The Convergence of Six Sigma and Process Management

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Executive Summary

This paper presents the compelling reasons why recent technology advancements are creating an accelerated trend to combine Process Management and Six Sigma to form a more robust approach to sustainable business performance improvement.

Process Management and Six Sigma methodologies have been in existence for more than 15 years. Both approaches to business performance improvement have assisted and continue to help businesses improve their performance. Both Gartner and AMR have taken a bullish position on the adoption of Process Management. Currently, 25% of US based companies with annual revenue greater than $200 million have adopted Six Sigma, this number is expected to grow to 80% by the 2010. For reasons based on technology, increased familiarization, and the increased need for robust approaches to business improvement, these two complimentary methodologies are now being used interactively to create a more powerful business improvement tool set.

The combination resolves weaknesses in one methodology while being additive for both. For example, Six Sigma by itself has had difficulty in systematically recognizing problematic areas of the business that are linked to the critical success factors of the company. However, process management readily characterizes process inputs, outputs and their performance, but lacks the analytical tools to solve difficult and complex problems. By using process management tools to model, simulate, and connect sub processes together to see how they link to critical success factors, gaps in performance are identified. Then the problems creating gaps in performance can be solved using Six Sigma improvement tools.
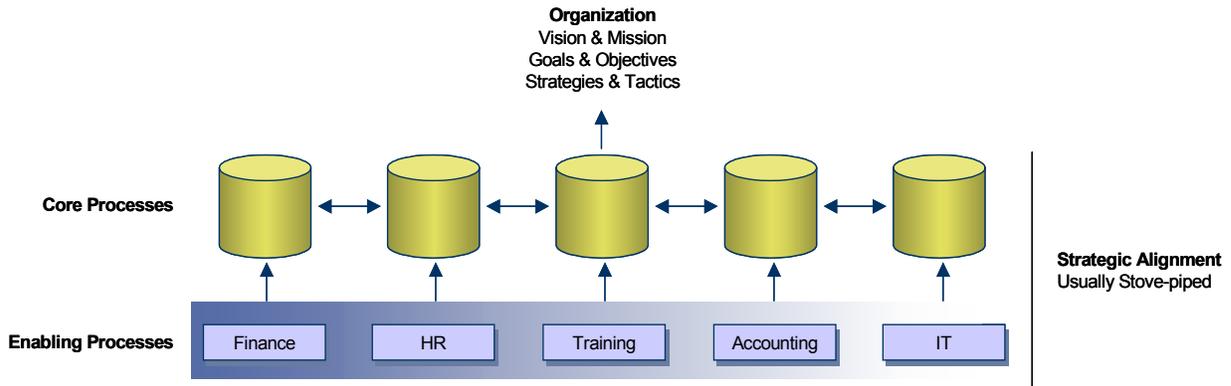
Recent advances using middleware and EAI (Enterprise Application Integration) to easily connect systems and databases together has provided the opportunity to electronically execute and control processes precisely the way they were designed or optimized. Products such as Traxion from CommerceQuest, provide all the tools to model, simulate, electronically execute, manage, and continuously improve a process.

Process Management and Six Sigma are obviously synergistic - the strengths of one complement the weaknesses of the other. Technology has now created the opportunity to sustain the expected benefits by electronically executing processes exactly as the business intends them to perform.

Business Processes

A business is a broad collection of processes that are involved in the ultimate goal of delivering a product or service to a customer. Ensuring that a business process runs smoothly is critical to maximizing the value provided to customers. Managing key processes efficiently is a critical success factor for businesses. But managing processes is harder than it may seem at first - mostly because these processes don't stand alone, but interact with one another.

Organization
Vision & Mission
Goals & Objectives
Strategies & Tactics

Core Processes

Strategic Alignment
Usually Stove-piped

Enabling Processes

| Finance | HR | Training | Accounting | IT |

Business processes exist in three forms. First are processes that are executed via computers, such as eBusiness, ERP, and CRM. These are also called information workflow or system-to-system processing. Next are the more traditional human value-added processes, also called human-to-human workflow processes. These two forms of processes co-exist and interact, creating the third form, where human workflow is augmented by information workflow.

Trends in Business Process Management

In 2000, Gartner predicted that Business Process Management (BPM) would become the next big phenomenon. The "thought leadership" expressed then has been reflected in the current popularity of business modeling. By 2004, Gartner has seen demand grow from 15 percent of their client base to more than 35 percent across all businesses, regardless of their cultural tendencies.

Because processes are the critical paths to progressive business change, processes are coming under intense scrutiny. According to Gartner, the need for process understanding will create significant Business Process Management activity. Gartner predicts a rising tide that will drive a growing business modeling market, including such services and technologies as Business Process Analysis (BPA) and Enterprise Architecture.

Trends in Six Sigma

Six Sigma first appeared in 1987 when Motorola initially launched it. Motorola Chairman Bob Galvin decided that traditional process performance levels, about 3 to 4-sigma, simply were not sufficient. Motorola set a new standard for excellence and began developing the means to achieve it.

Enamored by Motorola's success, other leading companies, such as Texas Instruments (now Raytheon), began a similar pursuit. But it wasn't until 1993 that Six Sigma really began to transform business. That's the year that Allied Signal's Larry Bossidy adopted Six Sigma. And this time there was something different; Six Sigma began to take shape as more than just a quality system—it began to look like a management system. At Allied Signal, an entire system of

leadership and support systems began to form around the statistical problem solving methods developed by Motorola.

Not long after Allied Signal began its pursuit of Six Sigma quality, Jack Welch, then Chairman and Chief Executive of General Electric, began to study Six Sigma. After a little time and a great deal of contemplation, Welch made the decision to apply Six Sigma. GE applied Six Sigma with rigor and with enthusiasm. As a result, GE's annual reports claim savings of billions of dollars with Six Sigma.

Since introduction by Motorola, Six Sigma has evolved from a product-oriented problem solving methodology into an enterprise wide approach for managing improvements. One good way to assess the adoption of a method, idea, or product is through trend analysis. In trend analysis we look at the rate of adoption over a period of time. Six Sigma trend analyses for U.S. companies with annual revenues greater than $200 million show that over 25% of US based companies in this category have adopted Six Sigma. The adoption rate is expected to exceed 80% by 2010.

Basics of Process Management

Initially, process management was described as mapping a process, determining the inputs and outputs, linking one process output to another process input, characterizing their performance, and then attempting to either monitor or control the inputs and outputs.

Process management has evolved into Business Process Management or BPM. BPM has added the power of a methodology and computer enabled technologies to provide modeling, simulation, and real time control over process behavior. BPM can be summarized as a structured approach to aligning and optimizing how business processes work together using computerized tools to repeatedly and consistently deliver results and value to a customer.

No matter which form of process you are in, human-to-human, system-to-system, or human-to-system, the goal of process management is essentially the same: Understand the process inputs, the blending of the inputs to produce the process outputs, and the management of the process efficiently and effectively.

Enterprise Business Process Management

Business Process Execution

Business Process Analysis

Business Activity Monitoring

Business Process Modeling

Business Process Integration

Business Process Simulation

Business Process Improvement

Understanding, in an organized and prioritized way, how the efforts in a company create the delivery of products and services is the basic premise of process management. Knowing which outputs from a process are critical, and the effect the inputs have on the outputs, is paramount to success. Knowing which inputs affect the important outputs allows you to optimize and control the behavior of the process.

A good test for determining if a company has well managed processes is to identify the linkage of processes with supporting process maps for business deliverables. Process maps are commonly aggregated into a process management summary (a document for aggregating and monitoring key process outputs) and a control plan (a document for addressing how key inputs will be controlled to assure the performance of the outputs). While this can range from essentially a
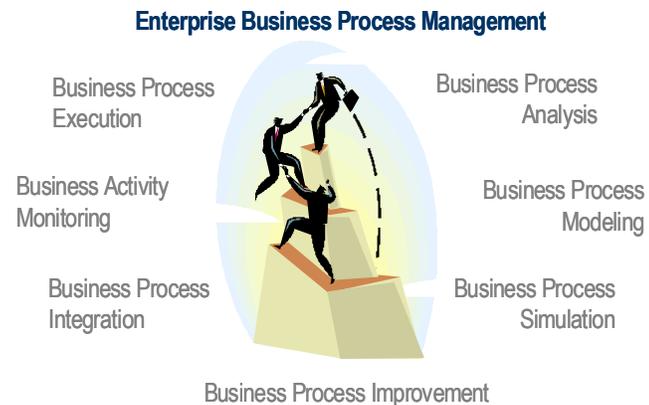
manual approach to computerized forms, the current state-of-the-art approach is the use of technology enabled process execution methods.
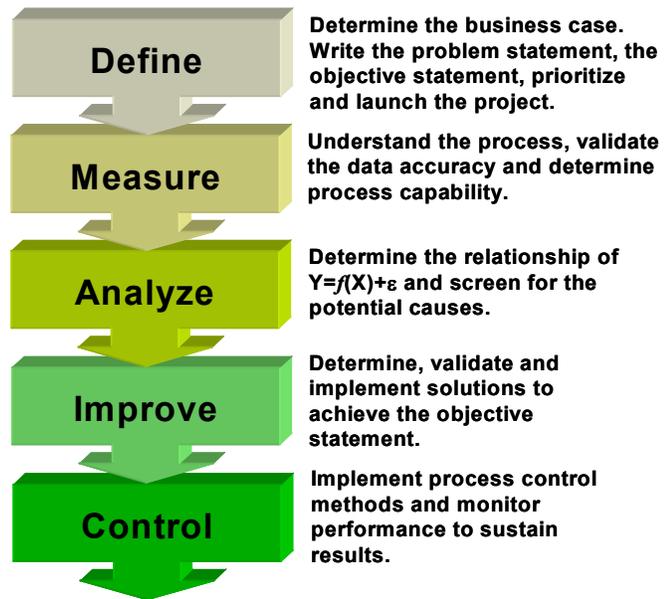
The Six Sigma Methodology

Six Sigma can be defined as a structured approach that recognizes problematic areas of the business, defines improvement projects, and delivers breakthrough-level solutions in a predictable and repeatable manner.

A problem is generically defined as the inability of a process or business characteristic to meet its requirements. In many cases, a near intuitive or logical solution is available; these types of solutions are one of the many benefits derived from a process management activity. However, when the situation is complex, spans several process activities, and may include the interaction of several inputs, a more powerful problem solving method is required.

Six Sigma uses a five phase methodology, known as DMAIC, that applies a fundamental formulaic approach that defines an output as a function of the inputs, stated as Y=f(X). In this equation, the Y is the process output that needs improvement, and the Xs are the inputs or root causes of the problem. DMAIC stands for Define, Measure, Analyze, Improve, and Control.

Each phase is comprised of various analytical tools designed to find the root cause(s) of almost any problem. The problem solving process is augmented by software tools to handle the data, modeling, simulation and associated statistical analysis that lead to an improvement action.

Define — Determine the business case. Write the problem statement, the objective statement, prioritize and launch the project.

Measure — Understand the process, validate the data accuracy and determine process capability.

Analyze — Determine the relationship of $Y=f(X)+\varepsilon$ and screen for the potential causes.

Improve — Determine, validate and implement solutions to achieve the objective statement.

Control — Implement process control methods and monitor performance to sustain results.

A hallmark of Six Sigma is its ability to institutionalize and sustain an improvement. This is the objective of the control phase. New technologies have recently become available that enable process execution management, like CommerceQuest's TRAXION. This type of tool provides computerized monitoring, control, and management of processes that have been optimized by a Six Sigma project.

Basics of Process Execution Management (PEM)

It is one thing to create a solution to a process output problem or to design a new process flow. It is an entirely different thing to convert those processes into sustainable improvements with existing management tools. The challenge with getting Six Sigma and Process Management right is often that companies can see the benefits from an optimization project, but when they try to implement process changes and enhancements by hand, improvements may not be sustainable. This is especially true when it is necessary to connect a variety of resources across the enterprise.

PEM uses computer monitoring of the process to transform all the elements of a Six Sigma or Process Management project into precisely run processes. It is performed by tapping into existing databases and then automatically managing the process, using established process and business rules, defined as a part of the process improvement solution. PEM is the real-time process engine that orchestrates task assignment, routing, forms management, and all other related process management functions needed to build and maintain robust business process applications.
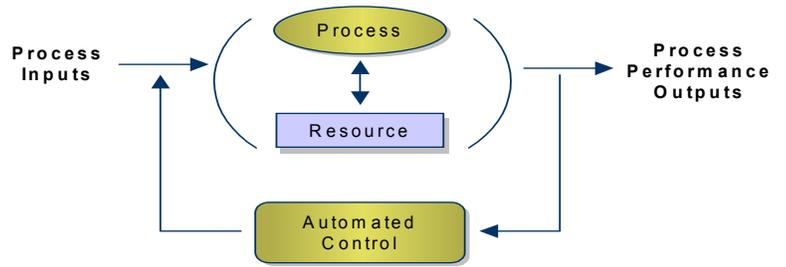
PEM drives and manages the execution of processes by linking human workflow, databases, systems, and applications, and can extend beyond enterprise boundaries. It provides tools for Black Belts, Business Analysts, and the IT organization to collaborate in the seamless design and delivery of Six Sigma and Business Process Management projects. Process improvement experts have the ability to design "learning processes" that leverage real-time and historical data on key performance metrics to drive ongoing continuous performance, even after a project has been completed.

Management dashboards derived from PEM offer real-time visibility into process performance metrics from the highest-level operational business rules to the most granular activities - an individual's tasks or transaction details. This allows Process Owners and Executives to take appropriate action at the point of exception and retain proactive control of key activities, or metrics. In essence, process execution management is a secure, live network for executing, managing, controlling, and continuously improving key business processes in real time. It can be implemented on a project basis, or can be used across the whole enterprise, to better manage process performance.

Integrating Process Management, Six Sigma, and Process Execution Management
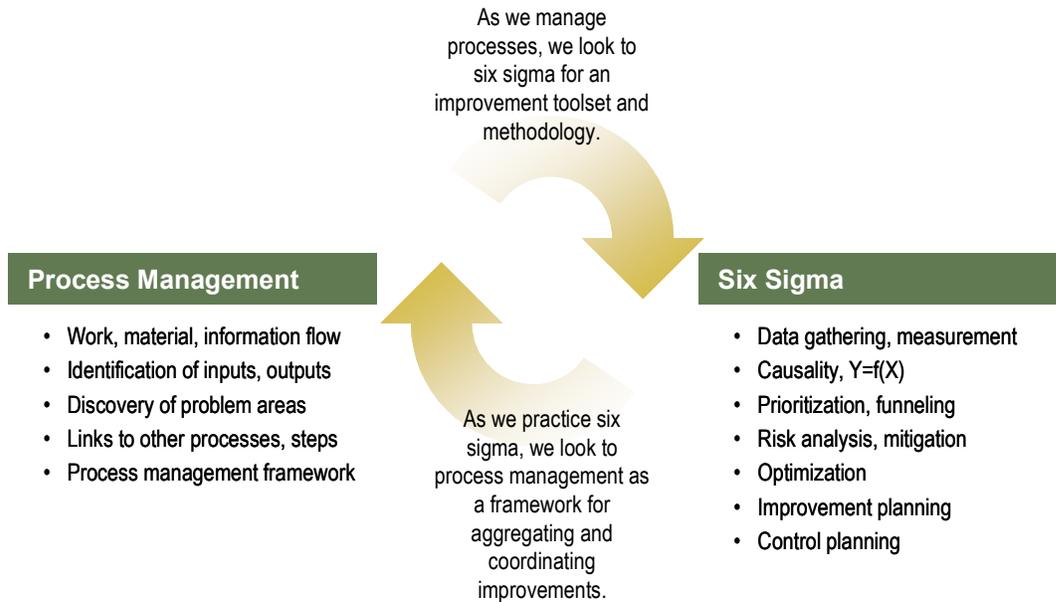
The interaction between these methodologies and techniques is easy to visualize. Six Sigma, with its DMAIC approach to problem solving, tends to be very constant in terms of the phases used. BPM tends to have stages of completion with potentially increasing levels of activity. PEM generally occurs after a process is fully characterized or a "to be" process has been defined. The diagram below shows typical interactions that can occur between BPM, Six Sigma, and the use of PEM.
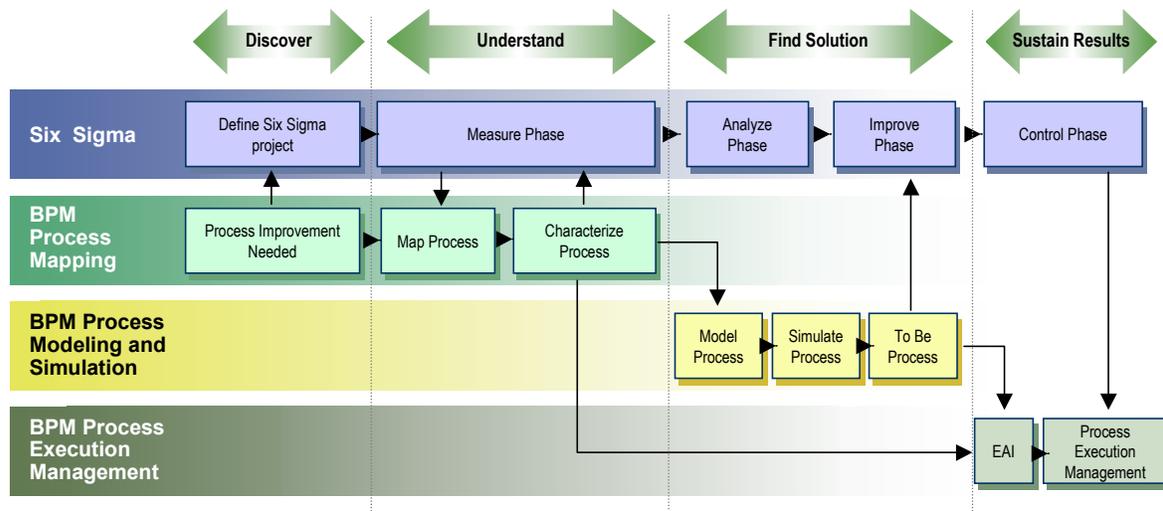
If your organization has started with BPM before starting Six Sigma, BPM will help you identify where it is most beneficial to apply Six Sigma. This is because Process Management provides the identification of problematic areas of the business and incapable process outputs. It is on these "incapable" processes and process outputs that the power of Six Sigma is focused to achieve improvement.

If an organization has implemented Six Sigma and then launches a BPM activity, BPM is a catalyst for improvement. Implementing Six Sigma first provides an appreciation for the importance of process, the need to organically find Six Sigma projects and the need to manage processes for stability and predictability.

PEM can be implemented as a standalone activity, or in conjunction with either Six Sigma or

As we manage
processes, we look to
six sigma for an
improvement toolset and
methodology.

Process Management	Six Sigma
• Work, material, information flow	• Data gathering, measurement
• Identification of inputs, outputs	• Causality, $Y=f(X)$
• Discovery of problem areas	• Prioritization, funneling
• Links to other processes, steps	• Risk analysis, mitigation
• Process management framework	• Optimization
	• Improvement planning
	• Control planning

As we practice six
sigma, we look to
process management as
a framework for
aggregating and
coordinating
improvements.

process management, or both. It naturally enhances the results from either of these two efforts.

A View of the Six Sigma Methodology in Harmony with BPM

When Six Sigma problem solving and process optimization is performed with other BPM activities, many of the DMAIC tasks are augmented by BPM activities. The information below demonstrates how BPM influences and augments the phases of six sigma.

Define Phase – If processes have been mapped or modeled, the key outputs (sometimes called CTQs in Six Sigma) are known, their capability is known and the need for improvement to meet the needs of the business are also known. This information is contained in a Process Management summary report that is used to aggregate process performance data across a number of processes. Processes that do not meet business needs become an excellent feed for defining Six Sigma projects.

Measure Phase – Process maps will probably exist from BPM activities. This will expedite the task for the Black or Green Belt in characterizing the process.

Depending upon need, these processes can be fully modeled for subsequent simulations using a highly intuitive set of tools that enable process improvement experts, to define, depict, and begin to build their ideal or "to be" process.

They can lay out all of the activities, participants, business rules, technologies, and resources that comprise a particular business process, and illustrate the activities performed by all participants (people, systems, and resources) across multiple functional areas of the extended enterprise. This activity breaks down the stovepipes between departments and business units to create uniform, assured, and auditable process models.

Analyze Phase – The primary activity of the Analyze Phase is to narrow down the number of potential contributors to a problem, and to find the root causes. Process modeling, which begins

in the Measure Phase, leads to exploratory simulation in the Analyze Phase. Simulation accounts for all resources within a process, both inside and outside the enterprise, for productivity levels, tasks, skill sets, resources, and costs. The Six Sigma belt or a business analyst can perform simulation "what if" scenarios with other analysis tools to identify causes and improvement ideas.

Improve phase - Once the process is identified, mapped, and modeled, and the most likely root causes are identified, additional "what if" scenarios and other experimental tools are used to create the improvement solution. Analysis and simulation are key components in understanding, fine-tuning, and optimizing processes in terms of time, cost, or any other key performance metric. This, in effect, generates the future-state process map and requirements for PEM to execute, integrate, and control the process in real time.

Control Phase – The objective of the Control Phase is to provide ongoing sustainability for the improvement solution. Using PEM provides a web-based monitoring and tracking component with continuous visibility - retroactively and proactively - into the performance of processes at "macro" and "micro" levels. Instead of relying on point-in-time or historical data to manage the process, managers are able to build a real-time dashboard that allows them to take control of their key business activities.

Based on the rules and controls set in the Improvement Phase, managers are able to identify process breakdowns and take corrective action, automate contingency plans, and maintain process performance levels established for the project. PEM gathers information from all process activities and transactions. It makes this performance data visible, auditable, and available to anyone, in real time. For example, it can place a phone call, send a message to a PDA or browser or send an email to individuals when a control feature or process rule is exceeded by the process.
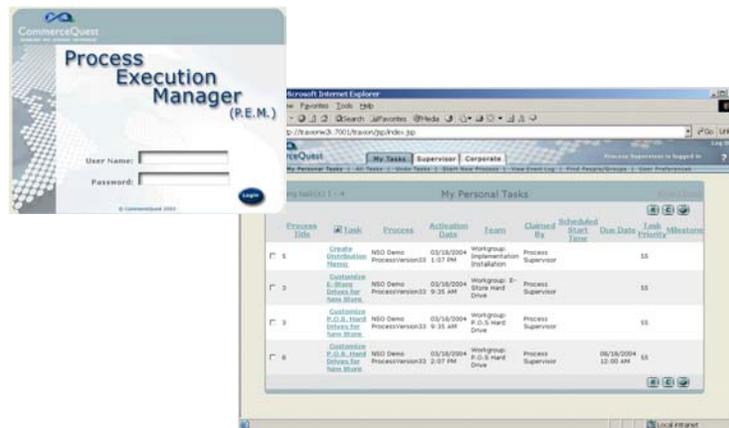
Because data is collected in real time for control, it is stored and can be used to allow managers to continuously improve process effectiveness and efficiency.

Conclusions

Since its inception, Six Sigma has evolved from a product centric quality improvement methodology to an enterprise wide improvement system that includes a powerful methodology, computer aided tools, and an impressive management framework.

Recent web enabled technologies and other methods to extract, analyze, and apply data to decision steps and information flow have enhanced the ability to manage complex and demanding processes with relative ease. Process Management tools, and the problem solving methodology of Six Sigma, have come together to increase the efficiency, effectiveness, and on-going control of a process to levels of performance not achievable before.

Eric Austvold of AMR Research noted in a January 14, 2004 research note, <u>BPM Is a When, Not an If – Start Now</u>, In 2001, we predicted that Business Process Management (BPM) technology would be a cornerstone of application architectures of the future, highlighting the technology as one of seven key architectural components of future software architectures. And now that is being realized. Because of increasing interest in composite application frameworks, service-oriented architectures, and process improvement initiatives like Six Sigma and Lean manufacturing, BPM is a must in 2004."

Don L. Redinius is the President and COO of Savvi Internatinal. Savvi International is a business performance improvement solutions company, specializing in the delivery of management systems, Six Sigma, Process Management, software tools, and Lean techniques for improving business performance. Savvi develops and applies expert business and technical knowledge, application software tools, e-learning, and classroom training solutions for all types of businesses. For more information, contact us at 480.515.2850 or visit us on the web at www.savvi.com.