<u>CS587- Software Project Management</u>
<u>Assignment #4</u>
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	Requirement	Analysis	Design	Coding	Unit Testing	Integration Testing	System Testing	Field	Total
Requirement	40								40
Analysis	36	73							109
Design	66	45	98						209
Coding	39	67	84	261					451
Unit Testing	15	14	38	78	17				162
Integration Testing	21	22	73	37	0	19			172
System Testing	22	11	43	24	0	0	32		132
Field	4	1	2	5	0	0	0	7	19
Total	243	233	338	405	17	19	32	7	1294

1. Calculate the defect removal rate for every phase

Defect Removal Rate for every phase

Formula= (Defects Removed in Current Phase/ Total number of KLOC) defects/KLOC

Phase	Defects Removed	Total KLOC	Defects Removal Rate (defects/KLOC)
Requirement	40	120	0.333333333
Analysis	109	120	0.908333333
Design	209	120	1.741666667
Coding	451	120	3.758333333
Unit Testing	162	120	1.35
Integration Testing	172	120	1.433333333
System Testing	132	120	1.1
Field	19	120	0.158333333

2. Calculate the defect Injection rate for every phase

Defect Injection Rate for every phase

Formula= (Defects Originated in Current Phase/ Total number of KLOC) defects/KLOC

Phase	Defects Originated	Total KLOC	Defects Injection Rate (defects/KLOC)
Requirement	243	120	2.025
Analysis	233	120	1.941666667
Design	338	120	2.816666667
Coding	405	120	3.375
Unit Testing	17	120	0.141666667
Integration Testing	19	120	0.158333333
System Testing	32	120	0.266666667
Field	7	120	0.058333333

3. Calculate the defect escape rate for every phase

Defects Escape Rate for every Phase

Formula= (No of Defects Escaped/Total number of KLOC) defects/KLOC

Phase	Defects Escaped	Total KLOC	Defects Escape Rate (defects/KLOC)
Requirement	203	120	1.691666667
Analysis	327	120	2.725
Design	456	120	3.8
Coding	410	120	3.416666667
Unit Testing	265	120	2.208333333
Integration Testing	112	120	0.933333333
System Testing	12	120	0.1
Field	0	120	0

4. Calculate the overall defect removal effectiveness.

Overall Defect Removal Effectiveness

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

= ((40+109+209+451+162+172+132)/1294)*100 (or) (1-(19/1294))*100

= 98.5317%

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

Overall Defect Removal Effectiveness

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

Phase	Defects Removed	Defects Existing at entry	Defects Injected during development of the phase	Defects removal effectiveness
Requirement	40	0	243	16.46090535
Analysis	109	203	233	25
Design	209	327	338	31.42857143
Coding	451	456	405	52.38095238
Unit Testing	162	410	17	37.93911007
Integration Testing	172	265	19	60.56338028
System Testing	132	112	32	91.66666667
Field	19	12	7	100

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

System Testing is the most effective phase in removal of defects with defects removal percentage ranging up to "91.66".

We will use Dunn's Defects removal effectiveness formula.

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

Phase	Defects Removed	Defects Removed at Current Phase + Subsequent phases	Dunn's Defect Removal effectiveness in %
Unit Testing	162	162+ 323	33.40206186
Integration Testing	172	172 + 151	53.25077399
System Testing	132	132 + 19	87.41721854

With the above table we can interpret that the most effective phase in defects removal is System testing with the defect removal effectiveness of the system testing % is 87.41721854

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

Over all defect removal effectiveness is 98.53%

Over all Inspection efficiency

Formula= ((Defects removed in Inspection/ Total Defects)*100)

= ((40+109+209+451)/1294)*100 = 62.51931%

Over all Testing efficiency

Formula= ((Defects removed in Testing/ Total Defects)*100)

=((162+172+132/485)*100)= 96.082474%

After close consideration of the above values, the reviews and inspection at coding is confirmed as more effective as more number of defects were identified. This results in less defects to be followed to the field. On the whole we can come to a conclusion that the 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 having an outstanding quality.

Therefore, the reviews and inspections were effective.

7. If the number of defects originated in design phase increased by 10% and defects detected in design review increased by 10%, do you think that will have a positive or negative impact on the defect removal effectiveness in the coding phase? Explain your answer in detail (present data to support your answer).

| | Phases | Defect Origin | | | | | | | | |
		Requirement	Analysis	Design	Coding	Unit Testing	Integration Testing	System Testing	Field	Total
Where Found	Requirement	40								40
	Analysis	36	73							109
	Design	72.6	49.5	118.58						240.68
	Coding	39	67	92.4	261					459.4
	Unit Testing	15	14	41.8	78	17				165.8
	Integration Testing	21	22	80.3	37	0	19			179.3
	System Testing	22	11	47.3	24	0	0	32		136.3
	Field	4	1	2.2	5	0	0	0	7	19.2
		249.6	237.5	382.58	405	17	19	32	7	1349.68

Over all Defect removal effectiveness

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

= (1330.48/1349.68) * 100 = 98.5774406 %

Overall Defect Removal Effectiveness

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

Phase	Defects Removed	Defects Existing at entry	Defects Injected during development of the phase	Defects removal effectiveness
Requirement	40	0	249.6	16.02564103
Analysis	109	209.6	237.5	24.37933348
Design	240.68	338.1	382.58	33.39623689
Coding	459.4	480	405	51.90960452
Unit Testing	165.8	425.6	17	37.46046091
Integration Testing	179.3	276.8	19	60.61528059
System Testing	136.3	116.5	32	91.78451178
Field	19.2	12.2	7	100

Earlier Value

The defects removal effectiveness in the coding phase is 52.38095238 %

Updated Value

The defects removal effectiveness in the coding phase is 51.90960452 %

On considering the above values, it is evident that the defect removal effectiveness of coding has a negative impact due to the changes in following factors

Defects removed is changed from 451 to 459.4

Defects existing in entry is changed from 456 to 480