WEEK 2

Lesson 05 - What is Cost of Quality

Know did you ?

A study commissioned by the U.S. Department of Commerce's National Institute of Standards and Technology (NIST) found that software defects cost the U.S. economy almost $60 billion annually. The study also found that about 80 percent of development funds are consumed by software developers identifying and correcting defects. 3 In another study, The Standish Group reports that canceled software development projects cost organizations US$55 billion dollars annually. 4 Clearly, poor software quality -- and poor software development processes -- is a major drain on business profitability.

http://www.ibm.com/developerworks/rational/library/dec04/bessin/

ITE 3505 - IT Quality Assurance

Degree of Bachelor of Information Technology (BIT)

University of Moratuwa

A new white paper by International Data Corporation (IDC), found existing software quality approaches at most companies are inadequate to address the internal and external costs of software defects. Sponsored by Coverity, the IDC white paper "Improving Software Quality to Drive Business Agility," found that development organizations find major problems with their software even after quality assurance and spend significant amounts of effort and time to repair those defects. Depending on organizational size, respondents from the IDC survey indicated that the costs of debugging are significant, reaching up to $22 million each year for some companies.[1]

5.0 What is Cost of Quality?

In general "Costs of Quality" or "Quality Costs" are the costs or expenses related with preventing, discovering, and correcting defective work. Cost of software quality is a technique which enables to understand the economic or financial concerns involved in delivering good quality software. Most of these costs can be reduced or prevented. Spending on software quality will affect on the following dimensions.

- **The level of satisfaction**

The extent to which customer or user recognize that a software meets his / her expectations

- **Product value**

The extent to which software has added value for its stakeholders in relation to the rival environment

- **Key attributes**

The extent to which software possesses key characteristics such as reliability, flexibility and maintainability

- **Defectiveness**

The extent to which software works inaccurately in the user environments due to unbearable operational defects

- **Process quality**

The level of involvement of capable, skilled and talented people to develop the right software product in the right way to make the software and the development work more effective and efficient.

[1] http://www.coverity.com/html/press_story65_08_04_08.html

5.1 Cost of Quality Categories

Cost of Quality categories for software is explained below.

Prevention Costs

These are the costs of actions that are particularly designed to avoid poor quality. This poor quality include errors in coding, errors in designing, errors in the user manual, deficiently documented or difficult to maintain complex code.

Some example of prevention costs include cost associated with staff training, cost of requirement analysis, prototyping cost, fault tolerance design, examining usability, reliability evaluation of tools used for development prior to their purchase, proper maintenance of internal documentation, etc.

Appraisal Costs

These are the cost of actions designed to discover quality problems such as inspections of code and testing.

Reviewing the design, inspection of code, black box and white box testing, training the testers, automation of testing, usability testing are some of the examples of activities that create appraisal costs.

Failure Costs

These are the costs that result from poor quality, such as bugs fixing costs and the cost of dealing with complaints of the customers.

Internal Failure Costs

These are the failure costs that occur prior to the supply of the software product to the customer. Along with costs of discovering and fixing errors are many internal failure costs suffer by groups outside of product development. If an error obstructs someone in your company from doing his or her job, then the costs of wasted time, missed milestones, and the additional time to get back onto schedule are all considered as internal failure costs.

Some examples of internal failure costs involve in fixing bugs / errors, regression testing, and also in wasted time of the in-house user, tester, writer, and marketer.

External Failure Costs

These failure costs occur after your company supplies the software product to the customer. These cost are mainly occur when offering customer services.

External failure cost involved in activities such as technical support calls, support answer books preparation, customer complaint investigation, refunds, damages to customer goodwill, cost of warranty and liability, discounts allowed to resellers of software product

Total Cost of Quality

This can be calculated by adding Prevention cost, Appraisal cost, Internal Failure cost and external failure costs together.

5.2 Benefits

In order to achieve organizational goals and the required success through software quality, one must focus on the following areas.

- What is the cost of good quality software?
- What is the software quality level that your organization can achieve?
- If the software of your company does not tally with the required quality, then what is the cost of that poor quality software?
- If your software is not quality enough as required by the stakeholders, then what are the negative impacts to your organization?

When considering the above, it is obvious that the focus on cost of quality will give following benefits to the organization as well as the stakeholders.

- Prevention cost will make sure that before the detection of an error it is better to prevent the possible errors according to the statement "Prevention is better than cure". Therefore prevention costs have the potential to minimize other quality cost categories and therefore it majorly impact on the total cost of quality.

  Example :

  (i) Spending on effective staff training enhances the skills and knowledge of the employees, who involve io software development which in return improves their quality of work and efficiency.

  (ii) Spending on requirement analysis and prototyping will make sure that you really understand exactly what your customer wants, so that effort and other resources can be utilized on those exact requirements which helps to eliminate later regrets.

  (iii) Evaluating the reliability of tools used for development prior to their purchase will make sure that you spend on the correct resources that will aid your development work.

- Spending on fixing bugs, testing every element of the code and testing for usability, etc. will make sure that every component of the software complies according to the requirements. This is indeed important to meet or exceed the expectations of the customer.

- Spending on deeper analysis of software quality will lead to take actions that improve the competitive situation in the market.

- Focus on cost of software quality will unhide the previously hidden costs related to poor quality. This will increase the willingness in management to spend in improving software quality.

- Concern in spending on software quality will make sure that the customer gets the right product at the right time as required which minimizes customer dissatisfaction.

- How concern you are about the quality of software which you develop for customer will determine how much you spend for it to improve its quality which reduces the external failure costs such as customer complaint investigation, refunds, etc.

- Spending on software quality will enable you to benchmark your software with your competitors, which will also reflect on customer's perception.

- Spending to improve the quality of software will enable your organization to demand high prices in the market place.

- Quality of software and value additions will make a positive impression in the customer's mind which results in repeat orders which increase the demand and improve profits of your organization.