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**Increasing the Use of Measures by  
Decreasing Measurement Effort**

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**Outline**

- Problem
- Solution
- Details
- Summary

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## Problem

### Background

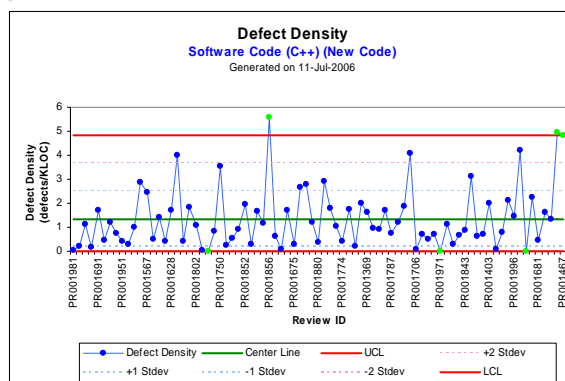
- GD Canada has chosen to focus on defect management (detection and resolution) for CMMI Level 4
- Implementation of CMMI Level 4 requires use of statistical methods to understand process variation and to monitor process performance.
- GD Canada is using statistical process control (SPC) to understand and monitor defect detection and defect resolution processes.

### Problem Statement

Effort required to get base measures from corporate databases, calculate derived measures, and construct SPC charts is seen as a barrier to deployment of defect management measures.

## Problem

In other words, how can we easily get to this?



Calculations can be cumbersome and time consuming

Requires specialized knowledge and skills

Decision makers don't want to spend time doing calculations

## Solution

### Measurement tool

- Automate extraction of base measures from corporate databases
- Automate calculation of derived measures
- Automate creation of control charts

**Focus on decision making rather than on the mechanics of database queries and control charting**

## Details

- Measures
- Decision Making
- Measurement Tool

## Details – Measures

- For CMMI level 4, focus at GD Canada is on defect management. Two aspects:
  - Defect Detection
  - Defect Resolution

Find 'em and Fix 'em !

## Details – Measures

### Defect Detection

- Find defects early in the product development life cycle
  - Accomplished through reviews (specs, designs, code, drawings, etc.)
  - Want to understand variation in, and monitor the performance of, review processes
  - Measures:
    - Defect Density
    - Defect Detection Effort

## Details – Measures

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### Defect Detection – Defect Density

- Base Measures:
  - # defects found during review
  - size of object reviewed
- Function:
  - Defect Density = # defects / size

## Details – Measures

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### Defect Detection – Defect Detection Effort

- Base Measures:
  - # defects found during review
  - total effort expended by all reviewers
- Function:
  - Defect Detection Effort = total effort / # defects

## Details – Measures

### Defect Resolution

↗ Plan for rework (assign resources, schedule effort, prioritize defects for resolution)

– Requires confidence in rework estimations –

- Measures
  - Effort Estimation Accuracy

## Details – Measures

### Defect Resolution – Effort Estimation Accuracy

- Base Measures:
  - estimated effort to resolve a defect
  - actual effort to resolve a defect
- Function:
  - Effort Estimation Accuracy = actual – estimated

## Details – Decision Making

### Defect Detection

**What:**

- Find defects in the object under review so that they can be removed
- Find defects efficiently (maximize defect detection and minimize effort)

**How:**

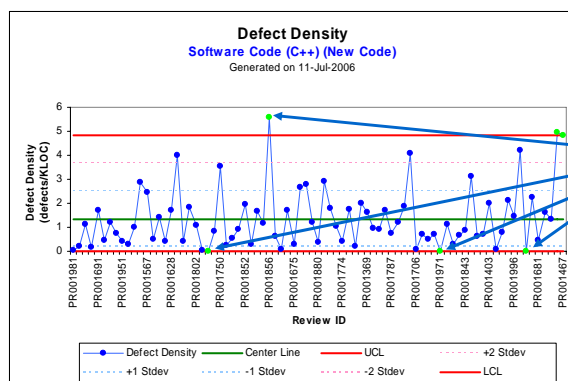
- Using SPC, determine if the results of a review session were unusual based on past history

**Decisions:**

- re-inspect?
- segment the object under review?
- involve reviewers with greater experience?

## Details – Decision Making

### Defect Detection



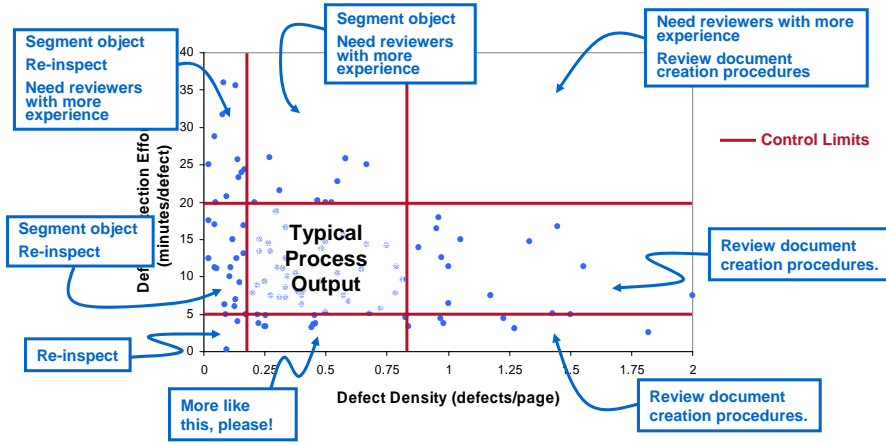
Decisions need to be made regarding the out-of-control points

Objective is to keep the process in control

Same is true for Defect Detection Effort

## Details – Decision Making

Defect Detection Decision Matrix



## Details – Decision Making

- Defect Resolution

**What:**

- Plan for rework

**How:**

- Using SPC, determine if estimates are trustworthy

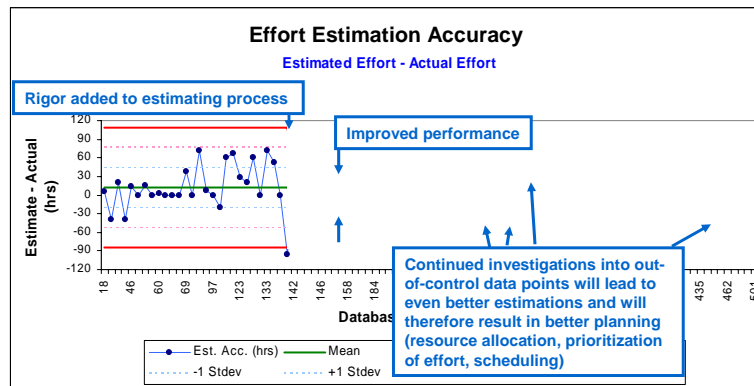
**Decisions:**

- Estimation process: make changes?
- Resolution process: assign resources? re-prioritize efforts? adjust schedule?



## Details – Decision Making

### Defect Resolution

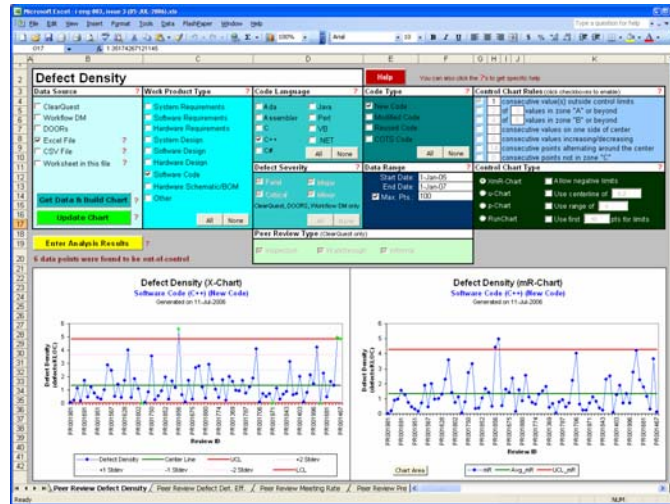


## Details – Measurement Tool

### Enabling Decision Making

- Reduce effort to collect data and make control charts
  - allow effort to be focused on analyzing results and making decisions
- Tool features:
  - Automatic extraction of base measures from corporate databases
  - Automatic calculation of derived measures
  - Automatic creation of SPC charts

## Details – Measurement Tool



Excel-based

Supports data extraction from standard corporate databases

Supports four types of charts: XMR, u, p, run charts

Supports standard control charting rules

Highlights out-of-control data points

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## Summary

- GD Canada deploying measures in support of defect management
- Statistical Process Control chosen to understand variation in, and monitor performance of, defect detection and defect resolution processes
- GD Canada measurement tool enables decision making through reduction of effort related to mechanics of SPC

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**Questions?**