Leveraging Business Process Management and Six Sigma in Process Improvement Initiatives

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Executive Summary

The promise of Six Sigma is attractive. What company wouldn't want increased profits and improved customer relations driven by more effective and efficient business processes?

But, the Six Sigma methodology often is associated with daunting myths that prevent companies from taking advantage of its potential. For example, it's assumed that Six Sigma is strictly for manufacturing processes. Or, it's believed that Six Sigma initiatives require massive training efforts, create unappealing bureaucracy and are just not cost-effective.

These myths simply aren't true. In fact, any company — from the most die-hard Six Sigma manufacturing company to the non-manufacturing organization who knows nothing about the methodology — can take advantage of the principles of Six Sigma to achieve continuous improvement in customer satisfaction, leading to millions of dollars in cost savings and profitability.

One of the most effective and efficient ways to enhance the value of a Six Sigma initiative is to use software to extend the principles of Six Sigma throughout the organization — across people, processes and technology. Lombardi Software's Business Process Management (BPM) software, TeamWorks™, for example, can effectively enhance Six Sigma-based initiatives. Focused on defining, measuring, analyzing, improving and controlling business processes, BPM software targets the same goal as the Six Sigma methodology — improving business processes — and therefore is an ideal platform to complement Six Sigma-based processes.

This white paper describes how a comprehensive solution that combines the proven effectiveness of the Six Sigma methodology with the power of the TeamWorks BPM software, will enhance the speed and agility of any enterprise's operations and improve any company's bottom line. You'll learn:

- How Six Sigma-based process improvement initiatives can be used on processes across the enterprise, not just manufacturing processes
- How BPM software speeds and enhances process improvement initiatives
- How Six Sigma and BPM combined offer one of the most powerful process improvement solutions possible

A Method to the Madness:
Six Sigma Provides a Method for Improving Business Processes
In its strict definition, Six Sigma is the application of statistical methods to business processes to improve operating efficiencies and return dollars to the profit of an organization. Here's the basic theory: *Sigma* is a letter in the Greek alphabet used to denote the standard deviation of a process. Sigma quality level is sometimes used to describe the output of a process. A Six Sigma quality level is said to equate to 3.4 defects per million opportunities.

The term in practice today, however, is used to denote more than simply counting defects. In today's businesses, Six Sigma is a methodology for pursuing continuous improvement in customer satisfaction and profit that goes beyond defect reduction to emphasize general business process improvement. This includes revenue improvement, cost reduction, cycle-time improvement, increased customer satisfaction and any other metric important to the company. It implies an entire culture of methodologies to improve the overall health of the organization.

The customers that form the base of today's world market are demanding higher-quality products at lower costs with greater responsiveness. Six Sigma helps an organization achieve these objectives when leveraged with other initiatives as part of a thorough business strategy. The ultimate goal is to develop a process improvement solution that aligns the proven methodology of Six Sigma with the corporation's strategic goals.

For example, a company's strategic goal may be to reduce their Days Sales Outstanding (DSO), which is a measure of the amount of cash that is currently in accounts receivable. There is significant value from a cash flow perspective for a company to be able to reduce their DSO. By applying Six Sigma methodologies to the processes that impact DSO, significant improvements in process efficiency and error reduction rates can be achieved. The process to reconcile invoice payment discrepancies, for example, can be streamlined to remove latency. Invoicing errors can also be reduced, minimizing the time to collect cash.

Improving the Process: Automation is Not Always the Answer
Many companies have made extensive investments in their software systems, and have approached process improvement with automation tools that route data from one system to another, such as automated interfaces between ERP, CRM and SCM applications. But, executing a project to improve business processes often requires more than just tying together systems to create a "lights out" automated process.

Here's the reality: Not all complex business processes can be fully automated, because:
- People are an integral part of the process.
- Mistakes and exceptions occur within the process.
- Complex process steps are not easily reduced to digital business rules

For example, Company A requires that all invoices are submitted via EDI transaction, but certain invoices are rejected by the system because they do not fall within the defined business rules set forth in the automated EDI transaction process. The process breaks down, and the system rejects the invoice. The rejected invoice must then be handled manually, and people must figure out how to review the invoice and enter it into the system — and this typically is the most inefficient way to handle a process.

Truly optimized business process initiatives start with a strong process improvement methodology, like Six Sigma, to design or re-engineer a process to eliminate, or at least greatly

reduce, the steps that cause the greatest number of errors or represent the most cost to the company. The process *may* be automated, but as we've mentioned, the answer to process improvement is not always simply process automation.

The Six Sigma project, for example, might produce a recommendation to replace or enhance an out-of-date system, cross-train employees or improve the layout of a production line. The key is to implement a solution in which the ideals of Six Sigma continuous process improvement can be executed quickly and consistently, without additional expenses of retooling, recoding or replacing the company's existing enterprise software.

BPM: The Platform for Process Improvement Solutions
The TeamWorks BPM platform automates processes when possible, and includes people in the process exactly when their knowledge is required — the most efficient formula for improving business processes. In this software environment, processes can be designed, executed, monitored and analyzed, allowing companies to take the processes they've reengineered using the Six Sigma methodology, and implement them in the most efficient way possible.

BPM coordinates business processes between people and the data in IT systems, giving the data context and turning it into meaningful business information, rather than just automatically routing it from system to system. It delivers contextual information to participants in the process, so they can make well-researched, informed decisions in the most efficient way. From a management perspective, it gathers and analyzes process metrics, such as process duration and cost savings, so that performance and value can be accurately tracked.

Figure 1. Monitoring and Responding to Business Events *The TeamWorks BPM platform monitors business activity across multiple software systems. When changes to normal operations occur, TeamWorks determines whether the event requires human decision, and either launches automated processes or prompts employees to respond by guiding them through their participation in the process. TeamWorks also delivers executive scoreboards that report up-to-the-second on how processes are performing, how those processes are affecting the business and how the processes can be improved further.*
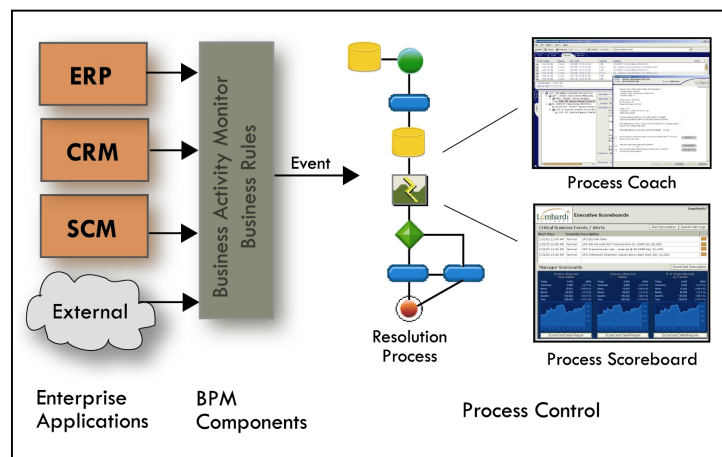
The BPM platform includes:
- An authoring environment for defining business processes
- A monitoring capability that watches processes for circumstances that fall outside of defined business rules, and launches sub-processes to address those circumstances
- An execution environment for managing those processes so that humans are included in the process when necessary
- A scoreboard that helps executives monitor and react to business events, providing a mechanism for continuous process improvement

**Applying Six Sigma and BPM to Enterprise Business Processes**
Process-focused initiatives have been around for years. Total Quality Management (TQM) and Business Process Reengineering (BPR), for example, advocated similar philosophies as Six Sigma: continuous process improvement is critical to long-term business success. But they have gradually fallen out of favor — not because they were necessarily misguided methodologies, but because they had no direct link to bottom-line profitability, nor any correlating technology to support the ideals of continuous process improvement across the corporation.

Table 1. *The combination of Six Sigma and BPM provides a synergistic approach that delivers the most powerful process improvement solution possible.*

	Six Sigma – Focus on Analysis	**BPM – Focus on Automation and Optimization**
Approach	*Analytical* strategy for generating financial value through process improvement	*Automation* and *optimization* environment for generating financial value through process improvement
Data	Leverages statistical analysis of key metrics to identify improvement opportunities	Accesses data from enterprise systems to enable statistical analysis
Process Improvement Design	Process improvements gained through focus on root-cause analysis. System changes achieved through collaboration with IT.	Provides visual design environment used to graphically define process flow and people/system interactions
Process Improvement Execution	Document recommended changes and measurement techniques	Improved process automated and integrated with existing IT investments
Measurement	Control charting measures continued trends of key metrics	Scoreboards measure continued trends of key process metrics and business value impact

The combination of Six Sigma and BPM is a natural pairing for making process-oriented initiatives successful. While the Six Sigma methodology is based on proven business principles that integrate corporate goals into process improvement efforts, BPM software provides a flexible technology as the sound foundation for designing and executing these ideals throughout the enterprise.

Figure 2. Adding Value to Six Sigma Strategies *Business Process Management enhances the Six Sigma methodology by providing data access, process metrics, business rules, graphical process modeling, and process automation that directly support the Six Sigma Design, Measure, Analyze, Improve and Control (DMAIC) model for restructuring business processes.*
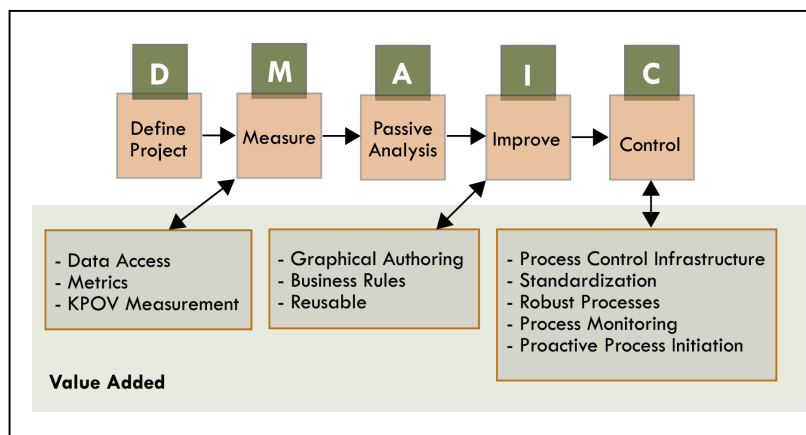
At this point, it's important to remember that getting stuck on reaching "zero defects" or "zero errors" can be discouraging if you approach it from the myth-perspective that a Six Sigma initiative is a complex and costly undertaking. This is why this paper advocates using the right metric to drive the right activity, rather than relying on defect reduction as the only metric. The path of striving for Six Sigma and using the Six Sigma ideals when analyzing and improving processes, will show quick benefits along the way because the methodology focuses on continuous, ongoing improvement.

The TeamWorks BPM platform is designed to facilitate ongoing process improvement initiatives in two ways: provide a graphical process authoring environment in which to quickly and easily define and modify processes, and provide a flexible software environment in which to execute processes. The authoring environment allows even non-technical business process owners to model and configure their business processes for execution in the platform. Thus, a black belt in Six Sigma, for example, could design a Six Sigma process without extensive involvement from software technicians.

In addition, TeamWorks gathers process metrics as process events happen, delivering to executives the information they need to analyze, modify, improve and control processes in real time. Together, the Six Sigma methodology and BPM software can improve a company's processes without huge, complex initiatives.

Six Sigma and BPM: Common Goals for Improving Business Processes
Consider the common goals of Six Sigma and BPM software: reduced costs, increased profits and improved customer relations through business process improvement. Now, consider the challenges facing today's enterprises: data housed in disparate transaction-based systems throughout the organization and manual processes that lack standardization and, therefore, cannot easily be monitored or improved.

The analytical approach of Six Sigma, combined with the automation and optimization approach of BPM, provides the solution to a corporation's process and technology challenges, while tying the solution directly with the corporation's financial goals. Here are some specific ways that TeamWorks, in particular, complements Six Sigma to solve process and data challenges, while delivering quick return on investment:

Data Monitoring
The typical Fortune 500 company must manage and optimize 300+ core processes and more than 2,000 related sub-processes, plus all of the corporate data that run its business. It's spent millions of dollars acquiring enterprise-wide systems aimed at planning, budgeting, forecasting, managing and analyzing its business, and it's spent additional time and money training its employees to use these systems. The challenge is that many processes and correlating data span multiple transactional systems, making metrics-gathering and analyzing cumbersome, and sometimes even impossible, despite all of the previous investments in technology.

TeamWorks has "undercover agents" that monitor business conditions in any system related to a process. It looks for business events that fall inside or out of defined business rules, and launches sub-processes that respond to those business events. In addition, TeamWorks has integration components that allow it to integrate with other applications, pushing and pulling data between any application and itself. These two features allow a company to extend its Six Sigma-based processes across the enterprise, despite where the process or the associated data and people are located.

Figure 3. Data Monitoring *BPM provides access and visibility into applications and data needed for Six Sigma analysis and process restructuring. In addition, it is the environment in which business rules can be defined and executed as part of automated processes. For example, analyzing a collections process to reduce days sales outstanding may require access to the order systems and customer and receivables records to determine the payment time of invoices. For statistical validity, the sample size may be every invoice and payment from the last three years. BPM application connectors provide access to the data and enable business rules to consolidate it.*
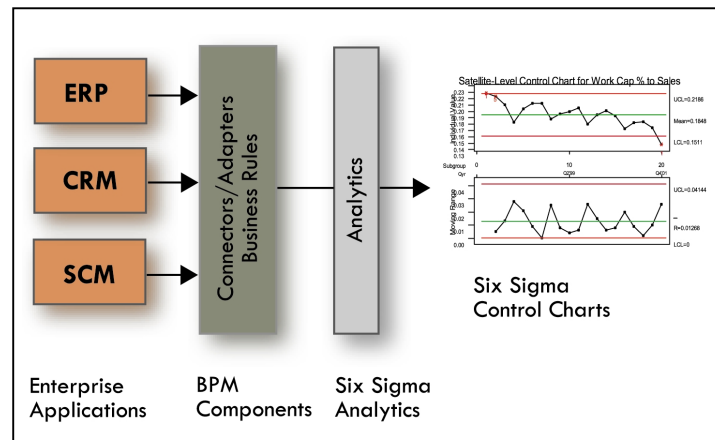
Process Improvement Design and Execution

One of the challenges of improving processes is that they often span multiple IT systems. As a result, improving the process requires improving the multiple applications that the process spans. But, changing large applications can be prohibitive — requiring money and time piled on top of the resources already spent on initial implementations.

To overcome this challenge, people tend to get heavily involved in the process with inconsistent and inefficient manual work-arounds. The opportunity for errors and process lag mounts as people choose email, fax and phone communication and multiple, manual data entries when processes cannot properly bridge across applications.

The TeamWorks BPM platform solves this problem by designing and executing processes that reach across multiple applications. It allows the process to bridge across applications, gathering data as needed, regardless of its source.

In addition, TeamWorks monitors the process for any business event that falls outside of its normal execution. When one of these business events occurs, it uses defined business rules to either launch an automated sub-process, or bring a person into the process by sending that person a task. Attached to the task is an electronic "process coach" that delivers the contextual information and process steps that the person needs to keep the process on track. For example, a process coach for a deduction management process might include the following elements:

- General information on invoices, purchase orders, delivery verifications, customer history, value of outstanding deductions, etc.
- Access to research, such as the disposition of the last 10 deductions, typical customer service resolution times, etc.
- Recommended actions to resolve or complete the process

This feature keeps the process moving, allowing people to make informed decisions when business events occur without needing to access multiple systems, or resorting to time-consuming manual methods. It fosters the Six Sigma process improvement ideal throughout the organization by integrating the efficient execution of processes into daily business.

Measurement: Scoreboards
Once the correct data has been located and put into the context of a business process, it must be measured and analyzed so that it becomes meaningful information that managers and executives can use to make informed decisions about the business. In addition, new data must be created about the performance of the process itself so that executives can determine where processes are lagging, and where they have been successfully improved. This is critical for continuous improvement because it gives specific information about processes to the decision-makers in an enterprise, arming them with the information they need to strategically respond to changing business conditions.

TeamWorks provides a "time/date" stamp on every step related to a process, and captures this data in a table that is updated continually. This data can then be displayed for a complete picture of business processes on a regular basis. A company's first TeamWorks solution may even be the first time certain metrics have been available to a company's executives (such as the new information that Company A received about its shipping company not living up to its service level agreement, in the following case study), giving them insight and control that was previously impossible. This capability gives executives the metrics needed to make decisions about ongoing process improvements.

Six Sigma and BPM: A Solution Case Study
Now that you understand the fundamental benefits of a Six Sigma/BPM process improvement initiative, let's look at a real-world scenario. Here's an example of how Six Sigma and BPM can improve a non-manufacturing, business-critical process and deliver real financial value:

Company A, a retail company, uses a third-party shipping provider to deliver its product to its customers. The shipping company attempts to deliver to the address provided by Company A. For a variety of reasons, the shipping information is incorrect. As part of its service level agreement with the shipping company, Company A has just 48 hours to update the shipper with the correct information, or the product is returned. If the product is returned, it must be opened to check for any damage, re-packaged and sold as "damaged" or "refurbished" — costing the company hundreds of dollars in additional handling costs, shipping fees and lost revenue.

After completing a Six Sigma-based analysis of the process, Company A determines that 2% of its shipments per year are being returned. They conclude that by implementing an improved collaboration process between themselves and their shipping company, they can reduce their returned shipments by 20%, and save the company $20 million per year.

Figure 4. A Case Study *The Six Sigma methodology is used to streamline this shipping process, to detail which steps can be streamlined or eliminated to increase efficiency, and to gauge the financial implications of process improvement. BPM is the software framework that automates and monitors the process, providing the structure in which the process is designed and executed.*
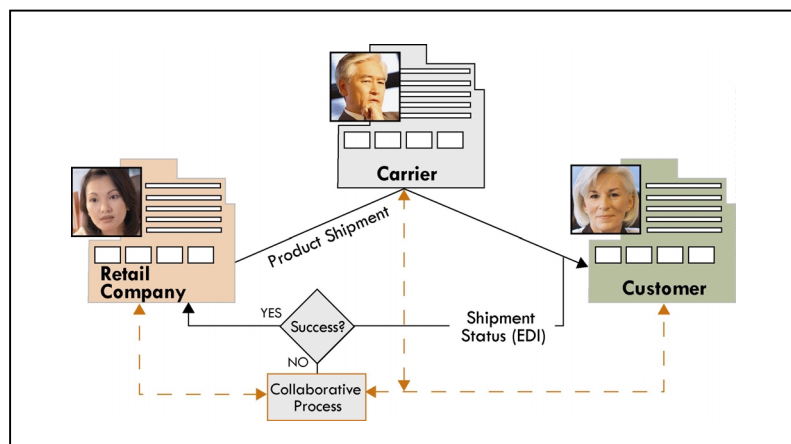
Company A implements their process improvement solution using the TeamWorks BPM software. The solution monitors EDI transactions between the shipping company and Company A, and automatically notifies the appropriate person at Company A when a shipment is in danger of being returned. It extracts and delivers relevant information — such as customer contact information, product order information, etc — from Company A's various data systems to help the person resolve the error quickly. It also provides electronic "coaches" that guide the person through the process so that they are executing the resolution process efficiently and consistently. The solution also allows the person to contact the customer via a web-based process if necessary to attain additional shipping address information.

Since a BPM solution was designed into the process, Company A eliminated the need for "fire fighting," or responding to individual emergencies in a manual, ad-hoc fashion. Plus, Company A not only reduced their returned shipments by 20%, improving their shipping process and saving the company millions of dollars per year, they began to uncover new data about their processes that previously was unavailable. For example, because the BPM software manages the process from beginning to end, it can gather metrics about the process along the way. By analyzing this data, Company A realized that 25% of the time, their shipping company was not giving them the full 48 hours, as designated in their service level agreement, to resolve the shipping address problem. Company A was able to collect this data over several months and present it to the shipping company in order to improve the shipping company's service level.

Conclusion
Six Sigma's analytical approach to continuously improving processes across the corporation — not just manufacturing processes — can be enhanced even further by using BPM software, such as Lombardi Software's TeamWorks, to design and execute the processes. While companies often attempt process improvement by automatically routing data from system to system, TeamWorks brings a more comprehensive approach to the table:
- Monitors systems for business events, and pulls relevant data from various systems, presenting the information to the appropriate person at the right time, so that processes are executed quickly and consistently, and errors are greatly reduced
- Provides graphical authoring environment so that Six Sigma-based processes can be quickly and easily defined or modified and deployed by non-technical business process owners
- Gathers metrics as process events happen, delivering to executives the information they need to analyze, modify, improve and control processes in real time

A strategic approach that combines the proven effectiveness of the Six Sigma methodology with the power of TeamWorks, can be the most effective solution for improving business processes. Together, Six Sigma and TeamWorks will enhance the speed and agility of an enterprise's operations and improve the company's bottom line.

About the Author
Forrest W. Breyfogle III is a Professional Engineer, ASQ (American Society for Quality) Certified Quality Engineer and Reliability Engineer, and an ASQ Fellow. Mr. Breyfogle began his career with IBM in development and later transferred to a product test organization. From 1980 to 1992 Mr. Breyfogle served IBM as an internal statistical consultant where he applied Six Sigma methodology to testing, development, manufacturing, and service organizations. In 1992, after a 24-year career at IBM, he founded Smarter Solutions, an international training and consulting firm that helps organizations save money and increase revenues through Six Sigma business process improvement.

Mr. Breyfogle has authored or co-authored three major books about Six Sigma: *Statistical Methods for Testing, Development, and Manufacturing*, Wiley, 1992; *Implementing Six Sigma*, Wiley, 1999 and *Managing Six Sigma*, Wiley, 2001. He has more than 40 technical published papers, and his articles have appeared in *ASQ Quality Progress, Quality Engineering, Quality and Reliability Engineering International, ASQ Quality Management Division Newsletter, Manufacturing Engineers Handbook,* and *International Test and Evaluation Journal*.

He has conducted Six Sigma workshop sessions throughout the world, and in 2001 he was invited to be the Six Sigma Subject Matter Expert (SME) for a Six Sigma Benchmarking study orchestrated by APQC. He has taught classes or external workshops for the Society of Manufacturing Engineers, American Society for Quality (ASQ), Society for Manufacturing Excellence (SME), Association for Manufacturing Excellence (AME), University of Texas MBA program, Southwest Texas State University, and Austin Community College.

Customers for Mr. Breyfogle's in-company training and/or consulting in Six Sigma methodologies include Abbott Laboratories, Alcoa, Coca-Cola, Crossroads Systems, Dell Computer Company, Ericsson Inc., HEB, IBM Corporation, IBM Global Services, Mobil Chemical Company, Motorola, National Instruments, Panasonic, Seton Medical Center, Sony, Sherwin Williams, SUN Microsystems, Toshiba Medical Systems, and Westinghouse.

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