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Quantitative methods in process improvement — Six Sigma —

Part 2: Tools and techniques

Méthodes quantitatives dans l'amélioration de processus — Six Sigma —

Partie 2: Outils et techniques

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 13053-2 was prepared by Technical Committee ISO/TC 69, *Applications of statistical methods*, Subcommittee SC 7, *Applications of statistical and related techniques for the implementation of Six Sigma*.

ISO 13053 consists of the following parts, under the general title *Quantitative methods in process improvement — Six Sigma*:

— *Part 1: DMAIC methodology*

— *Part 2: Tools and techniques*

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Introduction

Six Sigma[1)] is an approach developed for businesses and organizations seeking to gain a competitive advantage. Six Sigma practices are designed to be instrumental in

— driving process improvement and making statistically based decisions,

— measuring business results with a level of reliance,

— provisioning for uncertainty and error,

— combining high returns and benefits in the short, medium and long run, and

— removing the waste from any process.

The sigma score (written Z_{value}) is an indicator of process quality that expresses process performance in terms of an ability to provide a product or a service that meets customer and third party specifications and expectations. It is directly related to either

a) the proportion of good or positive outputs (yield) provided by a process, or

b) the proportion of poor or negative outputs [%, ppm or defects per million opportunities (DPMO)] from a process.

The following table translates the Z_{value} as the proportion of defects that might be expected.

Table 1 — Sigma scores

Calculated value of DPMO (Y_{DPMO})	**Sigma score** (Z_{value})
308 538,0	2
66 807,0	3
6 210,0	4
233,0	5
3,4	6
NOTE 1 A full table of sigma scores can be found in ISO 13053-1:2011, Annex A.	
NOTE 2 Calculations are based on a 1,5 sigma shift of the mean.	

1) Six Sigma is a trade mark of Motorola, Inc.

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Quantitative methods in process improvement — Six Sigma —

Part 2:
Tools and techniques

1 Scope

This part of ISO 13053 describes the tools and techniques, illustrated by factsheets, to be used at each phase of the DMAIC approach.

The methodology set out in Part 1 of ISO 13053 is generic and remains independent of any individual industrial or economic sector. This makes the tools and techniques described in this part applicable to any sector of activity and any size business seeking to gain a competitive advantage.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
benchmarking
method for comparing the performance of the leading organizations in a market segment

2.2
brainstorming
group creativity technique designed to generate a large number of ideas

2.3
cause and effect diagram
Ishikawa diagram
fishbone diagram
visual tool often used with brainstorming for the logical organization of potential causes of a problem

2.4
common cause
source of process variation that is inherent in a process over time

2.5
confidence interval
interval within which a parameter to be estimated can be expected to lie with a probability of $\geq 1 - \alpha$, e.g. generally 95 % or 99 %

2.6
continuous data
data that have been measured on a scale and that can be subdivided

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