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Software Customer Satisfaction

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Abstract

Satisfying our customers is an essential element to staying in business in this modern world of global competition. We must satisfy and even delight our customers with the value of our software products and services to gain their loyalty and repeat business. Customer satisfaction is therefore a primary goal of process improvement programs.

So how satisfied are our customers? One of the best ways to find out is to ask them using Customer Satisfaction Surveys. These surveys can provide management with the information they need to determine their customer's level of satisfaction with their software products and with the services associated with those products. Software engineers and other members of the technical staff can use the survey information to identify opportunities for ongoing process improvements and to monitor the impact of those improvements.

This paper includes details on designing your own software customer satisfaction questionnaire, tracking survey results and example reports that turn survey data into useful information.

Focusing on Key Customer Quality Requirements

When creating a Customer Satisfaction Survey, our first objective is to get the customer to participate. If the survey deals with issues that the customer cares about, they are more likely to participate. We also want to make sure that the survey is short and easy to complete in order to increase our chances of this happening. If the survey is long and detailed, the recipient is more likely to set it aside to complete later, only to have it disappear into the stacks of other papers on their desk. Therefore, the first step in creating a Customer Satisfaction Survey is to focus in on the customer's key quality requirements.

When determining this list of key quality requirements it can be helpful to start by looking to the software quality literature and selecting those factors that are relevant to your specific products or services. For example, in his book *Practical Software Metrics for Project Management and Process Improvement*, Bob Grady discusses the FURPS+ quality model used at Hewlett-Packard. The elements of the FURPS+ model include Functionality, Usability, Reliability, Performance and Support. The plus (+) extends the acronym to include quality components that are specific to individual products. A second example is the ISO 9126 standard, *Information Technology - Software Product Evaluation - Quality Characteristics and Guidelines for Their Use*, that defines seven quality characteristics for software product evaluation including:

- Usability
- Reliability
- Efficiency
- Reusability
- Maintainability
- Portability
- Testability

In his book *Measuring Customer Satisfaction*, Bob Hayes has an example of a support survey based on the quality requirements of availability, responsiveness, timeliness, completeness, and professionalism.

These general lists from the literature can be tailored to match the quality requirements of a specific software product or service. For example, if your software product has extensive user interfaces and is sold internationally, the ability to easily change the product to meet the needs of

languages other than English may be a key quality requirement. An excellent source of information to use when making a tailoring decision is the people who created the software product or who provide the software services. They can have unique insight into their job functions and how they relate to meeting the customer's requirements.

Another mechanism for determining the customer's quality requirements is the Critical Incident Approach describes by Bob Hayes in *Measuring Customer Satisfaction*. In this approach, customers are interviewed and each interviewee is asked to describe 5-10 positive and 5-10 negative encounters with the product or service that they have personally encountered in the past. The incidents are then used to generate categories of “satisfaction items” based on shared common words used in the incident description. For example, both positive and negative statements about how long they had to wait for help when they phoned the technical service support line would be grouped together into a “length of wait for service” category. These satisfaction items are then used to discover key customer quality requirements. For example, the "length of wait for service" item could be combined with the "ability to schedule a convenient field representative service call appointment" item and the "number of people transferred to" item, then summarized as the quality requirement called Availability of Service.

Creating the Questionnaire

After selecting the key quality requirements that will be the focus of the survey, the next step is to create the survey questionnaire. The questionnaire should start with an introduction that briefly states the purpose of the survey and includes the instructions for completing the survey. Figure 1 illustrates an example of a Software Customer Satisfaction Survey.

The introduction is followed by the list of questions. This survey has two questions for each of the quality requirements of functionality (questions 9 & 10), usability (questions 7 & 8), initial reliability (questions 3 & 4), long-term reliability (questions 5 & 6), technical support (questions 11 & 12), installation (questions 1 & 2), documentation (questions 13 & 14) and training (questions 15 & 16). This adds redundancy to the questionnaire but it also adds a level of reliability to the survey results. Just like we would not try to determine a person’s actual math aptitude by asking them a single math question, asking a single question about each quality requirement reduces the reliability of predicting the actual satisfaction level from the measured level. The questionnaire also has two questions that judge the customers overall satisfaction, one for the software product and one for the support services.

The questionnaire in Figure 1 uses a scale of 1 to 5 to measure the customer satisfaction level. We could have simply asked the question "Are you satisfied or dissatisfied". However, from a statistical perspective, scales with only two response options are less reliable than scales with five response options. Studies have shown that reliability seems to level off after five scale points so further refinement of the scale does not add much value. Note that this example also asks the customer to rank the importance of each item. I will discuss the use of the importance index later in this paper.

In addition to the basic questions on the questionnaire, additional demographic information should be gathered to aid in the detailed analysis of survey results (not shown in Figure 1). Again, the questions included in the demographic section should be tailored for individual organizations. For example, the demographic information on a survey for a provider of large software systems that are used by multiple individuals within a customer's organization might include:

- Product being surveyed
- Current software release being used
- Function/role of the individual completing the survey (e.g., purchaser, user/operator, installer, analyst, engineer/maintainer)

Figure 1: Example - Software Customer Satisfaction Survey

The ABC Software Company is committed to quality and customer satisfaction. We would like to know your opinion of our XYZ software product. Please indicate your level of satisfaction with and the importance to you of each of the following characteristics of our product.

On a scale of 1 to 5, circle the appropriate number that indicates how satisfied you are with each of the following items. A score of 1 being very dissatisfied (VD) and 5 being very satisfied (VS).

On a scale of 1 to 5, circle the appropriate number that indicates the importance to you of each of the following items. A score of 1 being very unimportant (VU) and 5 being very important (VI). Note that items 17 & 18 do not have importance scores since they are overall satisfaction items.

In the *Comment* section after each question, please include reasons for your satisfaction or dissatisfaction with this item including specific examples where possible.

	Satisfaction					Importance				
	VD				VS	VU				VI
1. Ease of installation of the software	1	2	3	4	5	1	2	3	4	5
Comments:										
2. Completeness and accuracy of installation instructions	1	2	3	4	5	1	2	3	4	5
Comments:										
3. Ability of the initially delivered software to function without errors or problems	1	2	3	4	5	1	2	3	4	5
Comments:										
4. Ability of the initially delivered software to function without crashes or service interruptions	1	2	3	4	5	1	2	3	4	5
Comments:										
5. Long term ability of the software to function without errors or problems	1	2	3	4	5	1	2	3	4	5
Comments:										
6. Long term ability of the software to function without crashes or service interruptions	1	2	3	4	5	1	2	3	4	5
Comments:										
7. Ability of the user to easily perform required tasks using the software	1	2	3	4	5	1	2	3	4	5
Comments:										
8. User friendliness of the software	1	2	3	4	5	1	2	3	4	5
Comments:										
9. Completeness of the software in providing all of the functions I need to do my job	1	2	3	4	5	1	2	3	4	5
Comments:										
10. Technical leadership of the functionality of this *p*roduct compared to other similar products	1	2	3	4	5	1	2	3	4	5
Comments:										
11. Availability of the technical support	1	2	3	4	5	1	2	3	4	5
Comments:										
12. Ability of technical support to solve my problems	1	2	3	4	5	1	2	3	4	5
Comments:										
13. Completeness of the user documentation	1	2	3	4	5	1	2	3	4	5
Comments:										
14. Usefulness of the user documentation	1	2	3	4	5	1	2	3	4	5
Comments:										
15. Completeness of the training	1	2	3	4	5	1	2	3	4	5
Comments:										
16. Usefulness of the training	1	2	3	4	5	1	2	3	4	5
Comments:										
17. Overall, how satisfied are you with the XYZ software product?	1	2	3	4	5					
Comments:										
18. Overall, how satisfied are you with the XYZ software products support services?	1	2	3	4	5					
Comments:										

- Experience level of the individual completing the survey with this software product (e.g., less than 6 months, 6 months - 2 years, 3 - 5 years, 5-10 years, more than 10 years)

Finally, some of the most valuable information that comes from a Customer Satisfaction Survey may come to us not from the questions themselves but from the "comments" section. I recommend that each question include a "comments" section. This gives the respondee the opportunity to write down their comments as they are thinking about that specific question. Figure 1 demonstrates the placement of the comment areas, but on a real questionnaire more space would be provided for actual comments. I have found the following benefits from having a comment section for each question:

- Comments are more specific.
- The volume of comments received is greater.
- Comments are easier to interpret since they are in a specific context.

The last step in creating the questionnaire is to test it by conducting a pilot survey with a small group of customers. The pilot should test the questionnaire at the question level, insuring that each question produces a reasonable distribution, that the meaning the customer places on each question matches the intended meaning and that each question is not ambiguous, overly restrictive or overly general. The pilot should also take a macro view of testing the questionnaire, looking for problems with flow and sequence of the questions, question order or grouping that induces a bias, and issues with the time, length and format of the questionnaire. Terry Vavra's book, Improving Your Measurement of Customer Satisfaction, provides information on testing for and avoiding these mistakes.

Who to Ask?

The responses to our surveys may be very dependent on the role the respondee has in relationship to our software product. For example, if we again look at large software systems for large multi-user companies, the list of individual customer stakeholders might include:

- Purchasing
- Analysts
- Installers
- Users/Operators
- Engineers/Maintainers

If however, we are looking at shrink-wrapped software we might be more interested in customer groups by personal vs. business use or by whether they are using the product on a stand-alone PC or on a network.

In their book, Exploring Requirements, Donald Gause and Gerald Weinberg outline a set of steps for determining user constituencies. The first step is to brainstorm a list of all possible users. This includes any group that is affected by or affects the product. The second step is to reduce this list by classifying them as friendly, unfriendly or one to ignore. For example, users that are trying to obtain unauthorized information from the system would be classified as unfriendly. Typically, for the purposes of Customer Satisfaction Surveys, we want to focus our efforts on those groups classified as friendly.

There are several ways of dealing with this diversity in Customer Satisfaction Surveys. First, you may want to sample from your entire customer population and simply ask demographic questions like those above to help analyze the responses by customer group. Secondly, you may want to limit your survey to only one customer group. For example, if you notice that your sales have fallen in a particular market, you may want to survey only customers in that market.

When sending questionnaires to a sample set of customers, your goal is to generalize the responses into information about the entire population of customers. In order to do this, you need to use random sampling techniques when selecting the sample. If you need to insure that you

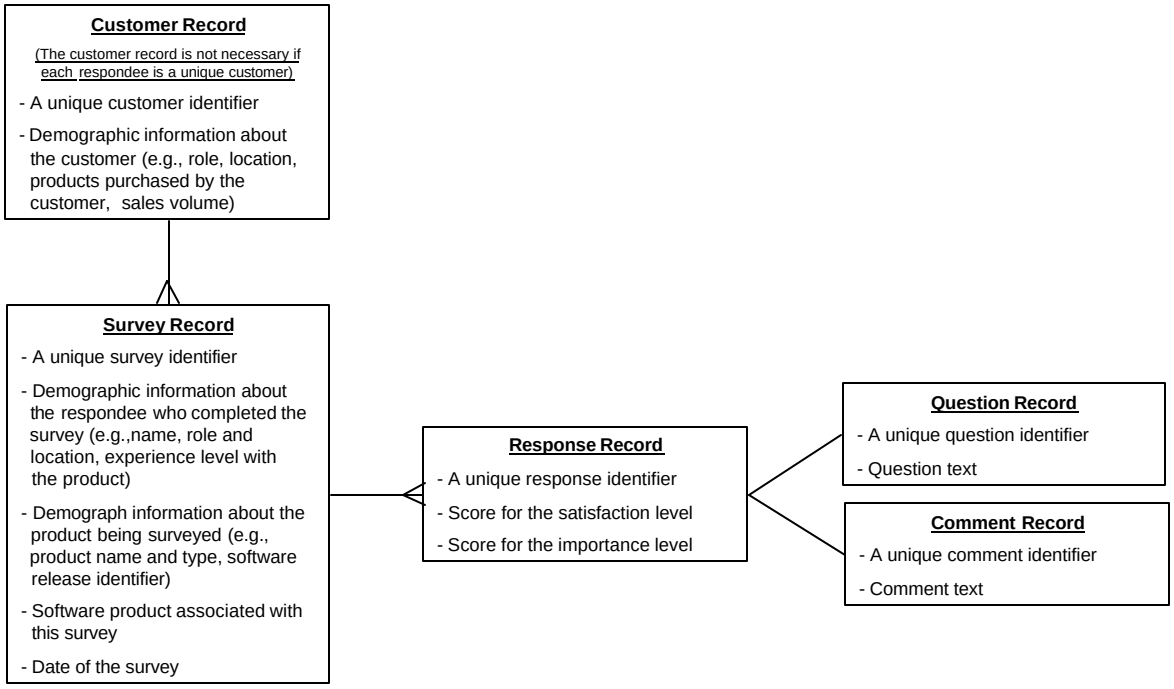
have adequate coverage of all customer groups, you may need to use more sophisticated selection techniques like stratified sampling. Both Bob Hayes' and Terry Vavra's books discuss sampling techniques.

Designing a Customer Satisfaction Database

The results of conducting a Customer Satisfaction Survey are the accumulation of large amounts of data. Every item on the survey will have two responses (i.e., satisfaction level and importance) and potentially a verbose response to the "comment" area. Multiply that by the number of questions and by the number of respondees. Add the demographic data and the volume of data can become huge. I highly recommend that an automated database be created to record and manipulate this data. A well-designed database will also allow for easy data analysis and reporting of summarized information. The following paragraphs describe the basic record structure in an example relational customer satisfaction database. For smaller, simple surveys, this database could be implemented using a spreadsheet, however, for large amounts of data I recommend that a database tool be used to implement the database.

Figure 2 illustrates the relationships between the records in an example database. There would be one customer record for each of the company's major customers (e.g., a supplier of telecommunications equipment might have major customers of Sprint, Bell South and Verizon).

Figure 2: Example Customer Satisfaction Survey Database Design



A survey record is created for each Customer Satisfaction Survey returned or interview completed. Multiple individuals at each company could complete one or more surveys so there is a one-to-many relationship between a company record and survey records. There is a response record for each question asked on the survey, creating a one-to-many relationship between the survey and response records and each response record has a one-to-one relationship with a question record. This design allows different questions to be asked of different survey participants (e.g., installers might be asked a different set of questions than the user) or the flexibility of modifying the questions over time without redesigning the database. The response record also has a one-to-one relationship with a comment record if text was entered in the comment portion of the questionnaire.

Reporting Survey Results - Turning Data Into Information

As mentioned above, the results of conducting a Customer Satisfaction Survey are the accumulation of large amounts of data. The trick is to convert this data into information that can be used by managers and members of the technical staff. I have found three reports to be very useful. The first report summarizes the current satisfaction/importance level for each key quality requirement. The second report examines the distribution of the detailed response data. The third report trends the satisfaction level for each key quality requirement over time.

Summary of Current Satisfaction Levels

Figure 3 illustrates an example of the first type of metric report that summarizes the survey results and indicates the current customer satisfaction level with each of the quality requirements. To produce this report, the survey responses to all questions related to that quality requirement are averaged for satisfaction level and for importance. For each requirement, these averaged values are plotted as a numbered bubble on an x-y graph. The number corresponds to the requirement number on the left. The dark blue area on this graph indicates the long-term goal of having an average satisfaction score of better than 4 for all quality requirements. The lighter blue area indicates a shorter-term goal of having an average score better than 3. Green bubbles indicate scores that meet the long-term goal, yellow bubbles indicate scores that meet the short-term goal and red bubbles indicate scores outside the goal. This reports allows the user to quickly identify quality requirements that are candidates for improvement efforts.

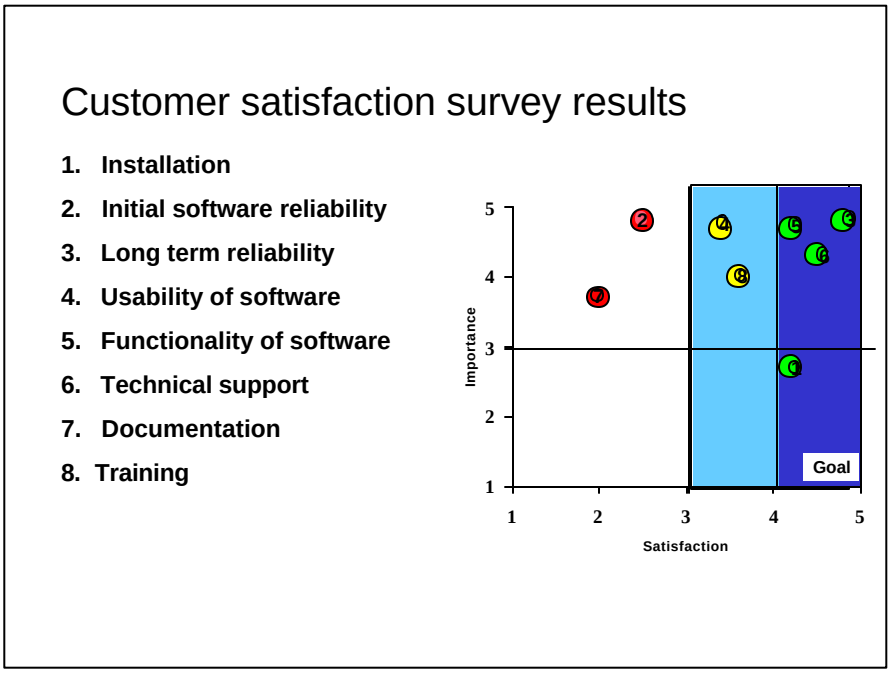


Figure 3: Example of Summary Report for Current Satisfaction Levels

Note that the long and short-term goals do not take importance into consideration. Our goal is to increase customer satisfaction, not to increase the importance of any quality requirement in the eyes of the customer. If the importance level of a requirement is low, then one of two things may be true. First, we may have misjudged the importance level of that requirement to the customer and it may not be a key quality requirement. In this case we may want to consider dropping it from our future surveys. On the other hand, the requirement could be important but just not high on the customer's priorities at this time. So how do we tell the difference? We do this by running a correlation analysis between the overall satisfaction score and the corresponding individual scores for that requirement. This will validate the importance of the quality dimension in

predicting the overall customer satisfaction. Bob Hayes' book, Measuring Customer Satisfaction, discusses this correlation analysis in greater detail.

From the report in Figure 3, it is possible to quickly identify Initial Software Reliability (bubble 2) and Documentation (bubble 7) as primary opportunities to improve customer satisfaction. By polling importance as well as satisfaction level in our survey, we can see that even though Documentation has a poorer satisfaction level, Initial Software Reliability is much more important to our customers and therefore would probably be given a higher priority.

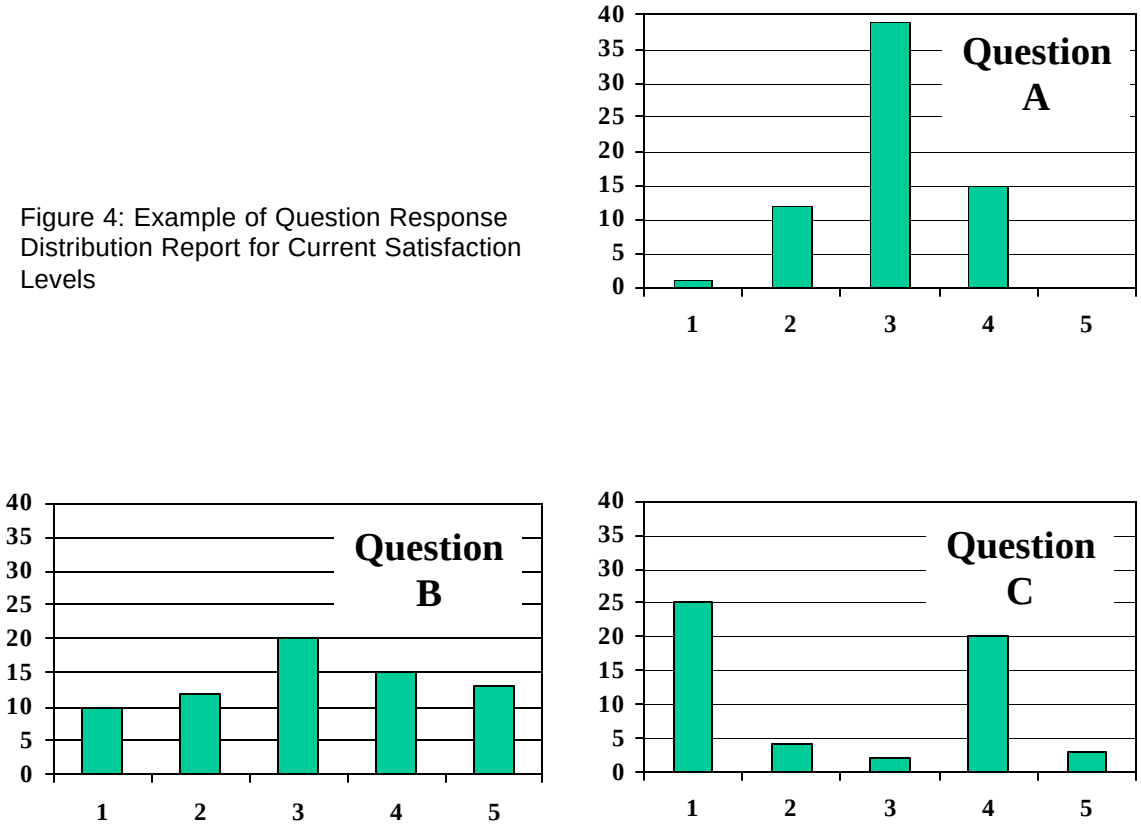
Detailed Data Analysis

Figure 4 illustrates an example of the second type of metrics report that shows the distribution of satisfaction scores for three questions. Graphs where the scores are tightly clustered around the mean (question A) indicate a high level of agreement amongst the customers on their satisfaction level. Distributions that are widely spread (question B) and particularly bi-modal distributions (question C) are candidates for further detail analysis. When analyzing the current satisfaction level, the reports in Figures 3 and 4 can be produced for various sets of demographic data. For example, versions of these graphs can be produced for each customer, each software release or each respondee role. These results could then be compared with each other and with overall satisfaction levels to determine if the demographics had any impact on the results. For example:

- Is there a particular customer who is unhappy with our technical support?
- Has the most recent release of the software increased customer satisfaction with our software's functionality?
- Are the installers dissatisfied with our documentation while the users are happy with it?

This type of analysis can require detailed detective work and creativity in deciding what combinations to examine. However, having an automated database and reporting mechanism makes it easy to perform the various extractions needed for this type of investigation.

Figure 4: Example of Question Response Distribution Report for Current Satisfaction Levels



The "comment" data can also be very valuable when analyzing the survey data for root cause reasons for customer dissatisfaction. This is especially true if there are reoccurring themes in the comments. For example, if one particular feature is mentioned repeatedly in the Functionality comments or if multiple customers mention the unavailability of technical support on weekends.

Satisfaction Level Trends Over Time

Another way to summarize the results of our satisfaction surveys is to look at trends over time. Figure 5 illustrates an example of the third type of metric report that trends the Features Promised vs. Delivered based on quarterly surveys conducted over a period of 18 months. Again, the dark and light blue areas on this graph indicate the long and short-term satisfaction level goals. This particular graph has a single line indicating the overall satisfaction level for the product. However when analyzing these trends, the demographic data can be used to create multi-line graphs where each line represents a separate classification (e.g., a customer, a software release or a respondee role). This allows for easy comparisons to determine if the demographics had any impact on the trends.

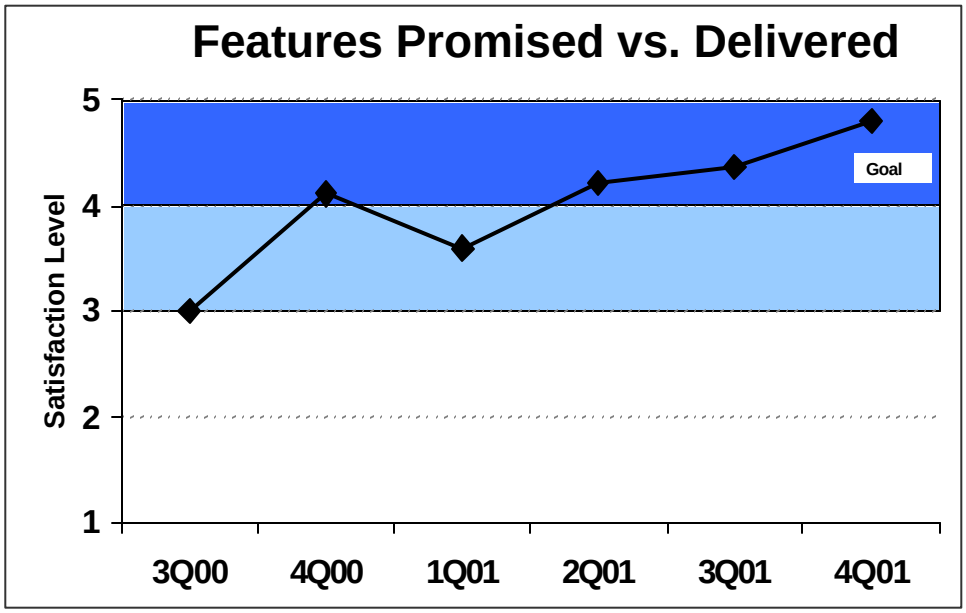


Figure 5: Example of Reporting Trends Satisfaction Levels Over Time

One note of caution is that to trend the results over time, the survey instrument must remain unchanged in the area being trend. Any rewording of the question can have major impacts on results and historic responses before the change should not be used in the trend.

The primary purpose of trend analysis is to determine if the improvements we have made to our products, services or processes had an impact on the satisfaction level of our customers. It should be remembered however, that satisfaction is a trailing indicator. Customers have long memories; the dismal initial quality of a software version three releases back may still impact their perception of our product even if the last two versions have been superior. We should not get discouraged if we do not see the dramatic jumps in satisfaction we might expect with dramatic jumps in quality.

Customer Satisfaction is a subjective measure. It is a measure of perception, not reality, although when it comes to a happy customer, perception is more important than reality. One phenomenon that I have noticed is that as our products, services and processes have improved, the expectations of our customers have increased. They continue to demand bigger, better, faster. This can result in a flat trend even though we are continuously improving. Or worse still a declining graph because we are not keeping up with the increases in our customer's expectations. Even though this can be discouraging, it is valuable information that we need to know in the very competitive world of software.

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