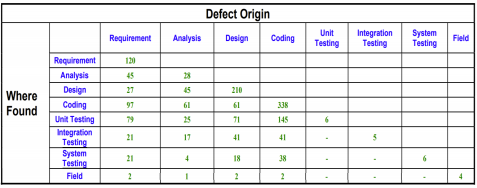
**Software Project Management**

**ASSIGNMENT-5**

**Rupa Rajendran**

**PART I - Requirements:**

Consider the data listed in the following matrix for a product of size 120KLOC



1. Calculate the defect removal rate for every phase

**Defects Removal Rate =**

**(Number of Defects removed in current phase /Total number of KLOC) defects/KLOC**

|  |  |  |  |
| --- | --- | --- | --- |
| **Phase** | **Defects Removed** | **Total KLOC** | **Defects Removal**  **Rate (defects/KLOC)** |
| **Requirement** | 120 | 120 | 1 |
| **Analysis** | 73 | 120 | 0.60833333 |
| **Design** | 282 | 120 | 2.35 |
| **Coding** | 557 | 120 | 4.64166667 |
| **Unit Testing** | 326 | 120 | 2.71666667 |
| **Integration Testing** | 125 | 120 | 1.04166667 |
| **System Testing** | 87 | 120 | 0.725 |
| **Field** | 11 | 120 | 0.09166667 |

2. Calculate the defect injection rate for every phase

**Defects Injection Rate =**

**(Number of defects originated in current phase/ Total number of KLOC) defects/KLOC**

|  |  |  |  |
| --- | --- | --- | --- |
| **Phase** | **Defects Originated** | **Total KLOC** | **Defects Injection Rate (defects/KLOC)** |
| **Requirement** | 412 | 120 | 3.43333333 |
| **Analysis** | 181 | 120 | 1.50833333 |
| **Design** | 403 | 120 | 3.35833333 |
| **Coding** | 564 | 120 | 4.7 |
| **Unit Testing** | 6 | 120 | 0.05 |
| **Integration Testing** | 5 | 120 | 0.04166667 |
| **System Testing** | 6 | 120 | 0.05 |
| **Field** | 4 | 120 | 0.03333333 |

3. Calculate the defect escape rate for every phase

**Defects Escape Rate =**

**(Number of Defects Escaped/ Total number of KLOC) defects/KLOC**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Phase** | **Defects**  **originated** | **Defects**  **removed** | **Defects Escaped** | **Total**  **KLOC** | **Defects Escape Rate**  **(defects/KLOC)** |
| **Requirement** | 412 | 120 | 412-120 = 292 | 120 | 2.43333333 |
| **Analysis** | 181 | 73 | 412+181-120-73=400 | 120 | 3.33333333 |
| **Design** | 403 | 282 | 412+181+403-120-73- 282=521 | 120 | 4.34166667 |
| **Coding** | 564 | 557 | 412+181+403+564- 120-73-282-557=528 | 120 | 4.4 |
| **Unit Testing** | 6 | 326 | 412+181+403+564+6- 120-73-282-557-  326=208 | 120 | 1.733333333 |
| **Integration**  **Testing** | 5 | 125 | 412+181+403+564+6+ 5-12-73-282-557-326- 125=196 | 120 | 1.63333333 |
| **System**  **Testing** | 6 | 87 | 412+181+403+564+6+ 5+6-120-73-282-557- 326-125-87=7 | 120 | 0.5833333 |
| **Field** | 4 | 11 | 412+181+403+564+6+ 5+6+4-120-73-282-  557-326-125-87-11=0 | 120 | 0.0000 |

4. Calculate the overall defect removal effectiveness

**Overall Defect Removal Effectiveness**

**= (Total No. of Defects removed in all the phases except field phase/Total number of defects removed in all the phase) \* 100**

= (120+73+282+557+326+125+87/1581) \*100

= (1570 / 1581) \* 100

= 0.99304238 \*100

**= 99.304 %**

5. Which phase is the most effective in removing defects? Explain.

**Defect Removal Effectiveness**

**= ((Defects Removed at this step/ (Defects existing on entry+Defect injected during development of this story)) defects/KLOC**

|  |  |  |  |
| --- | --- | --- | --- |
| **Phase** | **Defects**  **removed in**  **this phase** | **Defects existing on**  **entry + Defects Injected during development of this phase** | **Defects removal**  **effectiveness (%)** |
| **Requirement** | 120 | 0+412=412 | 29.126% |
| **Analysis** | 73 | (412-120)+181=473 | 15.433% |
| **Design** | 282 | (473-73)+403=806 | 34.98% |
| **Coding** | 557 | (806-282)+564=1088 | 51.19% |
| **Unit Testing** | 326 | (1088-557)+6=537 | 60.70% |
| **Integration Testing** | 125 | (537-326)+5=216 | 57.87% |
| **System Testing** | 87 | (216-125)+6=97 | 89.69% |
| **Field** | 11 | (97-87)+4=14 | 78.57% |

Most effective phase is removal of defects is the phase that has the maximum defect removal effectiveness rate.

The most effective phase in defect removal is system testing with defect removal percentage ranging up to **86.69%.**

For testing phases we use the below formula:

We use Dunn’s formula to calculate defect removal effectiveness

**=(Defects removed at current phase/(Defects removed at current phase + Defects removed at subsequent phases)) defects/KLOC**

|  |  |  |  |
| --- | --- | --- | --- |
| **Phase** | **Defects**  **removed in**  **this phase** | **Defects removed in this Phase + subsequent phases** | **Dunn's Defect removal effectiveness (%)** |
| **Unit Testing** | 326 | 326+(125+87+11)=549 | 59.38% |
| **Integration Testing** | 125 | 125+(87+11)=223 | 56.05% |
| **System Testing** | 87 | 87+(11)=98 | 88.75% |

From the results of Dunn’s Formula, the most effective phase in Defects removal is System Testing. Defect removal effectiveness of system Testing is **88.75%**

6. Do you think reviews and inspections were effective? Explain.

Overall defect removal effectiveness is 99.304%

**Overall Inspection Efficiency = (defects removed in inspection / total defects) \* 100**

**=** ((120+73+282+557)/1581)\*100

**=**65.27%

Considering all the calculations we can say that reviews and inspection at coding were more effective as a greater number of defects were identified. As overall results matter more than the individual phase results we can state that reviews and inspection were effective in removing defects.

From the above value, we can also interpret that the defect removal effectiveness is greater than CMM Level 5 which makes its maturity level have an outstanding quality.

Therefore, the reviews and inspections were effective.

7. If the number of defects originated in the design phase increased by 15% and defects detected in design review increased by 60%, would these changes increase or decrease the defects escaped to the coding phase? Explain your answer in detail (present data to support your answer).

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|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Phases** | **Requirement** | **Analysis** | **Design** | **Coding** | **Unit**  **Testing** | **Integration Testing** | **System Testing** | **Field** | **Total** |
| **Requirement** | 120 |  |  |  |  |  |  |  | **120** |
| **Analysis** | 45 | 28 |  |  |  |  |  |  | **73** |
| **Design** | 43.2 | 72 | 386.4 |  |  |  |  |  | **501.6** |
| **Coding** | 97 | 61 | 70.15 | 338 |  |  |  |  | **566.15** |
| **Unit Testing** | 79 | 25 | 81.65 | 145 | 6 |  |  |  | **336.65** |
| **Integration**  **Testing** | 21 | 17 | 47.15 | 41 |  | 5 |  |  | **131.15** |
| **System**  **Testing** | 21 | 4 | 20.7 | 38 |  |  | 6 |  | **89.7** |
| **Field** | 2 | 1 | 2.3 | 2 |  |  |  | 4 | **11.3** |
| **Total** | **428.2** | **208** | **608.35** | **564** | **6** | **5** | **6** | **4** |  |

**Defect escape rate:**

**Defect escape rate=** Defects escaped/product size in KLOC

**Product Size:** 120 KLOC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Phase** | **Defects**  **Detected** | **Defects Injected** | **Defects escaped** | **Defect escape rate** |
| **Requirement** | 120 | 428.2 | 428.2-120=308.2 | 2.56 defects/KLOC |
| **Analysis** | 73 | 208 | 428.2+208-120-73=443.2 | 3.69 defects/KLOC |
| **Design** | 501.6 | 608.35 | 428.2+208+608.35-120-73-  501.6=549.95 | 4.58defects/KLOC |
| **Coding** | 566.15 | 564 | 428.2+208+608.35+564-120-73- 501.6-566.15=547.8 | 4.56 defects/KLOC |

• Considering default values, we get the defect escape rate for coding phase is 4.4 • After increasing defects origin at design phase by 15% and defects detected in design review by 60%, we get the defect escape rate as **4.56**

• Hence by considering the following calculations we can consider that there is an **increase** in number of defects escaped to the coding phase