

: How is Six Sigma related to DSS?

For some readers Six Sigma may seem totally unrelated to Decision Support Systems. Others may not be quite certain what exactly "Six Sigma" means. Until summer of 2004, I had both of these perspectives. During the Crystal Ball 2004 User Conference, I attended a session on using Crystal Ball for Six Sigma and I talked to some Six Sigma Master Black Belts. Since then I've been trying to learn more about Six Sigma and how DSS might help. I've made some progress.

Six Sigma is linked to statistical quality control, process design, process improvement and the overall quality movement. According to the Six Sigma glossary at Motorola University, Six Sigma was "invented by Motorola, Inc. in 1986 as a metric for measuring defects and improving quality. Since then, it has evolved to a robust business improvement methodology that focuses an organization on customer requirements, process alignment, analytical rigor and timely execution." Motorola views Six Sigma as a metric, a methodology, and a management system. After Motorola won the Malcolm Baldrige Quality Award in 1988, other company leaders were eager to learn about Six Sigma. Motorola executives traveled the world teaching Six Sigma to other organizations. Check for Six Sigma at www.motorola.com. In recent years, Motorola has renewed its commitment to Six Sigma. In an interview at onesixsigma.com, Bob Galvin, former Motorola CEO states, "The Six Sigma and process improvement initiatives were attenuated in the mid-1990's due to company growth. However, they are being restored currently. The way they are being applied today is somewhat different. The programme is now called Six Sigma Digital. People who are advocating it and living it are very enthusiastic about it. There is a personal vitality to the entire programme that comes through Chris Galvin, Chairman and CEO and Mike Zafirovski, President and COO. They have truly personalised it."

In addition to Motorola, many major companies use Six Sigma concepts. The GE website (www.ge.com) notes "Globalization and instant access to information, products and services continue to change the way our customers conduct business. Today's competitive environment leaves no room for error. We must delight our customers and relentlessly look for new ways to exceed their expectations. This is why Six Sigma Quality has become a part of our culture." According to materials at 3M United States, "In recent years, 3M has become one of the world's major adopters and proponents of Six Sigma methodology. At 3M, Six Sigma has proved that fundamental process change leads to higher quality output, increased productivity and energized employees. Today, we have more than 30,000 employees trained, with plans to complete Green Belt training for all salaried employees by the end of 2004 — including, of course, the entire Industrial Business sales force and technical teams. Globally, over 11,000 projects have closed and more than 12,000 projects are currently underway."

Six Sigma has its own specialized jargon and acronyms -- DMADV, DFSS and DMAIC. The Motorola University Six Sigma Dictionary is a good starting place. DMAIC is an acronym for "Define opportunity, Measure performance, Analyze opportunity, Improve performance, and Control performance". DMAIC is the prescribed Six Sigma problem-solving framework for improving business processes. DFSS is an acronym for "Design for Six Sigma" which is a "proactive approach to building Six Sigma performance into the up front design of a new product, service or process." DMADV is the "most popular Six Sigma framework used within DFSS projects." DMADV is an acronym for "Define requirements, Measure performance, Analyze relationships, Design solutions, Verify functionality." So DMAIC is for process improvement and DFSS/DMAIC are for process

: *How is Six Sigma related to DSS?*

design.

Jim Franklin, Chief Executive Officer of Decisioneering, was interviewed by Sophie Smiles from onesixsigma.com. Sophie asked "What does Six Sigma mean to Decisioneering?" Jim replied "We use Six Sigma to describe a broad set of disciplines, which include Lean Manufacturing, Process Excellence and other Continuous Improvement (CI) techniques which have data-driven decisions at their heart." He also noted "Simulation can be applied throughout all the phases of Six Sigma (whether it be the DMAIC or various DFSS methodologies), although interestingly, organisations often vary at which stage they apply simulation within their projects."

Jiju Antony, The University of Warwick, was asked in a onesixsigma.com interview "How does Six Sigma differ from TQM and BPR?" Antony said "Six Sigma's strength lies in the following core aspects:

- * Quantifiable and measurable bottom-line results to the balance sheet
- * Use of a systematic or disciplined methodology
- * Integration of human and process issues
- * The Importance of data and decision making based on data rather than assumptions and hunches!
- * Strong leadership and uncompromising commitment to top management"

In 2000, Quality Digest had a Pro-Con feature on Six Sigma with opinion articles by John Ramberg and D.H. Stamatis. In Six Sigma: Fad or Fundamental? Ramberg writes "But what is Six Sigma? In the narrow statistical sense, Six Sigma is a quality objective that specifies the variability required of a process in terms of the specifications of the product so that product quality and reliability meets and exceeds today's demanding customer requirements."

Ramberg also notes "The originators of Six Sigma went far beyond this narrow definition, which was actually derived from their own reliability assessment of product performance. They defined a program to accomplish Six Sigma that included leadership, infrastructure, and tools and methods. Thus they have followed the advice of Joseph M. Juran and Peter Senge to make quality part of the corporate business plan. According to General Electric (GE)--an early adopter of the program--Six Sigma is a 'disciplined methodology of defining, measuring, analyzing, improving and controlling the quality in every one of the company's products, processes and transactions--with the ultimate goal of virtually eliminating all defects.'"

Stamatis takes the Con side of the argument and claims "Six Sigma presents absolutely nothing new to the quality field of defect prevention. It's little more than an old appraisal methodology that focuses on problems after they've already occurred." He concludes "We all must understand that

: *How is Six Sigma related to DSS?*

some cases require problem solutions rather than root-cause solutions. We need problem solvers utilizing statistical thinking, not root-cause problem solvers dealing in high-level statistical analysis.

Both Ramberg and Stamatis agree improving quality is important and that a "Quality" culture is important to achieving improved product/service quality. Neither mentions computerized decision support although both mention data collection and statistical analysis.

What should the Six Sigma change agents know about DSS? If they really want to be effective, the Master Black Belts and the Black Belts should know a lot about computerized Decision Support Systems. Green Belts and Project Champions need to understand the basic concepts and the synergies.

Building DSS often involves dealing with measurement issues and process mapping for "As-Is" processes. Data is the driver for data-driven DSS hence data attributes, data storage and defining metrics are part of the DSS builders toolkit. DSS builders also are often experts in creating computerized displays for data visualization.

Currently, Six Sigma Black Belts have a very specialised skill set focused on statistics and "softer" skills in communication and facilitation. Black Belts usually understand modeling, simulation and optimization, sometimes they have knowledge of relational databases and data management; but most have no formal training in building computerized Decision Support Systems. Even so Six Sigma Black Belts "should know how to establish control systems for maintaining the gains achieved through Six Sigma". Black Belts have prerequisite and overlapping knowledge for building DSS, they need to know fundamental DSS concepts to exploit the overlap and synergies.

So how are DSS and Six Sigma interrelated?

My ideas are still evolving on this question so feedback would be much appreciated. Prior to writing this Ask Dan!, I discussed my initial conclusions with a UNI colleague in Supply Chain/Quality Management, Mike Spencer. Mike helped with what I got right and I accept the blame for any errors. This answer may not yet be at Six Sigma quality.

1. We can build data-driven DSS to assist Green and Black Belts in analyzing and monitoring processes. Some times the computerized system may be more of a one-time application for a special study, than a DSS. The nature of the computerized support system depends upon the nature of the Six Sigma intervention, the intended users, and the duration of the intervention.

2. We can build a DSS as part of a process design or change effort to help improve or insure quality. Poor quality can result from poor decisions.

: *How is Six Sigma related to DSS?*

3. We can build data-driven DSS to help managers monitor metrics and critical success factors across processes and to help operations managers monitor process quality and results.

Both Decisioneering and onesixsigma.com recommend my new book "Decision Support Systems: Frequently Asked Questions" for budding Black Belts. Check http://www.onesixsigma.com/tools_resources/literature/literature10.php.

I'm sure that many tools from Six Sigma on topics like process mapping and measurement can also help and inform DSS builders.

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: *How is Six Sigma related to DSS?*

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The above response is from Power, D., How is Six Sigma related to DSS? DSS News, Vol. 6, No. 13, June 5, 2005.

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Last update: 2005-08-07 14:19