STRATEGIC QUALITY PLANNING AND DEPLOYMENT

I. Strategic Planning
   A. Definition of Strategy
   B. Goals and Principles of Strategic Planning
   C. Economic Considerations of Quality
   D. Strategic Management vs. Operational Management
   E. Vision, Mission, and Policy
   F. Strategic Planning Inputs, Activities and Outputs
   G. Differences Between Business Plans and Strategic Quality Plans (SQP)
   H. Integrating Business Strategies Across the Enterprise
   I. Strategic Plan Deployment

II. The Strategy of Lean Six Sigma
   A. The Strategy of Six Sigma: Outcomes
   B. Functional vs. Process Management
      1. Prevention vs. Inspection
   C. Types of Business Processes
      1. Core and Sub-processes
   D. Process Ownership
   E. Process Dashboards
   F. Project Selection Criteria – How to Choose High Impact Projects
   G. First Wave Projects
   H. Nine Steps to Business Process Management

III. How to Develop and Deploy Strategic Quality Plans (SQP)
   A. Challenges to Strategic Planning and Deployment
   B. Critical Success Factors
   C. Leadership Alignment
   D. Seven Steps Process for Strategic Quality Planning
   E. Discovering Customer Needs / “Voice of the Customer”
   F. Customer Positioning
   G. Predicting the Future State
   H. Gap Analysis
   I. Alignment
   J. Implementation
IV. Competitive Intelligence
   A. Benchmarking
      1. Advantages of Competitive Benchmarking
      2. Types of Benchmarking
      3. Benchmarking Best Practices
   B. Porter’s Five Forces
   C. SWOT
   D. PEST

V. Obtaining Stakeholder and Customer Input
   A. Obtaining Stakeholder and Customer Input
   B. Stakeholder Analysis
      1. Stakeholder Assessment Table
      2. Power and Influence Table
   C. Types of Stakeholders
   D. How LSS May Impact Different Types of Stakeholders
   E. Critical to Quality (CTQ, Cost, Process, Safety, Delivery, etc.)
   F. Stakeholder Mapping
   G. Voice of the Customer (VOC)
   H. Types of Customers
      1. Customer Needs, Characteristics, and Metrics
   I. Defining Product and Process Characteristics
   J. Effective Metrics

VI. Balanced Scorecards
   A. Creating a Balanced Scorecard
   B. The Customer Perspective
   C. The Financial Perspective
   D. The Learning and Growth Perspective
   E. The Business Process Perspective
   F. Key Performance Indicators
   G. Implementing a Balanced Scorecard
VII. Hoshin Planning
   A. Hoshin Universal Business Planning Objectives
   B. Elements of Hoshin – Deming Wheel
   C. Origins of Hoshin
   D. Practice of Hoshin
   E. Hoshin Deployment

VIII. Organizational Assessment
   A. Capabilities: Processes, People, and Assets
   B. ISO-9001 Overview
      1. How ISO Certification Can Benefit LSS Deployment
   C. Industry Specific Standards
   D. Malcolm Baldrige National Quality Program
      1. Seven Categories of Criteria
      2. Process for Implementing Malcolm Baldrige
      3. How Malcolm Baldrige Can Benefit LSS Deployment
   E. Capability Maturity Model and Other Models
   F. Link Between Strategic Planning, Quality Systems Planning and Projects
      1. Charters
      2. Control Phase

IX. Measures of Excellence
   A. Shingo Prize
      1. Goal of the Shingo Prize
      2. Shingo Levels of Transformation
      3. Dimension 4 – Business Results
      4. Dimension 3 – Consistent Lean Enterprise Culture
      5. Dimension 2 – Continuous Process Improvement
      6. Dimension 1 - Cultural Enablers
   B. Lean Six Sigma Industry Awards
   C. Award Criteria and Components
X. The Role of the MBB in SQP
   A. The Role of the MBB in SQP: Outcomes
   B. Facilitating SQP Discussions
   C. Assuring the Correct Structure for Successful LSS Deployment
   D. Measuring Organizational Performance
   E. Relating Strategic Quality Plans to Lean Six Sigma
   F. Aligning Projects with Strategic Quality Plans
   G. Use the SQP to Resolve Conflicts and Quell the Naysayers
   H. Creating a “Learning Culture”

ENTERPRISE-WIDE DEPLOYMENT AND MANAGEMENT OF LEAN SIX SIGMA

I. Six Sigma Leadership
   A. Structure
   B. Roles and Responsibilities

II. Tools for Project Definition
   A. Charter
   B. Quality Function Deployment (QFD) / House of Quality (HOQ)
   C. SIPOC
   D. Flowcharts
   E. Value Stream Maps (VSM)
   F. Failure Mode and Effects Analysis (FMEA)
   G. Voice of the Customer (VOC) / Voice of the Process (VOP)
   H. Critical to Quality (CTQ) Tree
   I. Costs of Quality (COQ)

III. Project Selection
   A. Criteria for Project Selection
      1. Murder Board
      2. Poor Man’s Hierarchy (AHP)
      3. Buss’ Rank Order
      4. Peer Review
      5. Project Evaluation Framework
   B. Project Portfolio Planning
      1. Criteria for Evaluating Projects
      2. Portfolio Interface Planning
   C. Project Resource Management
   D. Maximizing the Mater Black Belt’s Influence
IV. Integrating Quality Initiatives
   A. Precursors to Lean Six Sigma
      1. The Toyota Production System
      2. W. Edwards Deming (Chain Reaction and 14 Steps for Management)
      3. Phil Crosby (Four Absolutes of Quality and 14 Steps for Quality)
      4. Joseph Juran (The Quality Trilogy)
      5. Goldratt’s Theory of Constraints (TOC)

TACTICS FOR SUCCESSFUL LEAN SIX SIGMA PROJECTS

I. Skills for Effective Presentations
   A. Criteria for High-Impact Presentations
      1. The Effective Use of PowerPoint
      2. Storyboarding
      3. A3 Reporting
   B. Identifying Speaker Styles
   C. Capturing and Maintaining the Audience’s Attention

II. Managing Project Teams
   A. Managing Different Team Member Styles
      1. Conflict
      2. Communication
      3. Personality
   B. Ensuring Team Development
      1. Evaluation of Team Development
         a. Characteristics of Effective Teams
         b. Stages of Team Development
         c. Sources of Power
      2. Training Methods
      3. Team-Building Methods
      4. Rewards and Recognition
III. Lean Six Sigma
   A. Concepts and Definitions
   B. The DMAIC Methodology
   C. Definition and Types of Waste
      1. Muda, Mura, Muri
      2. Value Added vs. Non-Value Added
   D. Lean Tools (5S, Kaizen, SMED, Value Stream Maps, Kanban, Continuous Flow,
      Theory of Constraints (TOC), Push vs. Pull Systems, etc.)
      1. Developing Value Stream Maps
      2. Managing Kaizen Events
   E. Lean Metrics (Cycle Time, Takt Time, Lead Time, Queue Time, Processing Time,
      etc.)
      1. Little’s Law
   F. Six Sigma Tools (DMAIC, DMADV, QFD/HOQ, DFSS, DFX, FMEA, SPC, etc.)

IV. Creative Problem Solving
   A. Definitions of Creativity and Innovation
   B. Approaches to Innovation
   C. Eight Principles of Problem-Solving
   D. Creativity Tools
      1. Brainwriting 6-3-5 vs. Brainstorming
      2. Knowledge Mapping
      3. TRIZ
         a. Altshuller’s 39 Contradiction Parameters
         b. Altshuller’s 40 Inventive Principles
         c. Contradiction Tables
      4. Transforming Solution Elements Through Association
      5. Morphological Box

V. Process Analysis Tools
   A. Types of Data
   B. Measures of Central Tendency
   C. Measures of Dispersion
   D. Parametric Hypothesis Tests
      1. Z, t, F, ANOVA, etc.
   E. Non-Parametric Hypothesis Tests
      1. One-sample sign test, One-sample Wilcoxon test, Mann-Whitney, Kruskal-Wallis,
         Levene’s Test, etc.
   F. Process Capability Metrics (Cp/Cpk, Pp/Ppk)
G. Statistical Process Control Charts
H. Graphical Data Analysis (Histograms, Stem-and-Leaf Plots, Pareto Charts, Scatter Plots, Time Series Charts, Box and Whisker Plots, Dot Plots, etc.)

VI. Evaluating Project Solutions
A. Impact Analysis
B. Criteria for Evaluating Solutions (Effectiveness, Feasibility, Time, Cost, Ease of Implementation, Risk, etc.)
C. Solutions Matrix
D. Effectiveness and Feasibility Matrix
E. Pugh Selection Matrix

MANAGING PRODUCT AND PROCESS DESIGN AND INPUTS

I. Basic Concepts of Reliability
A. Definition
B. Reliability as “Quality Over Time”
C. Reliability in Services (SERVQUAL)
D. Taguchi’s Concept of Robust Design
   1. Taguchi’s Loss Function
E. Reliability Metrics and Models
   1. The Bathtub Curve
   2. The Exponential Time-to-Failure Model and Formula
   3. MTBF, MTTF, MTTR, Failure Rate, etc.
F. Failure Reporting, Analysis and Corrective Action System (FRACAS)
G. Rolled Throughput Yield (RTY)

II. Managing Risk
A. Failure Mode and Effects Analysis (FMEA)
   1. Design vs. Process FMEA
B. Design Reviews
III. Design for Six Sigma (DFSS)
   A. DMADV / DMADOV
   B. Design for Manufacturability (DFM) and Serviceability (DFS)
      1. Requirements
   C. Quality Function Deployment (QFD)
      1. House of Quality (HOQ)
   D. Supplier Quality Assurance
      1. Approaches and Considerations for Building Supplier Relationships
         a. Three Elements of Supplier Quality Assistance
         b. Identifying Quality Targets (Smaller, Larger or Nominal is Best)
      2. Strategies for Supplier Selection
         a. Mechanisms for Accountability

ANALYTICAL TOOLS: ENSURING USEFUL DATA

I. Measurement Systems Analysis (MSA)
   A. Components of Measurement Error (Precision, Accuracy, Bias, Repeatability,
      Reproducibility, Stability, Discrimination, Linearity, etc.)
   B. Sources of Measurement Variation
   C. Methods and Criteria for Evaluating Measurement Variation
   D. Conducting and Evaluating Gage R&R Studies
   E. Data Collection and Training Plans
   F. Attribute Gage Studies
      1. Kappa Coefficient

II. Sampling Strategies
   A. Random, Stratified, Systematic and Cluster Sampling
   B. Acceptance Sampling Plans
      1. Operating Characteristic (OC) Curves
      2. Components (Sample Size, Acceptance Number, AQL, LTPD)
   C. Sample Size Determination
      1. The “n of 30” myth
      2. Impact of Sample Size on Alpha and Beta Risk
      3. Estimating Sample Sizes for Confidence Intervals
      4. Estimating Sample Sizes for Hypothesis Tests
ANALYTICAL TOOLS: FINANCIAL DATA ANALYSIS

I. Financial Measures for Analyzing Performance
   A. Common Metrics (ROI, ROA, etc.)
   B. Costs of Quality
      1. History
      2. Types of Quality Costs
         a. Prevention
         b. Appraisal
         c. Internal Failure
         d. External Failure
      3. Evaluating Quality Costs
      4. The COQ Cycle

ANALYTICAL TOOLS: INFERENTIAL STATISTICS

I. Statistical Inference
   A. Descriptive vs. Inferential Statistics
   B. Basic Model of Statistical Inference
      1. Definition of Population
      2. Statistically Valid Samples
      3. Representative Samples
      4. Appropriate and Valid Analysis
      5. Estimating Sample Sizes
   C. Confidence Intervals and Point Estimates
      1. Uncertainty and the Standard Error of the Mean
      2. The Central Limit Theorem
      3. Confidence Intervals for Means and Proportions
   D. Principles of Hypothesis Testing
      1. Selecting the Test to Use
      2. Forming Hypotheses
      3. Type I (Alpha) and Type II (Beta) Errors
      4. Critical Values
      5. Interpreting Hypothesis Test Results
      6. Hypothesis Tests for Means and Proportions
      7. One-Way ANOVA
   E. Probability Distributions Used in Six Sigma
      1. Standard Normal (z)
2. Student’s t Distribution
3. F Distribution
4. Binominal Distribution
5. Poisson Distribution

F. Tests for Normality
   1. Histograms
   2. Anderson-Darling Normality Test
   3. Options for Non-Normal Data and Non-Parametric Statistics
      a. Mann-Whitney Test
      b. Levene’s Test
      c. Mood’s Median Test
      d. Friedman’s Test

ANALYTICAL TOOLS: MEASURING AND MODELING RELATIONSHIPS BETWEEN VARIABLES

I. Modeling
   A. Definition and Purpose
   B. Influence Diagrams
   C. Scatter Plots
   D. Correlation Coefficient (r)
   E. Regression Analysis
      1. Definitions of Terms (Dependent Variables, Independent Variables, etc.)
      2. Simple Linear Regression and Method of Least Squares
         a. Model
         b. Interpretation of Results
      3. Multiple Linear Regression (MLR)
         a. Model
         b. Interpretation of Results
      4. Residual Analysis
      5. Prediction vs. Explanation

II. Designed Experiments (DOE)
   A. Contributors (George Box, Sir Ronald Fisher, etc.)
   B. Definitions of Scientific Research and Experimentation
   C. Characteristics of Designed Experiments
      1. Screening Designs vs. Optimizing Designs
      2. Selecting the Optimum Design (Dealing with Constraints)
   D. Identifying KPIV (Key Process Input Variables) and KPOV (Key Process Output)
E. Definition of Terms (Factors, Levels, Latent Variables, Orthogonal Arrays, Runs, Replications, Repetitions, Randomization, Full Factorial Designs, Fractional Factorial Designs, Center Points, etc.)

F. Table of Signs

G. Number of Runs
   1. Determining the Number of Runs
   2. Ways to Reduce the Number of Runs
   3. The Benefits of Replication
      a. Estimating Error
      b. Impact on Power / Beta Levels

H. Full Factorial Randomized Designs
   1. Notation and Purpose

I. Fractional Factorial Designs
   1. Notation and Purpose
   2. Impact of Confounding
   3. Identifying and Interpreting Design Resolution
   4. Identifying Alias Sets
   5. Plackett-Burman Designs

J. Interpretation of Results
   1. Analysis of Variance (ANOVA)
   2. Main Effects Plots
   3. Interaction Plots
   4. Cube Plots

K. Managing Difficult-to-Change Variables
   1. Blocked Designs

L. Nested Designs

M. Mixed Level Designs

N. Response Surface Methodology (RSM)
   1. Three-Level Designs
   2. Central Composite Designs (CDD) – Box Wilson
   3. Box-Behnken Designs
   4. Contour Plots

O. DOE with Two or More Response Variables

P. Mixture Designs

Q. Foldover Designs

R. Managing Potential Problems with DOE
ANALYTICAL TOOLS: STATISTICAL PROCESS CONTROL (SPC) AND PROCESS CAPABILITY

I. Variables Control Charts
   A. X-bar and R Charts

II. Attributes Control Charts
   A. Types of Attributes Charts (p, np, c, u) and When to Use Each One

III. Time-Weighted Control Charts
   A. Cumulative Summation (CUSUM) Control Charts
      1. V-Mask CUSUM Control Charts
      2. One-Sided CUSUM Control Charts
   B. Exponentially Weighted Moving Average (EWMA) Control Charts

IV. Multivariate Control Charts
   A. The Control of Means
      1. Using Two Independent Control Charts
      2. Control Ellipse Problems
   B. The Control of Variances
      1. T-Squared Generalized Variance Chart

V. Correcting for the Effect on Varying Sample Sizes on the Control Limits

VI. Assessing Process Stability
   A. Common vs. Assignable Causes of Variation
   B. Which Tests Apply to Each Type of Control Chart
   C. The Western Electric Tests for Process Stability
      1. Outliers
      2. Runs
      3. Stratification
      4. Mixtures
      5. Cycles / Repeating Patterns
      6. Trends
   D. Type I Error Probabilities
   E. Average Run Lengths (ARL)
   F. Within vs. Between Variation

VII. The Role of the Central Limit Theorem (CLT) in SPC
    A. Properties of the CLT as They Apply to Means
B. Properties of the CLT as They Apply to Variances
   1. The Chi-Square Distribution
C. Implications of the CLT to SPC

VIII. The Role of SPC in the DMAIC Process
A. Process Characterization
B. Process Capability Studies
C. Process Control Plans
   1. Process Control Layout
   2. Eight Process Control Activities to Document
   3. Using “Process Checkers”
   4. Four Types of Actions to Be Taken For Unstable Processes

LEADERSHIP FOR SIX SIGMA

I. Managing Change
   A. Types of Change
   B. Forces for Change
   C. Stages of Adjusting to Change (DREC)

II. Organizational Development
   A. Characteristics of Organizational Development
   B. Force Field Analysis

III. Organization Theory
   A. Characteristics of Organizational Structures (Horizontal, Vertical, Specialized, etc.)
   B. Advantages and Disadvantages of Different Organizational Structures
   C. Chain of Command Principles (Authority, Responsibility, Accountability, Delegation, Line Authority, Staff Authority, Span of Control, Centralized vs. Decentralized, etc.)
   D. Types of Departmentalization (Vertical, Divisional, Matrix, Team, Network, etc.)

IV. Effective Organizational Leadership
   A. Characteristics of Effective Leaders vs. Effective Managers
   B. Types of Power
      1. Positional: Legitimate, Reward, Coercive
      2. Personal: Expert, Referent
   C. Delegation Principles and Benefits
D. Leadership Styles (Autocratic, Democratic, Behavioral, etc.)
   1. Concern for People vs. Concern for Task
   2. Transactional Leader
   3. Charismatic Leader
   4. Transformational Leader
   5. Level Five Leader
   6. Interactive Leader
   7. Virtual Leadership
   8. Servant Leader

E. Contingency Leadership Approaches
   1. Ken Blanchard’s Situational Leadership
      a. Directive / Task Oriented vs. Supportive / Relationship Oriented
      b. Leadership Styles: Directive, Coaching, Supportive, Delegating
   1. Path-Goal Theory
      a. Three Types of Contingencies: Leadership Behavior, Situational, Rewards

V. Assessing Organizational Readiness
   A. The Organization’s Cultural Maturity
   B. Leadership Requirements for Lean Six Sigma
   C. Criteria for Infrastructure Readiness
   D. Lean Six Sigma Critical Success Factors

VI. Building Strategic Relationships and Commitment
   A. Three-Part Strategy
   B. Building Your Personal Brand
INTERPERSONAL SKILLS FOR MASTER BLACK BELTS

I. Communication Management Process
   A. Requirements for the Sender
   B. Requirements for the Receiver
      1. Levels of Memory Retention by Communication Method
   C. Active Listening Guidelines
   D. Communications Management Environment
   E. Effective Communication Strategies
      1. Power / Interest Grid
      2. Power / Interest Relationships
      3. Stakeholder Reporting Matrix
         a. Reporting Norms
         b. Agenda Notes

II. Productive Meetings
    A. The Golden Rules of Productive Meetings

III. Managing Conflict
    A. Sources of Conflict
    B. Stages of Conflict
    C. Strategies for Resolving Conflict

IV. Negotiation Skills
    A. The Three Scenarios of Negotiation: Win-Win, Win-Lose, Lose-Lose
       1. Distributive vs. Integrative Negotiation
       2. Negotiation Approaches (Collaboration, Competition, Accommodation, etc.)
       3. Framing the Problem
       4. Defining Interests and Needs
       5. BATNA

V. Dealing With Difficult People
    A. Recognizing and Handling Different Types of Difficult People (Pessimist, Complainer, Know-It-All, Bully, Gossiper, Slacker, etc.)
SIX SIGMA SUCCESS FACTORS

I. Capturing Lessons Learned
   A. Purpose and Benefits
   B. Project Documentation Plan Requirements
      1. Contents
      2. Document Transfer Process Tools
      3. Control Plan
      4. Support Infrastructure

II. Monitoring and Evaluating Project Outcomes
   A. Summative Evaluation / Lagging Indicators
   B. Formative Evaluation / Leading Indicators
   C. Developing an Evaluation Plan
   D. Roles and Responsibilities
   E. Overcoming Resistance

III. Action and Results Plans
   A. Purpose of Each
   B. Action Plan Format
      1. Three-Level Action Plan Facilitation
         a. Portfolio-Level Plans
         b. Project-Level Plans
         c. Process-Level Plans
   C. Response Plan Components
      1. Triggers, Response, Target Time Frame, Conditions
   D. Plan Implementation Guidelines

IV. Promoting Six Sigma and Celebrating Successes
   A. Importance of Promotion and Celebration
   B. Methods
V. Creating a Six Sigma Culture
   A. The Role of Human Resources
   B. Obtaining Management’s Involvement in Project Implementation
   C. Creating Effective Reward and Recognition Systems
   D. Communicating Six Sigma Successes
   E. Improving the Six Sigma Process
   F. Measuring Your Six Sigma Culture

VI. Pitfalls to Avoid
   A. Common Six Sigma Mistakes and How to Avoid Them

PROFESSIONAL DEVELOPMENT

I. Developing Training Strategies
   A. How Adults Learn
      1. Adult Training Needs
   B. Different Learning Styles (Visual, Auditory, Kinesthetic, etc.)
   C. Retention Rates by Learning Style
   D. Learning Curves
   E. Bloom’s Taxonomy of Learning
   F. Assessing Training Needs for Lean Six Sigma
      1. Effective Workforce / Training Correlation
      2. The Role of the Master Black Belt
      3. Assessment Criteria
      4. Stakeholder Training Needs
      5. Developing Desired Training Outcomes
      6. Performance Standards
   F. The PADDIE Approach
   G. Methods for Delivering Training

II. Motivation Principles
   A. Maslow’s Hierarchy of Needs
   B. Herzberg’s Motivation – Hygiene Theory
   C. McClelland’s Theory
   D. McGregor’s Theory X vs Theory Y Preferences
   E. Vroom’s Expectancy Theory
   F. Adam’s Equity Theory
   G. Skinner’s Behavioral Reinforcement Theory
III. Effective Feedback
   A. Importance of Feedback
   B. Three Directions of Communication (Horizontal, Diagonal, Vertical)

IV. Required Skills for the Master Black Belt from A to Z

V. Master Black Belt Career Progression
   A. Common Job Requirements
   B. Common Career Options