

## Certified Six Sigma Black Belt (SSBB) Body of Knowledge Map 2015 - 2022

The Certified Six Sigma Black Belt (SSBB) Body of Knowledge (BoK) has been updated to ensure that the most current state of six sigma black belt 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 <https://asq.org/cert/exam-development>.

Part of the updating process is to conduct a job analysis survey to determine whether the topics in the 2015 BoK are still relevant to the job role of six sigma black belts and to identify any new topics that have emerged since that BoK was developed. The results of the SSBB job analysis survey showed that most of the topics that were in the 2015 BoK are still relevant to the job roles of six sigma black belts. As indicated in Table 2, two 2015 BoK subtopics were split into two subtopics (I.B.2 & I.B.3; V.E.2 & V.E.3), two new subtopics were added (IV.D.6 & IV.D.7), and several subtexts were revised.

The 2022 Certified Six Sigma Black Belt Body of Knowledge (SSBB BoK) will be introduced at the September 2022 administration. Both BoKs will be available online until November 1, 2022, at which time the 2015 BoK will be removed.

### **General comments about ASQ Body of Knowledge updates**

When the Body of Knowledge (BoK) is updated for an ASQ exam, most of the material covered in the BoK remains the same. There are very few programs that change significantly over a 5-7 year period. One of the points that we make to all 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.

With regard to exam preparation materials, you should be able to use any of the reference books that are currently listed on the bibliography for the exam program. These are the source materials that the exam development committees use to write questions and verify answers.

### Specific comments about the 2022 SSBB Body of Knowledge updates

The SSBB Body of Knowledge mostly stayed the same with the 2022 update. There were no changes to content in III. Team Management and IX. Design For Six Sigma (DFSS) Framework and Methodologies. The 2015 subtopics VI.B.8 Contingency tables and VI.B.9 Non-parametric tests were removed due to low importance and frequency mean scores in the job analysis survey. The primary changes made to the BoK were revisions to the subtext and decrease in cognitive levels. There were six areas that received a decrease in level of cognition, and none were increased.

Table 1 below portrays the change in items allocated to each section of the Body of Knowledge. The section names have remained the same. Table 2, on page 3, presents the 2022 SSBB BoK and maps the topics to the 2015 BoK. Table 3, starting on page 13, presents the 2015 SSBB BoK and maps the topics to the 2022 BoK. Details on changes between the two can be found below.

**Table 1. SSBB BoK Section Item Allocation**

<b>BoK Section</b>	<b>2015 BoK</b>	<b>2022 BoK</b>	<b>Difference</b>
I. Organization-wide Planning and Deployment	12	12	--
II. Organizational Process Management and Measures	10	12	+2
III. Team Management	18	15	-3
IV. Define	20	20	--
V. Measure	25	25	--
VI. Analyze	22	22	--
VII. Improve	21	21	--
VIII. Control	15	17	+2
IX. Design for Six Sigma (DFSS) Framework and Methodologies	7	6	-1

**Table 2. 2022 SSBB BoK mapped to 2015 SSBB BoK**

2015 BoK	2022 BoK Details	Notes
<b>Section</b>	<b>I. Organization-wide Planning and Deployment [12 Questions]</b>	
I.A	<b>A. Organization-wide considerations</b>	
I.A.1	<p>1. Fundamentals of six sigma and lean methodologies            Define and describe the value and goals of these approaches and describe the integration and complementary relationship between them. Identify and understand an organization’s lean six sigma maturity model. (Understand)</p>	Updated subtext; added maturity model
I.A.2	<p>2. Six sigma, lean, and continuous improvement methodologies            Describe when to use six sigma instead of other problem-solving approaches and describe the importance of aligning six sigma objectives with organizational goals. Describe screening criteria and how such criteria can be used for the selection of six sigma projects, lean initiatives, and other continuous improvement methods. (Apply)</p>	
I.A.3	<p>3. Relationships among business systems and processes            Describe the interactive relationships among business systems, processes, and internal and external stakeholders, and the impact those relationships have on business systems. (Understand)</p>	
I.A.4	<p>4. Strategic planning and deployment for initiatives            Define the importance of identification and strategic planning of six sigma projects and lean initiatives as part of the business planning process taking into consideration outcomes such as return on investment and measured intangibles. Use strengths, weaknesses, opportunities, and threats analysis (SWOT), contingency planning, and business continuity planning to enhance strategic planning and deployment. (Apply)</p>	Removed hoshin kanri, portfolio analysis, and PEST; added business planning and ROI
I.B	<b>B. Leadership</b>	
I.B.1	<p>1. Roles and responsibilities            Describe the roles and responsibilities of executive leadership, champions, sponsors, process owners, master black belts, black belts, and green belts in driving six sigma and lean initiatives. Understand the importance of coaching multiple levels of leadership and belts on appropriate six sigma tools and techniques. Understand the importance of finance and its role supporting a project and confirming its outcome. Describe how each group influences project deployment in terms of providing or managing resources, enabling changes in organizational structure, and supporting communications about the purpose and deployment of the initiatives. (Understand)</p>	Added aspects of coaching and finance’s role
I.B.2	<p>2. Organizational barriers            Describe how an organization’s structure and culture can impact six sigma projects. Identify common causes of six sigma failures, including lack of management support and lack of resources. (Apply)</p>	Renamed subtopic; split change management into I.B.3

2015 BoK	2022 BoK Details	Notes
I.B.2	3. Change management Apply and facilitate change management techniques, including stakeholder analysis, readiness assessments, proactive change management, and communication plans to overcome barriers and drive organization-wide change. (Apply)	Subtext taken from 2015 I.B.2 and revised
	<b>II. Organizational Process Management and Measures [12 Questions]</b>	Number of questions changed from 10 to 12
II.A	<b>A. Impact on stakeholders</b> Describe the impact six sigma projects can have on customers, suppliers, and other stakeholders. (Understand)	
II.B	<b>B. Benchmarking</b> Define and distinguish between various types of benchmarking, e.g., best practices, competitive, collaborative, and breakthrough. Select measures and performance goals for projects resulting from benchmarking activities. (Apply)	
II.C	<b>C. Business measures</b>	
II.C.1	1. Performance measures Define and describe balanced scorecard, key performance indicators (KPIs), key behavior indicators (KBIs), objectives and key results (OKRs), customer loyalty metrics, and leading and lagging indicators. Explain how to create a line of sight from performance measures to organizational strategies. (Analyze)	Added KBIs and OKRs
II.C.2	2. Financial measures Define and use revenue growth, market share, margin, net present value (NPV), return on investment (ROI), and cost-benefit analysis (CBA). Explain the difference between hard cost measures (from profit and loss statements) and soft cost benefits of cost avoidance and reduction. (Apply)	
	<b>III. Team Management [15 Questions]</b>	Number of questions changed from 18 to 15
III.A	<b>A. Team formation</b>	
III.A.1	1. Team types and constraints Define and describe various teams, including virtual, cross-functional, and self-directed. Determine what team type will work best for a given a set of constraints, e.g., geography, technology availability, staff schedules, time zones. (Apply)	
III.A.2	2. Team roles and responsibilities Define and describe various team roles and responsibilities for the leader, facilitator, coach, and individual member. (Understand)	
III.A.3	3. Team member selection criteria Describe various factors that influence the selection of team members, including the ability to influence, openness to change, required skills sets, subject matter expertise, and availability. (Apply)	

2015 BoK	2022 BoK Details	Notes
III.A.4	4. Team success factors Identify and describe the elements necessary for successful teams, e.g., management support, clear goals, ground rules, and timelines. (Apply)	
III.B	<b>B. Team facilitation</b>	
III.B.1	1. Motivational techniques Describe and apply techniques to motivate team members. Identify factors that can demotivate team members and describe techniques to overcome them. (Apply)	
III.B.2	2. Team stages of development Identify and describe the classic stages of team development: forming, storming, norming, performing, and adjourning. (Apply)	
III.B.3	3. Team communication Describe and explain the elements of an effective communication plan, e.g., audience identification, message type, medium, and frequency. (Apply)	
III.B.4	4. Team leadership models Describe and select appropriate leadership approaches (e.g., direct, coach, support, and delegate) to ensure team success. (Apply)	
III.C	<b>C. Team dynamics</b>	
III.C.1	1. Group behaviors Identify and use various conflict resolution techniques (e.g., coaching, mentoring, and intervention) to overcome negative group dynamics, including dominant and reluctant participants, groupthink, rushing to finish, and digressions. (Evaluate)	
III.C.2	2. Meeting management Select and use various meeting management techniques, including using agendas, starting on time, requiring pre-work by attendees, and ensuring that the right people and resources are available. (Apply)	
III.C.3	3. Team decision-making methods Define, select, and use various tools (e.g., consensus, nominal group technique, and multi-voting) for decision-making. (Apply)	
III.D	<b>D. Team training</b>	
III.D.1	1. Needs assessment Identify the steps involved to implement an effective training curriculum: identify skills gaps, develop learning objectives, prepare a training plan, and develop training materials. (Understand)	
III.D.2	2. Delivery Describe various techniques used to deliver effective training, including adult learning theory, soft skills, and modes of learning. (Understand)	

2015 BoK	2022 BoK Details	Notes
III.D.3	3. Evaluation Describe various techniques to evaluate training, including evaluation planning, feedback surveys, pre-training and post-training testing. (Understand)	
	<b>IV. Define [20 Questions]</b>	
IV.A	<b>A. Voice of the customer</b>	
IV.A.1	1. Customer identification Identify and segment customers and show how a project will impact both internal and external customers. (Apply)	
IV.A.2	2. Customer data collection Identify and select appropriate data collection methods (e.g., surveys, focus groups, interviews, and observations) to gather voice of the customer data. Ensure the data collection methods used are reviewed for validity and reliability. (Analyze)	
IV.A.3	3. Customer requirements Define, select, and apply appropriate tools to determine customer needs and requirements, including critical-to-X (CTX when 'X' can be quality, cost, safety, etc.), CTQ tree, quality function deployment (QFD), supplier, input, process, output, customer (SIPOC), and Kano model. (Analyze)	
IV.B	<b>B. Business case and project charter</b>	
IV.B.1	1. Business case Describe business case justification used to support projects. (Understand)	
IV.B.2	2. Problem statement Develop a project problem statement and evaluate it in relation to baseline performance and improvement goals. (Evaluate)	
IV.B.3	3. Project scope Develop and review project boundaries to ensure that the project has value to the customer. (Analyze)	
IV.B.4	4. Goals and objectives Identify SMART (specific, measurable, actionable, relevant, and timebound) goals and objectives on the basis of the project's problem statement and scope. (Analyze)	
IV.B.5	5. Project performance measurements Identify and evaluate performance measurements (e.g., cost, revenue, delivery, schedule, and customer satisfaction) that connect critical elements of the process to key outputs. (Analyze)	
IV.B.6	6. Project charter review Explain the importance of having periodic project charter reviews with stakeholders. (Understand)	
IV.C	<b>C. Project management (PM) tools</b> Identify and use the following PM tools to track projects and document their progress. (Evaluate)	
IV.C.1	1. Gantt charts	
IV.C.2	2. Toll-gate reviews	

2015 BoK	2022 BoK Details	Notes
IV.C.3	3. Work breakdown structure (WBS)	
IV.C.4	4. RACI model (responsible, accountable, consulted, and informed)	
IV.D	<b>D. Analytical tools</b> Identify and use the following analytical tools throughout the DMAIC cycle. (Apply)	
IV.D.1	1. Affinity diagrams	
IV.D.2	2. Tree diagrams	
IV.D.3	3. Matrix diagrams	
IV.D.4	4. Prioritization matrices	
IV.D.5	5. Activity network diagrams	
NEW	6. Process decision program chart (PDPC)	
NEW	7. Interrelationship digraph (ID)	
	<b>V. Measure [25 Questions]</b>	
V.A	<b>A. Process characteristics</b>	
V.A.1	1. Process flow metrics Identify and use process flow metrics (e.g., work in progress (WIP), work in queue (WIQ), touch time, takt time, cycle time, and throughput) to determine constraints. Describe the impact that “hidden factories” can have on process flow metrics. (Analyze)	
V.A.2	2. Process analysis tools Select, use, and evaluate various tools, e.g., value stream maps, process maps, work instructions, flowcharts, spaghetti diagrams, and gemba walk. (Evaluate)	Removed circle diagrams
V.B	<b>B. Data collection</b>	
V.B.1	1. Types of data Define, classify, and distinguish between qualitative and quantitative data, and continuous and discrete data. (Evaluate)	
V.B.2	2. Measurement scales Define and use nominal, ordinal, interval, and ratio measurement scales. (Apply)	
V.B.3	3. Sampling Define and describe sampling concepts, including representative selection, homogeneity, bias, accuracy, and precision. Determine the appropriate sampling method (e.g., random, stratified, systematic, subgroup, and block) to obtain valid representation in various situations. (Evaluate)	
V.B.4	4. Data collection plans and methods Develop and implement data collection plans that include data integrity, accuracy, and processing tools, e.g., check sheets and data normalization. Avoid data collection pitfalls by defining the metrics to be used or collected, ensuring that collectors are trained in the tools and understand how the data will be used, and checking for seasonality effects. (Analyze)	Revised subtext
V.C	<b>C. Measurement systems</b>	

2015 BoK	2022 BoK Details	Notes
V.C.1	1. Measurement system analysis (MSA) Use gauge repeatability and reproducibility (R&R) studies and other MSA tools (e.g., bias, correlation, linearity, precision to tolerance, and percent agreement) to analyze variable measurement system capability. Use audit MSA for attribute measurement system. (Evaluate)	Revised subtext; added audit MSA
V.C.2	2. Measurement systems across the organization Identify how measurement systems can be applied across all functional areas of the organization (e.g., marketing, sales, engineering, research and development (R&D), supply chain management, operations and customer experience). (Understand)	Revised subtext
V.C.3	3. Metrology Define and describe elements of metrology, including calibration systems, traceability to reference standards, and the control and integrity of measurement devices and standards. (Understand)	
V.D	<b>D. Basic statistics</b>	
V.D.1	1. Basic statistical terms Define and distinguish between population parameters and sample statistics, e.g., proportion, mean, and standard deviation. (Apply)	
V.D.2	2. Central limit theorem Explain the central limit theorem and its significance in the application of inferential statistics for confidence intervals, hypothesis tests, and control charts. (Understand)	
V.D.3	3. Descriptive statistics Calculate and interpret measures of dispersion and central tendency. (Evaluate)	
V.D.4	4. Graphical methods Construct and interpret diagrams and charts, e.g., box-and-whisker plots, scatter diagrams, histograms, normal probability plots, frequency distributions, and cumulative frequency distributions. (Evaluate)	
V.D.5	5. Valid statistical conclusions Distinguish between descriptive and inferential statistical studies. Evaluate how the results of statistical studies are used to draw valid conclusions. (Evaluate)	
V.E	<b>E. Probability</b>	
V.E.1	1. Basic concepts Describe and interpret probability concepts, e.g., independence, mutually exclusive events, addition and multiplication rules, conditional probability, complementary probability, and joint occurrence of events. (Understand)	Decreased cognitive level from Apply to Understand
V.E.2	2. Common distributions Describe, interpret, and use normal, Poisson, binomial, chi square, Student's t, and F distributions. (Evaluate)	Renamed subtopic



2015 BoK	2022 BoK Details	Notes
V.E.2	3. Additional distributions Identify hypergeometric, bivariate, exponential, lognormal, and Weibull distributions. (Understand)	Split out from V.E.2 and decreased cognitive level from Evaluate to Understand
V.F	<b>F. Process capability</b>	
V.F.1	1. Process capability indices Define, select, and calculate $C_p$ and $C_{pk}$ . (Evaluate)	
V.F.2	2. Process performance indices Define, select, and calculate $P_p$ , $P_{pk}$ , $C_{pm}$ , and process sigma. (Evaluate)	
V.F.3	3. General process capability studies Describe and apply elements of designing and conducting process capability studies relative to characteristics, specifications, sampling plans, stability, and normality. (Evaluate)	
V.F.4	4. Process capability for attributes data Calculate the process capability and process sigma level for attributes data. (Apply)	
V.F.5	5. Process capability for non-normal data Identify non-normal data and determine when it is appropriate to use Box-Cox or other transformation techniques. (Apply)	
V.F.6	6. Process performance vs. specification Distinguish between natural process limits and specification limits. Calculate process performance metrics, e.g., percent defective, parts per million (PPM), defects per million opportunities (DPMO), defects per unit (DPU), first pass yield, and rolled throughput yield (RTY). (Evaluate)	Updated subtext
V.F.7	7. Short-term and long-term capability Describe and use appropriate assumptions and conventions when only short-term data or only long-term data are available. Interpret the relationship between short-term and long-term capability. (Evaluate)	
	<b>VI. Analyze [22 Questions]</b>	
VI.A	<b>A. Measuring and modeling relationships between variables</b>	
VI.A.1	1. Correlation coefficient Calculate and interpret the correlation coefficient and its confidence interval and describe the difference between correlation and causation. (Evaluate)	
VI.A.2	2. Linear regression Calculate and interpret regression analysis and apply and interpret hypothesis tests for regression statistics. Use the regression model for estimation and prediction, analyze the uncertainty in the estimate, and perform a residuals analysis to validate the model. (Evaluate)	

2015 BoK	2022 BoK Details	Notes
VI.A.3	3. Multivariate tools Understand sources of variation through multivariate tools (e.g., factor analysis, discriminant analysis, and multiple analysis of variance (MANOVA)). (Understand)	Revised subtext; decreased cognitive level from Evaluate to Understand
VI.B	<b>B. Hypothesis testing</b>	
VI.B.1	1. Terminology Define and interpret the significance level, power, type I, and type II errors of statistical tests. (Evaluate)	
VI.B.2	2. Statistical vs. practical significance Define, compare, and interpret statistical and practical significance. (Evaluate)	
VI.B.3	3. Sample size Calculate sample size for common hypothesis tests: equality of means and equality of proportions. (Apply)	
VI.B.4	4. Point and interval estimates Define and distinguish between confidence and prediction intervals. Define and interpret the efficiency and bias of estimators. Calculate tolerance and confidence intervals. (Evaluate)	
VI.B.5	5. Tests for means, variances, and proportions Use and interpret the results of hypothesis tests for means, variances, and proportions. (Evaluate)	
VI.B.6	6. Analysis of variance (ANOVA) Select, calculate, and interpret the results of ANOVAs. (Evaluate)	
VI.B.7	7. Goodness-of-fit (chi square) tests Define, select, and interpret the results of these tests. (Evaluate)	
NEW	<b>C. Risk analysis and management</b>	
NEW	1. Types of risk Identify, assess, and prioritize various types of risk such as, enterprise, operational, supplier, security, product, and cyber-security. (Analyze)	
VI.C	2. Failure mode and effects analysis (FMEA) Describe the purpose and elements of FMEA, including risk priority number (RPN), and evaluate FMEA results for processes, products, and services. Distinguish between design FMEA (DFMEA) and process FMEA (PFMEA) and interpret their results. (Evaluate)	
VI.D	<b>D. Additional analysis methods</b>	
VI.D.1	1. Gap analysis Analyze scenarios to identify performance gaps, and compare current and future states using predefined metrics. (Analyze)	

2015 BoK	2022 BoK Details	Notes
VI.D.2	2. Root cause analysis Define and describe the purpose of root cause analysis, recognize the issues involved in identifying a root cause, and use various tools (e.g., 5 whys, Pareto charts, fault tree analysis, cause and effect diagrams, and A3) to resolve chronic problems. (Analyze)	Added A3
VI.D.3	3. Waste analysis Identify and interpret the seven classic wastes (overproduction, inventory, defects, over-processing, waiting, motion, and transportation) and resource under-utilization. (Analyze)	
<b>VII. Improve [21 Questions]</b>		
VII.A	<b>A. Design of experiments (DOE)</b>	
VII.A.1	1. Terminology Define basic DOE terms, e.g., independent and dependent variables, factors and levels, response, treatment, error, and nested. (Understand)	
VII.A.2	2. Design principles Define and apply DOE principles, e.g., power, sample size, balance, repetition, replication, order, efficiency, randomization, blocking, interaction, confounding, and resolution. (Apply)	
VII.A.3	3. Planning experiments Plan and evaluate DOEs by determining the objective, selecting appropriate factors, responses, and measurement methods, and choosing the appropriate design. (Evaluate)	
VII.A.4	4. One-factor experiments Understand when to use completely randomized, randomized block, and Latin square designs. (Understand)	Decreased cognitive level from Evaluate to Understand
VII.A.5	5. Two-level fractional factorial experiments Understand these types of experiments and describe how confounding can affect their use. (Understand)	Decreased cognitive level from Evaluate to Understand
VII.A.6	6. Full factorial experiments Understand these types of experiments. (Understand)	Decreased cognitive level from Evaluate to Understand
VII.B	<b>B. Lean methods</b>	
VII.B.1	1. Waste elimination Select and apply tools and techniques for eliminating or preventing waste, e.g., pull systems, kanban, 5S, standard work, and poka-yoke. (Analyze)	
VII.B.2	2. Cycle-time reduction Use various tools and techniques for reducing cycle time, e.g., continuous flow, single-minute exchange of die (SMED), and heijunka (production leveling). (Analyze)	
VII.B.3	3. Kaizen Define and distinguish between kaizen and kaizen blitz and describe when to use each method. (Apply)	

2015 BoK	2022 BoK Details	Notes
VII.B.4	4. Other improvement tools and techniques Identify and describe how other process improvement methodologies are used, e.g., theory of constraints (TOC) and overall equipment effectiveness (OEE). (Understand)	
VII.C	<b>C. Implementation</b> Develop plans for implementing proposed improvements, including conducting pilot tests or simulations, and evaluate results to select the optimum solution. (Evaluate)	
	<b>VIII. Control [17 Questions]</b>	Number of questions changed from 15 to 17
VIII.A	<b>A. Statistical process control (SPC)</b>	
VIII.A.1	1. Objectives Explain the objectives of SPC, including monitoring and controlling process performance, tracking trends, runs, and reducing variation within a process. (Understand)	
VIII.A.2	2. Selection of variables Identify and select critical process characteristics for control chart monitoring. (Apply)	
VIII.A.3	3. Rational subgrouping Define and apply the principle of rational subgrouping. (Apply)	
VIII.A.4	4. Control chart selection Select and use control charts in various situations: $\bar{X} - R$ , $\bar{X} - s$ , individual and moving range (ImR), p, np, c, u, short-run SPC, and moving average. (Apply)	
VIII.A.5	5. Control chart analysis Interpret control charts and distinguish between common and special causes using rules for determining statistical control. (Analyze)	
VIII.B	<b>B. Other controls</b>	
VIII.B.1	1. Total productive maintenance (TPM) Define the elements of TPM and describe how it can be used to consistently control the improved process. (Understand)	
VIII.B.2	2. Visual controls Define the elements of visual controls (e.g., pictures of correct procedures, color-coded components, and indicator lights), and describe how they can help control the improved process. (Understand)	
VIII.C	<b>C. Maintain controls</b>	
VIII.C.1	1. Measurement system reanalysis Review and evaluate measurement system capability as process capability improves, and ensure that measurement capability is sufficient for its intended use. (Evaluate)	
VIII.C.2	2. Control plan Develop a control plan to maintain the improved process performance, enable continuous improvement, and transfer responsibility from the project team to the process owner. (Apply)	

2015 BoK	2022 BoK Details	Notes
VIII.D	<b>D. Sustain improvements</b>	
VIII.D.1	1. Lessons learned Document the lessons learned and benefits realized from all phases of a project and identify strategies for reinforcing and replicating improvements. (Apply)	Revised subtext
VIII.D.2	2. Documentation Develop or modify documents including standard operating procedures (SOPs), work instructions, and control plans to ensure that the improvements are sustained over time. (Apply)	
VIII.D.3	3. Training for process owners and staff Develop and implement training plans that are handed off to process owners to ensure consistent execution of revised process methods, KPIs to confirm sustained benefits, and standards to maintain process improvements. (Apply)	Revised subtext
VIII.D.4	4. Ongoing evaluation Identify and apply tools (e.g., control charts and control plans) for ongoing evaluation of the improved process, including monitoring leading indicators, lagging indicators, and additional opportunities for improvement. (Apply)	
	<b>IX. Design For Six Sigma (DFSS) Framework and Methodologies [6 Questions]</b>	Number of questions changed from 7 to 6
IX.A	<b>A. Common DFSS methodologies</b> Identify and describe DMADV (define, measure, analyze, design, and validate) and DMADOV (define, measure, analyze, design, optimize, and validate). (Understand)	
IX.B	<b>B. Design for X (DFX)</b> Describe design constraints, including design for cost, design for manufacturability (producibility), design for test, and design for maintainability. (Understand)	
IX.C	<b>C. Robust designs</b> Describe the elements of robust product design, tolerance design, and statistical tolerancing. (Understand)	

**Table 3. 2015 SSBB BoK mapped to 2022 SSBB BoK**

<b>2015 BoK</b>		<b>2022 BoK</b>		<b>Notes</b>
<b>Code</b>	<b>Label</b>	<b>Code</b>	<b>Label</b>	
<b>I.A.1</b>	Fundamentals of six sigma and lean methodologies	<b>I.A.1</b>	Fundamentals of six sigma and lean methodologies	Updated subtext; added maturity model
<b>I.A.2</b>	Six sigma, lean, and continuous improvement methodologies	<b>I.A.2</b>	Six sigma, lean, and continuous improvement methodologies	
<b>I.A.3</b>	Relationships among business systems and processes	<b>I.A.3</b>	Relationships among business systems and processes	
<b>I.A.4</b>	Strategic planning and deployment for initiatives	<b>I.A.4</b>	Strategic planning and deployment for initiatives	Removed hoshin kanri, portfolio analysis, and PEST; added business planning and ROI
<b>I.B.1</b>	Roles and responsibilities	<b>I.B.1</b>	Roles and responsibilities	Added aspects of coaching and finance's role
<b>I.B.2</b>	Organizational roadblocks and change management	<b>I.B.2</b>	Organizational barriers	Renamed subtopic
--		<b>I.B.3</b>	Change management	Subtext taken from 2015 I.B.2 and revised
<b>II.A</b>	Impact on stakeholders	<b>II.A</b>	Impact on stakeholders	
<b>II.B</b>	Benchmarking	<b>II.B</b>	Benchmarking	
<b>II.C.1</b>	Performance measures	<b>II.C.1</b>	Performance measures	Added KBIs and OKRs
<b>II.C.2</b>	Financial measures	<b>II.C.2</b>	Financial measures	
<b>III.A.1</b>	Team types and constraints	<b>III.A.1</b>	Team types and constraints	
<b>III.A.2</b>	Team roles and responsibilities	<b>III.A.2</b>	Team roles and responsibilities	
<b>III.A.3</b>	Team member selection criteria	<b>III.A.3</b>	Team member selection criteria	
<b>III.A.4</b>	Team success factors	<b>III.A.4</b>	Team success factors	
<b>III.B.1</b>	Motivational techniques	<b>III.B.1</b>	Motivational techniques	
<b>III.B.2</b>	Team stages of development	<b>III.B.2</b>	Team stages of development	
<b>III.B.3</b>	Team communication	<b>III.B.3</b>	Team communication	
<b>III.B.4</b>	Team leadership models	<b>III.B.4</b>	Team leadership models	
<b>III.C.1</b>	Group behaviors	<b>III.C.1</b>	Group behaviors	
<b>III.C.2</b>	Meeting management	<b>III.C.2</b>	Meeting management	
<b>III.C.3</b>	Team decision-making methods	<b>III.C.3</b>	Team decision-making methods	
<b>III.D.1</b>	Needs assessment	<b>III.D.1</b>	Needs assessment	
<b>III.D.2</b>	Delivery	<b>III.D.2</b>	Delivery	
<b>III.D.3</b>	Evaluation	<b>III.D.3</b>	Evaluation	

2015 BoK		2022 BoK		Notes
Code	Label	Code	Label	
IV.A.1	Customer identification	IV.A.1	Customer identification	
IV.A.2	Customer data collection	IV.A.2	Customer data collection	
IV.A.3	Customer requirements	IV.A.3	Customer requirements	
IV.B.1	Business case	IV.B.1	Business case	
IV.B.2	Problem statement	IV.B.2	Problem statement	
IV.B.3	Project scope	IV.B.3	Project scope	
IV.B.4	Goals and objectives	IV.B.4	Goals and objectives	
IV.B.5	Project performance measurements	IV.B.5	Project performance measurements	
IV.B.6	Project charter review	IV.B.6	Project charter review	
IV.C	Project management (PM) tools	IV.C	Project management (PM) tools	
IV.C.1	Gantt charts	IV.C.1	Gantt charts	
IV.C.2	Toll-gate reviews	IV.C.2	Toll-gate reviews	
IV.C.3	Work breakdown structure (WBS)	IV.C.3	Work breakdown structure (WBS)	
IV.C.4	RACI model (responsible, accountable, consulted, and informed)	IV.C.4	RACI model (responsible, accountable, consulted, and informed)	
IV.D	Analytical tools	IV.D	Analytical tools	
IV.D.1	Affinity diagrams	IV.D.1	Affinity diagrams	
IV.D.2	Tree diagrams	IV.D.2	Tree diagrams	
IV.D.3	Matrix diagrams	IV.D.3	Matrix diagrams	
IV.D.4	Prioritization matrices	IV.D.4	Prioritization matrices	
IV.D.5	Activity network diagrams	IV.D.5	Activity network diagrams	
--		IV.D.6	Process decision program chart (PDPC)	New
--		IV.D.7	Interrelationship digraph (ID)	New
V.A.1	Process flow metrics	V.A.1	Process flow metrics	
V.A.2	Process analysis tools	V.A.2	Process analysis tools	Removed circle diagrams
V.B.1	Types of data	V.B.1	Types of data	
V.B.2	Measurement scales	V.B.2	Measurement scales	
V.B.3	Sampling	V.B.3	Sampling	
V.B.4	Data collection plans and methods	V.B.4	Data collection plans and methods	Revised subtext
V.C.1	Measurement system analysis (MSA)	V.C.1	Measurement system analysis (MSA)	Revised subtext; added audit MSA

2015 BoK		2022 BoK		Notes
Code	Label	Code	Label	
V.C.2	Measurement systems across the organization	V.C.2	Measurement systems across the organization	Revised subtext
V.C.3	Metrology	V.C.3	Metrology	
V.D.1	Basic statistical terms	V.D.1	Basic statistical terms	
V.D.2	Central limit theorem	V.D.2	Central limit theorem	
V.D.3	Descriptive statistics	V.D.3	Descriptive statistics	
V.D.4	Graphical methods	V.D.4	Graphical methods	
V.D.5	Valid statistical conclusions	V.D.5	Valid statistical conclusions	
V.E.1	Basic concepts	V.E.1	Basic concepts	Decreased cognitive level from Apply to Understand
V.E.2	Distributions	V.E.2; V.E.3	Common distributions; Additional distributions	2015 V.E.2 split into two subtopics; Additional distributions cognitive level decreased from Evaluate to Understand
V.F.1	Process capability indices	V.F.1	Process capability indices	
V.F.2	Process performance indices	V.F.2	Process performance indices	
V.F.3	General process capability studies	V.F.3	General process capability studies	
V.F.4	Process capability for attributes data	V.F.4	Process capability for attributes data	
V.F.5	Process capability for non-normal data	V.F.5	Process capability for non-normal data	
V.F.6	Process performance vs. specification	V.F.6	Process performance vs. specification	Updated subtext
V.F.7	Short-term and long-term capability	V.F.7	Short-term and long-term capability	
VI.A.1	Correlation coefficient	VI.A.1	Correlation coefficient	
VI.A.2	Linear regression	VI.A.2	Linear regression	
VI.A.3	Multivariate tools	VI.A.3	Multivariate tools	Revised subtext; decreased cognitive level from Evaluate to Understand
VI.B.1	Terminology	VI.B.1	Terminology	
VI.B.2	Statistical vs. practical significance	VI.B.2	Statistical vs. practical significance	
VI.B.3	Sample size	VI.B.3	Sample size	
VI.B.4	Point and interval estimates	VI.B.4	Point and interval estimates	
VI.B.5	Tests for means, variances, and proportions	VI.B.5	Tests for means, variances, and proportions	
VI.B.6	Analysis of variance (ANOVA)	VI.B.6	Analysis of variance (ANOVA)	
VI.B.7	Goodness-of-fit (chi square) tests	VI.B.7	Goodness-of-fit (chi square) tests	



2015 BoK		2022 BoK		Notes
Code	Label	Code	Label	
<b>VI.B.8</b>	Contingency tables			Removed
<b>VI.B.9</b>	Non-parametric tests			Removed
<b>VI.C</b>	Failure mode and effects analysis (FMEA)	<b>VI.C.1;</b> <b>VI.C.2</b>	Types of risk; Failure mode and effects analysis (FMEA)	2015 VI.C split into two subtopics; Types of risk new to BoK
<b>VI.D.1</b>	Gap analysis	<b>VI.D.1</b>	Gap analysis	
<b>VI.D.2</b>	Root cause analysis	<b>VI.D.2</b>	Root cause analysis	Added A3
<b>VI.D.3</b>	Waste analysis	<b>VI.D.3</b>	Waste analysis	
<b>VII.A.1</b>	Terminology	<b>VII.A.1</b>	Terminology	
<b>VII.A.2</b>	Design principles	<b>VII.A.2</b>	Design principles	
<b>VII.A.3</b>	Planning experiments	<b>VII.A.3</b>	Planning experiments	
<b>VII.A.4</b>	One-factor experiments	<b>VII.A.4</b>	One-factor experiments	Decreased cognitive level from Evaluate to Understand
<b>VII.A.5</b>	Two-level fractional factorial experiments	<b>VII.A.5</b>	Two-level fractional factorial experiments	Decreased cognitive level from Evaluate to Understand
<b>VII.A.6</b>	Full factorial experiments	<b>VII.A.6</b>	Full factorial experiments	Decreased cognitive level from Evaluate to Understand
<b>VII.B.1</b>	Waste elimination	<b>VII.B.1</b>	Waste elimination	
<b>VII.B.2</b>	Cycle-time reduction	<b>VII.B.2</b>	Cycle-time reduction	
<b>VII.B.3</b>	Kaizen	<b>VII.B.3</b>	Kaizen	
<b>VII.B.4</b>	Other improvement tools and techniques	<b>VII.B.4</b>	Other improvement tools and techniques	
<b>VII.C</b>	Implementation	<b>VII.C</b>	Implementation	
<b>VIII.A.1</b>	Objectives	<b>VIII.A.1</b>	Objectives	
<b>VIII.A.2</b>	Selection of variables	<b>VIII.A.2</b>	Selection of variables	
<b>VIII.A.3</b>	Rational subgrouping	<b>VIII.A.3</b>	Rational subgrouping	
<b>VIII.A.4</b>	Control chart selection	<b>VIII.A.4</b>	Control chart selection	
<b>VIII.A.5</b>	Control chart analysis	<b>VIII.A.5</b>	Control chart analysis	
<b>VIII.B.1</b>	Total productive maintenance (TPM)	<b>VIII.B.1</b>	Total productive maintenance (TPM)	
<b>VIII.B.2</b>	Visual controls	<b>VIII.B.2</b>	Visual controls	
<b>VIII.C.1</b>	Measurement system reanalysis	<b>VIII.C.1</b>	Measurement system reanalysis	
<b>VIII.C.2</b>	Control plan	<b>VIII.C.2</b>	Control plan	
<b>VIII.D.1</b>	Lessons learned	<b>VIII.D.1</b>	Lessons learned	Revised subtext
<b>VIII.D.2</b>	Documentation	<b>VIII.D.2</b>	Documentation	

2015 BoK		2022 BoK		Notes
Code	Label	Code	Label	
<b>VIII.D.3</b>	Training for process owners and staff	<b>VIII.D.3</b>	Training for process owners and staff	Revised subtext
<b>VIII.D.4</b>	Ongoing evaluation	<b>VIII.D.4</b>	Ongoing evaluation	
<b>IX.A</b>	Common DFSS methodologies	<b>IX.A</b>	Common DFSS methodologies	
<b>IX.B</b>	Design for X (DFX)	<b>IX.B</b>	Design for X (DFX)	
<b>IX.C</b>	Robust designs	<b>IX.C</b>	Robust designs	