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CS-7A

Software Testing - Assignment

Question : 1 Categories of Software Metrics

- 1- End product quality Metrics
- 2- On process Quality Metrics
- 3- Maintenance quality Metrics

1- Product Quality Metrics

- Mean time of failure

Measure the time between failures (when a functional unit ceases to perform its required operation/function)

- Defect Density

LOC :- Lines of Code

Defect Density $\Rightarrow \frac{\text{number of Defects in a time period}}{\text{KLOC}}$

Customer Problems Metric

- Usability problem
- Unclear Documentation
- Duplicate Defects
- User errors

PUM = $\frac{\text{total problems reported by customer for a time period}}{\text{total number of license Month of software during that period}}$

No. of license Month = No. of install license \times No. of months in that period.

- Customer Satisfaction Metrics

Percent of Completely satisfied customers

% of satisfied customers

% of dissatisfied Customers

% of non-satisfied customers

Net satisfaction index (NSI)

2- In Process Quality Metric

Tracking the defect arrival and removal in each phase of development cycle.

- Defect Density During Machine Testing

It is positively correlated with the defect rate in the field.

- Defect Arrival pattern during Machine Testing.

- Defect Arrival / Time Interval

- Larger Backlog indicates lower quality of system.

► Phase Based Defect Removal pattern
Tracking of defects in all phases and some metrics are:- Inspection Coverage

Inspection effort

Review Manpower rate

- 1- High Level Design Review
- 2- Low Level Design Review
- 3- Code Inspection
- 4- Unit Testing
- 5- Component Testing
- 6- System Testing

► Defect Removal Effectiveness :

DRE = $\frac{\text{Defects removed during a development phase}}{\text{Defects latent in the product}} \times 100\%$

Defects latent in the product \Rightarrow Defects removed during the phase + Defects found later.

3-Maintenance Quality Metric

- 1- Fix Backlog and Backlog Management Index.
- 2- Fix response time & responsiveness
- 3- Percent Delinquent Fixes
- 4- Fix Quality

\rightarrow $BMI = \frac{\text{No. of problems solved during the Month}}{\text{No. of problems arrival during Month}} \times 100\%$

\rightarrow $\text{FIX Response Time} \rightarrow \text{Responsiveness}$

\rightarrow Fix response time ^{Metric} is calculated as: Mean time of all problems from open to closed.

\rightarrow $\text{Percent Delinquent Fixes}$

\rightarrow $PDF = \frac{\text{No. of fixes that exceeded the response time criteria by severity level}}{\text{No. of fixes delivered in a specific time}} \times 100\%$

\rightarrow INDEX = $100 \times \text{Delinquent}$.

\rightarrow $\text{FIX Quality}:$

A fix is defective when it does not fix the reported problem, or if it fixed the original problem but injected a new defect.

(i) Calculate Defect Removal Effectiveness?

$DRE = \frac{\text{Defects removed during Development Phase}}{\text{Defects latent in the product}}$

After inspection defects in requirements = 160
Later defects in requirement = 40

Defects latent in product = $40 + 160 = 200$

Defects resolved during development = 160

$$DRE = \frac{160}{200} \times 100\% = 80\%$$

(MTTPC) Calculate Mean time to problem closure =

Sr	Reported Problem	Problem Open Time	Closed Time	Duration
1	Problem X	2023-5-10 9:40AM	4:40PM	7 hours
2	Y	2023-5-11 12:40PM	23-5-12 2:10PM	4 hours 20 mins
3	Z	23-5-11 10:30AM	2:30PM	4 hours
4	A	11:00AM	4:PM	5 hours

$$\text{Total time} = 7 + 9.5 + 4 + 5 = 25.5 \text{ hours}$$

$$MTTPC = \frac{\text{Total time to problem closure}}{\text{No. of problems}} = \frac{25.5}{4} = 6.38 \text{ hours}$$

MTTPC of 6.38h indicates a moderate

Response time for Bug fixes.

Reasons:-

- MTPC under 8 hours is acceptable for minor issues
- Resolving issues in a day increase customer satisfaction.
- Faster Response time for urgent issues enhance overall efficiency.

(ii) Calculate following

1 - Schedule Estimation Accuracy (SEA)

$$SEA = \frac{\text{Actual Project Duration}}{\text{Estimated project duration}}$$

:- 5 tasks were expected to get completed on day 5 but actually got completed on day 7.

$$SEA = \frac{5}{7} = 1.4%$$

2 - Effort Estimation Accuracy (EEA)

$$EEA = \frac{\text{Actual Project effort}}{\text{estimated project effort}} = \frac{24}{12} = 2$$