CSC444F Software Engineering I

Tutorial Assignment 1

This assignment is handed out during the tutorial of week 2 (Week of 10/9/2001)
This assignment is due in two weeks, at **the start of your tutorial on Monday 24/9/2001.**
To avoid late penalties, submit it to your TA within the first half hour of the tutorial.

Penalties

Reports submitted up to 48 hours late: -50%.
Reports submitted more than 48 hours late will not be graded.

Grading Scheme

This assignment constitutes 5% of your grade for the course.
This report is a team assignment. Each team should submit a single report, and all members of the team will receive the same grade. *See the course orientation handout for details on team grading*. You should include a short statement about which team members wrote which parts of this assignment. If some parts were joint efforts, make this clear.

Content

The assignment is to produce a risk management plan for your team project. The plan should cover all three phases of the project, and should address financial, managerial and technical risks. Your risk management plan should have three parts, as follows:

1) A list of your top ten risks. These should be placed in order, with your biggest risk first—and don't forget to describe how you ranked them. For each risk, describe:
   - what the risk is
   - a mitigation strategy for the risk
   - a contingency plan for the risk
   - how you will know when to invoke the contingency plan.

2) A description of the process you will use for managing risk. This can be relatively brief (less than one page of text), but should be detailed enough so that each member of the team understands his/her role in managing risk. For example, how will your team monitor risk? What process will you use for deciding when to invoke a contingency plan? How will you handle emergencies? Will individual members of the team be authorized to carry out parts of your risk management strategy, or will the whole team need to meet and agree each action? How often will you update your list of top ten risks?

3) To help you manage risks, you need to take regular measurements of the status of your project. Choose a suitable set of project metrics that you will collect during your project, to help you monitor risk. Describe five of these metrics in detail, including:
   - what you think it might tell you;
   - whether it is a measure of your *product*, or a measure of the development *process*;
   - how frequently you plan to collect the data;
   - how much effort you think it will take to collect (e.g in minutes per week);
   - whether the method for making the measurements is algorithmic or subjective;
   - whether the scale used for the metric is nominal, ordinal, interval, or ratio.

Background information

To help you identify, describe and rank risks, you may find the following helpful.

- A *Risk* is a possible future undesirable outcome. For each risk, the *Risk Exposure* is defined as the probability of the undesirable outcome times the size of the loss involved.
- *Risk Mitigation* is the process of reducing risk exposure, either by decreasing the probability of the risk occurring, or by finding ways to reduce the possible impact if it does occur.
- A *Contingency Plan* is a backup plan for use in case the mitigation strategy is ineffective, or only partially effective. It usually describes emergency measures to be used if the undesirable outcome still occurs despite all attempts to prevent it.

Because probabilities are often hard to estimate precisely in the early project planning phases, many projects don't calculate risk exposure explicitly, but rather use a simple scale to compare risks. For example, in its manned spaceflight program, NASA uses a five point scale for assessing loss, in decreasing order of severity: Loss of Human life, Loss of spacecraft, Loss of Mission, Degraded Mission, Minor inconvenience. Loss of mission means that none of the goals of the mission were accomplished, but the spacecraft and crew were safely recovered. Apollo 13 is an example of this kind of outcome. This type of scale can be combined with a scale for likelihood, to define a number of levels of importance for risks:

		Likelihood of Occurrence		
		Very likely	**Possible**	**Unlikely**
Undesirable outcome	**(5) Loss of Life**	Catastrophic	Catastrophic	Severe
	(4) Loss of Spacecraft	Catastrophic	Severe	Severe
	(3) Loss of Mission	Severe	Severe	High
	(2) Degraded Mission	High	Moderate	Low
	(1) Inconvenience	Moderate	Low	Low

You could apply a similar scheme to your projects, although you would have to adapt the 5-point scale for assessing loss, because there are no human lives or spacecraft at stake in your projects (I hope). However, if you imagine the worst possible outcome (failing the course? not having a project to submit?) as your highest loss, and then define some decreasing levels below it, you can proceed from there. You also need to think carefully about how each square in the matrix should be labeled, as these give you the rankings for comparing risks.

You should also consult the standard software engineering textbooks for hints about likely risks during a software project. In particular, Boehm produced a paper surveying a large number of software projects in industry, and drew up a list of the top ten most common risk factors. It is reproduced on page 192 of van Vliet.

For an introduction to software measurement, read sections 6.1 and 6.8 of van Vliet. *Metrics* are specific items that can be measured to answer questions about a software development project. A metric may be:

- algorithmic—if it does not depend on the viewpoint of the person or machine making the measurement
- subjective—if it involves some subjective judgement, and hence may vary depending on who is doing the measuring

Each metric will have a scale of units associated with it, which may be one of the following:

Nominal—A nominal scale is an unordered set of named categories, such that the only comparison that makes sense is equality.

Ordinal—An ordinal scale is an ordered set of categories, such that tests of relative size ('greater than', 'less than') make sense. For example, each of the scales in the table of risk categories above is an ordinal scale: a 5-point scale for outcome, a 3-point scale for likelihood, and a 5-point scale (from low to catastrophic) for risk importance.

Interval—An interval scale is an ordered scale where the intervals between the points on the scale are constant, so that addition and subtraction make sense. For example, temperature measured in centigrade: we can add and subtract temperatures, but it does not make sense to multiply them (i.e. 40˚C is *not* twice as hot as 20˚C)

Ratio—A ratio scale is an ordered scale where the intervals between points on the scale are constant, and there is an absolute zero, so that multiplication and division make sense. For example, temperature measured in Kelvin (for which it does make sense to say that 40˚K really is twice as hot at 20˚K).