No Surprises: A Case Study for Using Statistical Process Control for Real-Time Improvement

Craig Hale, Esterline Control Systems - AVISTA
How Predictable is Your Next Project?

• Are your processes reliable?

• Are there improvement opportunities?

• What are the key factors to consider when estimating?
Predict the Future (of Your Project) Using Statistical Process Control
SPC Monitors Processes in Real-Time
Why Use It?: No Surprises

Things we wanted to happen

Things that did happen
What it Does: Helps You Understand What is Happening
Identify your Factors

- **Uncontrollable**
  - Customer Requirement Stability
  - Software\Hardware Environment Stability
  - Complexity
  - Schedule

- **Controllable**
  - Engineer Experience
  - Size of Team
  - Processes selected to control level of Quality
Where to Use It: Support Business Goals
Develop Effective Measures

• **Specific**
• **Measurable**
• **Attainable**
• **Relevant**
• **Timely**
When to Use It:
Ideally, Early in the Process

- Requirements Specification
- Software Design
- Software Implementation
- Integration Testing
- Requirements-Based Testing
An Example: Improving a Process

The AVISTA Vision:
Creating a Safer World
Basic Improvement Steps

- Identify
- Gather
- Analyze
- Test
- Pilot
- Evaluate
- Enhance
- Train
- Deploy

Plan

Execute

Evaluate

Improve
Pick a Statistical Tool

- Minitab
- Statistica
- Crystal Ball
- MS Excel
Hypothesis: Review Size Impact
Baselines: Critical to Success

Requirement Count Projecting Defects/Rqmt

- Data
- Monte stdErr
- Power (Data)
- Power (Monte stdErr)
Discovery

Old Review Size = Less Defect Detection

New Review Size = Increase Defect Detection
### Initial Results: Reduced Defects

<table>
<thead>
<tr>
<th>Organization</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>-33.0%</td>
</tr>
<tr>
<td>Review Size</td>
<td></td>
</tr>
<tr>
<td>Defects Per</td>
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</tbody>
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Challenges

• Buy-in
• Defining Criteria
• Training
• Complexity
• What to do when out of range
Baselines and Models Lessons Learned

- Configure Baselines in single location
- Use a checklist for reviewing
- Involve people early (engineers, leads)
- Train people to enhance understanding
- Scrutinize “we are different”
- Gather as much data as possible
- Leverage statistical hypothesis testing
Baselines and Models Lessons Learned

- Use SMART when defining measures
- Validate measures by amount of data available
- Analyze data as close to implementation as possible
- Analyze data prior to it becoming stale
- Collect project characteristic data
- Maintain outlier in an organized database or at least single spreadsheet
Where Are You Going?
Statistical Process Control: Your Early Warning System
Questions?

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