



# 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



# An Example: Improving a Process

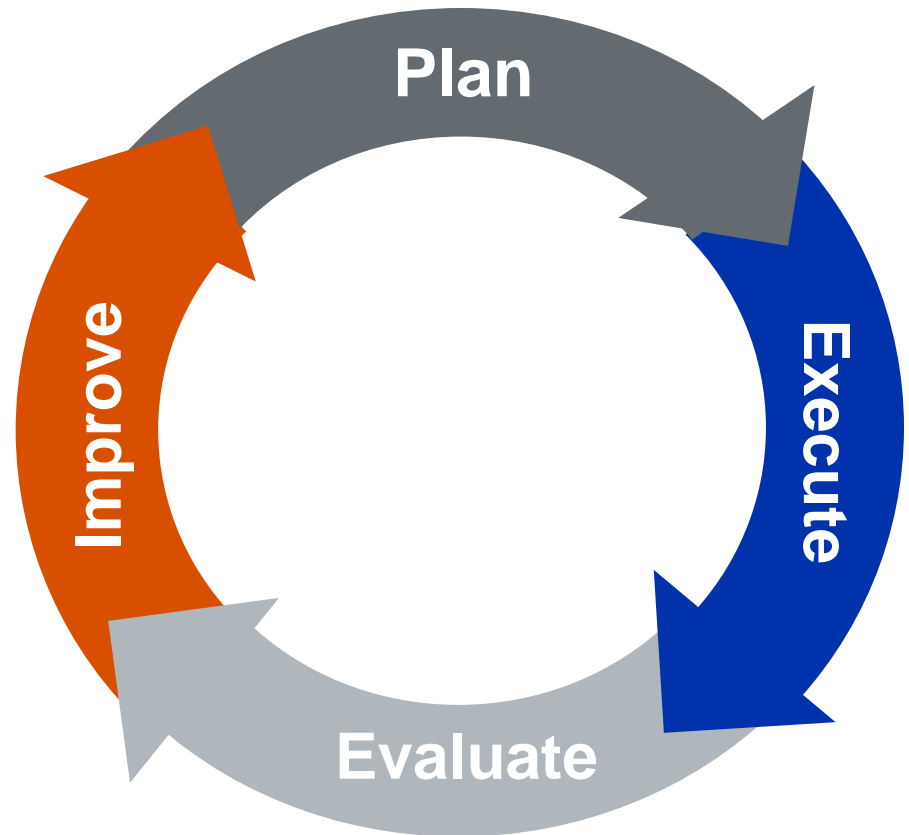
*The AVISTA Vision:  
Creating a  
Safer World*

Esterline  
Control Systems



# Basic Improvement Steps

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



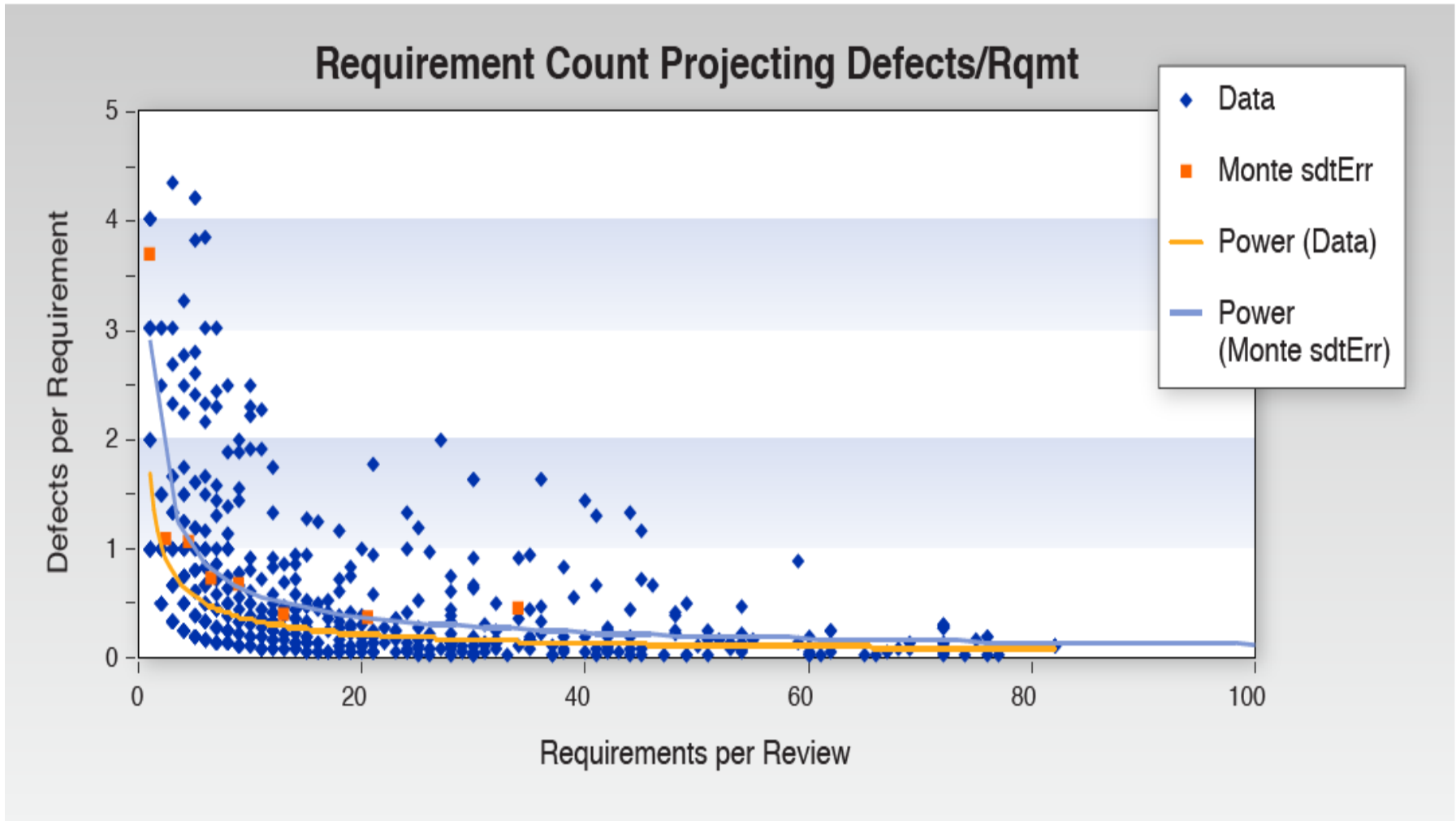
# Pick a Statistical Tool

- **Minitab**
- **Statistica**
- **Crystal Ball**
- **MS Excel**

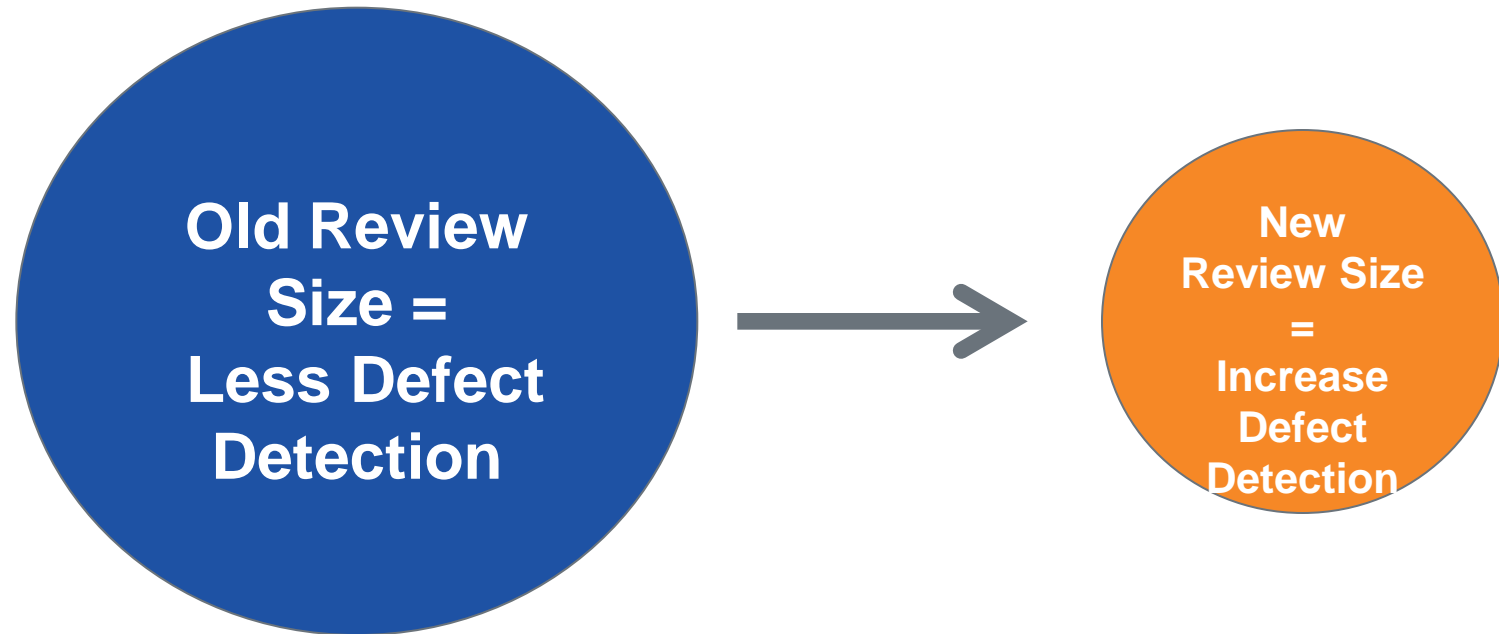
# Hypothesis: Review Size Impact



# Baselines: Critical to Success



# Discovery





# Initial Results: Reduced Defects

	<b>Organization</b>
	<b>Mean</b>
<b>Review Size</b>	-33.0%
<b>Defects Per</b>	56.9%

# Challenges

- **Buy-in**
- **Defining Criteria**
- **Training**
- **Complexity**
- **What to do when out of range**



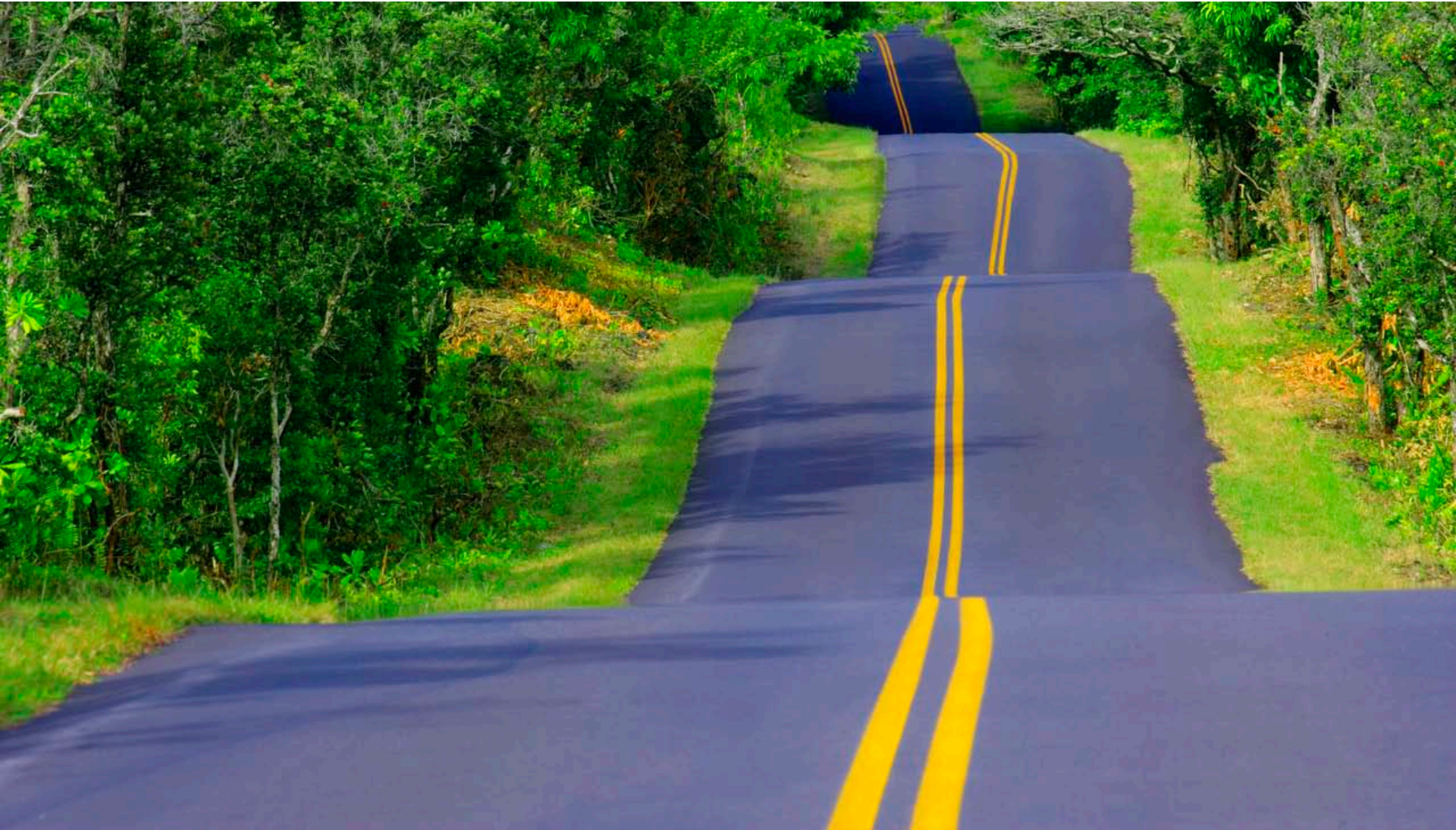
# Baselines and Models Lessons Learned

- **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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