

Using Metrics to Drive Customer Satisfaction

Jeff Fiebrich

Freescale Semiconductor, Inc.
j.fiebrich@freescale.com

Abstract

When beginning a metrics program, the most important thing to ask is 'Who are the metric's customers?' Each metric should have a customer that is prepared to take immediate, documented action when indicated by the metric. A metric without a customer is a waste of time.

When implementing software metrics, one must understand the purpose behind the metrics. Is the metric to measure software development productivity, to illustrate the level of quality in software products, or simply to drive an initiative or goal? Development teams will typically want to deliver software productivity metrics to management while management will typically want to see metrics that support the company's effort to increase customer satisfaction - two very different things. To resolve this issue, a discussion must occur that captures what data the customer needs to see in order to react in a way that promotes the purpose of the metric. Once the metric reporting parameters have been established, the logistics of successfully driving the metrics can easily be defined.

Biography

Jeff Fiebrich is a Software Quality Manager for Freescale Semiconductor Inc. He is a member of the American Society for Quality (ASQ) and has received ASQ certification in Quality Auditing and Software Quality Engineering, and is a RABQSA International Certified Lead Auditor. A graduate of Texas State University with a degree in Computer Science and Mathematics, he served on the University of Texas, Software Quality Institute subcommittee in 2003 - 2004. He has addressed national and international audiences on topics from software development to process modeling.

Jeff has over twenty-five years of Quality experience as an engineer, project manager, and software process improvement leader. He has lead efforts in ISO certification and Software Engineering Institute (SEI) Maturity and SPICE assessments. Jeff has led improvement efforts in the United States, Middle East, Europe, India, and Asia.

Jeff is the co-author of the book, 'Collaborative Process Improvement', Wiley-IEEE Press, 2007.

Introduction

Metrics programs are all about taking measures and turning them into information. This information is then used to make some sort of decision – whether it is to take some action or to make a process improvement. These actions or decisions then – hopefully – create a better end-customer experience. Keeping the customer in mind, and remembering that you have customers at many levels, when beginning a metric program the most important thing to ask is ‘Who are the *metric’s* customers?’ Each metric should have a customer who is prepared to take immediate, documented action when indicated by the metric. A metric without a customer represents time wasted. And of course, a “customer” can be internal or external; it can be your manager or CEO; it can even be a process.

It is particularly important in implementing software metrics, that you understand the purpose behind them. Is the metric intended to measure software development productivity, to illustrate the level of quality in software products, or simply to drive an initiative or goal? Metrics can have a cause and effect relationship with each other. For example, development teams will typically want to deliver software productivity metrics to management while management will typically want to see the effect of productivity which, in turn, supports the company’s effort to increase customer satisfaction. These are two very different things. To resolve this issue, a discussion must occur that captures what data the metrics customer needs to see in order to react in a way that promotes the purpose of the metric. Once the reporting parameters have been established, and the interrelationships understood, the logistics of successfully deriving the metrics can easily be defined.

Establishing Metrics

Establishing metrics in today’s environment is challenging and time sensitive. It used to be that a typical improvement effort was discussed in January, implemented in March, and checked in November to determine success. Today, metrics customers are requesting improvement efforts in an eight to sixteen week timeframe. They are requesting weekly status reports.

Even if you have identified the metrics you want to analyze, you must ensure that they are based on current data. Data that is a month, week, or sometimes even a few days old can initiate a metrics customer to take an action that is no longer warranted. Real-time data is preferable, and a desirable feature is to have on demand capabilities from a utility like SharePoint’s Performance Point, or other business intelligence dash boarding tools. Of course, there are many steps that must be taken prior to establishing an on-demand metric.

We can also take the typical annual improvement program to resolve an in-house issue and compact it down to a few weeks. Yes, this acceleration of effort will require an increase in resources, but a well-executed metric can be used to show management that an issue that was scheduled to be resolved in December was resolved in March; and another was resolved in April. Early resolution of an issue should always be seen as a financial win for a company but remember, your metrics customer must be engaged and have a stake in establishing that the correct data is tracked.

A properly established metric can assure you and your customer that progress is being made and that they are on schedule. If there is a possible issue, everyone will be aware of it at the earliest possible moment. In this way, you can capture and correct issues long before they arrive in your end product. This, in turn, will ensure a better resulting product!

1.1 A Metric must have a customer

Each metric must have a customer! Even the latest and greatest metric being publicized by the top software blog may be meaningless when it comes to your own customers' needs. Often, the data that we gather, analyze, and report in the coolest graphic is without a customer. Without a customer that 'wants the metric', 'has requested the metric', or 'must have the metric', the most amazing metric is irrelevant. Metrics that are in-demand by their customers are very powerful.

1.2 Metrics can support your company's goals

Metrics can easily track your company's success at achieving its' goals. Most industries sit down in January and establish a set of goals for the year. Many times, employees' bonuses are tied to successfully meeting these goals. The last thing you want to do is have updates on a quarterly or semi-annual basis. If one can establish a metric that can illustrate the current status of achieving bonus goals, metrics customers will be waiting in line to utilize it. ¹

Often your metrics customer will not see the connection between software productivity, and end customer satisfaction scores. It will be your particular challenge to show them how metrics interrelate and contribute to end product quality. Once they can make the connection, they will help you establish a more targeted metrics program that may include customer satisfaction goals as an aggregate of other metrics goals.

When annual goals are established, a company may publish five to ten goals and it is tempting to try to supply metrics for all goals at the same time. Take it slow. This would be overwhelming for you and your customer, like trying to boil the ocean. Instead, pick a goal that is being stressed by a potential customer as an important goal. Develop and present a high quality proposal and example for the potential customer. During your discussion, explain how the metric aligns with the customer's goal. If you do this effectively, your customer will come back for more.

Don't fall into the trap of pleasing your customer to get them on your side. Giving a customer a metric that tells things that you want him to know is usually wasted time, even if he says he likes the metric. Focus on demonstrating how your data can be used to show how he is progressing with his priorities. The amount of effort required by you to provide the metric is irrelevant. If the customer experiences the positive effects of a metric, he will come back for more support, and maybe next the metric will seem more valuable to everyone. This usually requires many discussions and demonstrations before a partnership is fortified, but it will happen!

1.3 The outcome of metrics

The metric supplier and the metric customer must understand the actions that the metric customer will take after reviewing his metric. This information is typically documented in the metric's Meta Definition. It is important that the customer understand that you are giving him metrics to enable him to drive improvement/success; not to review during his morning coffee. For example, upon receiving a metric report that indicates progress, the customer may be able to loosen or relax previous commitments or even restructure resources. Likewise, given a metric report that indicates slippage, the customer may immediately devote more of his time to this activity or even request immediate corrective action put in place. The possible reactions of a customer will greatly vary, but each reaction should be documented in the Meta Definition. A metric report that does not generate an action by the customer should always be questioned. As the metric supplier, you should monitor the customers' reactions.

Implementing Metrics

Good things happen as a result of good metrics. If you generate a metric week after week that results in no action taken, then you are not generating a metric that brings value to the table. One good test of a good metric is to quit generating it. If no one misses the metric, it was of no value.

As metric suppliers, we always fall in love with our metrics like parents with their children. And many times we will be the last person to acknowledge that our child (metric) has become completely worthless. Even when 'we' evaluate 'our' metrics annually, we fail to recognize that the metric is no longer performing for its customer.

1.4 Create the Meta Definition

Creating a metric is like many other tasks in life; planning is essential! With that said, it is also important to understand that every metric can be improved and no metric is perfect. Simply take your best shot at the metric to the potential customer and then fine tune it toward perfection. They may quickly find out that perfection is the enemy of good, and learn to accept change as a normal part of the metric program.

During the definition phase, the team must create a Meta Definition for each metric. This is where the owners of the metric will document how this metric will be created and used; refer to Table 1. This will most likely be the most painful stage of defining a metric. As implied in the Latin definition of 'Meta', *beyond*; the level of detail captured, documented, briefed to the team, and approved by the team should be beyond any level previously imagined. Although it is possible to spend too much time in the definition (beyond) phase, this is rarely the case. An example of a typical Meta Definition can be seen below. This will be the Bible for the metric.²

Table 1 - Meta Definition

Download file:	<i>Link to the file for download</i>
Operational Definition	
Metric Name	<i>Metric Name</i>
Metric ID	<i>Metric Unique ID</i>
Goal	<i>Goal derived from management or other information needs, that the current metric contributes.</i>
Purpose	<i>Purpose of the metric being defined, in relationship to the above mentioned goal.</i>
Computation	<i>Formula</i>
Unit of measure	<i>KLOC, %, etc.</i>
Data items	<i>Detail and explain all members of the formula.</i>
Data source	<i>Where to collect from the values of the formulamembers.</i>
Tools	<i>Tools, templates, checklists, scripts etc. used to compute metric.</i>
Phase and frequency to collect	<i>Frequency of collection - weekly, monthly, quarterly, yearly, on a need basis - specify what phase of the project when the metric must be collected.</i>
Responsible for measuring	<i>Who is responsible for measuring?</i>
Interpretation/Actions	<i>How to interpret values? What infers a positive status; a negative status? What are the possible actions to be taken each time a positive or negative status is detected? (also see target and threshold section)</i>
Target	<i>How to set target; value of the target if known.</i>
Threshold	<i>How to set threshold; value of the threshold if known.</i>
Reporting to	<i>Where to report the measurements?</i>
Frequency to report	<i>Frequency to report.</i>
Responsible for reporting	<i>Who is responsible for reporting?</i>

Recommended action on deviation	<i>Action recommended when deviation from target occurs.</i>
Methodology to collect	<i>Who is doing what; from where, store where; etc.?</i>
Measurements storage place	<i>Where to store measurements?</i>
Integrity verification	<i>How measurements integrity is verified?</i>
Responsible for integrity verification	<i>Who is responsible for integrity checks?</i>
Reference:	<i>References, standards etc.</i>
Analysis of measurements data	
Analysis spec and procedure	<i>Specify and prioritize the analyses that will be conducted and reports that will be prepared.</i>
Data analysis methods and tools	<i>Visual display, presentation techniques, descriptive statistics (mean, median, mode). Statistical sampling criteria, analysis in presence of missing data elements; analysis tools.</i>
Administrative	<i>Administrative procedures for analyzing data and communicating results. Approach to review and update analyses and reports. Approach to update measures as necessary. Criteria for evaluating: utility of analysis results and for evaluating the conduct of the measurement and analysis activities. For example, results are provided on a timely basis, understandable, and used for decision making.</i>

1.5 Get full participation

One of the important logistical actions will be assuring that all data points are included. If we are reporting to the CEO the on-time delivery to external customers, this metric must include the status of every delivery to every customer. We cannot selectively omit the status of deliveries to customers who are in payment arrears. The reality is that these might be the most important deliveries for this metric.

A good rule of thumb is that a metric reported at the group level must have everyone in the group participating. A metric reported at the division level must have everyone in the participating division.

1.6 Agree on the metric report format

The supplier and the customer of the metric must agree on the metric report format. It is best to include an example of the report in the Meta Definition. The driver of the format should be the customer. After we go away and gather the data, clean the data, format the data exactly how we believe the customer wants it, and apply some graphic sparkle to the data just like we heard the customer request, it can be very difficult to hear the customer say 'this is not what I wanted.' Patience will be the winning virtue! Continue to have short discussions with the metric customer until the customer is completely satisfied. Many times, if the customer does not feel he has designed the metric, he will not embrace the metric. You want him to feel like he is the owner of the metric.

1.7 Check your emotions at the door

As we all know, given a bucket of data, we can easily take that data and present it in a manner that supports terminating a project and extending the project at the same time. Even with a great Meta Definition for your metric, different individuals will have a different emotional investment to the data.³ Using multiple individuals to collect and crunch portions of the data rarely works. The easiest way to avoid metric emotions is to have one person crunch and beautify the data. Establishing a script or query

to accomplish the majority of this work is even better. The less human intervention the better. It is likely that none of the individuals represented by the metric data will appreciate this effort, but it is only the customer's appreciation that is important to a successful metric.

Using Metrics to Drive Customer Satisfaction

Metrics must always be used for good, and never evil. This is easily said and yet never believed. Let's focus on using metrics to drive customer satisfaction!

1.8 Defect Count

All of our end customers want zero defects in their products. How can we convince our customers that we are seriously chasing this unrealistic demand? Any company that is satisfying the incredible schedule of its software deliveries and is profitable will likely never achieve the zero defects demanded by their customers. Many customers are happy to accept a percentage goal reduction over the previous year's defect count. For example, have a 20% reduction of defects over the previous year. In other words, if a customer experienced ten defects during the previous year, they are surely not pleased with your performance. If you tell him that this year you have set a goal to deliver him eight defects in his product, he should find you extremely frustrating. Why would he be happy to know that you plan to impact his production eight times this year? However, if you tell him that you have set a goal of a 20% defect reduction over last year, it is much easier for him to envision this number going **to zero** at some point in the future.

Figure 1 shows an example of the effect of a 20% reduction of Severity 1 and 2 customer defects. This metric report does not show when *Zero Defects* will be achieved. What it does illustrate is a *Drive Toward Zero Defect*.

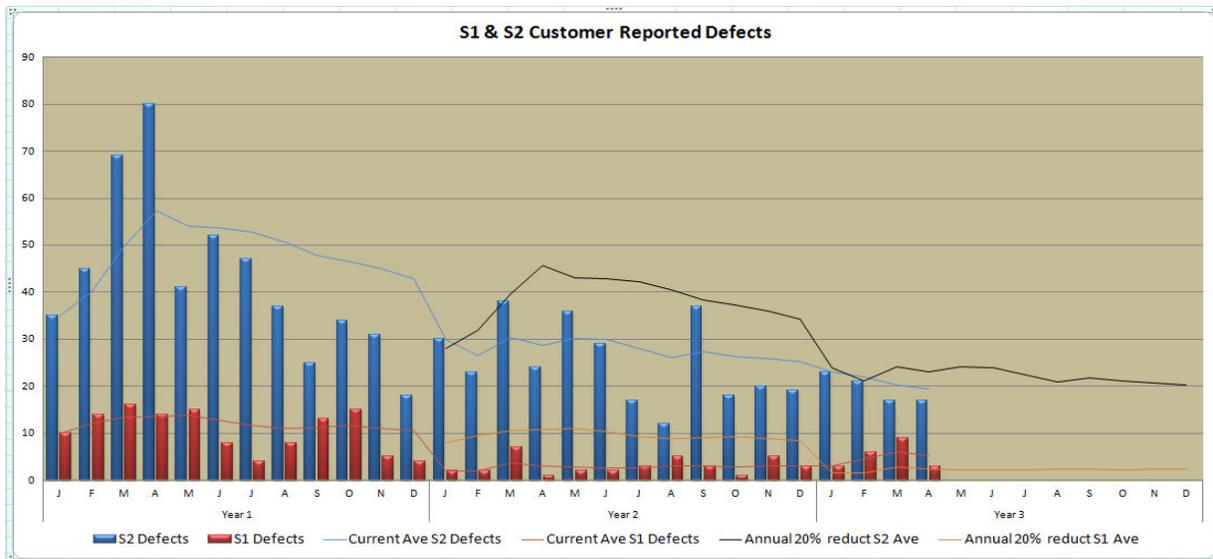


Figure 1. Reduction Report

Often a specified percentage reduction of defects is more easily embraced than an arbitrary number. The percentage reduction can easily be tracked weekly, monthly, quarterly or annually and reported to your customer.

1.9 Defect resolution cycle time

How quickly a customer's defect was resolved is an excellent metric for driving customer satisfaction. Like all metrics, the Meta Definition for this metric leaves space for interpretations. Can it be said that the defect is resolved when the customer receives the updated component or when he is told how to patch his component or why the defect occurred?

When addressing defect resolution cycle time, consider what will make the customer happy. One customer may require a forty-eight hours cycle time, while another customer may just want the update in the next software release in six months. So if it takes you seven days to resolve a defect, you will have to know the needs of the customer to determine if the seven day resolution will make him 'satisfied.'

1.10 Defect Root Causes

Another example of a metric used to drive customer satisfaction is a Defect Root Cause metric.

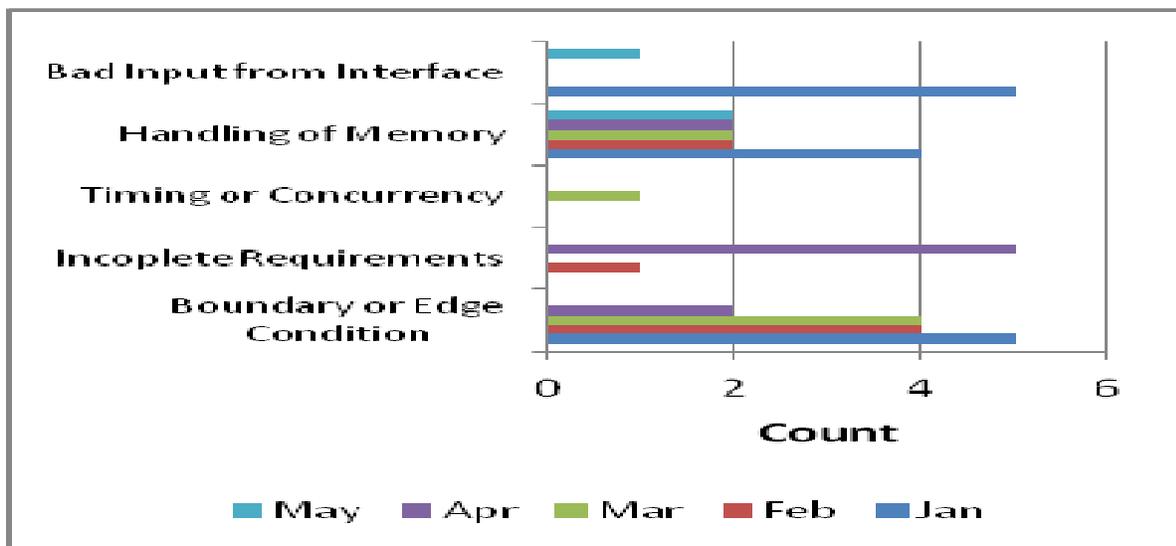


Figure 2 – Root Cause Histogram

Simply assimilate your customers' defects and determine the root cause of each defect. Place the root causes in a histogram as shown in Figure 2. On a regular basis, review this metric, document, and

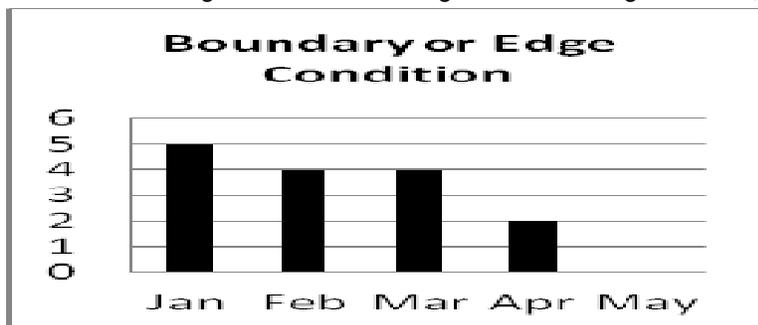


Figure 3 - Boundary or Edge Condition Histogram

implement a plan of action to prevent the top three root causes from recurring. The action should be designed for immediate impact. The histogram shown in Figure 3 illustrates effectiveness of plans of action put in place for *boundary or edge condition* root causes.

On the other hand, if you execute a plan action for four months to resolve the *handling of memory* root cause and this defect continues to be delivered to your customer as illustrated in Figure 4, a serious problem exists. It is obvious that a more effective plan of action should have been put in place? Either the requirements in the Meta Definition were not followed or the Meta Definition Interpretation/Action

section needs to be updated to prevent this from occurring. The Meta Definition will also need to be reviewed, approved and briefed to the team each time it is updated. Any time the metrics indicate that an Interpretation/Action is necessary but this indication is disregarded then escalation may be necessary.

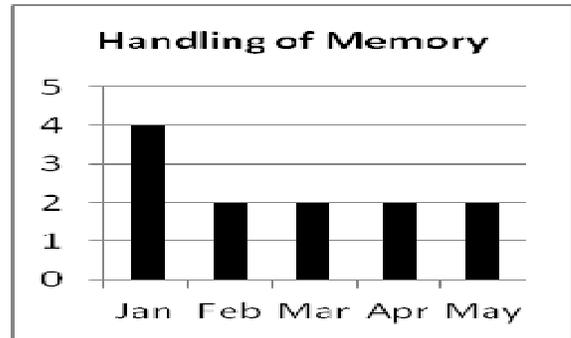


Figure 4 – Handling of Memory Histogram

1.11 Using Multiple Metrics

Often a combination of metrics can be used to show a more convincing story. For example; are we increasing customer satisfaction? The Figure 5 shows that our customer’s defect count is below our goal and that should make our customer happy. (Customer: “Can that be improved?”) The defects are largely being resolved within the fourteen day resolution cycle requested by the customer. (Customer: “Can that be improved?”) But what are we doing to continually improve these numbers? Well, we have assimilated the root causes of all the defects; picked out the worst offender; and put in place effective action plans that permanently resolve them. (Customer: “Oh. Thanks!”)

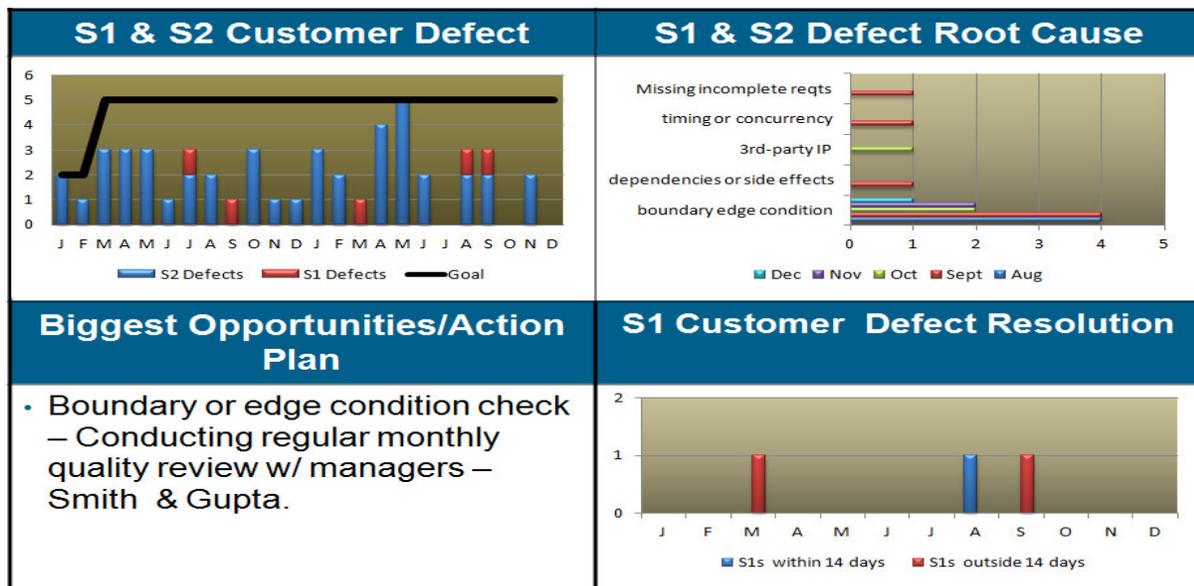


Figure 5 – Combination of Metrics Example

Figure 5 is an example of a graphic that can be used to assure a customer that your daily goal is to focus on satisfaction. It also shows where resources can be directed to create the greatest impact.

Although metrics are a great way to get a feeling of your current status, if a metric is several years old, it can be good to illustrate that the metric is not stagnant, but is constantly being used to drive-up product quality. In Figure 6, the three metrics have been in place for over two years; but the goals continue to tighten. For example, last year (Last Yr’s Exit) the percentage of S1 and S2 Customer Reported Defects (CRDs) was reduced 15% over the previous year; this year our target (This Yr’s Target) reduction goal is 20%; currently our year to date (YTD) reduction is 32%.

Group 1		Last Yr's Exit	This Yr's Target	Current YTD	Comment
Category	KPI				Status Notes
Customer Defects	% of S1 & S2 CRDs vs. Total Defects	12%	10%	4%	(S1 & S2 Customer Reported Defects/ total number of valid defects)
Customer Defects	Reduced % of S1 & S2 CRDs over 2011	15%	20%	32%	S1 & S2 Customer Reported Defects
Customer Responsiveness	% of S1 CRDs resolved within 14 days	86%	100%	92%	S1 Customer Response < 14d

Figure 6 – Long term metric example

Summary

A good metrics program will consider the timeliness of the data used, which should be defined by its intended usage. This means that the metric customer should be engaged from the beginning to evaluate what actions they will take if the metric triggers the need for an improvement. Remember, too, that customers come in all shapes and sizes; they may be senior leadership establishing and tracking company goals, the customer establishing delivery goals, or anything in between.

A good metrics program will focus on the following four beliefs:

- Metrics are about taking measures and turning them into actionable results.
- Metrics should be developed in a partnership with the customer and the provider.
- Metrics may or may not align with company goals, but it is a bonus when they do.
- Meta Definition is a useful tool for documenting how metrics will be created and used.

Satisfaction is tied to using the metrics to show the customer that your team and company are working to continually improve the process and the product.

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