Chapter 9: Customer, Customer, and Customer

The quality of IT system management is determined by customer satisfaction, not by the absence of system defects. Customer satisfaction is important for an organization to grow and stay in business. Customer satisfaction plays a vital role in building an organization's reputation and progress. The IT project manager wants to improve his or her organization's ability to build and maintain a loyal customer base with quality products and services. This chapter presents proven strategies that a manager should follow to build long−term relationships with customers that will create value for the customer and the organization.

Knowing the Customer

Customer is a generic word used in this chapter and is interchangeable with *user* and *stakeholder*. Knowing the customer is important for the success and prosperity of an organization. The IT project manager must know what customers want for the IT system and what they think of his or her organization and services (Figure 9−1). The manager should keep his or her customers and system developers well connected. Box 9−1 shows a list of features that will help the manager understand the customer.

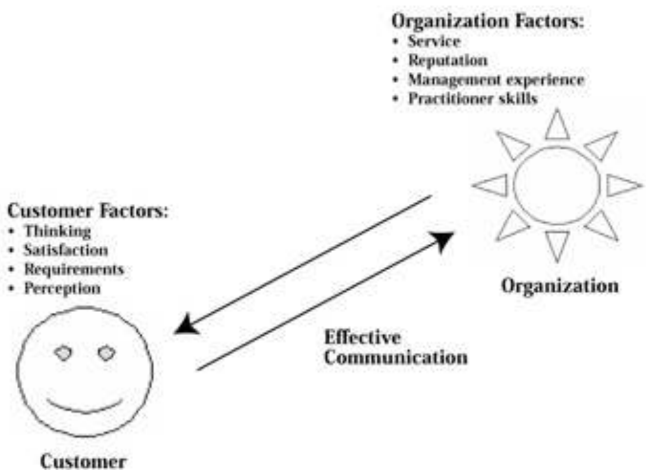

Figure 9−1: Knowing your customer's parameters

Box 9−1: Features to Help the Manager Understand the Customer

- Understand the customer's requirements.
- Maintain open communication with the customer.
- Include the customer in the organization profile.
- Keep the customer in the loop for the project status.
- Establish processes for delivering quality service.
- Establish a point of contact who will respond to the customer's inquiries immediately.

Customer satisfaction and dissatisfaction results provide vital information for understanding customers. The project manager should listen to and learn about each customer on a continuous basis. The use of electronic commerce (e−commerce) is rapidly changing the industry and may affect the manager's listening and learning strategies and his or her definition of the customer. The manager's selection of listening and learning strategies depends on the organization's key business factors. Some frequently used strategies include focus groups with key customers, close integration with key customers, interviews with lost customers about their decisions, use of a customer− complaint process to understand key services, and survey feedback information, including use of the Internet.

The customer survey is important for quality customer service. One of the uses of a survey is to identify the level of customer satisfaction. Another use can be in areas that need improvement, such as the IT system environment, organization infrastructure, hardware and software, utilities operations, laboratory facilities, service orders, and individual tasking. A suggested customer survey rating scale is identified as follows:

5 = Exceptional

4 = Very good

3 = Good

2 = Poor

1 = Very poor

Customer comments are welcome to improve the relationship between the IT system developers and the customers. An organization cannot survive without customers.

The customer is satisfied if he or she receives the IT project information quickly and accurately. Customer satisfaction survey results give the manager vital information for understanding the customers. Such results provide meaningful information for the customer's views that provide repeat business and positive referrals for future business.

Customer Relationship Management Process

The customer relationship management process involves the project manager listening, learning, and implementing a performance excellence strategy. The average customer is an ordinary person who needs to buy what every successful retail store supplies. The manager should use common sense to win the customer. Respect begets respect. It is not difficult for the manager to establish a cordial relationship with a customer if he or she wants to stay in business.

The customer relationship management process uses data mining techniques, continuous data updates, and one−to−one communications programs. This process endures optimal handling of every customer contact. The success of a business depends on a good relationship with the customer.

With the rise of the Internet and e−commerce, customers are more empowered and more demanding than ever. They expect to be able to contact an organization the way they want and when they want. If the manager cannot provide customers with the information and services that they need, he or she will lose them as customers.

Customer Expectations

The project manager must meet customer expectations to be successful. A customer expects the IT system to be reliable, maintainable, and available, all of which help provide an index of system suitability. These measures are interdependent and must complement one another in the development process. Box 9−2 and Figure 9−2 list customer expectation factors.

Box 9−2: Customer Expectation Factors

- Study and planning
- Quick response
- E−mail facilities
- Web page of the organization with information on the latest updates
- Easy wireless access
- Courteous reception that is the first contact with the organization
- Help desk to answer customer questions
- A toll−free telephone number for easy access
- Cellular telephone capability
- Voice over Internet protocol
- System developers' vision by introducing latest technology
- Text chat
- Call back
- Reduced risk in the system development
- Guidance for developing the IT system more quickly, cheaper, cleaner, and with enhanced quality

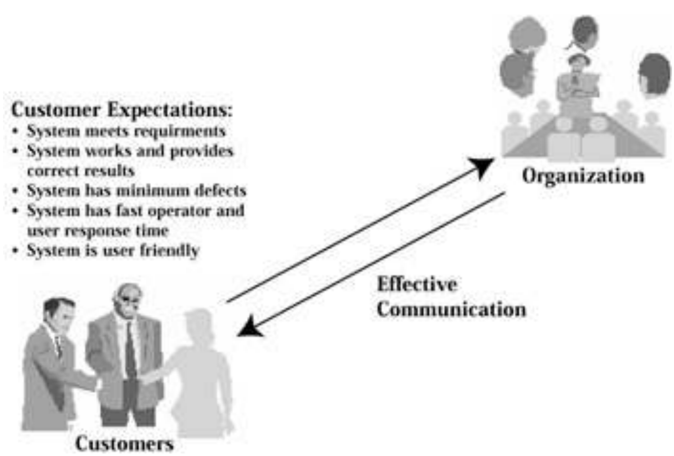

Figure 9−2: Customer expectations

A system is *reliable* if it does what it is supposed to do at any given time. The reliable system provides information to decision makers quickly. The reliability of a system is important because an unreliable system can have drastic effects on the system's life cycle. The project manager can evaluate reliability by having a system operate for long periods of time without human intervention. The system should detect error conditions and then recover from them. This means that the system will perform the required function as stated in the conditions within the stated time. Reliability must be emphasized in all phases of the system engineering; it cannot be added after the system has been developed but must be introduced in the initial stages of the system development.

Maintainability means that the system modules, components, and units can be readily enhanced, adapted to new environments, and corrected. Operational *availability* provides insight into whether the system will be in place and working when it is needed for mission performance. *Statistical validity* means that the system's performance is consistent enough and differences are large enough to convince the manager that those outputs resulted from the inputs. *Design validity* means that the inputs were controlled enough for the manager to relate the output performance directly to the inputs of interest. *External validity* means that the results are applicable to real world operations. Table 9−1 shows the confidence level graphically.

Table 9−1: Customer Confidence Level

Number of tests without any failures necessary to demonstrate specific lower confidence level reliabilities								
LCL	**.90**	**.95**	**.98**	**RD** **.99**	**.995**	**.999**	**.9995**	**.9999**
.90	22	45	114	230	460	2301	4604	23025
.95	29	59	149	298	598	2994	5990	29956
.99	44	90	228	458	919	4603	9208	46050
.995	51	104	263	527	1057	5296	10594	52981
.999	66	135	342	688	1379	6905	13813	69075

WHERE $N = \frac{\text{Ln }(1-\text{LCL})}{\text{LN RD}}$

Customer Acceptance Criteria

The project manager should clearly and precisely define customer acceptance criteria for the IT system. The customer should write his or her requirements, expectations, and the detailed process for accepting the system. Acceptance involves the proper planning and execution of tests that demonstrate that the system satisfies the customer's needs. The tests include functional, performance, and integration tests that will be developed during the system development. For their own satisfaction the customers perform the acceptance tests to see for themselves that the result achieved is correct. Figure 9−3 shows a customer acceptance scenario.

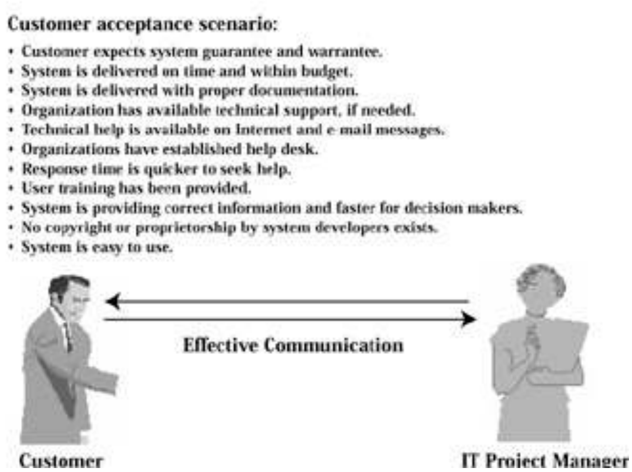

Figure 9−3: Customer acceptance scenario

The following are some of the tools used for acceptance tests:

- Coverage analyzer
- Timing analyzer
- Standards checker

The customer establishes that the system documents will be online and in electronic formats beside the hard copies. The customer can also establish constraints and conditions for the system so that it will meet all of his or her expectations.

Case Study 9−1

Customer confidence levels are important. For example, a contractor makes a change after a failure, tests it once, and says it is fixed. The customer should ask for a confidence level because the sample size is one and the confidence that the system has achieved a certain reliability requirement is probably very low. Using binomial distribution shows that a reliability requirement of 0.99 is achieved with a 90% lower confidence level if 230 trials are completed without a failure.

Customer Equation

The customer equation consists of a full range of human factor engineering (HFE), manpower, personnel, training, health−hazard assessment, and system safety. These factors improve customer performance and total system performance throughout the system development and acquisition processes. The customer equation contains the following:

- Manpower and personnel integration
- HFE
- Human system integration (HSI)

Manpower and Personnel Integration

Manpower and personnel integration (MANPRINT) is an umbrella concept encompassing HFE, manpower, personnel, training, health−hazard assessment, and system safety. The result of using the MANPRINT concept is that the system development and maintenance life cycle operates in the most cost−effective and safest manner consistent with the manpower structure, personnel aptitude and skill, and available training resources. The MANPRINT requirements are based on a team concept. The MANPRINT team's methodology is to compare and balance the following factors for the customer's satisfaction:

- Software engineering cost
- Hardware engineering cost
- Personnel quality constraints
- Operator/user ability
- Training requirements
- Overall system performance
- System reliability, maintainability, and availability
- System security

The goal of the MANPRINT program is to deliver an IT system that meets the customer's technical and human engineering requirements. The project manager establishes the following:

- Tasks and milestones for planning, coordinating, and integrating the MANPRINT elements
- The system hardware and software engineering team responsible for the design and development before various phases
- An analysis of evaluation data to determine if the MANPRINT requirements are achieved

The MANPRINT program is the key to providing an operator−trainable engineering product. The manager compiles all minutes regarding the status progress report for the MANPRINT program and submits it to the customer at all formal system reviews.

Human Factor Engineering

HFE ensures that the designed system meets the customer's requirements and will be operated and maintained within the capabilities and skill levels of the expected users. HFE takes into account the following factors:

- Human characteristics
- Skill capabilities
- Performance
- Safety factors
- Training
- Staffing implications

The manager develops the HFE data during the system concept exploration phase to do the following:

- Determine probable human performance, health and safety requirements, and projected personnel requirements.
- Develop planning of personnel support and training programs.
- Support organizational and operational concepts and provide all requisite HFE input to the management plan.

The manager progressively applies the HFE management plan to the system engineering and maintenance phases. Development of HFE inputs requires a thorough engineering analysis of system requirements. Personnel and training planning describes actions, decisions, processes, and procedures necessary to staff the organizations that employ or support the system to customer satisfaction.

Training development plans address all training support for a specific system, including personnel requirements, training device requirements, and the influence of the system on other aspects of training. The project manager plans to provide resources to accomplish HFE, personnel, and training.

The human equation helps the manager boost the morale of those who are involved in the development, maintenance, and operation of the system engineering.

Human System Integration

HSI involves all of the other terms and is not just HFE or system integration as is often perceived. HSI is concerned with all aspects of personnel, the environments in which they must work, the equipment with which they work, and the interfaces with each.

Evaluation of the personnel aspects of a system during a test requires skilled test design processes and experienced human factor personnel. The manager asks the following questions during the evaluation:

- Why was the operation performed poorly? Were the personnel not skilled enough, smart enough, or strong enough? Was the system not designed to the skill level of the operators in the force?
- Was it a personnel problem or a training problem?
- Were there not enough people to do the job (force structure/manpower issue)?

A correlation exists between the number of people required, basic skill and ability levels, and the amount of training that it takes to get those people to the necessary level to perform the job successfully.

HSI influences all areas from basic system technical performance (unless the system can perform without the people!) through operational effectiveness and suitability to the appropriate tactics and techniques given the user/maintainer population. Poor HSI design can have a negative influence on every aspect of system performance.

System Safety

Those responsible for system safety introduce the necessary safety measures for systems to ensure that the system executes within a system context without resulting in an unacceptable risk. The objective is to equip system−engineering practitioners with the extra knowledge and skills necessary to participate in safety−critical system development.

Safety is freedom from hazardous conditions that can cause fatal injury, damage, and loss of equipment and property. The following guidelines can help the user achieve safety:

- Design to prevent or minimize the occurrence of hazards.
    - Monitoring
    - Automatic control
    - Lockouts
    - Locking
    - Interlocks
- Design to control hazards, if they occur, using automatic safety devices.
    - Detection
    - Fail−safe design
    - Damage control
    - Containment
    - Isolation
- Provide warning devices, procedures, and training to help personnel react to hazards.

The techniques used to establish system safety standards depend on the direction of the management goals, customer's requirements, and importance of the system−critical mission. Management can set up a group to deal with safety concerns. The role of the system safety group is to do the following:

- Establish the system safety plan.
- Become involved with all of the safety measures.
- Analyze the safety measures.
- Attend all system engineering reviews to introduce safety measures.
- Attend configuration management (CM) board meetings to establish steps required to take system engineering safety measures for CM.
- Establish audit trails for all identified hazards.
- Monitor audit trails for safety measures.
- Plan and produce documents about how to take necessary steps in case of safety hazards.
- Design and issue necessary instructions to avoid hazards during system engineering development and maintenance.
- Produce necessary documents for safety precautions.
- Set goals to ensure that the system is safe and can operate in the presence of faults.
- Show that no single fault can cause a hazard in the system's safety and that hazards from sequences of faults are sufficiently unlikely.
- Identify the critical safety areas of the system for future monitoring.

- Analyze system engineering hazards for detection, elimination, control, and limitation of damage in case of an accident; methods in which the system can fail safely; and the extent to which failure is tolerable.
- Establish measures to prevent hazards:
    - Minimize complexity
    - Separate safety−critical functions and data
    - Limit actions of the system
    - Minimize interfaces
    - Incorporate firewalls
    - Limit authority
    - Limit access
    - Minimize the duration of hazardous states
    - Control flow limitation
    - Control sequences such as concurrency, synchronization, and hand−shaking
    - Protect against credible hardware and software failures.
- Adopt a structured approach.

User−Machine Interfaces

The user−machine interface is important for IT system engineering development and maintenance. Human factors and system requirements are to be interfaced in a friendly atmosphere so that the system product is user friendly. This approach builds confidence in those who have to work with the system.

System Security

System security is important for all systems. A good security schema for information data may employ many security methods customized to an installations particular needs. The manager should take precautions to prevent hackers from penetrating the system and destroying the data. The following are some of these security methods:

- ***Data encryption.*** Data encryption consists of software and hardware techniques that safeguard data. The encryption is imposed upon the data by mathematic operations and a certain set of operands called the key. The key is mathematically represented as: Data O Key = Encryption data
- ***Cryptography*** is introduced as a means of transforming data information into a form in which its meaning is obscured. The mathematic operation can be made as complicated as time permits to obscure the data information. Data encryption keeps data information secret and authentic. The same key and the reverse mathematic operation is required at the receiving end to decode the data.
- ***Data compression.*** Data compression reduces the number of bits necessary to represent a character for line−speed purposes. Encryption and data compression both may involve bit manipulation.
- ***Audit trails.*** Audit trails provide monitoring and tracking of errors and unsuccessful attempts to violate access privileges. This creates a comprehensive record of all network and system activities. This also provides statistical information of who logged on when and where and who is accessing what and for how long.
- ***Passwords.*** Passwords are a common, inexpensive technique for restricting access to data. They provide a means of authenticating the authority of a person to access certain types of data.
- ***Security levels.*** The use of security levels helps an organization classify its data in categories, such as top secret, secret, confidential, restricted, or unclassified, and to determine each categorys backup needs.

- ***Access levels.*** Access levels can be assigned to users for a variety of access privileges. Some can have access privileges to update the data dictionary and database files, and others privileges can be more restricted. Other examples of access levels are read−only, write−only, remote access, specific file or directory accesses, ability to upload or download data from a mainframe or network database, and access to printer capabilities.
- ***Lockout.*** Lockout uses a password to get at a specific resource. All users of that resource must know the password.
- ***Callback.*** Callback devices prevent unauthorized access to the communications channel of a computer. Some devices require a caller to provide an identification number and hang up. After verifying the users access rights, the device calls the user back. This technique can also be combined with the use of passwords.
- ***Verification and authentication.*** Verification and authentication is a method of verifying that data are not altered between the time they are sent and received.
- ***Biometrics.*** Biometrics are high−technology devices used to measure some physical characteristics of the individual seeking access, such as fingerprints or retinal patterns. Biometrics measures are often combined with other measures, such as personal identification numbers (PINs), to determine authorization rights.
- ***Smart cards.*** A smart card is a card with magnetic strips or embedded chips that contain access information. After inserting the card into a reading device, the user types in a PIN to gain access.
- ***Management of Customer Training.*** Training of customers and users is of prime importance in achieving maximum system productivity. The users training includes the means of efficiently operating the system, the things that can go wrong, and when appropriate, how to recover the intelligence information. The training also covers precautions to be taken to protect the data. The users training effort commences at the beginning of the systems concept and continues throughout the systems development life cycle until all training products have been delivered. The training material consists of the following:
- ***Task analyses.*** Task analyses reflect operator actions influenced by system changes. The task analyses are prerequisites for all other training products. Material gathered during the system concept phase and material contained in the Engineering Change Proposal documentation are the source material on which to base changes to the task analyses. The task analyses documentation is delivered at the time of system delivery.
- ***Technical manuals.*** Technical manuals reflect the appropriate system changes. The Engineering Change Proposal and other documents are the basis for changing and updating each technical manual. The technical manual is delivered either as a total revision or on a page−by−page basis. Those changes are developed and validated as shown in the appropriate version development schedule. Camera−ready copies of technical manuals are delivered concurrently with delivery of the system.
- ***Instructor and key personnel training.*** Instructor and key personnel training is developed to reflect operational changes occurring on each version resulting from implementation of version requirements. The training is conducted in the users facility. The course material is delivered to the user, and videotapes are produced as needed.
- ***Operators notes.*** Operators notes are developed to instruct operators in how to handle the system. The operators notes contain commands and instructions, including the following:

    - Start
    - Stop
    - Initialize
    - Print reports
    - Follow diagnostic guidelines
    - Perform recovery techniques
    - Perform back−up procedures
    - Switch actions

- ♦ Fixing minor problems
- ♦ Reboot

Training, personnel, and manpower are not independent. A test generally indicates whether a task was performed to a standard, but determining why it was not is more difficult. The training program can be focused on the wrong population, it can be too short for the given population, or it can be a poor training program.

In many instances, the training program is late in being developed for new systems because the new system is late in its own development cycle. The training developers have not had their hands on the system to see how it actually works and how the target user population will use the system in practice. This new system will be compared with an existing system that has been in use for several years and has been optimized by experience. Work−around has been developed and documents have been modified to fit the capabilities of the system. Customers prefer online training as well.

Case Study 9−2

Mr. Jacobson focuses on developing the USPSs information platform, systems integration, data warehousing, and e−commerce initiatives. The technology office also continues producing Point of Service One retail terminals.

Jacobson said that his plans include making it possible for postal customers to track mail via several USPS websites. The service will also use mail tracking as an internal management tool.

Customer Management Checklist

- Have a clear business plan for interaction with customers.
- Assign responsibility to key officials to work with customers for their satisfaction.
- Show courtesy, dignity, and respect to customers.
- Educate all employees, especially receptionists, about the organization. Receptionists are the first people in an organization to meet customers (the first impression is the last impression).
- Emphasize quality of class−one service.
- Provide proper training to the work force so they will be courteous toward customers.
- Establish a long−term relationship with the customer.
- Move aggressively on IT system development by forming a team with the customer.
- Provide information to the customer when he or she needs it.
- Establish a knowledge management concept that provides systematic attention to and sharing of knowledge with developers and customers. The key to knowledge management is the simple idea that many heads are better than one.
- In case a customer is lost, reevaluate business practices and make necessary changes for the future.
- Develop a partnership between the customer and the IT system developers.