

Six Sigma Green Belt BOK MAP 2006-2014

The **Certified Six Sigma Green Belt (SSGB)** body of knowledge (BOK) has been updated to ensure that the most current state of reliability practice is being tested in the examination. If you would like more information on how a BOK is updated, see a description of the process on page 4 in the [Certification Handbook](#) (PDF – 228 KB) on the www.asq.org website.

Part of the updating process is to conduct a job analysis survey to determine whether the topics in the 2002 BOK are still relevant to the job role of reliability engineers and to identify any new topics that have emerged since that BOK was developed. The results of the CRE job analysis survey showed that nearly all of the topics that were in the 2002 BOK are still relevant to the job roles of reliability engineers in 2009. Three topics were removed, as indicated in the following tables. A few new topics were added to the 2009 BOK, and they are highlighted on the following pages as well.

The 2014 Certified Six Sigma Green Belt (SSGB BOK) will be introduced at the December 6, 2014, administration. Both BOKs will be available online until December 5, 2014, at which time the 2006 BOK will be removed.

General comments about ASQ Body of Knowledge updates

When the Body of Knowledge (BOK) is updated for an ASQ exam, the majority of the material covered in the BOK remains the same. There are very few programs that change dramatically over a 5-year period. One of the points that we make to all of the exam development committees is that ASQ Certification Exams need to reflect “the state of practice” not “the state of the art” – this helps to keep the programs grounded in what people currently do, rather than being driven by the latest hot-topic improvement idea or trend. Typically, the biggest change in any updated BOK is in how the content is organized. When a new BOK is announced and posted on the ASQ website, we also include a “BOK Map” that highlights the changes between the two bodies of knowledge: old and new. The BOK map also clearly identifies any new content that has been added to the exam, as well as any content that has been removed from the exam.

2006 BOK Code	2014 BOK Details	New Elements in 2014 BOK
	I. Overview: Six Sigma and the Organization (13 Questions)	Decreased by 2 questions
	A. Six sigma and organizational goals	
1A1	1. Value of six sigma Recognize why organizations use six sigma, how they apply its philosophy and goals, and the evolution of six sigma from quality leaders such as Juran, Deming, Shewhart, Ishikawa, and others. (Understand)	Removed process inputs, outputs and feedback impact.
1A3	2. Organizational goals and six sigma projects	Revised title and subtext. Swapped order with 1A3.

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	Identify the linkages and supports that need to be established between a selected six sigma project and the organization's goals, and describe how process inputs, outputs, and feedback at all levels can influence the organization as a whole. (Understand)	
1A2	<p>3. Organizational drivers and metrics</p> <p>Recognize key business drivers (profit, market share, customer satisfaction, efficiency, product differentiation) for all types of organizations. Understand how key metrics and scorecards are developed and how they impact the entire organization. (Understand)</p>	Revised title and subtext. Swapped order with 1A2.
B. Lean principles in the organization		
1B1, 1B3	<p>1. Lean concepts</p> <p>Define and describe lean concepts such as theory of constraints, value chain, flow, and perfection. (Apply)</p>	Expanded description to include Theory of Constraints and reworded subtext
1B2	<p>2. Value-streaming mapping</p> <p>Use value-stream mapping to identify value-added processes and steps or processes that produce waste, including excess inventory, unused space, test inspection, rework, transportation, and storage. (Understand)</p>	Reword to include "Value stream mapping" and added subtext for clarity
C. Design for six sigma (DFSS) methodologies		Revised Topic title. Removed 'in the organization' and added 'methodologies'
1C3,	<p>1. Road maps for DFSS</p> <p>Distinguish between DMADV (define, measure, analyze, design, verify) and IDOV (identify, design, optimize, verify), and recognize how they align with DMAIC. Describe how these methodologies are used for improving the end product or process during the design (DFSS) phase. (Understand)</p>	Moved from 1C3 and reworded subtext
2D2	<p>2. Basic failure mode and effects analysis (FMEA)</p> <p>Use FMEA to evaluate a process or product and determine what might cause it to fail and the effects that failure could have. Identify and use scale criteria, calculate the risk priority number (RPN), and analyze the results. (Analyze)</p>	Moved from 2D2 and revised subtext
1C2	<p>3. Design FMEA and process FMEA</p> <p>Define and distinguish between these two uses of FMEA. (Apply)</p>	Revised subtext
II. Define Phase (23 Questions)		Decreased by 2 questions

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	A. Project identification	Revised Topic title from “Process Management for Projects”
	<p>1. Project selection Describe the project selection process and what factors should be considered in deciding whether to use the six sigma DMAIC methodology or another problem-solving process. (Understand)</p>	New sub-topic
2A1	<p>2. Process elements Define and describe process components and boundaries. Recognize how processes cross various functional areas and the challenges that result for process improvement efforts. (Analyze)</p>	
	<p>3. Benchmarking Understand various types of benchmarking, including competitive, collaborative and best practices. (Understand)</p>	New sub-topic
	<p>4. Process inputs and outputs Identify process input and output variables and evaluate their relationships using the supplier, inputs, process, output, customer (SIPOC) model. (Analyze)</p>	New sub-topic
2A2	<p>5. Owners and stakeholders Identify the process owners and other stakeholders in a project. (Apply)</p>	Removed ‘internal and external customers’ from subtext
	B. Voice of the customer (VOC)	
2A3	<p>1. Customer identification Identify the internal and external customers of a project, and what effect the project will have on them. (Apply)</p>	Moved from 2A3. Revised subtext
2A4, 2A5	<p>2. Customer data Collect feedback from customers using surveys, focus groups, interviews, and various forms of observation. Identify the key elements that make these tools effective. Review data collection questions to eliminate vagueness, ambiguity, and any unintended bias. (Apply)</p>	Moved from 2A4-5, revised subtext
2A6	<p>3. Customer requirements Use quality function deployment (QFD) to translate customer requirements statements into</p>	Moved from 2A6, revised subtext

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	product features, performance measures, or opportunities for improvement. Use weighting methods as needed to amplify the importance and urgency of different kinds of input; telephone call vs. survey response; product complaint vs. expedited service request. (Apply)	
	C. Project management basics	Moved from 2B
2B1	1. Project charter Define and describe elements of a project charter and develop a problem statement that includes baseline data or current status to be improved and the project's goals. (Apply)	
2B2	2. Project scope Help define the scope of the project using process maps, Pareto charts, and other quality tools. (Apply)	
2B3	3. Project metrics Help develop primary metrics (reduce defect levels by x-amount) and consequential metrics (the negative effects that making the planned improvement might cause). (Apply)	
2B4	4. Project planning tools Use Gantt charts, critical path method (CPM), and program evaluation and review technique (PERT) charts to plan projects and monitor their progress. (Apply)	
2B5	5. Project documentation Describe the types of data and input needed to document a project. Identify and help develop appropriate presentation tools (storyboards, spreadsheet summary of results) for phase reviews and management updates. (Apply)	
2B6	6. Project risk analysis Describe the elements of a project risk analysis, including feasibility, potential impact, and risk priority number (RPN). Identify the potential effect risk can have on project goals and schedule, resources (materials and personnel), costs and other financial measures, and stakeholders. (Understand)	Revised and expanded subtext
2B7	7. Project closure Review with team members and sponsors the project objectives achieved in relation to the	Revised and expanded subtext

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	<p>charter and ensure that documentation is completed and stored appropriately. Identify lessons learned and inform other parts of the organization about opportunities for improvement. (Apply)</p>	
2C	<p>D. Management and planning tools: Define, select, and apply these tools: 1) affinity diagrams, 2) interrelationship digraphs, 3) tree diagrams, 4) prioritization matrices, 5) matrix diagrams, 6) process decision program charts (PDPC), and 7) activity network diagrams. (Apply)</p>	Moved from 2C
2D	<p>E. Business results for projects</p>	Moved from 2D
2D1	<p>1. Process performance Calculate process performance metrics such as defects per unit (DPU), rolled throughput yield (RTY), cost of poor quality (COPQ), defects per million opportunities (DPMO), sigma levels, and process capability indices. Track process performance measures to drive project decisions. (Analyze)</p>	
	<p>2. Communication Define and describe communication techniques used in organizations: top-down, bottom-up, and horizontal. (Apply)</p>	New sub-topic
2E	<p>F. Team dynamics and performance.</p>	Moved from 2E
2E1	<p>1. Team stages and dynamics Define and describe the stages of team evolution, including forming, storming, norming, performing, adjourning, and recognition. Identify and help resolve negative dynamics such as overbearing, dominant, or reluctant participants, the unquestioned acceptance of opinions as facts, groupthink, feuding, floundering, the rush to accomplishment, attribution, discounts, digressions, and tangents. (Understand)</p>	Revised subtext
2E2	<p>2. Team roles and responsibilities Describe and define the roles and responsibilities of participants on six sigma and other teams, including black belt, master black belt, green belt, champion, executive, coach, facilitator, team member, sponsor, and process owner. (Apply)</p>	Revised subtext
2E3	<p>3. Team tools Define and apply team tools such as brainstorming, nominal group technique, and multi-voting.</p>	

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	(Apply)	
2E4	4. Team Communication Identify and use appropriate communication methods (both within the team and from the team to various stakeholders) to report progress, conduct reviews, and support the overall success of the project. (Apply)	Revised title to include “Team” and expanded subtext
	III. Measure Phase (23 Questions)	Decreased by 7 questions
3A1, 3A2	A. Process analysis and documentation Develop process maps and review written procedures, work instructions, and flowcharts to identify any gaps or areas of the process that are misaligned. (Create)	Combined 3A1 and 3A2 and revised subtext. Updated cognitive level to “Create”
	B. Probability and statistics	
3B3	1. Basic probability concepts Identify and use basic probability concepts: independent events, mutually exclusive events, multiplication rules, permutations, and combinations. (Apply)	Moved from 3B3, revised subtext
3B2	2. Central limit theorem Define the central limit theorem and describe its significance in relation to confidence intervals, hypothesis testing, and control charts. (Understand)	Moved from 3B2, revised subtext
3D	C. Statistical distributions Define and describe various distributions as they apply to statistical process control and probability: normal, binomial, Poisson, chi square, Student’s t, and F. (Understand)	Moved from 3D and updated title from “Probability Distributions”. Revised subtext and cognitive level updated to “Understand”
	D. Collecting and summarizing data	Moved from 3C
3C1	1. Types of data and measurement scales Identify and classify continuous (variables) and discrete (attributes) data. Describe and define nominal, ordinal, interval, and ratio measurement scales. (Analyze)	
3C2, 3C3	2. Sampling and data collection methods Define and apply various sampling methods (random and stratified) and data collection methods (check sheets and data coding). (Apply)	Combined 3C2 and 3C3 and revised subtext
3C4	3. Descriptive statistics Define, calculate, and interpret measures of dispersion and central tendency. Develop and	Revised subtext

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	interpret frequency distributions and cumulative frequency distributions. (Evaluate)	
3C5	4. Graphical methods Construct and interpret diagrams and charts that are designed to communicate numerical analysis efficiently, including scatter diagrams, normal probability plots, histograms, stem-and-leaf plots, box-and-whisker plots. (Create)	Revised subtext
3E	E. Measurement system analysis (MSA) Calculate, analyze, and interpret measurement system capability using gauge repeatability and reproducibility (GR&R) studies, measurement correlation, bias, linearity, percent agreement, and precision/tolerance (P/T). (Evaluate)	
	F. Process and performance capability	Revised Topic title from “Process capability and performance”
3F2	1. Process performance vs. process specifications Define and distinguish between natural process limits and specification limits, and calculate process performance metrics. (Evaluate)	Moved from 3F2
3F1	2. Process capability studies Define, describe, and conduct process capability studies, including identifying characteristics, specifications, and tolerances, and verifying stability and normality. (Evaluate)	Moved from 3F1 and revised subtext
3F3, 3F4, 3F6	3. Process capability (C_p, C_{pk}) and process performance (P_p, P_{pk}) indices Describe the relationship between these types of indices. Define, select, and calculate process capability and process performance. Describe when C_{pm} measures can be used. Calculate the sigma level of a process. (Evaluate)	Combined elements of 3F3, 3F4 and 3F6 and updated subtext.
3F5	4. Short-term vs. long-term capability and sigma shift Describe the assumptions and conventions that are appropriate to use when only short-term data are used. Identify and calculate the sigma shift that occurs when long- and short-term data are compared. (Evaluate)	Moved from 3F5. Revised subtext to remove ‘attributes data’
	IV. Analyze Phase (15 Questions)	
	A. Exploratory data analysis	
4A1	1. Multi-vari studies Select appropriate sampling plans to create multi-vari study charts and interpret the results for	

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	positional, cyclical, and temporal variation. (Create)	
4A2	<p>2. Correlation and linear regression</p> <p>Describe the difference between correlation and causation. Calculate the correlation coefficient and linear regression and interpret the results in terms of statistical significance (p-value). Use regression models for estimation and prediction. (Evaluate)</p>	
	B. Hypothesis testing	
4B1	<p>1. Basics</p> <p>Distinguish between statistical and practical significance. Determine appropriate sample sizes and develop tests for significance level, power, and type I and type II errors. (Apply)</p>	
4B2, 4B3, 4B4, 4B5	<p>2. Tests for means, variances, and proportions</p> <p>Conduct hypothesis tests to compare means, variances, and proportions (paired-comparison t-test, F-test, analysis of variance (ANOVA), chi square) and interpret the results. (Analyze)</p>	Combined subtopics 4B2-5, and updated subtext
	V. Improve Phase (15 Questions)	Changed title from “Six Sigma – Improve and Control” to “Improve Phase”
	A. Design of experiments (DOE)	
5A1	<p>1. Basic terms</p> <p>Define and describe terms such as independent and dependent variables, factors and levels, responses, treatments, errors, repetition, blocks, randomization, effects, and replication. (Understand)</p>	Added “blocks, randomization, effects” to subtext
5A2	<p>2. DOE graphs and plots</p> <p>Interpret main effects analysis and interaction plots. (Apply)</p>	Revised Sub-topic title from “Main effects”. Added “analysis” to subtext.
	B. Root cause analysis	
	Use cause and effect diagrams, relational matrices, and other problem-solving tools to identify the true cause of a problem. (Analyze)	New Topic and subtext
	C. Lean Tools	New Topic
1B1	<p>1. Waste elimination</p> <p>Select and apply tools and techniques for eliminating or preventing waste, including pull systems, kanban, 5S, standard work, and poka-yoke. (Apply)</p>	New Subtopic and subtext.
1B2	2. Cycle-time reduction	New Subtopic and subtext.

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	Use various techniques to reduce cycle time (continuous flow, setup reduction). (Analyze)	
	3. Kaizen and kaizen blitz Define and distinguish between these two methods and apply them in various situations. (Apply)	New Subtopic and subtext.
	VI. Control Phase (11 Questions)	New Topic
5B	A. Statistical process control (SPC)	Moved from 5B
5B1	1. SPC Basics Describe the theory and objectives of SPC, including measuring and monitoring process performance for both continuous and discrete data. Define and distinguish between common and special cause variation and how these conditions can be deduced from control chart analysis. (Analyze)	Revised title and expanded subtext for clarity
5B2	2. Rational subgrouping Define and describe how rational subgrouping is used. (Understand)	
5B3, 5B4	3. Control charts Identify, select, construct, and use control charts: $\bar{X} - R$, $\bar{X} - s$, individual and moving range (ImR or XmR), median, p, np, c, and u. (Apply)	Combined 5B3 and 5B4, and revised Subtopic title and subtext
5D	B. Control plan Assist in developing and implementing a control plan to document and monitor the process and maintain the improvements. (Apply)	Revised subtext for clarity
	C. Lean tools for process control	New Topic and Subtopics
	1. Total productive maintenance (TPM) Define the elements of TPM and describe how it can be used to control the improved process. (Understand)	New subtopic and subtext
	2. Visual factory Define the elements of a visual factory and describe how it can be used to control the improved process. (Understand)	New subtopic and subtext

