Quality Guideline

Training Program

Six Sigma Green Belt
Training

six sigma club

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European
Six Sigma Club Deutschland e.V.
www.sixsigmaclub.de

Contents

Foreword

Background

This guideline places the current discussion about standards in Six Sigma expert training in the historical context of the training discourse of the last 20 years, in which the content and duration of the training and the teaching depth achieved were increasingly determined at will by the training companies. It was not uncommon for training development to be focussed exclusively on the economic interests of the training companies, contrary to the final qualification of the training participants.

The unintended side effects of this training approach are a significant reduction in the number of training hours, leading to an insufficient teaching depth of the topics at the end of the training.

The consequences are insufficient expertise in project work and a lack of comparability of expert knowledge on the market. This makes it almost impossible for a client to correctly assess the different qualifications.

In practice, the expertise required of a Six Sigma Green Belt-trained specialist has also changed considerably.

Until a few years ago, a Green Belt was understood to be a person who performs certain support functions within a Green Belt project. Today, a Green Belt is understood to be a person who, through extended training, should be able to act as a Six Sigma project manager using less complex analysis tools. If necessary, they consult a Black Belt or Master Black Belt for more complex analysis.

In this function, he leads the team organisationally and methodically, prepares necessary analysis with the support of a coach if necessary and reports on the progress of the project to the client/process owner/sponsors or to the responsible committee.

Origin

In a closed meeting of the board of the European Six Sigma Club - Deutschland e.V. of March 2008 a list of training content describing the minimum requirements for Six Sigma Green Belt training was created.

Subsequently, a quality standard was developed together with the members of the association, which was finalised at a closed meeting in Kassel in November 2008.

At this same closed meeting, the minimum requirements were approved as quality guidelines of the European Six Sigma Club -Deutschland e.V. and made binding.

Changes

The following changes have been made compared to the version dated 19 July 2017:

a) Adaptation of the document layout to the new design
b) Supplementary data mining advanced course (recommended additional training).

Previous issues

Version from July 19th, 2017

Version from November 22nd, 2014

Version from August 28th, 2012

Version from August 15th, 2011

Version from December 14th, 2008

Abbreviations

6S	Six Sigma
ANOVA	Analysis of Variance
BB	Black Belt
C&E	Cause and Effect
DMAIC	Define - Measure - Analyze - Improve - Control
ESSC-D	European Six Sigma Club Germany e.V.
GB	Green Belt
K	Kick-off
MBB	Master Black Belt
SIPOC	Supplier - Input - Process - Output - Control
SMBB	Senior Master Black Belt
VOC	Voice of Customer

Terms

Quality Guideline	Guideline for ensuring the desired quality in the result
Sponsor	Usually a member of middle management. Supports the project manager and team in completing the tasks.

1 Area of application

The guideline describes the minimum requirements for Six Sigma Green Belt training. The type, scope and teaching depth are described in classified form and are used for comparison with existing or newly developed training courses.

If the training to be assessed fulfils the criteria described below, this is the basic requirement for the expert to be certified as a Six Sigma Green Belt in accordance with the guidelines of the European Six Sigma Club Deutschland e.V.

2 Introduction

The following guideline is divided into project phases and a general section, but this does not mean that the tools must be trained in the specified phase.

As many tools can be used in several phases, it is the trainer's responsibility to convey the content at the appropriate time according to the didactics used.

3 Training duration

For the Six Sigma Green Belt training program, a minimum of 8 days of instruction with a minimum of 80 teaching units (TU) of 45 minutes each plus breaks must be completed to teach the content described below and to achieve the required teaching depth.

Typically, training consist of 10 teaching days with a total of 100 teaching units of 45 minutes each plus breaks.

At universities, it is allowed to achieve the required level of instruction by dividing the teaching units between attendance time (lecture) and a proportion of self-study. The maximum permissible proportion of self-study is 25% of the total teaching units, based on the minimum scope of the standard training course described above (80 units). The teaching units to be completed in self-study are calculated with a factor of three. For the Six Sigma Green Belt training, this results in 60 teaching units of attendance time and an additional 60 teaching units (20x3) of self-study, assuming maximum utilisation of the self-study rate of 25% and a minimum number of teaching units.

For a certificate of attendance to be issued to the participant, the participant must have attended at least 85% of the total number of hours planned for this training course.

4 Training content, project phase-orientated

4.1 Kick-off (K)

- Six Sigma background and basics
- DMAIC phase structure
- Project management basics

4.2 DEFINE (D)

- Task sheet (also called project order, team charter, project charter)
- SIPOC
- VOC (Voice of Customer)

4.3 MEASURE (M)

- Fundamentals of statistics (mean value, median, range, standard deviation, variance, determination of proportions)
- Histogram
- Boxplot
- Time series diagram (progression diagram)
- Control chart
- Pareto diagram
- Multivariate chart (main effect and interaction)
- Scatterplot (also called XY diagram or scatterplot)
- Matrix plot
- Flowchart
- Output/input collection
- Ishikawa diagram (fishbone diagram, cause and effect diagram, C&E diagram)
- Cause and effect matrix (also known as C&E matrix)
- Data collection plan
- Measurement system analysis (for measured values and attributes)
- Distribution test (e.g. normal distribution test)
- Process capability analysis (for continuous data)
- Sigma level calculation (Sigma Level)

4.4 ANALYSIS (A)

- Confidence interval
- Test for equality of variance (two or more samples)
- t-test for two samples
- Simple analysis of variance (one-way ANOVA)
- Chi-square test
- Correlation analysis
- Simple linear and non-linear regression

4.5 IMPROVE (I)

- Brainstorming
- Decision matrix
- FMEA for solution risks
- Action plan
- Data analysis of the solution piloting
- Process capability of the solution pilot

4.6 CONTROL (C)

- Data analysis of the solution (before/after)
- Hypothesis tests of the solution (before/after)
- Process capability of the solution (before/after)
- Individual control chart
- Two-track average/scatter map (Xquer/R or Xquer/s)
- Control plan
- Final project report (incl. standardisation)
- Field report

5 Scope and objectives of the individual topics

The topics, methods and tools defined above describe the minimum content required for the training. In this section, the scope and objectives of these topics are specified based on classifications. The result of the respective training must reach the specified class or higher to comply with the guideline.

5.1 Classification legend

5.1.1 Classification for the scope (delivery)

Class	Meaning
A	Method was explained
B	Method was shared
C	Method was practised alone or in a group
D	Method was practised including feedback on the exercise

5.1.2 Classification of targets

Class	Meaning
1	The participant has understood the principle of the application
2	"1" and participant can select & use tool
3	"2" and participant can interpret important results
4	"3" and participant knows the calculation background in detail
5	"4" and participant can also calculate the result manually

5.2 Classification for Six Sigma Green Belt Training

Topic	Phase	Scope(delivery)	Goal
Six Sigma background and basics	K	A	1
DMAIC phase structure	K	A	1
Basics of project management	K	A	2
Task sheet (also called project order, team charter, project charter)	D	D	2
SIPOC	D	D	2
VOC (Voice of Customer)	D	A	1
Fundamentals of statistics (mean value, median, range, standard deviation, variance, determination of proportions)	M	C	5
Histogram	M	C	3
Boxplot	M	C	4
Time series diagram (progression diagram)	M	C	3
Control chart	M	C	3
Pareto diagram	M	C	4
Multivariate chart (main effect and interaction)	M	C	5
Scatterplot (also called XY diagram or scatterplot)	M	C	4
Matrix plot	M	C	3
Flowchart	M	C	3
Output/input collection	M	D	3
Ishikawa diagram (fishbone diagram, cause and effect diagram, C&E diagram)	M	B	3
Cause and effect matrix (also known as C&E matrix)	M	B	5
Data collection plan	M	C	2
Measurement system analysis (for measured values and attributes)	M	D	3

Distribution test (e.g. normal distribution test)	M	D	3
Process capability analysis (for continuous data)	M	C	3
Sigma level calculation (Sigma Level)	M	B	3
Confidence interval	A	C	3
Test for equal variance (two or more samples)	A	C	3
t-test for two samples	A	C	3
Simple analysis of variance (one-way ANOVA)	A	B	3
Chi-square test	A	B	3
Correlation analysis	A	C	3
Simple linear and non-linear regression	A	D	3
Brainstorming	I	B	2
Decision matrix	I	A	3
FMEA for solution risks	I	A	2
Action plan	I	A	2
Data analysis of the solution pilot	I	A	3
Process capability of the solution pilot	I	A	3
Data analysis of the solution (before/after)	C	A	3
Hypothesis tests of the solution (before/after)	C	C	3
Process capability of the solution (before/after)	C	B	3
Individual control chart	C	B	3
Two-track average/scatter map (Xquer/R or Xquer/s)	C	B	3
Control plan	C	A	2
Final project report (incl. standardisation)	C	A	2
Field report	C	A	2

6 Recommended additional qualification

In addition to our social environment, digitalisation is also changing the way we communicate and work. The key benefit of digitalisation does not lie in the increase in convenience and efficiency, the improved use of resources, environmental protection or process optimisation. Rather, it lies in the enormous gain in transparency and data, which makes it possible to initiate and automate the process of learning and continuous improvement and take it to a new level.

The opportunities and challenges arising from digitalisation have long since found their way into Six Sigma. Not only is more data from an increasing number of sources of varying quality available in an ever-shorter time, but the possibilities for process optimisation and control have also increased. The ESSC-D working group "Six Sigma Thinking Ahead" has gathered well-founded cross-industry experience, put the Six Sigma toolbox to the test and added essential tools for the future-proof belt and all those interested in quality management in the age of digitalisation and big data.

These include, among others:

- Different project management methods
- Preparation of structured and unstructured data as well as large amounts of data
- Visualisation options for complex data structures
- Common methods of data science (or data mining)
- Possibilities and limits of artificial intelligence (AI) and machine learning (ML)
- Application and use of developed correlation models

Further information and recommended training depths can be found in detail here:
https://www.sixsigmaclub.de/download/ESSCD_QualityGuideLine_DM_Aufbaukurs_DE.pdf

"Learning is like rowing against the current. If you stop, you drift backwards."
(Laozi, Chinese philosopher, 6th century BC)