Chapter 1 The Goals and Terminology of Software Engineering

1. Besides those listed in this chapter, what additional expectations do you think software products may fail to meet?

Solution: Stated requirements don’t meet various user needs, even when the user has not specifically mentioned them before.

3. What are the four P’s of software engineering? (Recall them without consulting the book.) Briefly describe each.

Solution: People, Product, Project, Process

4. In a paragraph, name at least two of the most important deficiencies you can think of in the reporting of project progress that contribute to an unsuccessful project outcome.

Solution: If project management is not aware in the first place of issues such as schedule slips and undue test failures, corrective action cannot be taken.

5. Explain in your own words why people are invariably the most important resource on a project.

Solution: A project can have the right features, tools, resources, etc., but if the people aren’t (1) skilled and (2) motivated, they will not be able utilize these resources effectively. Conversely, if highly skilled and motivated people are on a project, they can intelligently compensate for many shortcomings and issues.

6. For the stakeholder groups listed in the text, give an example of a project motivation for each.

Solution: Business: low cost; Project management: meet schedule; Development team: technical innovation; Customer: meet requirements; End user: ease of use

7. You are developing a second-generation custom order entry application for a particular customer. Explain and give examples of at least two types of problems that can arise if the customer is not involved in defining the new application, and their first use of the application is after it is completed.
Solution: There are many. a. A user interface may be developed that is different than the first-generation interface, and the customer does not want to retrain its users.

8. Why does the use of standards make it easier to generate useful, reliable documents? Why isn’t their use a guarantee that high-quality documents will be produced?

Solution: Documentation standards help to ensure that all the necessary parts of a document are present. However, they don’t ensure by themselves the quality of the content of the document.

Chapter 2 Introduction to Quality and Metrics in Software Engineering

1. In addition to the reasons stated in this chapter, name at least two other advantages to producing quality software

Solution: a. It is easier to enhance with new features. b. Quality work results in higher employee morale. (Think about the converse: when managers transmit a don’t-care attitude, employees tend to follow suit.)

3. (a) Describe in your own words the difference between verification and validation.
   (b) What are the advantages and disadvantages of specifying a V&V plan before a plan for conducting your specific project?

Solution to (b) An advantage of specifying a V&V plan before a project plan is that quality procedures can be specified across the organization, thereby promoting uniformity in the organization’s products. This saves time by avoiding the continual re-creation of the procedures that are to be followed from project to project. A disadvantage includes the fact that we cannot provide all of the details of the V&V plan until the plan for the project has been settled. For example, we cannot specify the V&V schedule until the project schedule has been specified in the project plan.
4. (a) What are metrics?

Solution: Metrics are numerical measures for software development. Examples of metrics are the amount of work done (measured in lines of code); the time taken to do the work and the defect rate (defects per 1000 lines of code).

(b) Name a reason why you understand metrics to be important.

Solution: Metrics are important because they bring discipline to the software development process, turning it from a mere activity into true engineering. The informed application of software metrics for measurement and forecasting can result in an improved process and a better product.

5. (b) For each of the following objectives, state a metric you would use to help in achieving the objective, state whether it is a product or process metric, and explain how it would be applied.

   i. avoid project schedule delays

   ii. measure continuous quality improvement from one project to the next

   iii. identify software parts that are exhibiting quality problems

   iv. establish a baseline for improving schedule accuracy

Solutions:

   i. Metric: Actual vs. planned schedule progress; Project metric since the schedule within a project is being measured; Project is monitored weekly to determine if schedule is meeting the plan.

   ii. Metric: Defects/KLOC; This is partly a product metric since we are measuring the health of the emerging product; number of defects discovered after software enters QA phase is used as a baseline for quality. It is also a project metric when used to compare with defect rates on similar projects since it
indicates the health of the project compared with norms. Subsequent projects also collect this metric and compare against baseline to measure improvement.

iii. Metric: Number of defects per software component; Project metric in showing the relative quality of work in various parts; also product metric in measuring the quality of software components. We refactor those exhibiting highest defect levels.

iv. Metric: Number of days schedule deviation vs. plan; Product metric; Collect metric for a project and use as a baseline to measure against on subsequent projects.)