SOFTWARE QUALITY

Introduction

- While quality is generally agreed to be ‘ a good thing’ , in practice what people really mean by the ‘quality’ of a system can be vague
- We therefore need to define precisely what qualities we require of a system
- However this is not enough- we need to judge objectively whether a system meets our quality requirements and this need measurement

THE PLACE OF SOFTWARE QUALITY IN PROJECT PLANNING

- Quality will be of concern at all stages of project planning and execution, but will be particular interest at Stepwise framework
- Step 1 : Identifying project scope and objectives

  Some objective could relate to the quality of the application to be delivered
- Step 2 : Identifying project infrastructure

  Within this step activity identifies installation standards and procedures. Some of these will almost certainly be about quality requirements.

THE PLACE OF SOFTWARE QUALITY IN PROJECT PLANNING CONT'D

- Step 3 : Analyze project characteristics

  In this activity the application to be implemented will be examined to see if it has any special quality requirements.
- Step 4 : Identify the product and activities of the project. It is at that point the entry, exit and process requirement are identified for each activity
- Step 8 : Review and publicize plan. At this stage the overall quality aspects of the project plan are reviewed

THE IMPORTANCE OF SOFTWARE QUALITY

- Increasingly criticality of software: The final customer or user is naturally anxious about the general quality of software.
- The intangibility of software : This makes it difficult to know that a particular task in a project has been completed satisfactory.
- Accumulating errors during software development : As computer system development is made up of a number of steps where the output from one step is the input to the next steps, the error in the earlier deliverable will be added to those in the later step, leading to an accumulating detrimental effect.

DEFINING SOFTWARE QUALITY

For any software system there should be three specification

- Functional specification describing what the system is to do
- Quality specification concerned with how well the function are to operate
- Resource specification concerned with how much is to be spent on the system

DEFINING SOFTWARE QUALITY CONT'D

When there is concerned about the need for a specific quality characteristics in a software product then a quality specification with the following minimum details should be drafted

- Definition/description : definition of the quality characteristics
- Scale : the unit of measurement

DEFINING SOFTWARE QUALITY CONT'D

- Minimally acceptable : the worst value which might be acceptable if other characteristics compensated for it, and below which the product would have to be rejected out of hand
- Target range: the range of values within which it is planned the quality measurement
- Now: the value that applies currently

ISO 9126

- ISO 9126 standards was first introduced in 1991 to tackle the question of the definition of software quality
- THE ORIGINAL 13 page document was designed as a foundation upon which further more detailed standard could be built.
- ISO9126 documents are now very lengthy

ISO 9126 CONT'D

Motivation might be-

- Acquires who are obtaining software from external suppliers
- Developers who are building a software product
- Independent evaluator who are accessing the quality of a software product, not for themselves but for a community of user

ISO 9126 CONT'D

- ISO 9126 also introduces another type of elements – quality in use- for which following element has been identified
- Effectiveness
- Productivity
- Safety
- Satisfaction

ISO 9126 CONT'D

ISO 9126 identifies six major software quality characteristics

- Functionality
- Reliability
- Usability
- Efficiency
- Maintainability
- portability

ISO 9126 CONT'D

- Once the requirements for the software product have been established, the following steps are suggested
- Judge the importance of each quality characteristic for the application
- Select the external quality measurements within the ISO 9126 framework relevant to the qualities prioritized
- Many measurement onto ratings that reflect user satisfaction

PRACTICAL SOFTWARE QUALITY MEASURES

- Each project needs to devise its own measures to meet its specific need
- The measures described relate to the final software products of a project

✓ Reliability

✓ Availability

✓ Mean time between failures

✓ Failure on demands

✓ Support activity

PRACTICAL SOFTWARE QUALITY MEASURES CONT'D

Maintainability

- A key component of this is changeability which relates to the ease with which software can be modified
- Maintainability is changeability plus new quality, analyzability

Extendibility

- it has two aspects one is ease with which existing code can be changed while another could be the ease with which new functionality can be added

PRODUCT VERSUS PROCESS QUALITY MANAGEMENT

- The system development process is made up of a number of activities that are linked together so that the output from one activity is the input to the next.
- Thus program testing will depend on there being a program to test which will be the deliverable from the program coding stage.
- Error can enter the process at any stage.
- They can either be introduced because of a defect in the way a process is carried out, as when the software developers make mistakes in the logic of their software.

PRODUCT VERSUS PROCESS QUALITY MANAGEMENT CONT'D

- Error that creep in the early stages are more expensive to correct at later stages for the following reasons
- The later the error is found , the more rework at more stages of development will be needed
- The general tendency is for each successive stage of development to be more detailed and less capable to absorb change.
- Following process requirements should be specified
- Entry requirement
- Implementation requirement
- Exit requirement

EXTERNAL STANDARDS

- **BS EN ISO 9001:200**

The standard is built on a foundation of the following principles

- Understanding by an organization of the need of their customer so that they can meet or even exceed those requirements
- Leadership to provide the unity of purpose and direction needed to achieve quality objective
- Involvement of staff at all level
- A focus on individual process which create intermediate or deliverable product & service
- A focus on the system of interrelated processes that create delivered product & services
- Continuous improvement of the process
- Decision making based on factual evidence
- Building mutually beneficial relationships with suppliers

EXTERNAL STANDARDS CONT'D

ISO 15504

- ISO/IEC 15504 is a standard for process assessment that shares many concepts with CMMI
- The two standard should be compatible
- Like CMMI the standard is designed to provide guidance on the assessment of software development process

TECHNIQUES TO HELP ENHANCE SOFTWARE QUALITY

- Three main themes emerge

✓ Increasing visibility

✓ Procedure structure

✓ Checking intermediate stages

TECHNIQUES TO HELP ENHANCE SOFTWARE QUALITY CONT'D

Inspections

- It is very effective way of removing superficial errors.
- It motivates developers to produce better structured and self explanatory software.
- It helps spread good programming practice as the participants discuss the advantages and disadvantages of specific piece of code.
- It enhance team spirit.

TECHNIQUES TO HELP ENHANCE SOFTWARE QUALITY CONT'D

The general principles behind Fagan method

- Inspection are carried out on all major deliverables.
- All types of defects are noted.
- Inspection can be carried out by colleagues at all levels except the very top.
- Inspection can be carried using a predefined set of steps.

TECHNIQUES TO HELP ENHANCE SOFTWARE QUALITY CONT'D

Structured programming and clean room software development

- With this type of development there are three separate teams

✓ A specification team

✓ A development team

✓ a certification team

TECHNIQUES TO HELP ENHANCE SOFTWARE QUALITY CONT'D

Formal methods

- Precondition
- Post condition

Software quality circle

- Staff are involved in the identification of sources of errors through the formation of quality circle. These can be set up in all departments of an organizations including those producing software where they are known as software quality circle(SWQC)

Study of any software project management software : viz Project 2000 or equivalent

- **Microsoft Project** is a project management software program, developed and sold by Microsoft, which is designed to assist a project manager in developing a plan, assigning resources to tasks, tracking progress, managing the budget, and analysing workloads.
- Microsoft Project was the company's third Microsoft Windows-based application, and within a couple of years of its introduction it became the dominant PC-based project management software.
- . Microsoft Project's proprietary file format is *.mpp*.
- Microsoft Project and Microsoft Project Server are the cornerstones of the Microsoft Office enterprise project management (EPM) product.

Application & Scope of research

Application

- PRINCE2

Scope of research

- Development of new software quality

ASSIGNMENT

1. Write a short note on Techniques to help enhance software quality
2. Discuss External standards
3. Write a short note on the place of software quality in project planning
4. Discuss the importance of software quality
5. Write a short note on product versus process quality management.
6. What is Practical software quality measures