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*Misty River Consulting*

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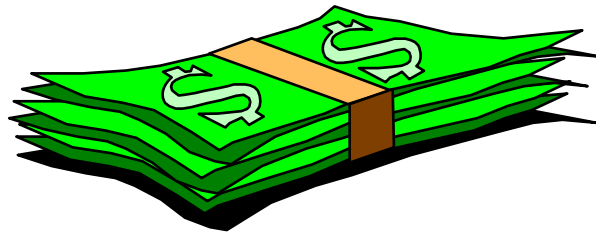
**To Improve It,  
Define and Measure It**

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## To Improve It, Define and Measure It

For most of us the experience of having a bounced check is one of frustration, denial, and embarrassment. Upon receipt of the official letter announcing our ineptitude, we righteously rush to our check books to find the mistake the bank made and begin writing our letter, in our heads, demanding a full public apology for this miscarriage of justice.

However, upon review of our check book register, we find that we had not been subtracting our checks, as they had been written, nor our ATM withdrawals. We had been lazily assuming that enough money was still left to cover our expenditures and withdrawals. We had not been measuring the amount of money that was left in our account and had made decision making errors as a result.



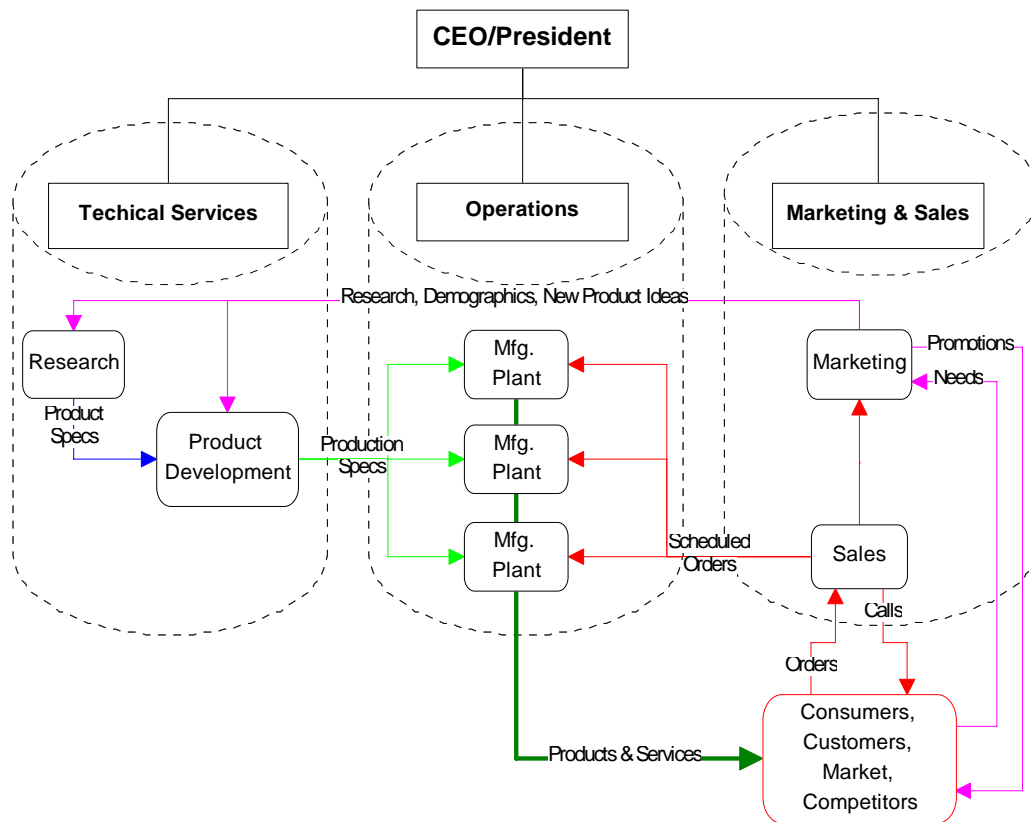
This same problem exists in many organizations as they attempt to improve the profitability of their products and services. They hope to improve customer satisfaction to sustain and improve market share. However, they do not measure customer satisfaction or have a formal system for communicating or acting on customer information (including complaints). To often these organizations are surprised to learn what they actually find in their customer satisfaction "accounts".

These organizations also may be dumbfounded to learn about their processes' performance. They often assume that since volume and efficiency levels are near to or achieve budget targets that they have adequate organizational performance. Unfortunately, this assumption lies against the grain to what most organizations find when they specifically begin to define, measure, and assess their processes' performance. Throughput may be erratic, quality attributes out of control, and costs, hidden in the shrinkage factors found in their budgets, uncontrolled and unmanaged.



## The Organization As A Process

To provide a view of what is occurring in organizations, one can conceive of the work that is done as being a whole set of interconnected and interrelated processes that cumulatively designs, produces, and delivers products and services for the customer. From this perspective, each process identified becomes a contributor to the total organization's behavior. From this perspective, each process's performance can be measured as it contributes to the whole. From this perspective, each process's demonstrated throughput and ability to satisfy its customer can be assessed, diagnosed, and acted upon.



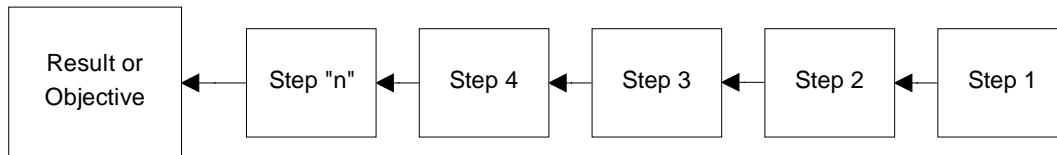
The traditional view from the organizational chart does little to allow us to understand the work that is actually accomplished within an organization. It does not provide us the ability to measure process throughput, quality attribute consistency, or the cost of performing or managing the work. Thus, the process map provides a complimentary set of information to the organizational chart that defines the work that the structure is designed to manage.

## The Reality of Process

Processes are a series of interconnected steps that lead to some outcome. They are most easily observed in manufacturing situations where materials are inputted into a system and then conveyed and transformed by a series of machines that systematically produce a product. Each

machine center becomes a step in the process. Each machine builds upon what the preceding step had accomplished.

The objective of this process is the production of a given volume of products with a given set of quality attributes with a given cost structure that is hoped to satisfy the customer and is hoped to provide a profit to the organization. By the end of the process, we can determine whether the process' objective has been met or not through measurement of the degree to which the objective was achieved.



In non manufacturing situations processes also exist. Accounts payable departments are really organizational structures that are designed to manage the receipt of vendor invoices, reconcile what is received with what is billed, and deliver a check in a timely manner to the vendor. The work that is done can be identified and defined as a process that systematically leads to the accomplishment of the objective. It has a measurable throughput rate, measurable quality attributes, and measurable costs that are all defined by the nature of the steps needed to accomplish the work.

### **Improving Organizational Performance**

Understanding process performance against its objective is a critical element to improving organizational performance because the cumulative sum of each individual process equals what the overall organization's behavior is. Understanding the degree to which each process achieves its objective allows us to find and prioritize what things to "fix" first to achieve new levels of organizational performance. Implicitly, we can also determine what process objectives are needed and what are not based on our understanding of the overall or strategic objectives that have been set for the organization. Thus, some processes may be entirely eliminated and still others may be created that did not exist before.

But for those processes that need to exist, each process's performance provides the basis for identifying the opportunities for improvement that lead to higher throughput, narrower ranges of variation in quality attributes, and lower costs. These opportunities are not visible until the processes are identified, measured, and assessed. No systematic and sustained improvement can occur without this.

### **The Elements of Process Measurement**

Measurement of process performance is possible along three main categories: throughput, quality consistency, and cost. As you can imagine, all three are related and influence each other. The faster and more sustained the throughput, the lower the cost of each unit outputted from the process.

The more consistent the quality of the product is as compared to the needs of the customer, the higher the customer satisfaction and the more demand becomes for the product. This accentuates the ability to sustain throughput and lowers unit cost. Improved quality consistency also reduces the amount of scrap, rework, and defects that essentially improves throughput as well as reduces unit cost.

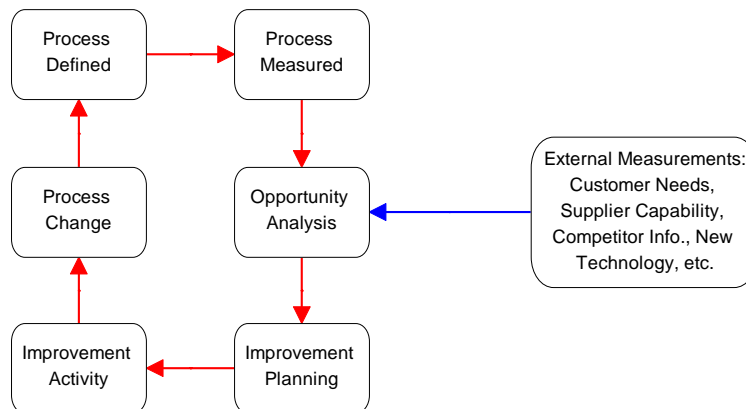
The cost structure of the units produced are a function of the materials that are used in the process and of the nature of the process steps themselves. Each step inherently incurs costs in the form of equipment and supplies, depreciation, labor, preventative maintenance, energy, etc. that are assigned to each unit on the basis of the unit's cycle time through the process and on the basis of the amount of sustained throughput. Thus, throughput, quality, and cost are interdependent upon each other.

As can be seen in our discussion, the cost of the units produced (that are satisfactory to the customer) is first driven by the cost of the materials, secondly by the cost incurred at each step of the process, thirdly by the rate of throughput, by the amount of rework, defects, or scrap found in that throughput, and finally by the degree of sustained throughput created by customer demand and/or constrained by process breakdowns or interruptions.

Thus, achievement of the process' objective is caused by how and what is inputted and by the consistency and speed of work that is done at each step. Definition of what is done in the process is therefore justifiable because of its direct causal link to achievement of the process objective.

### The Intent of Process Performance Measurement

There is no need to set up a new information system to measure process performance unless their is the intent, expectation, resources, and accountability to actually improve process performance.



Setting up a measurement system without the intent to improve is cost prohibitive because of the following:

- The cost of the effort would be entirely a waste and only serve to overload and frustrate management.
- In addition, it could provide some lethal ammunition to those engaged in the political battlefield of career advancement and self promotion.
- The present financial information systems and management reporting systems will continue to provide all that is needed to senior management and the organization's owners.

But, if the organization is intent on continually improving its performance, then it must design some systems to understand what the processes are and how those processes are now performing. These systems do not have to be complex or integrated. Their sole purpose is to find opportunities and assign resources and accountability to take advantage of them. The results of the improvement endeavor will eventually be reflected in the other traditional information systems found in the organization.

## **Deciding What To Measure**

What is measured is of a process can be found in the three main categories of throughput, quality consistency, and/or cost. However, what is specifically measured is process specific. The measurements are of individual processes, not compilations of several similar or interconnected processes. These measures are designed to find the opportunities found in one single process. Thus the measurements are not complicated. They are entirely dependent upon what the objective of the process is as defined by the management group. Again, whatever the measures are will fall into one of the three categories of throughput, quality attributes, and/or cost.

### Throughput

Throughput is measured in two ways: speed and time operating. Speed can be measured as the rate at which units are moving through the constraint of the process. Complimentary to this measure of speed is the length of time one unit takes to move through the process - cycle time. Operating time is also a measure of throughput and describes the degree to which throughput is sustained. It is a measure of how long the process is actually operating compared to its available time of operation.

### Quality

Quality attribute measures are a function of how consistent the unit attributes are and how they compare to the needs of the customer. Thus information about the statistical variation found in the unit is one measure of the quality attribute. Another piece of information that is needed is a measure of what the needs of the customer are. Specifications are a good measure of customer need if they are indeed highly correlated substitute measures for the customer's stated needs. As a result of these two measures, the organization can deduce to what extent the unit's central tendency and degree of variation compare to the needs of the customer.

Other measures of quality are also important to those planning the improvement of a process. These measures include systematic reporting of changes in customer needs, complaints, comments, claims, etc. In addition, customer satisfaction surveys are also a valuable piece of information for planning improvement.

One other measure that is important is to understand how the customer feels about his/her other choices from the competition. You may have very good consistency and you may be seen as a good supplier by the customer, but so might your competitor(s). Therefore, it is also important to understand to what extent your customers' feel you are providing superior value as compared to the competition.

These measures that indicate whether you are providing superior value to the customer are the most critical to the organization. Without a product or service that is perceived to be of better quality than the competitor, there is no basis for doing business. Throughput will have been in vain because no one is buying the product.

## Cost

Cost measures also are an important element in determining whether a customer finds your products and services to be of superior value or not. Information about the cost structure and pricing of your product or service will be compared to the benefits your product and services provide. As a result of this comparison, the customer will determine to what extent you provide value to him or her. As they compare the benefits and costs of your product and services to the competition, they will determine whether your offering is superior or not.

Another piece of information that is important is the cost and pricing of your competitor's similar product or service. By comparing the two, the organization can assess whether improvements in cost structure are needed to improve the customer's perception of value and to prevent margin erosion from pricing changes that will inevitably occur in a competitive marketplace.

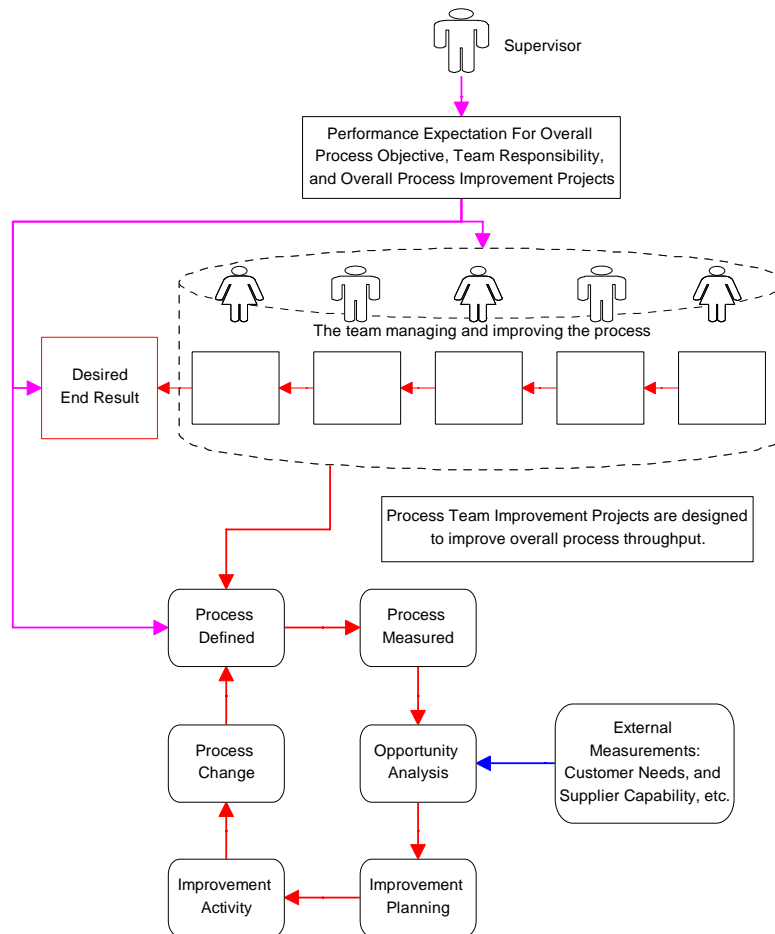
The process creates the corresponding cost structure of the products or services flowing from it. Knowledge of the process, the equipment used, the labor used, the energy used, etc. per process step provide a picture as to why, given a known throughput rate and a given quality attribute, the cost structure of your product and service are the way they are. This knowledge also provides the organization an estimate as to what the benefit would be to any given improvement opportunity found for the process in question. Finally, it gives the organization a means to assess the value of new procedures or technology that could incrementally or radically change the process' design and performance.

There is yet another perspective on cost that needs to be addressed. Some steps in a process add value to the unit, they change the unit in some fashion, as it moves through the process. Other steps do not add value. They are present to inspect incoming materials, inspect the work of previous steps, rework or redo the work of previous steps, store units between steps to act as a buffer for the erratic throughput that occurs on occasion, store units between processes

or departments because of poor planning, or they are just moving things from one point to the next.

The steps that add value also add cost. But the cost is justified by the fact that it will be recovered from the customers decision to buy that product or service because of the perception of value they find in your product or service. The steps that add no value to the units being processed add only cost to the unit. The customer will not perceive any increase in the value of the product or service because of their presence. These non value added steps add only cost to the product or service that is produced and are passed on to the customer.

Whatever the measure that is being used to assess process performance, it is driven by the objective of the process and is specific to that one single process. Process performance improvement occurs one process and one opportunity at a time.



## Where To Measure

The objective of the process, as defined by management, provides the employees who work in that process a common ground. This facilitates common purpose and a shared sense of responsibility for cooperating together to manage and improve their common process. Measures

of process performance, measures that indicate to what extent the objective is being accomplished, provide the employees the information they need to cooperatively manage and improve the process.

Measurements take place at the point in the process that the specific process performance objective is caused at. For example, a measure of throughput speed occurs at the most constraining step in the process - the bottleneck. If this is done, the throughput capability of each step will have been identified so that the bottleneck is identified. If throughput is measured at the bottleneck, employees will be focused on throughput improvements that improve overall process throughput even though the improvement may be specific to the bottleneck itself.

A measure of some quality attribute occurs at the point in the process at which that attribute is created. This provides information not only about the attribute itself, but also information that the employee can simultaneously use to take control action if needed.

Cost measures are also specific to the process step itself. By understanding the specifics of the process step being studied, its contribution to the cost structure of the units being produced can be identified by understanding the labor involved, the equipment depreciation costs involved, the energy involved, the cost of maintenance involved, its degree of contributing to defects, rework, scrap, etc. The effect that changes in throughput through that step have on the cost contribution of that step can also be identified.

## **Conclusion**

The measurement of process performance is meant to provide information that identifies what to improve. These measures are not intended to provide "auditing" or "control" functions as can be found in some financial and cost accounting systems. They are meant to identify the opportunities that exist to improve the performance of process and contribute to the overall profitability of the organization.

By understanding what needs to be improved, employees can be engaged in their respective processes or in cross functional settings to improve the performance of the process. That is really the only reason to measure it. One can not justify spending dollars to measure process performance unless one is intent upon using that information to target and act on improvement opportunities that clearly lead to higher customer satisfaction, higher unit margins, and increased volumes sold.

## **Appendix: Potential Measures of Process Performance**

### **Throughput**

- 1) Rate or speed of throughput.
- 2) Unit cycle time.
- 3) Total time of throughput compared to available time.
- 4) Change over time.

### **Quality**

- 1) Highly correlated substitute measures of customer's true need.
- 2) Statistical descriptions of the unit's quality attributes.
- 3) Comparative statistic of actual to customer need.
- 4) Historical information about customer complaints and claims.
- 5) Periodic measures of customer satisfaction and satisfaction to competitor's offering.

### **Cost**

- 1) Optimal cost structure of unit given optimal throughput and quality.
- 2) Actual cost structure and pricing of unit given present throughput and quality.
- 3) Elements of the cost structure as determined by the process design and technology employed.
- 4) Periodic estimate of cost structure given the availability of new technology or logistical situations.
- 5) Actual cost and pricing structure of competitor's unit.
- 6) Comparative statistic indicating your cost compared to the competitor.
- 7) Identification of non added value steps and there corresponding costs.

This listing of potential measures of process performance is not meant to be exhaustive. It is a list of measures that need to be considered as one determines how best to measure a process. What is specifically measured is specific to the process, driven by the stated objective of the process, and is in the form of throughput, quality attribute descriptions, and cost.