaching team reports directly to the instructors. Attending the same class, the client-side and development-side coaches exchange information about progress, plans and problems on a weekly basis. The SQA manager coordinates the coaches and auditors to monitor issues and look for synergies.

3. Achievements and Challenges

Our project-based educational model has evolved over three years of collaboration. One achievement over this period has been the refinement of the process used to set up and kick off a global project of this nature, now with a far greater emphasis of the required infrastructure and support. While individual teams are free to use any development technology that satisfies the requirements in their work, all communication and sharing of artifacts is mediated by group mailing lists and a wiki backbone (see *http://atlantis.seidenberg.pace.edu/wiki/gsd2008* for full details). Just in time learning (i.e., that required to survive) happens in most of the classrooms, so support networks have been established to help ensure those activities that seriously impact quality do not get overlooked. Communication remains the major challenge though. Students find it difficult to coordinate across twelve-hour time differences, and conflicting schedules, uneven course loads and external work commitments compound this problem. Irrespective of prior planning, it takes a few weeks of experimentation to settle into a pattern that appears satisfactory to all; a few weeks can be too long on a fourteen week project. One associated challenge is gaining coaching support while it can still have impact and yet another is ensuring the short cycle time that is so essential for effective auditing; a delay in any activity has serious repercussions across the globe.

4. Acknowledgements

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5. References

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