Real-Time Six Sigma with BPM Suites

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Introduction

Six Sigma has become the leading methodology in process improvement. It provides a quantitative approach to identifying what matters most to the customer-- discovering the process input(s) that most influence those critical to quality performance indicators. Six Sigma's continuous measurement and improvement lifecycles attempt to deliver the best-performing process in the eyes of the customer. One of the fundamental approaches and philosophies in Six Sigma is *continuous improvement,* until one achieves the desired quality goals. Six Sigma attempts to reduce the *variances* in process performance. A core theme within Six Sigma is that variation is the enemy and that processes must perform in a predictable manner accurately and precisely around target performance limits. An argument made by Six Sigma practitioners is that customers feel process variance far worse than the mean. For instance, if the organization promises to respond to a customer service call within two hours, in a Six Sigma process improvement approach statistically 99.7% of the responses will be very close to two hours, guaranteeing consistence in service response times. Just having a response time of two hours on the average (mean) is not enough if there are huge variations in the response times. It is in fact acceptable to have a larger mean but fewer variations. The *sigma level* of a process or product can be considered as the number of process or product *defects* per million *opportunities*. A defect implies falling below a lower specification limit or above an upper specification limit. An opportunity is a measure that could potentially satisfy or fail the specification limits. Processes and products with higher sigma levels have far fewer defects. For example, at sigma level 3 there will be 66,807 defects per million opportunities (for instance this means 66,807 calls will not be within the prescribed two hour limit response time limits). At sigma level 6, there will be only 3.4 defects.

How do organizations achieve Six Sigma? There are a number of key methodologies associated with Six Sigma. If new product/process is being designed, the preferred methodology is Design for Six Sigma (DFSS) realized through the Define-Measure-Analyze-Design-Verify (DMADV) framework. If existing products or processes are being improved, the preferred methodology to improve an existing product/process is called Define-Measure-Analyze-Improve-Control (DMAIC). By far, the dominant operational methodology in terms of number of projects performed within Six Sigma companies is the DMAIC approach. In either case, the methodology identifies specific activities, participants, tools, and continuous improvements through rigorous measurements and analytics. Six Sigma practitioners often use statistical tools such as Minitab especially in the analysis phase.

Six Sigma starts with defining the business case of the project – the customer's CTQ (Critical to Quality) objective (Define phase). In Six Sigma, typically the data is sampled after the fact. Gathering (Measurement phase) the data can itself be a challenge. Staying within the realm of transactional systems, often the Six Sigma black belts need to locate the sources of the data and have measurement analysis strategies. Sometimes there are no actual software systems and the data needs to be gathered manually. Once the data is collected, it needs to be analyzed (Analysis phase) to identify the potential causes of the defects – the "vital few" critical to process variables that are the root causes of the problems. Then, you can introduce various solutions to improve the process performance (Improve phase). Finally, the process need to be monitored (Control phase), and continuously improved toward the CTQ objectives.

Now what does this have to do with BPM Suites? Well, BPM is also about "process improvement" using automation, management and continuous improvement. So the question becomes, how

can BPMS Suites help support Six Sigma projects? What is the relationship between Business Process Management Suites and Six Sigma? Before we delve into the BPM Suite support for Six Sigma, we must first categorize the different types of "processes" within an organization.

Categorizing Your Processes

In any organization, there are three categories of processes and policies, organized in a hierarchy (represented through concentric circles or sets):

- *All the Processes and Policies*: Every single task within an enterprise is carried out in the context of a "process." Now this process could be ad-hoc or undocumented; it could be very short; it could be a one-shot process. But, it is still a process. Alternatively, the processes could be documented in policy and procedure manuals or the by-laws of the organization. Process specifications as well as business rules can also be embedded within application programming code or in some cases in people's heads. The outermost circle thus represents the set of all processes and policies within the enterprise. Now a strict subset of these processes and policies are the modeled processes and policies.

- *Modeled processes and policies*: here you have flowcharts and more lists of policies, potentially organized in different categories of rules. Modeling does not mean the process is executing. All it means is that you have a formal or semi-formal representation of the process or policy in a repository. An organization using Visio or a Business Process Analysis tool can create a repository of its information, organization, process, and business rules models. Strategic goals and objectives could potentially be tied to the organizational goals. These strategic goals can have dependencies and be organized in perspectives, for instance the four perspectives of Balanced Scorecard.

- *Automated (executing) process and policies*: the third category of process and policies – and the most important and exciting one – are the *automated* and *executing* processes. Having a repository of models is good, but, it will not be help agility or continuous improvement if these processes and business rules are not executing. You need to automate as many of your ad-hoc or modeled processes as possible. To achieve continuous improvement this innermost circle must grow. In fact, the differentiations between modeled and executing should disappear even as more and more ad-hoc, undocumented, legacy embedded or documented processes move toward automation and digitization.

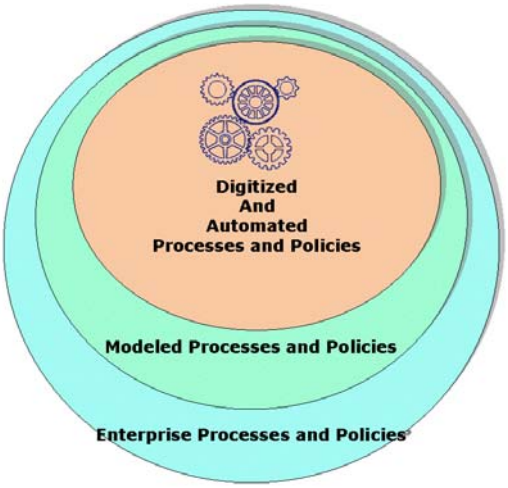

Figure 1. Three Process Categories

BPM suites focus on this last category: automation. Once a process gets automated you can gather data from its executing instances and realize rigorous business activity monitoring and performance management of the processes. You will be able to manage processes "in flight" and can control them in real-time. BPM Suites support modeling and execution of information models, business rule models, flow models, and integration models. Furthermore, BPM suites continuously update audit trails that document the executing processes. This information is readily available for review and analysis.

Now we can see the synergy between these two realms: BPM Suites and Six Sigma. The combination of new Six Sigma tools and real time management and control of business processes gives rise to a new approach in Six Sigma. We call this *Real Time Six Sigma.* Real Time Six Sigma heavily leverages BPM Suite's onboard capabilities such as process monitoring, specialization, situation selection, rule execution, and event action to enable continuous improvement, especially for "in-flight" process instances.

BPM Suites and Real Time Six Sigma

So how do BPM Suites support Real Time Six Sigma? There are several salient features in BPM that directly support Six Sigma and, in fact, help achieve real-time Six Sigma controls. The underlying assumption is that the "process" (or "processes") and "policies" (or "business rules") that are being improved are in fact modeled and deployed to the BPM Suite for execution.

- *CTQs and CTPs mapped onto BPM Suite Properties:* In a BPM Suite you should be able to declaratively define business rules that directly capture the Critical to Quality (CTQ) and Critical to Process (CTP) measures and their relationships through: $Y = f(X_1, X_2, \ldots, X_n)$. The Y is the CTQ and the 'X_i's are the CTPs. So the Y and each of the 'X_i's – which themselves could be represented through expressions - are mapped onto BPM Suite properties.
    - For example, in a customer service application you can have a Y that represents service response time. This Y is expressed as:

      ResponseTime = RequestResolved - RequestSubmitted

- *Process Maps:* In the 'D' define phase of DMAIC or DMADV you define the "as-is" and "to-be" process maps. The word "Process" is rather overloaded. It means both how things get done – modeled or otherwise – resulting in CTQ measures, as well as the flow map of activities executing in some order by various participants. The BPM Suite can use Visio diagrams or its own proprietary diagramming to represent and map the processes. This is the most directly supported capability in a BPM Suite. As we shall see, you might also need to have several processes with the same purpose and apply them situational-ly, depending upon the process characteristics.

- *Measurements:* In the 'M' phase of DMAIC, you need to come up with a plan to collect the data for analyzing the process capabilities. With a BPM Suite, once your processes are automated, in most cases, there is no need to have a data collection plan: all the relevant data are readily available. These are the process instance data. Each process model or map will be instantiated. For example, in a customer service application, each call will potentially start a process or case instance for the service call. All the data, the task allocation, the attachments, etc., will be managed by the underlying BPMS Suite. There is no incremental work needed to gather the data.

- *Report and Export:* In the 'A' – analysis phase - of DMAIC, you need to analyze the process capability and identify sources of variations. This is typically done through a statistical package such as Minitab. A BPM Suite should provide ad-hoc reporting wizards to generate the process instance data needed for analysis. This data then needs to be exported to Excel or directly to Minitab for analysis. Another alternative is to directly connect to the process data repository through SQL/JDBC queries.

- *Sources of Variation:* One of the main objectives in a Six Sigma project is to identify the sources or causes of variation. This typically results in a list of statistically significant 'X's, based on the analysis of historical data. This analysis can also identify that there are actually multiple "processes" with different characteristics. For instance, an analysis of customer service response data might indicate there are statistically significant differences between customers who call for hardware problems vs. those having issues with software problems (this could be verified for instance through a chi-square test and its P-value). This means you need to have different service agreements and potentially different process maps based on the type of the service call. As new processes and situations are discovered in the Six Sigma analysis, the project team can easily modify and *specialize* existing process applications. With fully automated processes, this means the BPM Suite engine should have the ability to organize the process applications along a number of dimensions, and activate the appropriate process or service agreement or business decision rule, depending on the situation: geographical location of customer, type of the service call, cost of the product, etc.

- *Real Time Controls:* Most of the analysis done in DMAIC processes is "after the fact." You gather the data, identify sources of variations, and then work on improvements. With a BPM Suite, since the processes are digitized and automated, they could be controlled in real-time. For instance, in a process map you can designate service level agreement rules to specific task assignments. The SLA could specify, for instance, if the task assignment gets within 25% of the CTQ upper specification limit, you need to immediately inform the managers or re-assign the task to another participant. Thus, since all the 'Y's and 'X's of the process are properties, you can associate rules that can fire if the values of CTQs or CTPs are getting close to their upper or lower limits. This is very powerful. It means you can potentially avoid exceptions and increase the performance of processes in real-time. The real-time support is not limited to SLAs. Here are other areas where a BPM Suite can provide real-time support for Six Sigma processes:

    - *Decision Rules:* These rules could be fired or invoked dynamically during the execution of a process. For instance, in an insurance application, a risk assessment rule can be used in deciding a predictive score. The CTQ measure could be the accuracy of the predictive scores.
    - *Triggers* activated whenever there is a change in the state of the process or in any of the process properties (the 'Y's or 'X's). For example, if the customer satisfaction is a property and this property value changes, you can immediately alert the account executive.
    - *Agent Technology:* You can use agents to monitor processes and automatically take action (e.g., escalate a work item to another party, send notification, or raise the item's urgency) or make changes to process instance properties.

There are other capabilities in BPM Suites that directly support Real Time Six Sigma. The key message here is that with automation you can potentially avoid violating the lower and upper limit specifications of your Six Sigma project's CTQs. In fact, in an end-to-end project involving Six Sigma as well as BPM Suite practitioners, your continuous improvement lifecycle will involve both as illustrated here:

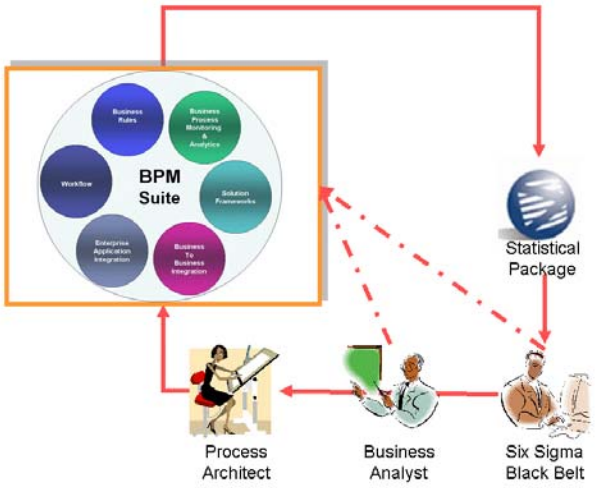

Figure 2. Continuous Improvement Lifecycle in Real Time Six Sigma

Ideally, the process architect that is responsible for building the BPM application, the business analyst, and the Six Sigma black belt are on the same team. Once sources of variations and controls are identified, they will be working closely on the continuous improvement of the information, integration, process, and business rules towards achieving the customers CTQ objectives.

BPM Suites are ideal for Real Time Six Sigma. Through BPM Suite implementations, you have comprehensive business process automation and management for enterprises that endeavor to optimize their processes and improve them in real time. Six Sigma is all about process (especially CTQ) improvement. BPM Suites are all about supporting these improvements through automations. A key advantage in a BPM Suite approach is handling change. With the built-in support for specializations in a BPM Suite you can facilitate rapid testing and introduction of incremental process changes – while monitoring process performance and ensuring control.

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