



## Design for Six Sigma (DfSS)

### Why

Six Sigma as a whole, seeks to improve processes and systems through variability reduction. The DMAICT Six Sigma process relies upon the collection and subsequent analysis of that data in order to identify the main causes of variation in order to identify an improvement. DfSS gives a methodology that can be used in situations where the process to be studied does not yet exist and cannot therefore be measured which prevents DMAICT Six Sigma from being used.

### What

DfSS is a methodology to identify the needs of the customer and the business and then producing an optimised process and/or system to achieve this. Although there are exceptions, companies usually deploy DMAICT Six Sigma prior to DfSS. This is because DMAICT produces faster results as it is improving an existing process, whereas DfSS may be improving a product or process that is years into the future. DMAICT therefore allows a business to gain confidence in Six Sigma as a whole and to rapidly recoup any set up costs involved in starting such a programme.

DfSS helps to identify the specific parameters which are critical to be well controlled within the design of a new product, service or process.

### How

DfSS starts by defining the product, service or process of which the design is to be optimised and identifies the needs of the customer and the measure of success of the process or system.

An equation  $Y=f(x)$  is then produced that models the output of the system based upon its inputs.

Each input is varied, allowing the effect on the output to be quantified. This identifies which inputs the output is most sensitive to. This allows optimised target values of the inputs to be set in addition to the specification limits, based upon the required output. It is interesting that some inputs may be found to be insignificant and may even be allowed to be widened. Other inputs will need to be tightly controlled if the system cannot be made robust against them. Work done to make sure that the tighter specifications on these key inputs are met, may include the need for a series of DMAICT projects to be run. Ultimately, the model and optimum solution should be verified by building the system.

The phases used by companies within DfSS vary much more than for DMAICT which tends (in most cases) to be DMAIC with an occasional suffix representing some form of project identification and a prefix representing some form of replication across the business.

Examples of DfSS phases include:

**Identify, Design, Optimise, Verify** (*usually applied for products or services*)

**Define, Measure, Analyse, Design and Verify** (*usually applied for processes*)

**Define, Characterise, Optimise and Verify**