CST416 Software Enterprise IV: Process and Project Management **Spring 2010**
Lab: Defect Estimation **March 3, 2010**

Objectives:

1. Understand how to estimate the total number of defects for a project using the Capture-Recapture method.
2. Know the importance of defect containment by understanding the play between defect injection and removal rates.

You may do this lab with 1 other partner who is NOT on your project team.

Activity 1: Capture-Recapture Method

Part 1: Compute a defect estimate ala the Schofield paper using the defect data in the table below:

	Huey	Dewey	Louie
Defect 1	X	X	
Defect 2		X	
Defect 3			X
Defect 4		X	
Defect 5	X	X	X
Defect 6		X	
Defect 7		X	
Defect 8	X		
Defect 9		X	X

Add the needed columns to the table to show your work.
Answer: What is the defect discovery rate for the Huey/Dewey/Louie team? Explain.

Part 2: Compute a defect estimate again, this time from reviews from 4 developers:

	Paul	John	George	Ringo
Memory Leak			X	X
DB connection not closed	X		X	
Does not close file		X		
Incorrect parameter type	X		X	
Improper indentation	X	X	X	X
Lack of code comments			X	
Null pointer Exception	X	X	X	
Type mismatch error				X
Incorrect logic condition		X	X	X
Incorrect computation			X	
Improper use of synch block		X		
Uses goto	X	X		
Incorrect initialization of var			X	X
Improper access level	X			X

Add the needed columns to the table to show your work.
Answer: What is the defect discovery rate for the Beatles team? Explain.

Activity 2: Defect Containment Derivation

Consider the following information about a hypothetical application for PestSoftware Inc.:

- The application has 180,000 lines of code (LOC)
- PestSoftware uses RUP, so it has phases (I)nception, (E)laboration, (C)onstruction, and (T)ransition.
- There is a defect injected for every 15 LOC.
- The *defect injection distribution rates* per phase are: I = 10%, E = 25%, C = 45%, and T = 20%
- The *defect removal rates* per phase are: I = 60%, E = 80%, C = 67%, and T = 50%
- The *cost ratios* of fixing defects are: I:E:C:T:F → 1:5:10:50:100, where F means the defect has made it to "(F)ield operation". Assume a defect always costs 1 "unit" to fix if found in phase.

Use this information to answers the following questions.

1. How many total defects exist in the application?
2. How many defects exist per phase?
3. Fill in the matrix below. In this matrix, each entry has 2 cells. Fill in the left one with the number of defects from the column phase, and the right one with the number of defects removed in this phase.

	Inception		**Elaboration**		**Construction**		**Transition**		**Total**	
Inception										
Elaboration										
Construction										
Transition										
Field operation										

As an example: Suppose there are 100 defects in a system. The defect injection rate says that 10%, or 10 of them, were injected during Inception. Then the left cell of the 1st row/column (Inception/Inception) would be 10. The right cell would be the defects removed *in-phase*, which would be 6 since the defect removal rate for Inception is 60%. That would leave 4 defects carried over to Elaboration, entered in row Elaboration and column Inception – and so on.

4. What are the total costs per phase for injected defects? (i.e. how much did all of the defects for Inception cost you? Elaboration? etc. Keep in mind that a defect fixed in phase costs 1 unit, and ration from there).
5. What is the cost-per-defect for each phase?
6. What is the overall project defect removal rate?

Activity 3: Discussion Questions

1. Suppose in Part 1 of CRM, that you found out that a) Huey seems to only find coding style errors while Louie only finds memory-related defects, and b) Dewey was kind of tired so he only skimmed the last 25% of the code. Would this information shake your faith that the CRM-based estimate you derived was appropriate? Explain why or why not for both (a) and (b).
2. If you asked to pick only one phase of the software process for PestControl Inc. to improve, what phase would it be, and what activity would you focus on (injection, discovery, or removal)? Explain your answer to both.
3. Is there any additional information that is missing so far that would have helped you answer #2 better?

Activity 4: Individual Journal

Keep up-to-date with your journal now that we got back on track! Answer the following.

Practice questions:

1. Do you think *CRM* is a useful technique to do on real software projects?
2. Do you think *CRM* will benefit your capstone project? How will it, how will it not?
3. In general, what do you think the main benefits and challenges are in *defect estimation*?
4. In general, what do you think the main benefits and challenges are in *defect containment*?

The questions (w/ explanations) after employing *CRM* in your **project** are:

1. Where/how have you applied *CRM* on your project? (If you have not, explain why not)
2. Did the *CRM* work as you expected on the project?
3. In general, what do you think the main benefits and challenges are in *defect estimation*?
4. In general, what do you think the main benefits and challenges are in *defect containment*?
5. Please provide any additional observations on *CRM, defect estimation,* or *defect containment* as desired.

Note: I added an extra question to cover defect estimation and containment separately.