CS777: Software Reliability and Quality Assurance
Term Paper 2: Assuring Quality on a Project – What would YOU do?
Due: Before 5pm EST on May 7th, 2009 (20% of your grade)

This is an intentionally open-ended piece of work and you will have to synthesize a lot of ideas and material to answer it. There is no textbook answer to regurgitate -- it is up to you to be convincing and persuasive. You are expected to draw upon your coursework, the class discussions, the readings you should have read, your school project and work experiences, your other graduate software engineering prerequisite courses and the topics within the various individual term papers when compiling your paper.

SCENARIO: You are now a seasoned software reliability and quality assurance consultant. You have just received an outline for 2 possible future projects, one called ESCAPES and one called TPCS. ESCAPES will be the software-based system to control an automatic ejector seat for military aircraft. TPCS will be the software-based system to monitor and control the animals, people and vehicles in a somewhat novel wildlife park. Please read the outlines for both of these future projects, provided as supplements to this project description[1] - ESCAPES.pdf and TPCS.pdf.

1 What are the three most important dependability attributes of the 2 software systems (ESCAPES and TPCS)? Justify your claims. Then, explain which of the 2 software systems (ESCAPES or TPCS) you believe will demand the higher level of reliability. This is not a question of right and wrong and students may even disagree – this is ok. What I am looking for is a clear explanation of your reasoning. Therefore, you must justify your answer fully.

2 Ever cautious, after learning all about software disasters at Pace, you decide that you will work only on the project to develop the software system that you have decided demands the lower level of reliability. State which of the two projects you believe this to be based on your answer to question 1. Then, write down (in a measurable way) what you believe to be a necessary and sufficient level of reliability (i.e., good enough reliability) for this software system. Again, this must be fully explained. If you find that you are struggling to do this, what steps would you take to find out what would be considered an acceptable level? I am not so interested in hard numbers… I am interested in your approach (i.e., what you think needs to go into figuring this out).

3 You are to put together a structured and detailed plan to explain how you are going to go about assuring the quality of the project that you will be working on (i.e., your response to question 2). This will consider both the quality of the development process and of its eventual product. Note, you have not been given any cost, schedule or scope restrictions as yet for this project, so you must assume that the most important criteria for this project for the customer is quality.

This plan should consider, at a minimum, and in no particular order:

- A statement about the quality and dependability goals for this project, with some indication as to how you are going to determine whether these goals have been met. (Note, you can focus solely on the reliability aspect of dependability or take this further and consider the other aspects too if you are able.) You may consider using the GQM or GAMMA approach to guide you (these will be referred to in class when we discuss metrics and measurement).
- An analysis of the different ways in which this system could fail (particularly due to software faults), and suggested mechanisms for mitigating and/or dealing with failure due to software faults.
- A list of all the other important risks to quality and ways to address each of them.
- Advice and recommendations for selecting an organisation(s) and team(s) to work on this project, including things to look for and/or do both prior to selection and during the project.
- The SQA organization you would put in place for the project (i.e., the various roles and responsibilities, checks and balances) and at what levels. Explain the role and value of internal and external auditors, and mentors for quality, and if you would use them.

[1] These are taken from a compilation of non-published case studies written by Pete Mellor (2002/2003), with permission.

- The individual SQA techniques and practices you would use and at what stages of the software development and project management lifecycle. Explain both why and how each of these techniques and practices addresses quality issues. Be detailed and explicit here and avoid simply taking a shopping list approach. This section should form a large part of your paper, requires research, and it may help to present techniques and practices as a table explaining what, why, when, how, etc.
- As you focus on quality, you must ensure that you place the effort where the cost/benefit is best, so consider what you would do with regard:
  - fault prevention practices;
  - fault identification practices;
  - fault removal practices; and
  - fault tolerance/recovery practices.
- The testing you would do and why, how you would undergo this testing, when you would do it, the data you would collect, what you would do with this data and how you would know when to stop testing. Who would do this testing? How and where would operational profiles help you in your task? How would tools help? What are the pitfalls?
- The broader criteria you would consider absolutely essential to be able to tell the customer (with confidence) that the software system is ready to deploy.
- A description of your intended role and responsibilities as SQA manager on the project.

4 Discuss how you would assess the overall reliability of a system like this since it is sure to contain and interact with a number of hardware, software and human components. What assumptions might you be making when only focusing on the reliability of software? Think bigger.

5 Write a ONE-page covering letter to summarise all of your work. It should clearly state whether or not you would undertake such a project and: if not why not; or if so under what conditions.

Think about this task very carefully before you start writing! It is hypothetical and there is no right or wrong answer. I do not want to see a random list of haphazard thoughts. I do want to see organized, justified and clear thinking. You are expected to be professional and to show some flair with this at graduate level!!!

LOGISTICAL INSTRUCTIONS

You are to decide what is the best way to present your work, both professionally and convincingly. I am not going to tell you or spoon feed you. There is no page limit – you do what you think is appropriate.

DEADLINES

Final paper is due on May 7, 2009 – before 5pm EST

Given it is exam and project time of year, any late work will lead to a delay in grade submission as I will not be able to mark it in a timely fashion. Late work will also receive grade reductions as per the syllabus.

Drafts/feedback

- **Presentations.** Each student will get a 5 to 10 minute slot and a 5-minute slot for Q&A in class on May 4, 2009. This is to get comments and feedback before final completion and submission. I will want you to discuss the project as a group.
- **Ideas and structure.** I will be happy to discuss this individually with each student, and I advise you all to make an appointment to do this with me in office hours sometime during the week of April 20. If you want feedback on initial progress, do likewise the week of April 27. This is to be done face to face and interactively – not via email.

DELIVERABLES

Students are to email me a soft copy and hand me a hardcopy of their paper before 5pm on Thursday May 7, 2009. This is to allow for any final adjustments to work following presentations on May 4.

Olly Gotel, Spring 2009
ogotel@pace.edu; http://csis.pace.edu/~ogotel/