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Competency Unit: Exemplar Global – SSB – Six Sigma Black Belt

How to use this document

The purpose of this Competency Unit is to give Training Providers detailed information on the performance criteria required for the development and delivery of the **Exemplar Global-Six Sigma Black Belt** examination.

A **Training Provider** is someone who has received the Exemplar Global Training Provider and Examiner Certification Scheme (TPECS) certification for the development and delivery of the **Exemplar Global-SSB examination**.

A Six Sigma Black Belt is a professional that works closely with department heads, sponsors, and senior executives to identify areas of strategic importance using a wide range of techniques and skills to overcome challenges to a company where breakthrough projects need to be implemented.

To pass the **Exemplar Global-SSB examination** an individual must show evidence that they have adequate skills in the nine (9) areas of Competencies shown in the tables below. These individuals show competency by meeting the performance criteria shown in the second column. Training Providers are responsible for ensuring that these individuals provide adequate evidence of the performance criteria, according to the Evidence Guide.

Training Providers use an accompanying Examination Profile to document how evidence will be collected and are authorized to administer the TPECS Competency Unit examination through their TPECS certification.

All TPECS examinations will measure the performance criteria shown in this competency unit as written.

Competency	Performance Criteria	Evidence Guide
<p>1. Lead DMAIC (Define, Measure, Analyze, Improve, Control) Projects – Apply Leadership</p>	<p>1.1: Understand leadership responsibilities in the deployment of Six Sigma:</p> <ul style="list-style-type: none"> • Providing resources • Managing change • Communicating ideas <p>1.2: Describe and identify organizational roadblocks:</p> <ul style="list-style-type: none"> • Lack of resources • Management support • Recovery techniques • Change management techniques <p>1.3: Use team formation theories:</p> <ul style="list-style-type: none"> • Team types and constraints • Team roles • Team member selection • Launching teams 	<p>Describe the responsibilities of executive leaders and how they affect the deployment of Six Sigma in terms of providing resources, managing change, and communicating ideas.</p> <p>Describe various techniques for facilitating and managing organizational change.</p> <p>Describe the impact an organization’s culture and inherent structure can have on the success of Six Sigma, and how deployment failure can result from the lack of resources, management support, etc.</p> <p>Describe various techniques to overcome these barriers.</p> <p>Describe techniques that motivate team members and support and sustain their participation and commitment.</p> <p>Facilitate a team through the classic stages of development: forming, storming, norming, performing and adjourning.</p>

Competency	Performance Criteria	Evidence Guide
2. Lead DMAIC Projects, Manage Projects	<p>2.1: Define benchmarking, performance and financial measures:</p> <ul style="list-style-type: none"> • Best practice • Competitive • Collaborative • Score cards • KPI's • COQ • ROI • NPV <p>2.2: Utilize time management for teams.</p> <p>2.3: Understand management and planning tools</p> <p>2.4: Collect customer data using various methods:</p> <ul style="list-style-type: none"> • Surveys • Focus groups • Interviews observations 	<p>Define and distinguish between various types of benchmarking, including best practices, competitive, and collaborative.</p> <p>Define various business performance measures, including balanced scorecard, key performance indicators (KPIs), and the financial impact of customer loyalty.</p> <p>Define financial measures, such as: revenue growth, market share, margin, cost of quality (COQ), net present value (NPV), return on investment (ROI), and cost-benefit analysis.</p> <p>Employ various time management techniques including: publishing agendas with time limits on each entry, adhering to the agenda, requiring pre-work by attendees, ensuring that the right people and resources are available.</p> <p>Define, select and apply tools such as: affinity diagrams, tree diagrams, process decision program charts (PDPC), matrix diagrams, interrelationship diagrams, prioritization matrices and activity network diagrams.</p> <p>Use various methods to collect customer feedback (e.g., surveys, focus groups, interviews, observation) and identify the key elements that make these tools effective.</p>

Competency	Performance Criteria	Evidence Guide
3. Lead DMAIC Projects, Coaching	3.1: Understand team facilitation: <ul style="list-style-type: none"> • Team motivation • Team stages • Team communication • Team Dynamics 3.2: Define and use team performance evaluation and reward. 3.3: Analyze customer data using various methods: <ul style="list-style-type: none"> • Graphical • Statistical • Qualitative tools 	Identify and use appropriate communication methods (both within the team and from the team to various stakeholders) to report progress, conduct milestone reviews and support the overall success of the project. Identify and use various techniques (e.g., coaching, mentoring, intervention, etc.) to overcome various group dynamic challenges, including overbearing/dominant or reluctant participants, feuding and other forms of unproductive disagreement, unquestioned acceptance of opinions as facts, groupthink, floundering, rushing to accomplish or finish, digressions, tangents, etc. Use graphical, statistical, and qualitative tools to analyse customer feedback. Assist in translating customer feedback into project goals and objectives, including critical to quality (CTQ) attributes and requirements statements.
4 Lead DMAIC Projects, Facilitate Change	4.1: Identify resistance to change. 4.2: Implement a plan to counter resistance to change. 4.3: Identify customers: <ul style="list-style-type: none"> • Identify customers • Classify customers 	Conduct an analysis to find restrainers and drivers to change. Outline steps taken that address issues identified at analysis, discussing: <ul style="list-style-type: none"> • Stakeholder management • Communications plans • Organizational readiness for change Identify and classify internal and external customers as applicable to a particular project, and describe how projects impact customers.
5: Lead DMAIC Projects, Define	5.1: Outline process elements: <ul style="list-style-type: none"> • Components • Boundaries 	Describe process components and boundaries. Recognize how processes cross various functional areas and the challenges that result for process improvement efforts.

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	<p>5.2: Identify owners and stakeholders:</p> <ul style="list-style-type: none"> • Process owners • Suppliers • Internal customers • External customers <p>5.3: Analyze customer data using various methods:</p> <ul style="list-style-type: none"> • Graphical • Statistical • Qualitative tools <p>5.4: Outline the project charter and project statement:</p> <ul style="list-style-type: none"> • Project elements • Problem statement <p>5.5: Develop the project scope using:</p> <ul style="list-style-type: none"> • Definitions • Pareto charts • Process maps <p>5.6: Develop the project metrics using:</p> <ul style="list-style-type: none"> • Primary metrics • Consequential metrics • Key project metrics <p>5.7: Apply project planning tools:</p> <ul style="list-style-type: none"> • Gantt charts • CPM • Pert 	<p>Identify process owners, internal and external customers, and other stakeholders in a project.</p> <p>Use voice of the customer analysis tools such as quality function deployment (QFD) to translate customer requirements into performance measures.</p> <p>Describe elements of a project charter and develop a problem statement, including baseline and improvement goals.</p> <p>Undertake the development of project definition/scope using Pareto charts and process maps.</p> <p>Undertake the development of primary and consequential metrics (e.g., quality, cycle time and cost) and establish key project metrics that relate to the voice of the customer.</p> <p>Use project tools such as Gantt charts, critical path method (CPM), and program evaluation and review technique (PERT) charts, and activity network diagrams.</p> <p>Provide input and select the proper vehicle for presenting project documentation (e.g., spreadsheet output, storyboards, etc.) at phase reviews, management reviews and other presentations.</p> <p>Describe the purpose and benefit of project risk analysis, including resources, financials, impact on customers and other stakeholders.</p> <p>Describe the objectives achieved and apply the lessons learned to identify additional opportunities. Present findings in a clear, concise manner.</p> <p>Define, select, and use affinity diagrams, interrelationship digraphs, tree diagrams, prioritization matrices, matrix diagrams, process decision program (PDPC) charts, and activity network diagrams.</p> <p>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.</p>

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	<p>5.8: Record project documentation:</p> <ul style="list-style-type: none"> • Spreadsheets • Story boards <p>5.9: Define and utilize project risk analysis:</p> <ul style="list-style-type: none"> • Purpose • Benefits • Impacts <p>5.10: Describe Project milestones in terms of:</p> <ul style="list-style-type: none"> • Objectives vs. outcomes • Lessons learned • Opportunities <p>5.11: Define, select and use management planning tools.</p> <p>5.12: Calculate process performance</p> <p>5.13: Define Tollgate review</p> <p>5.11: Define, select and use management planning tools.</p> <p>5.12: Calculate process performance</p> <p>5.13: Define Tollgate review</p>	<p>Present findings of the define stages in a concise manner.</p>

Competency	Performance Criteria	Evidence Guide
6: Lead DMAIC Projects, Measure	<p>6.1: Define and describe measurement and metrology:</p> <ul style="list-style-type: none"> • Continuous data • Discrete data • Elements of metrology • Calibration • Traceability to reference standards • Standards and measurement devices <p>6.2: Identify use of measurement systems in enterprise.</p> <p>6.3: Employ basic probability concepts:</p> <ul style="list-style-type: none"> • Independence • Mutually exclusive • Multiplication rules <p>6.4: Implement a measurement systems analysis tool.</p> <p>6.5: Use appropriate software for analysis and project completion.</p> <p>6.6: Measure Tollgate review</p>	<p>Define and describe measurement methods for both continuous and discrete data.</p> <p>Define and describe elements of metrology, including calibration systems, traceability to reference standards, the control and integrity of standards and measurement devices.</p> <p>Identify how measurement systems can be applied in marketing, sales, engineering, research and development (R&D), supply chain management, customer satisfaction and other functional areas.</p> <p>Describe and apply concepts such as independence, mutually exclusive, and multiplication rules.</p> <p>Calculate, analyze, and interpret measurement system capability using repeatability and reproducibility (GR&R), measurement correlation, bias, linearity, percent agreement, and precision/tolerance (P/T).</p> <p>Understand advanced techniques for analysis using statistical and other data analysis software.</p> <p>Present findings of the measure stages in a concise manner.</p>

Competency	Performance Criteria	Evidence Guide
7: Lead DMAIC Projects, Analyze	<p>7.1: Undertake hypothesis testing:</p> <ul style="list-style-type: none"> • Basics • Tests for means, variances, and proportions • Paired-comparison tests • Single-factor analysis of variance (ANOVA) • Chi square <p>7.2: Select and use contingency tables.</p> <p>7.3: Identify and handle non-normal data.</p> <p>7.4: Use various tools and techniques to analyze data:</p> <ul style="list-style-type: none"> • Gap analysis • Root cause analysis • Waste analysis <p>7.5: Analyze Tollgate review</p>	<p>Define and distinguish between statistical and practical significance and apply tests for significance level, power, type I and type II errors.</p> <p>Determine appropriate sample size for various tests.</p> <p>Define paired-comparison parametric hypothesis tests.</p> <p>Define terms related to one-way ANOVAs and interpret their results and data plots.</p> <p>Define and interpret chi square and use it to determine statistical significance.</p> <p>Select, develop and use contingency tables to determine statistical significance.</p> <p>Recognition of non-normal data.</p> <p>Select, develop and use various non-parametric tests, including Mood's Median, Levene's test, Kruskal-Wallis, and Mann-Whitney.</p> <p>Use various tools and techniques (gap analysis, scenario planning, etc.) to compare the current and future state in terms of pre-defined metrics.</p> <p>Define and describe the purpose of root cause analysis, recognize the issues involved in identifying a root cause, and use various tools (e.g., the 5 whys, Pareto charts, fault tree analysis, cause and effect diagrams) for resolving chronic problems.</p> <p>Identify the 7 classic wastes (overproduction, inventory, defects, over-processing, waiting, motion and transportation) and other forms of waste such as resource under-utilization.</p> <p>Present findings of the analyze stages in a concise manner.</p>

Competency	Performance Criteria	Evidence Guide
8: Lead DMAIC Projects, Improve	<p>8.1: Describe Design of Experiments (DOE):</p> <ul style="list-style-type: none"> • Basic terms • Main effects • Design principles • Planning experiments • One-factor experiments • Two-level fractional factorial experiments • Full factorial experiments <p>8.2: Select and apply various reduction, elimination and mitigation tools:</p> <ul style="list-style-type: none"> • Waste elimination • Cycle-time reduction • Kaizen and kaizen blitz • Risk analysis <p>8.3: Develop plans for implementing improved process.</p>	<p>Define basic DOE terms such as independent and dependent variables, factors and levels, response, treatment, error, repetition, and replication.</p> <p>Interpret main effects and interaction plots.</p> <p>Apply to design the DOE principles, including power and sample size, balance, repetition, replication, order, efficiency, randomization, blocking, interaction, confounding, and resolution.</p> <p>Plan, organize and evaluate experiments by determining the objective, selecting factors, responses and measurement methods, and choosing the appropriate design.</p> <p>Design and conduct completely randomized, randomized block and Latin square designs and evaluate their results.</p> <p>Design, analyze and interpret these types of experiments and describe how confounding affects their use.</p> <p>Design, conduct and analyze full factorial experiments.</p> <p>Select and apply tools and techniques for eliminating or preventing waste, including pull systems, kanban, 5S, standard work, and poka-yoke.</p>
		<p>Use various tools and techniques for reducing cycle time, including continuous flow and single-minute exchange of die (SMED). Distinguish between these two methods and apply them in various situations.</p> <p>Use tools such as feasibility studies, SWOT analysis (strengths, weaknesses, opportunities and threats), PEST analysis (political, environmental, social and technological) and consequential metrics to analyze and mitigate risk.</p> <p>Develop plans for implementing the improved process (i.e., conduct pilot tests, simulations), and evaluate results to select the optimum solution.</p>

Competency	Performance Criteria	Evidence Guide
9: Lead DMAIC Projects, Control	9.1: Understand other tools for control and maintenance: <ul style="list-style-type: none"> • TPM • Visual factory • Measurement system reanalysis • Control plan 9.2: Understand how to sustain improvements: <ul style="list-style-type: none"> • Lessons learned • Training plan deployment • Documentation • Ongoing evaluation 	Define the elements of TPM and describe how it can be used to control the improved process. Define the elements of a visual factory and describe how they can help control the improved process. Review and evaluate measurement system capability as process capability improves, and ensure that measurement capability is sufficient for its intended use. Develop a control plan for ensuring the ongoing success of the improved process including the transfer of responsibility from the project team to the process owner. Document the lessons learned from all phases of a project and identify how improvements can be replicated and applied to other processes in the organization
	9.3: Understand Financial Review/Validation	Develop and implement training plans to ensure continued support of the improved process. Develop or modify documents including standard operating procedures (SOPs), work instructions, etc., to ensure that the improvements are sustained over time. Identify and apply tools for ongoing evaluation of the improved process, including monitoring for new constraints and additional opportunities for improvement. Describe methods of Savings/Improvement validation by an independent entity (Financial Analyst).