

Software Projects with 3rd & 4th Year Software Engineering Students in 2012

INTRODUCTION

I am writing to you as you have expressed interest in proposing a software development project for a team of 3rd and 4th year Software Engineering students to undertake during the course of the 2012 university year (February to November).

The project component of the Bachelor of Software Engineering Degree (BSEng) Program at the ANU is an important aspect of the requirements of *Engineers Australia* who have accredited the degree. More importantly, the project component provides students with an opportunity to learn more of the practical aspects of software engineering and therefore to be more prepared to join the workforce as qualified software engineers.

In the past the benefits that have been realized by both students and the participating organisations have been significant. For example, students get to work on a 'real' project and therefore experience and deal with real-world pressures, demands and issues. Such experiences tend to mature the students quickly and thus prepare them for their ultimate careers in software engineering. They also get to experience the real benefits of what they are being taught within the BSEng program, especially in the areas of planning, project management, requirements elicitation, design and quality management.

Receiving an operational end product is but one of the benefits to the participating companies/organisations. Other benefits include:

- an appreciation of young people who have been educated well and who represent some of the best performing students in the university;
- working with young professionals who deal with issues effectively even when they possess little initial knowledge concerning the project domain and the surrounding political, social and technical issues.

Over the past nine years, 70 external/industry projects and 26 university projects have been completed by software engineering students. Most of these projects have been completed to expectations, with only a very small percentage that haven't. However, all projects have provided benefit to clients. Many of the participating students have been offered jobs as a result of their excellent work and their professional attitudes. Over 200 students have graduated during this period.

DEGREE REQUIREMENT

The BSEng program includes a requirement for the conduct of two significant software

projects – one conducted in 3rd year and another in 4th year.

At ANU, 3rd and 4th year students work as teams to undertake projects. Generally teams will consist of two 4th year students (managers) and four to six 3rd year students (technical staff). Of course the separation of roles is not absolute, especially since most projects typically contain a greater proportion of technical work. However, the 4th year students have the responsibility of ensuring planning, estimating, scheduling and monitoring of progress, as well as being the principle contact point for clients.

Several benefits have been gained by conducting projects using combined 3rd and 4th year student teams. The major benefits have been:

- more consistent capability among students receiving their degrees, and
- 3rd year students can focus on improving their technical skills whilst at the same time observing how well they are being managed and therefore learn more of the importance of good project management. Hopefully the 3rd year students will also identify how to manage better for when they enter 4th year and run a project themselves.

The academics responsible for the course take the role of senior management within a big company which has standard systems for project governance. Team mentors (tutors) who work closely with teams play the role of project managers to whom the team leaders report.

As in past years, this invitation is being sent almost exclusively to local Australian SMEs (small to medium enterprises) and some government organizations with the intent of aiding Australian industry. So, if there is interest from your organisation in having some well-educated software engineering students undertake a NON-CRITICAL software development for your company/organisation, then please read on.

GUIDELINES FOR PROSPECTIVE CUSTOMERS

The general guidelines for choosing a project for the 3rd and 4th year BSEng students to undertake are:

- the project effort should constitute 1500 - 2000 person-hours of effort (depending on team size) as each student is expected to contribute 250 hours over the course of the year, and
- it should not matter to the company/organisation if the students fail to deliver a final product within the time frame.

The emphasis that the university places on the work that the students do includes a combination of "practice" and "product" and not just the product. The entire exercise needs to be one of learning from the adoption of new ideas, the adaptation of theoretical understandings, and the experience of making considered decisions. Of course as a prospective "customer" your emphasis will likely be different and so all three parties (your company/organisation, the students and the project coordinators) need to establish clear understandings and expectations. This does not mean that lengthy, complicated agreements need to be created. However, all participating parties need to be sure that the students are in a position at the end of the year to complete the course satisfactorily.

So far in their degree studies, 4th year students have learned about (in no particular order) software development lifecycles, requirements analysis/modeling, software architecture and design, programming techniques, project management, documentary deliverables, (some) configuration management, (some) testing. In 4th year they will also learn about quality management, testing, IV&V (independent verification and validation) and process improvement through measurement, as well as engineering law.

Where-ever possible two members of each project team will be 4th year students. They will be the team managers and therefore will be responsible for contract negotiation, requirements elicitation, project planning and oversight, analysis and design and the agreed deliverables. The remaining members of the team will be 3rd year and possibly conversion masters students. These students will participate in some of the requirements elicitation, planning, analysis and design as well as being responsible for coding, testing, version control and quality assurance. The 3rd year students will become next year's project managers.

CUSTOMER REQUIREMENTS

To initiate proceedings for having a team of students undertake a project for your company/organisation, a documented set of (at least) the broad requirements (one to two pages only) of your proposal should be provided.

You should also provide an indication as to how much effort (in person-hours) you expect your project to require for completion. Anything significantly over **2200 person-hours** is probably too large and therefore should be scaled down, while anything less than 1500 person hours is probably too small.

You must also provide a nominee who is to act as sponsor and main contact for the duration of the project. Nominees will need to be available to the student team managers for the purpose of clarifying, detailing and scoping of the requirements. It is suggested that nominees meet with (4th year) students at least monthly during the life of the project. It is likely that nominees will also need to be available to students to answer questions, via email or phone, at other times. Project sponsors are also required to attend and participate in three project reviews (major milestone reviews) during the course of the project.

Student team managers are expected to make effort estimations and subsequent software development plans (SDPs) based on their team's known commitments and time frame guidelines mentioned earlier in this document. If it appears that the job may be too large in the light of known constraints, then team managers will need to prioritise (with the company/organization nominee) which tasks/components are mandatory and which are "optional". Within a relatively short time, all participating parties should agree on what it is that the student team is expected to produce. During this early phase of development, each team is expected to identify assumptions, risks and constraints and to also develop a risk management plan.

Software development plans are to be monitored by the student team manager and project sponsor and, as required, changed to accommodate new risks or occurrences of identified risks. Project sponsors should ensure that team managers keep them advised of project progress on a regular basis.

It is hoped that the learning outcomes of this overall scheme will not be just a one-way flow from industry to student but also from student to industry. At this stage in the history of software engineering there are a variety of practices ranging from very poor to excellent within industry. It is hoped that the students will experience mainly the latter, but also may be able to help make improvements to the former.

CONDUCTING OF PROJECT

As part of the development, student teams are expected to specify the requirements, document the architecture, produce self-documenting code, test the code and documentation the results as well as produce installation documentation.

Whilst it is important for student teams to make every attempt to fulfill customer requirements, it is also important that they conduct the project in a professional fashion. This means that they must produce documentation that will allow all parties to review and understand what information is being input to the various decisions that need to be made and indeed be able to provide auditable evidence of the validity of the processes and quality of the artefacts that they use/produce.

As part of the deliverables to project coordinators, each student is required to carry out a postmortem analysis of the project. The emphasis of the postmortem is on lessons learned about processes and decisions. Students are required to demonstrate the final product to their peers and other academics during lectures in the last few weeks of second semester.

Three times during the project we hold a formal project review meeting with clients, students, mentors and course academics. These meetings take between one and one and a half hours and have proven very useful for ensuring that student teams actually provide value to clients. It is expected that these meetings will take place during the weeks of 23-27 April, 23-27 July and 24-28 September.

At the end of the academic year we hold a showcase of all student projects to which clients, prospective clients and other interested parties were involved. In the past, all who have attended have been impressed with the quality of the work the students had completed as well as the variety of projects offered to students.

We welcome feedback from sponsors (written and /or verbal) at any stage of the project. Project sponsors are required to provide brief feedback at the end of the project on the value they received from the product delivered.

INTELLECTUAL PROPERTY

Following University guidelines, any IP remains the property of the students unless negotiated otherwise. However, student teams have in the past signed over the rights to the sponsoring organisation/company such that the IP may be further developed and/or sold. These are usually non-exclusive agreements, so that students still retain the rights to the IP as well.

However, if IP relating to student efforts allows your company/organization to make significant profit then it is preferred that some sort of sharing arrangement with the student team should be adopted. This is as opposed to anyone (including project coordinators and students) deeming as exploitive an "all my IP" attitude if/when a financial bonanza might occur when based purely on student work.

IMPORTANT DATES

If you wish to participate in this program in 2012, I need to receive your (one to two page) outline of your project prior to **1 February**. I intend to offer this year's 3rd and 4th year BSEng students a range of projects, most of which will be offered by industry and non-university based organizations, so I cannot guarantee that your project will be offered to students. The first semester begins on **20 February**. Before that date I need to have selected the projects that will be offered to students. By **20 February at the latest** I also need to provide the basic requirements of the software products to be developed to student teams for their consideration.

For projects that are to be offered to students, we ask that project sponsors (or their nominee) talk briefly to students about their project during lectures in week two (1-5 March). I will advise you by 20 February if your project is to be offered to student teams as well as the date, time and location of the lecture. I will advise you by 10 March if your project has been selected by a student team. At that time I will give you contact details for the students.

In previous years we have met with project sponsors early in the semester so that we can present more detail about how we run the projects and how the student assessment

scheme fits in with organisational needs and procedures. This has proved to be a very successful way of for all parties to meet and to clarify any concerns that anyone may have. We plan to do this again in 2012. This is likely to take place during a lunch time (12 – 2) during the week 13 – 16 March, or at the latest in the following week, 19 – 23 March.

If you have questions and/or require further information then please contact me on either of the phone numbers shown below or via email.

CURRENT COURSE SUPERVISOR

Ms Lynette Johns-Boast

Office: 6125 4526,

Mobile: 0405 611 859

Email: lynette.johns-boast@anu.edu.au

I look forward to your participation.

Yours sincerely,

Lynette

Lynette Johns-Boast

Lecturer

Research School of Computer Science

The ANU College of Engineering & Computer Science

CANBERRA ACT 0200