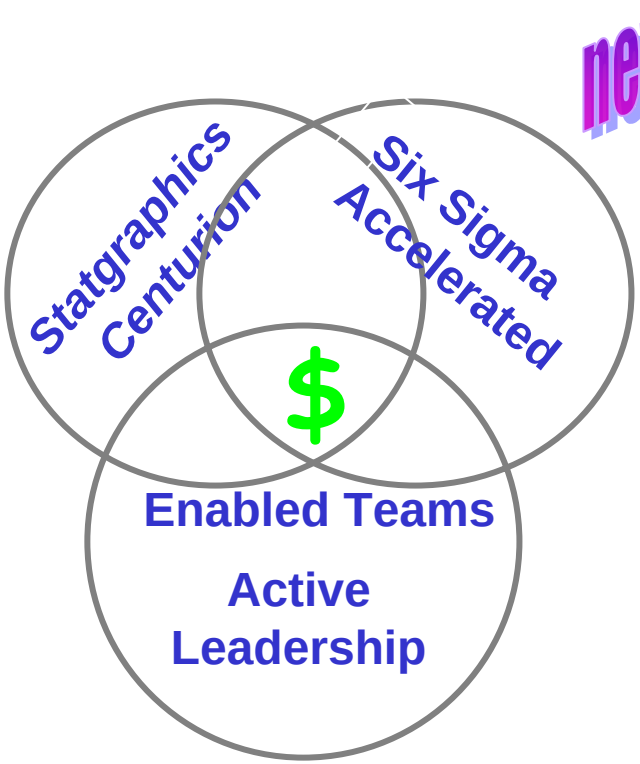
Introduction to ABI and Statgraphics Centurion

"Nobody gives a hoot about profits." Deming

Successful Businesses Disagree…..

Statgraphics Centurion™ and ABI can HELP your business *INCREASE PROFIT*



new

- **Statgraphics Centurion includes the framework for Accelerated Six Sigma**
- **Statgraphics Centurion /ABI –the perfect link for Six Sigma Training & Application**
- **ABI applies Statgraphics Centurion with proven methods for your business**
- **ABI applies Over 50 years of combined Engineering / Management Expertise**

What is Six Sigma?

What is Six Sigma?

- **Sigma represents a unit of measurement that designates the distribution or spread about the average of a process to represent how well a process is performing.**
- **The higher the sigma value, the less variation and fewer defects will reach the customer**
- **When a company has achieved a six sigma rate of improvement, it has limited defects to 3.4 per million opportunities – virtual defect-free performance.**
- **The DMAIC Six Sigma Process of Problem Solution is a natural fit for Statgraphics Centurion**

Six Sigma is ….

….an Improvement System Focused on Driving Business Success

- **Customer focused business strategy**
- **A disciplined data-driven approach for eliminating defects**
- **A statistical measurement - 3.4 DPMO**
- **A dedication to meeting customer requirements**
- **A philosophy, culture change for greater customer satisfaction**

How does Six Sigma work?

An approach and set of tools for the Team to follow when improving/designing a process or product based on Statistical Data from the Voice of the Customer

Key to successful Implementation: Statgraphics Centurion

Profit = Customer + Process + Employee

The Customer

- What bothers your customer?
- Will this take time away from my customer?
- Who really is the customer?

Management

- Buy in
- Genuine buy in

The Team

- Time
- Resources
- Expertise
- Motivation

Payback / Benefit

- To Customer
- To management
- To my Team
- Self actualization
- Culture
- Savings

Student Growth

- Program designed to reduce training doubts & fears
- Resistance
- Nurturing
- Driving out statistical horror
- Making problem solving fun
- Job enrichment / advancement

Savings

- Calculate following Control Phase
- Indirect , Direct
- Productivity
- Opportunity
- Profit

Applied Learning

- “You learn by doing the thing” Sophocles
- The importance of **The Project**
- DMAIC: Scientific method 101
- Process Understanding
- Statgraphics Centurion

The Process for Six Sigma Projects (DMAIC)

Define

Listening to the Voice of the Customer

- Prerequisites (Philosophy, Mgmt buy-in)
- Y=f(X) Concept & Strategy
- ID Team / Key Constituents
- Project Statement (4 Boxer.ppt)
- Process Mapping/ Risk Assessment
- Quality Function Deployment (QFD)
- Financial Analysis

Measure

Measuring Current Process Health

- Define Performance Standards
- The Y's (CTQ's) & the Z's
- 7 Basic Tools (Pareto Analysis, Run Chart, Scatter Diagrams etc.)
- Fishbone Diagrams
- Validate the Measurement System
- Establish SPC and Process Capability
- Establish Tolerance Limits

Analyze

Identifying important causes of the defects

- Multiple Box-Whisker
- Regression Analysis (y vs x)
- ANOVA / Components of Variance
- Hypothesis (Ho/Ha) Testing
- Chi Square Testing
- Screening Designs

Improve

Removing the causes of the defects

- Fishbone Revisited
- Sequential Design of Experiments (DoE)
- Error Proofing
- Revisit Tolerance Limits

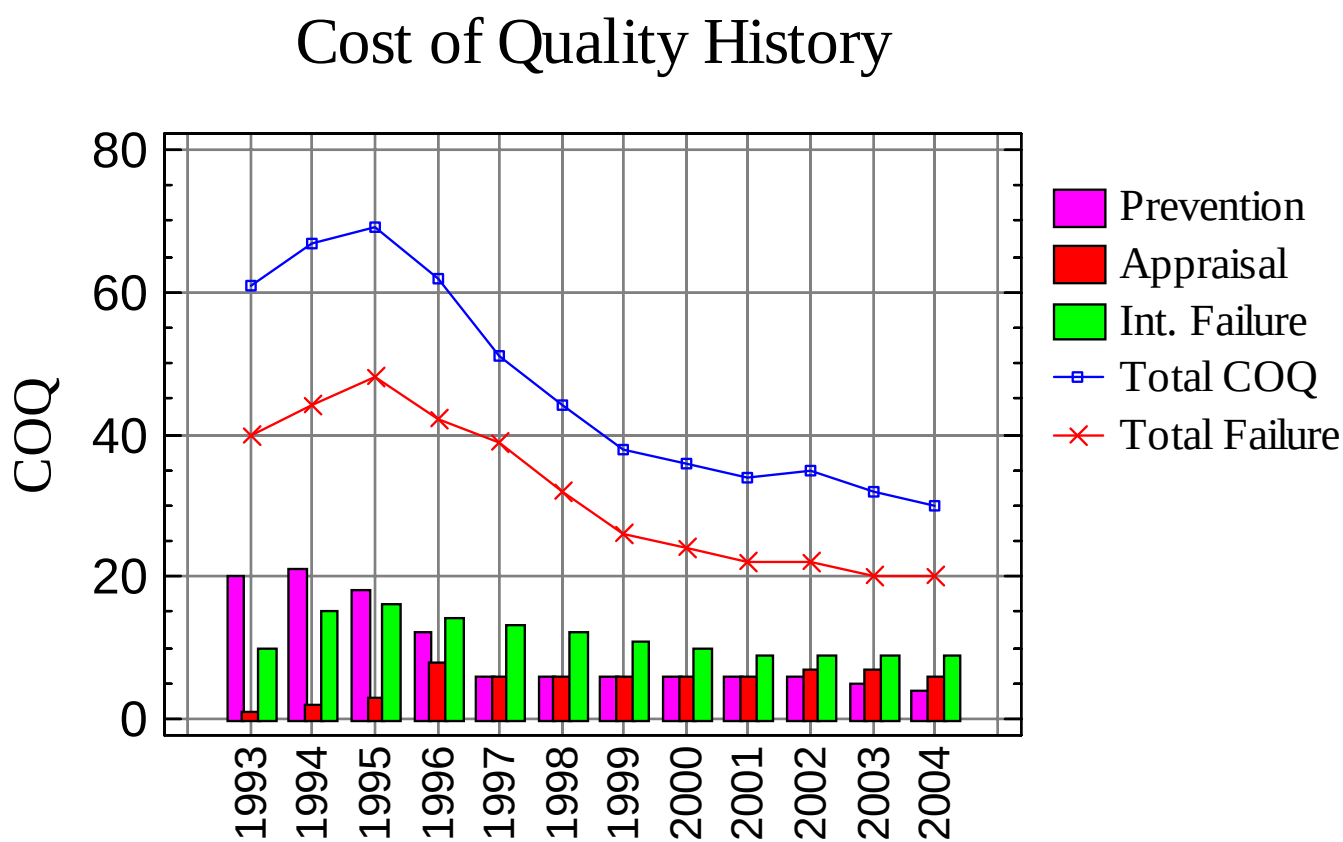
Control

Maintaining the improvements

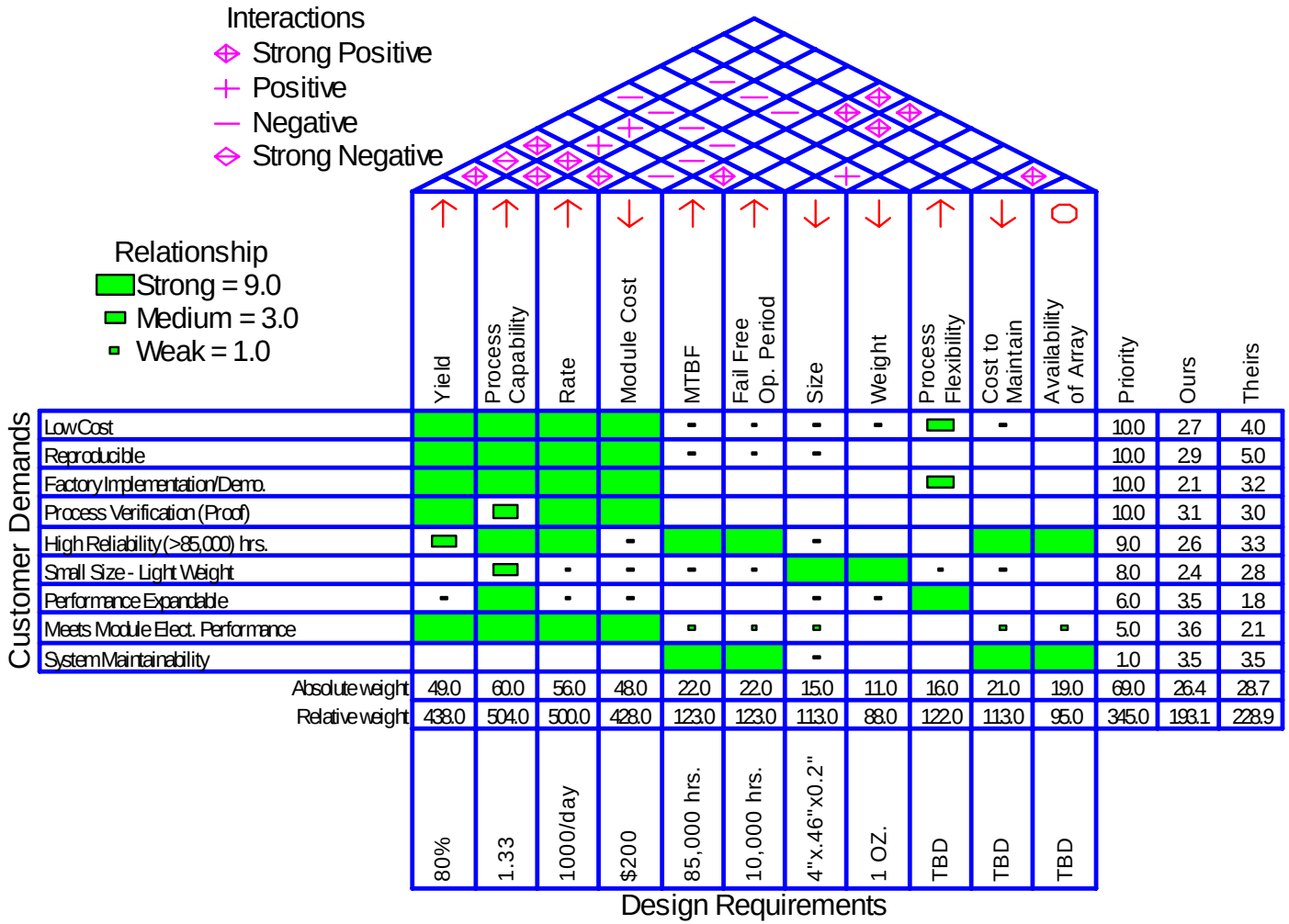
- Statistical Process Control (reduced inspection)
- Capability Monitoring
- Failure Mode Effects Analysis
- Action Plans

Let’s look at a sampling of Six Sigma tools found in Statgraphics Centurion

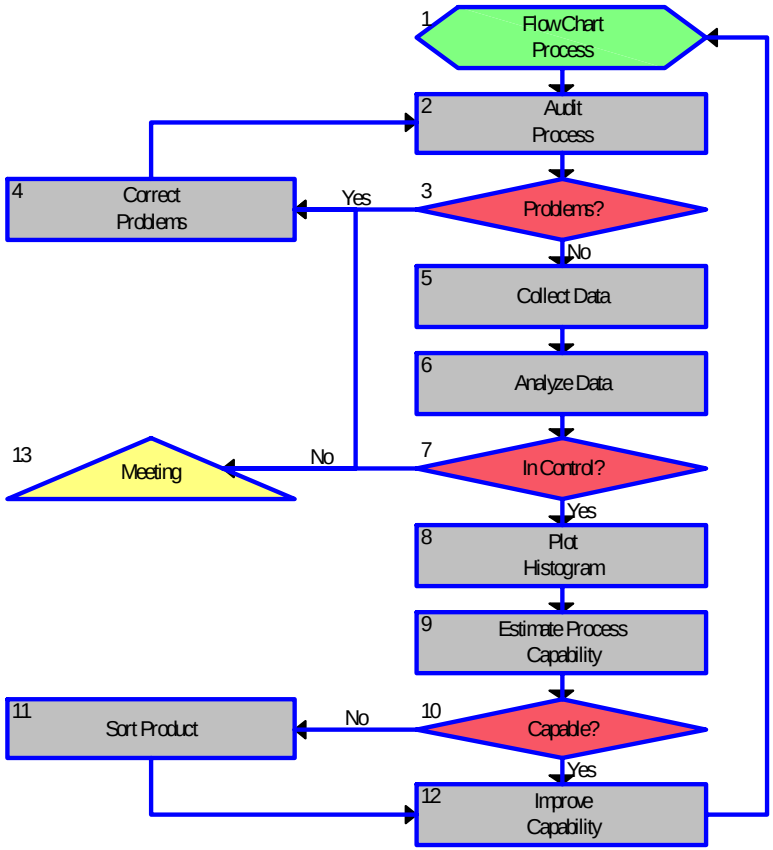
Cost of Quality for a Six Sigma Project



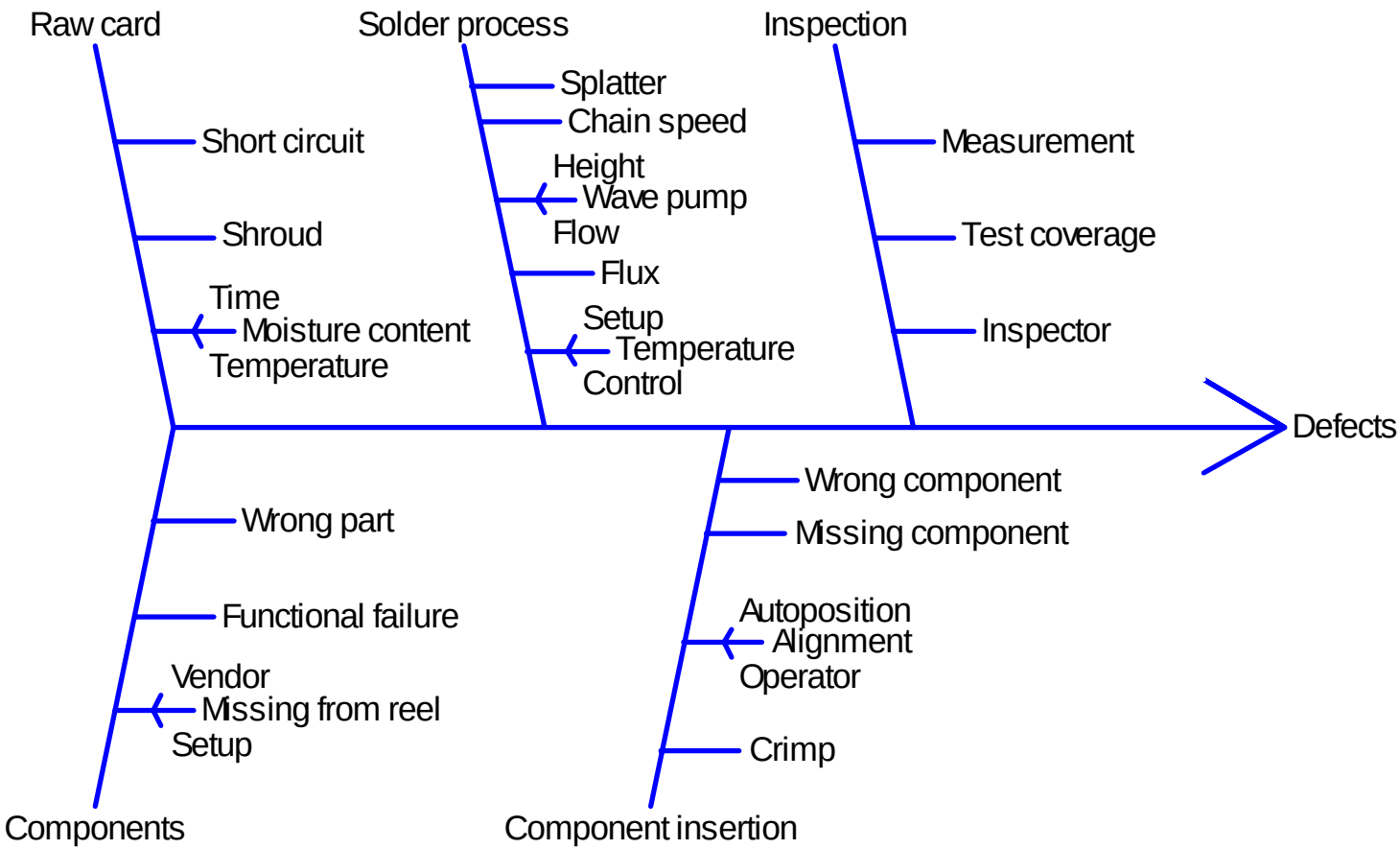
Quality Function Deployment - The House of Quality
Listening to the *Voice of the Customer*



The Process Map to Understand your Process Early in Six Sigma

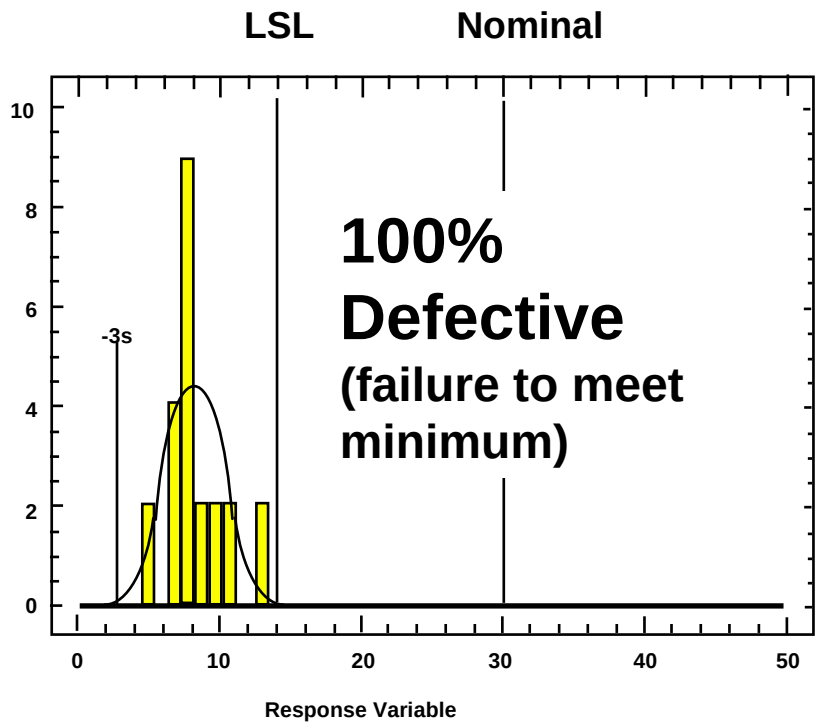


Brainstorming over a Fishbone Diagram

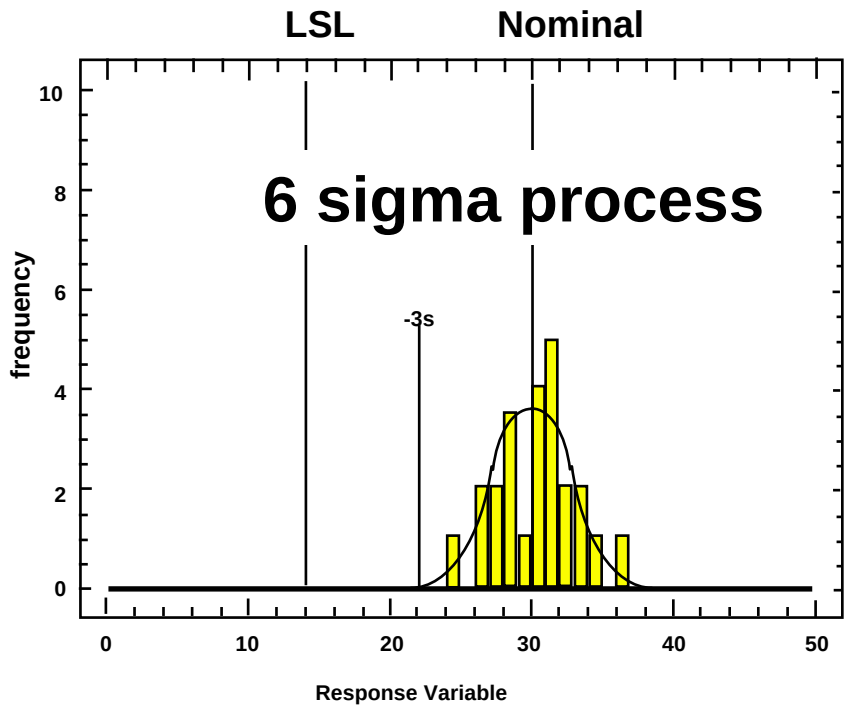


Statgraphics & Six Sigma can take “failure to meet minimum” to a 6 sigma process

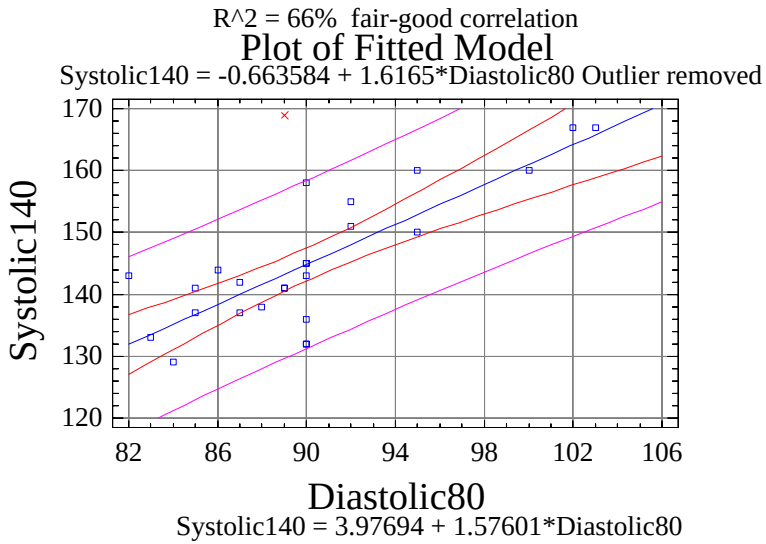
Bad Process

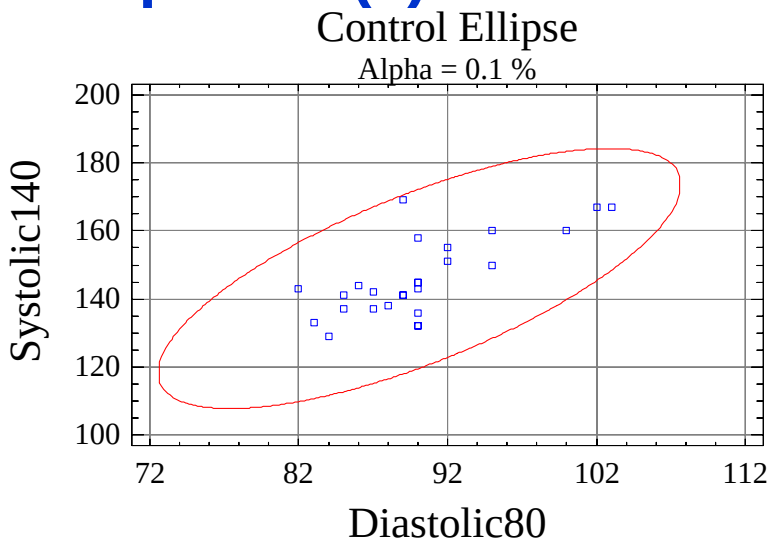


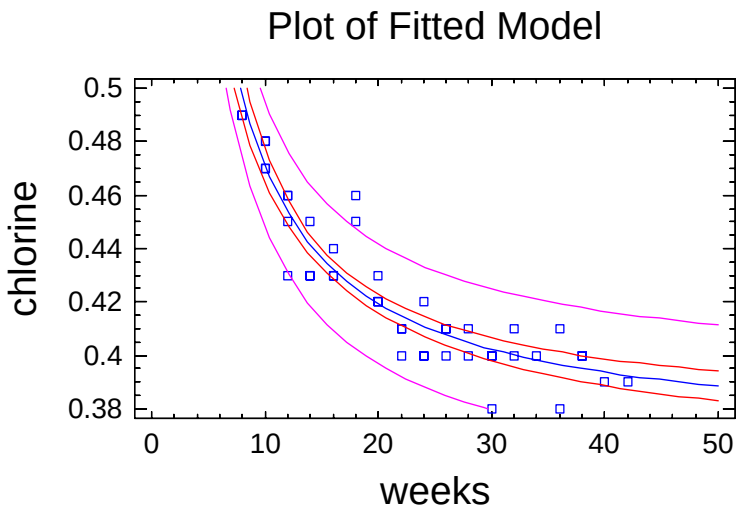
Good Process

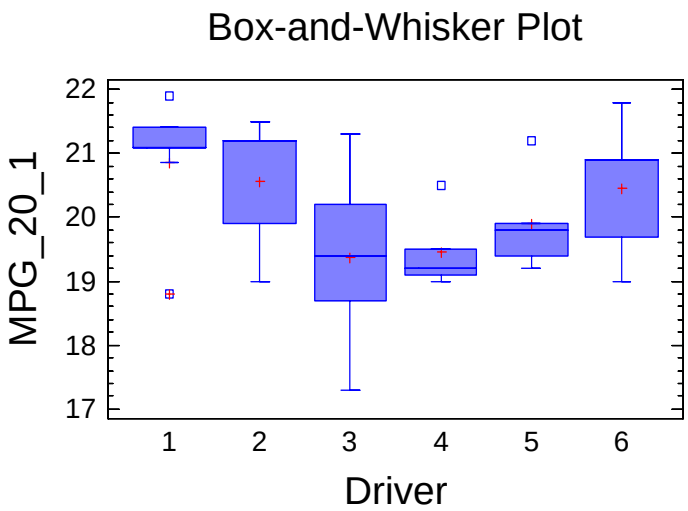


Statgraphics & Six Sigma enable understanding Cause & Effect Relationships Y=f(x)









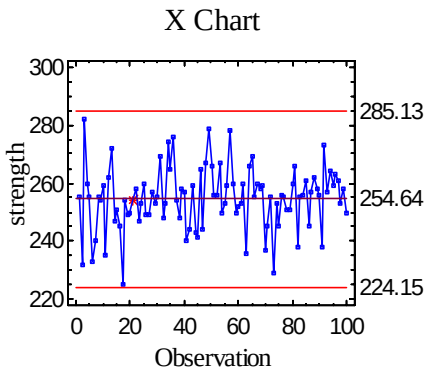
Snapstats:
A Special Feature in Statgraphics Centurion for Quick Process Capability

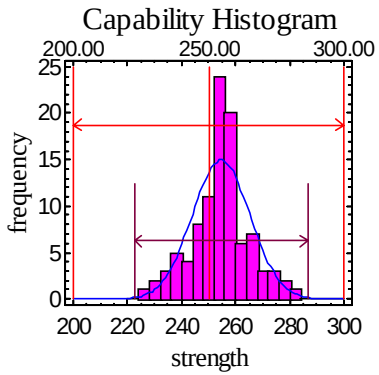
SnapStat: Capability Assessment (Individuals)

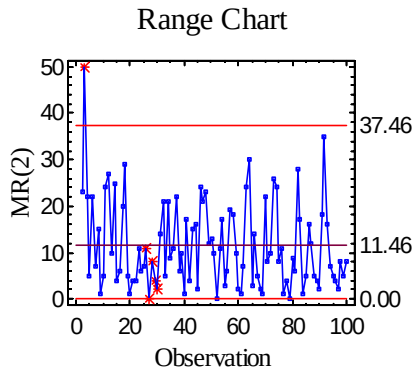
Data variable: strength
Sample size = 100 Mean = 254.64

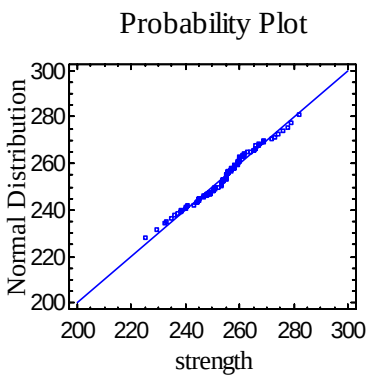
Specifications	Beyond Spec.	Z-Score
USL = 300	0.000000%	4.25
Nom = 250		
LSL = 200	0.000000%	-5.12

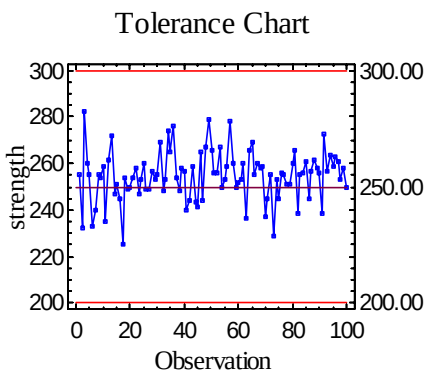
Long-Term Capability	Short-Term Capability
Sigma = 10.6823	Sigma = 10.1637
Pp = 1.56	Cp = 1.64
Ppk = 1.42	Cpk = 1.49
DPM = 11.03	DPM = 4.08



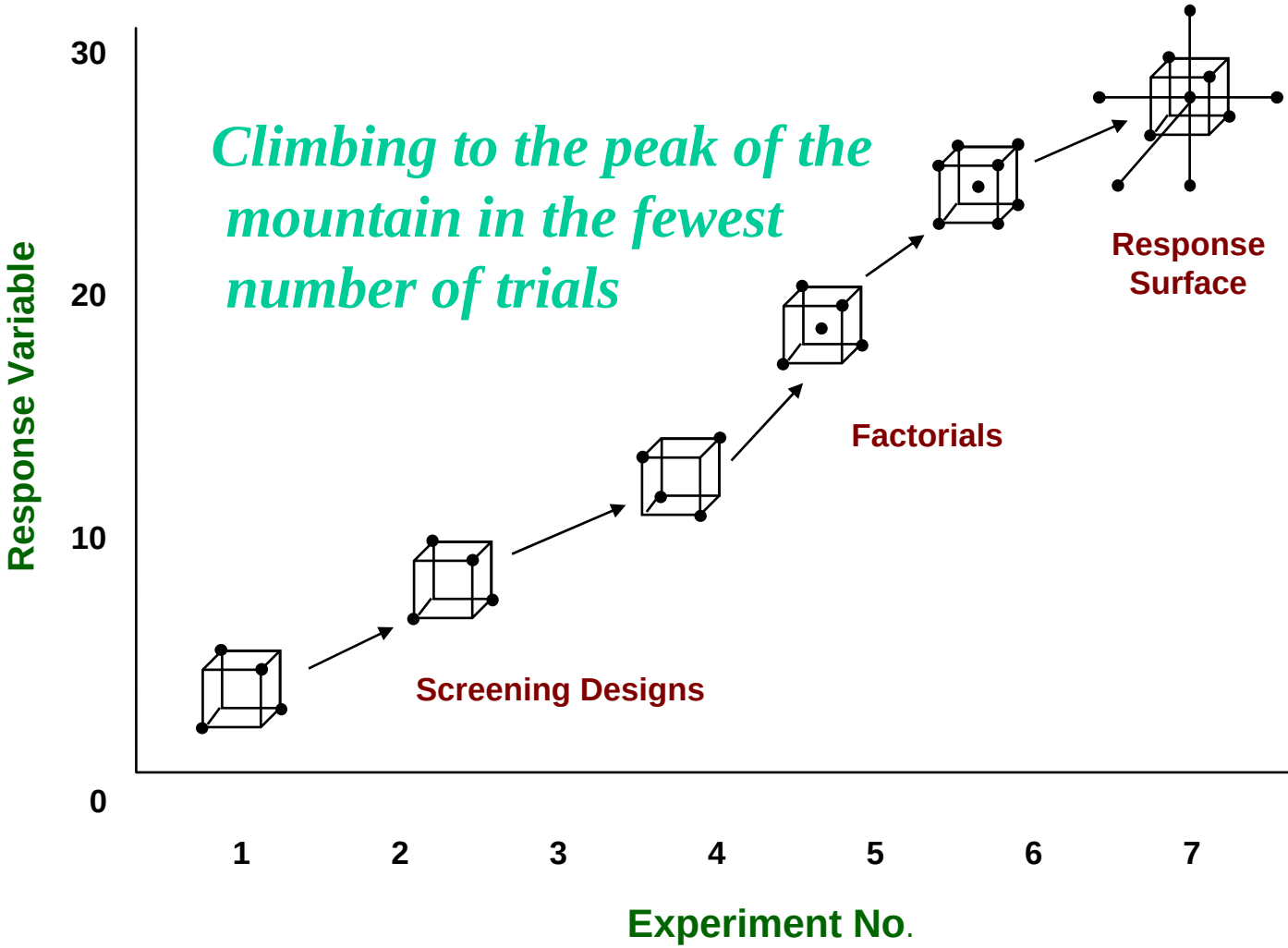






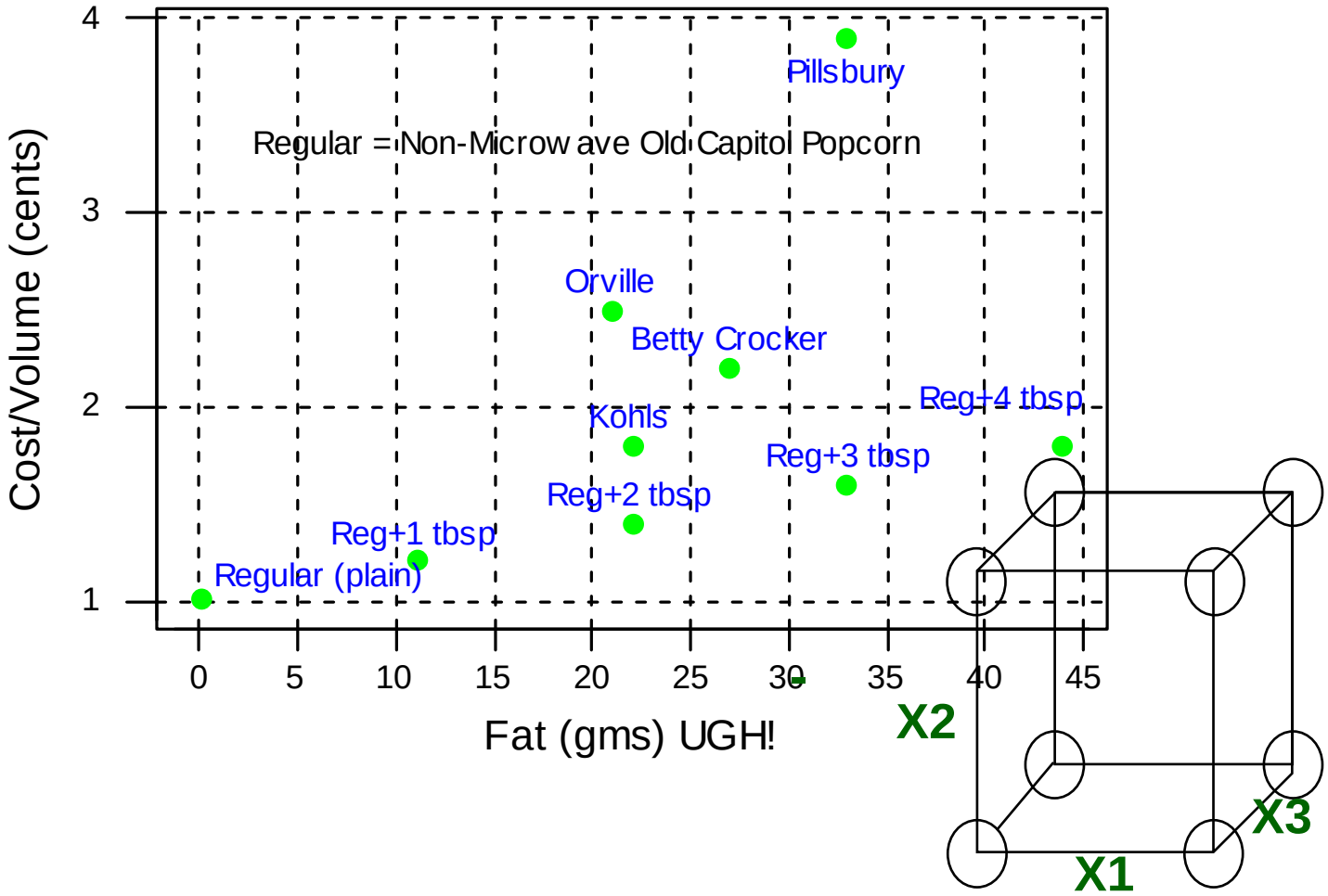


Process Development Using Sequential Experimentation



Six Sigma Enters the World of a Science Project

"Maybe Microwave Popcorn ain't so Hot !"



Class Exercise
To Demo DoE

You are put in Charge of this Six Sigma Project

Customers of OTI (Optimum Travel, Inc.) have been complaining about the limited Travel Distance of its main Product, “the 6 Sigma” Golf Ball.

Management wants to increase the travel distance to improve customer satisfaction and beat the competition.

How Would Your Team Begin ?

Course Offerings

ABI Six Sigma Company Offerings using Statgraphics Centurion™

- **Executive Overview (1/2 Day)**
- **Six Sigma Overview (1 Day or 2 Day)**
- **Six Sigma Accelerated (6 Day)**
  (2 Day and 3 Day Sessions with Project/ Mentoring)
- **Six Sigma Green Belt (10 Day)**
  (Four 2 Day Sessions with Project/ Mentoring)
- **Six Sigma Black Belt (14 Day)**
  (Five 2-3 Day Sessions with Project/ Mentoring)

Six Sigma Executive Overview

Outline

- **What is Six Sigma?**
  - ***Definition and Organization Infrastructure***
- **How Does Six Sigma Improve Business Performance?**
- **Who is Using Six Sigma?**
- **What have been the Benefits?**
- **Where can Six Sigma be Used? (In My Business?)**
- **Six Sigma Methods and Tools using Statgraphics**
- **How do I Implement Six Sigma?**

Six Sigma Overview

Define / Measure / Analyze (Day 1)

- What is Six Sigma?
- DMAIC Model
- Project Selection
- Project Charter
- Team Roles and Responsibilities
- Voice of the Customer
- Concept Engineering
- Quality Function Deployment
- Using SIPOC for Process Identification
- Process Mapping
- Measurement System Analysis
- Data Collection Methods
- Understanding Variation
- Fundamentals of Statistical Process Control (SPC)
- Defining Process Capability
- Calculating Sigma Levels /DPMO

Six Sigma Overview

Analyze / Improve / Control (Day 2)

- Seven Basic Quality Tools for Analyzing Data
- Basic Regression
- Design of Experiments (DoE)
- Analysis of Variance (ANOVA)
- Failure Mode & Effects Analysis (FMEA)
- Error Proofing
- SPC for Process Control
- Piloting and Implementing a Solution
- Process Control Plan
- Reporting Project Benefits / Financial Impact
- Leveraging “Best Practices”
- Summary and Lessons Learned

Six Sigma Accelerated

A new Approach to Six Sigma Implementation

Six Sigma *Accelerated plus Statgraphics Centurion* and You

If you're a company that wants to either improve its quality levels or develop its employees, then **Six Sigma *Accelerated*** is for you. Featuring **Statgraphics Centurion**, **Six Sigma *Accelerated*** places the emphasis on problem-solving strategy while providing statistical software and support in the background.

As a result, **Six Sigma *Accelerated*** training gives you the real-world tools and techniques you need to implement improvement strategies. These improvement strategies allow you to increase performance and decrease process variation, resulting in defect reduction while improving product quality, your net income and employee morale. Simply put, **Six Sigma *Accelerated*** provides you with a hands-on formula for business improvement.

Six Sigma *Accelerated* training follows the traditional Six Sigma Model: Define – Measure – Analyze – Improve – Control (DMAIC). While doing so, **Statgraphics Centurion** provides the synergy of the statistical methods with the DMAIC model.

This, in turn, allows you to address your most difficult problems (those requiring a data driven approach and the use of statistical tools and techniques). Furthermore, **Six Sigma *Accelerated*** gives you the ability to analyze your company's weakness orientation while offering you additional tools for business improvement.

Since most users may not be trained statisticians, the ***StatAdvisor*** tool adds a short narrative paragraph to all tabular and graphical output explaining in user-friendly language the significance of the results. The explanation is context sensitive, picking up the actual numerical results and integrating them into the explanation. To further simplify the team's Project Presentation, ***StatAdvisor*** output can be plugged into the STATGRAPHICS ***StatReporter*** tool, which will generate a report of the data analysis for Team Project Reporting and Presentation.

How long is Accelerated Six Sigma training?

Applied Business Improvement (ABI) and Statgraphics offer the **Six Sigma *Accelerated*** course in a six-day format. Individuals who complete **Six Sigma *Accelerated*** course will be familiar with the Green Belt Six Sigma basic skills and core statistics tools. Upon completion of this course, ABI offers an additional five-day Six Sigma course for those subsequently seeking to upgrade to Six Sigma Black Belt status.

Who should attend? Class requirements.

This course is designed for those seeking Six Sigma Green Belt level. A basic knowledge of Statistics is helpful but not critical. Completion of a Six Sigma project and class access to a laptop computer are required.

Six Sigma Accelerated (SSA) Course Outline

Session 1 – *Define* (1 Day)

- 1.1 Six Sigma Overview
- 1.2 DMAIC Model
- 1.3 Project Selection / Charter
- 1.4 Team Roles and Responsibilities
- 1.5 Voice of the Customer / Concept Engineering
- 1.6 Quality Function Deployment (QFD) STATGRAPHICS *Centurion* ™
- 1.7 Process Map STATGRAPHICS *Centurion* ™
- 1.8 Cause & Effect STATGRAPHICS *Centurion* ™
- 1.9 Cost of Quality Trend Analysis STATGRAPHICS *Centurion* ™
- 1.10 StatReporter STATGRAPHICS *Centurion* ™

Session 2 - *Measure* (1 Day)

- 2.1 Data Collection Methods
- 2.2 Understanding Variation
- 2.3 Calculating Sigma Levels/ dpu/ DPMO STATGRAPHICS *Centurion* ™ (Tools)
- 2.4 Sample Size Determination STATGRAPHICS *Centurion* ™
- 2.5 Scatter plots/ Exploritory Plots /Time Sequence Plots STATGRAPHICS *Centurion* ™
- 2.6 Gage Studies STATGRAPHICS *Centurion* ™
- 2.7 Basic Statistical Process Control (SPC) STATGRAPHICS *Centurion* ™
- 2.8 Process Capability STATGRAPHICS *Centurion* ™
- 2.9 SnapStats/ StatAdvisor STATGRAPHICS *Centurion* ™

Session 3 - *Analyze* (1 Day)

- 3.1 Variable Data STATGRAPHICS *Centurion* ™
- 3.2 Attribute Data STATGRAPHICS *Centurion* ™
- 3.3 Hypothesis Tests STATGRAPHICS *Centurion* ™
- 3.4 Reliability Analysis STATGRAPHICS *Centurion* ™
- 3.5 SnapStats STATGRAPHICS *Centurion* ™

SSA Outline

Session 4 - *Improve* (1 Day)

- 4.1 Analysis of Variance (ANOVA) STATGRAPHICS *Centurion* ™
- 4.2 Curve Fitting Made Easy STATGRAPHICS *Centurion* ™
- 4.3 Regression STATGRAPHICS *Centurion* ™
- 4.4 Experimental Design Creation / Analysis STATGRAPHICS *Centurion* ™
- 4.5 ix Sigma Golf Exercise

Session 5 - *Control* (1 Day)

- 5.1 Variable / Attribute Control Charts STATGRAPHICS *Centurion* ™
- 5.2 Acceptance Sampling STATGRAPHICS *Centurion* ™
- 5.3 Classification Methods (optional) STATGRAPHICS *Centurion* ™
- 5.4 Piloting / Implementing Process Improvement / Assessment
- 5.5 Process Control Plan / Documentation
- 5.6 Reporting Project Benefits / Financial Impact

- **Session 6 – *Project Presentations* (1 Day)**
- 6.1 Team Project Presentations
- 6.2 Leveraging "Best Practices" / Lessons Learned
- 6.3 Celebration

Statgraphics Centurion Permits Learning Six Sigma in 5 Days

Six Sigma Green Belt Training

Session 1

Define/Measure

2 Days

- **Six Sigma Overview**
- **What's In It for Me?**
- **DMAIC Model**
- **Project Selection**
- **Project Charter**
- **Team Roles and Responsibilities**
- **Voice of the Customer**
- **Quality Function Deployment (QFD)**
- **Cost Benefit Analysis**
- **SIPOC for Process Identification**
- **Process Mapping**
- **Basic Statistics Summary**
- **Statgraphics Tutorial**

Six Sigma Green Belt Training

Session 2

Measure/Analyze

2 Days

- **Project Presentation - *Define/Measure***
- **Measurement System Analysis**
- **Data Collection Methods**
- **Understanding Variation**
- **Using Statistical Process Control (SPC)**
- **Defining Process Capability**
- **Calculating Sigma Levels/DPMO**
- **Seven Basic Quality Tools for Analyzing Data**
- **Regression Made Easy**

Six Sigma Green Belt Training

Session 3

Analyze/Improve

2 Days

- **Project Presentation - *Measure/Analyze***
- **Hypothesis Testing**
- **Design of Experiments (DoE)**
- **Six Sigma Golf Exercise**
- **Analysis of Variance (ANOVA)**
- **Failure Modes and Effects Analysis FMEA)**
- **Error Proofing**
- **SPC for Process Control**

Six Sigma Green Belt Training

Session 4

Improve/Control

2 Days

- **Project Presentation - *Analyze/Improve***
- **Piloting Process Improvement**
- **Process Improvement Assessment**
- **Implementing a Process Improvement**
- **Process Control Plan**
- **Process Documentation**
- **Reporting Project Benefits/Financial Impact**
- **Leveraging “Best Practices”**
- **Summary and Lessons Learned**
- **Green Belt Knowledge Assessment (Optional)**

Six Sigma Black Belt Training

Session 1

Define

2 Days

- **Six Sigma Overview**
- **What's In It for Me?**
- **DMAIC Model**
- **Project Selection**
- **Project Charter**
- **Team Roles and Responsibilities**
- **SIPOC for Process Identification**
- **Voice of the Customer**
- **Quality Function Deployment (QFD)**
- **Cost Benefit Analysis**
- **Basic Statistics Summary**
- **Statgraphics Training**

Six Sigma Black Belt Training

Session 2

Measure

2 Days

- **Project Reviews**
- **Process Mapping**
- **Measurement System Analysis**
- **Data Collection Methods**
- **Understanding Variation**
- **Statistical Process Control (SPC)**
- **Process Capability**
- **Calculating Sigma Levels / DPMO**
- **“Measure” Statistics**
- **Statgraphics Training**

Six Sigma Black Belt Training

Session 3

Analyze

3 Days

- **Project Reviews**
- **Seven Basic Quality Tools for Analyzing Data**
- **Linear and Multiple Regression**
- **Hypothesis Testing**
- **Design of Experiments (DoE)**
- **Six Sigma Golf Exercise**
- **Analysis of Variance (ANOVA)**
- **“Analyze” Statistics**
- **Statgraphics Training**

Six Sigma Black Belt Training

Session 4

Improve

3 Days

- **Project Reviews**
- **Failure Modes and Effects Analysis (FMEA)**
- **Error Proofing**
- **Design for Six Sigma (DFSS)**
- **Piloting Process Improvement**
- **Process Improvement Assessment**
- **Implementing Process Improvement**
- **“Improve” Statistics**
- **Statgraphics Training**

Six Sigma Black Belt Training

Session 5

Control

2 Days

- **Project Reviews**
- **Lean Enterprise**
- **SPC for Process Control**
- **Process Control Plan**
- **Process Documentation**
- **Reporting Project Benefits/Financial Impact**
- **Leveraging “Best Practices”**
- **Summary and Lessons Learned**
- **Black Belt Knowledge Assessment (Optional)**
- **Statgraphics Training**

ABI Six Sigma Company Offerings using **Statgraphics Centurion™**

- **Six Sigma Executive Overview (1/2 Day) $ 2,500**
- **Six Sigma Overview (2 Day) (1 Day also available) $ 5,000**
- **Six Sigma Accelerated (6 Day) (Under Development) $ 15,000**
  (2 Day and 3 Day sessions with Project/Mentoring)
- **Six Sigma Green Belt (10 Day) $ 25,000**
  (Four 2 Day sessions with Project/Mentoring)
- **Six Sigma Black Belt (14 Day) $ 35,000**
  (Five 2-3 Day sessions with Project/Mentoring)
- **Design for Six Sigma (DFSS) (Under Development)**
  (3 ½ Days following Six Sigma Training)

- **Add T&L plus course material / books to each course cost**
  (assuming meeting room / meals/ refreshments provided)
- **Maximum Class size 25**
- **Additional Consulting Available**

Public and Private Courses available. ABI willing to customize training to specific customer needs based on Needs Assessment with sponsoring management.

Process Understanding and Improvement

Course Objective: ***Provide a working knowledge of Statistical Process Control (SPC) and Process Capability and introduce the Basic Quality Tools for Process Improvement***

PAGES	DELIVERABLES
3-8	Working with Data
9-14	Understanding Variation
15-35	Principles of SPC
36-42	Introduction to Control Charts
43-72	Variables Control Charts (X-MR ; Xbar-R)
73-98	Attributes Control Charts (c ; u ; np ; p)
99-110	Process Capability - Variables
111-115	Process Capability – Discrete
116-122	Tolerance Intervals (optional)
123-137	Tools to Understand and Improve the Process

Introduction to Design of Experiments

Session Topics

- Common Approaches to Experimentation
- What is Design of Experiments (DoE)?
- Factorial Designs
- The Process of Experimentation
- Demo: Catapult Experiment Using Statgraphics
  - Analysis of Variance (ANOVA)
- Detectable Effects
- Fractional Factorial Designs
- Confounding
- Screening Designs
- Response Surface Optimization
- Taguchi Methods

Introduction to Design of Experiments

Process of Experimentation

- **Define Project**
  - ***Identify Response Variables***
- **Understand Current Situation**
- **Perform Designed Experiment**
  - ***Identify Factors***
  - ***Choose Factor Levels***
  - ***Select Design (Replication)***
  - ***Randomize Experiment Runs***
  - ***Collect Data***
  - ***Analyze Data***
  - ***Form Conclusions***
  - ***Verify Results***
- **Define and Implement Solutions**
- **Record Results**
- **Standardize Results**
- **Determine Future Plans**

ABI Introductory Company Offerings using **Statgraphics Centurion™**

- **Process Understanding and Improvement (1/2 Day) $ 2,500**
  (1 Day also available)
- **Design of Experiment – Executive Overview (1/2 Day) $ 2,500**
  (1 Day also available)
- **Design of Experiments – Introduction (1 Day) $ 2,500**

Add Travel & Living Expense plus course material / books to each course cost (assuming meeting room / meals/ refreshments provided)

Maximum Class size 25

Additional Consulting Available

Public and Private Courses available. ABI willing to customize training to specific customer needs based on Needs Assessment with sponsoring management.

George Dyson and Terry Russell have been actively involved in both teaching and mentoring Six Sigma and Design for Six Sigma directly with local area businesses or the University of Cincinnati, Belcan Corp. or the Center for Quality of Management. In 2005, both Terry and George were invited to participate in current training with General Electric, followed by co-teaching Six Sigma and Design for Six Sigma at GE.

George H. Dyson III

George Dyson is the area Six Sigma representative for StatPoint, Inc., the developer of the **STATGRAPHICS *Centurion* ™** software package. He is responsible for its support and application of its release. George is a partner in ABI Associates, a business improvement consulting practice devoted to optimizing Six Sigma training/Implementation to improve business performance.

Prior to his current position, George accumulated 33 years of professional experience with United Technologies and General Electric Aircraft Engines. During his career at GE, he provided statistical support, managed teams, and developed new courses and patent applications to solve a wide variety of engineering and manufacturing problems, including new process development, Reliability/Quality and Six Sigma training and project support. His individual Six Sigma and Design for Six Sigma projects saved GE $1.5 Million.

George Dyson holds an Associate in Applied Science, a Bachelor's Degree in Mechanical Engineering and a MS Degree in Engineering Management. He has taught undergraduate courses in Engineering Statistics and holds instructor certifications from GE and Motorola (Six Sigma). He has an Honorable Discharge from the U.S. Air Force Reserves 440th Troop Carrier Wing, Staff Sergeant.

Terry Russell

Terry Russell is a partner in ABI Associates, a business improvement consulting practice working with domestic and international companies to improve business performance through management system and process improvement and through Six Sigma training and implementation. Clients have included companies in both product manufacturing and service sectors.

Prior to his current position, Terry accumulated 36 years of professional experience with the National Aeronautical and Space Administration and General Electric Aircraft Engines. With GE, Terry was recognized for his leadership in the development and implementation of international TQM based business improvement programs.

Terry Russell holds a Bachelor's Degree in Mechanical Engineering and Master's Degrees in Mechanical Engineering and Business Administration. He holds instructor certifications from GE, Motorola (Six Sigma) and Ford (TOPS8D), and has been Leader of the Day for several Center for Quality of Management courses. He is a registered Professional Engineer in the State of Ohio and serves as Chair of the Industrial Advisory Board for the Ohio University Department of Mechanical Engineering.