A new approach to business processes

by A. L. Scherr

This paper presents a methodology for analyzing and designing the processes that an enterprise uses to conduct its business. The methodology builds upon traditional approaches to business process definition by adding the dimension of people's accountabilities: their roles, relationships, and agreements. The approach presented allows for unique insights into customer satisfaction, employee empowerment, and quality. It also provides a basis for spanning the concerns of both business people and information technologists responsible for providing business process automation.

Business processes are the means by which an enterprise conducts its business. They are how business strategies are accomplished, and they provide the context for the deployment of computer technology. This paper presents a methodology for looking at business processes that extends the conventional concern for tasks, activities, and data by focusing on the dimension of people and their accountabilities—their roles, agreements, and relationships. The methodology promises to provide business people with a means for gaining new insights into their own operations, as well as a powerful way to deal with concerns for quality, customer satisfaction, cycle time, cost accounting, individual accountability, employee empowerment, supplier relations, the use of computer automation to support business, and employee training.

Business processes are the key to building a bridge between the concerns of the business person and those of the information technologist. It is clear that a common language is needed. This language must allow business people to express the design of their business processes in terms that are meaningful to them and, at the same time, provide complete and unambiguous direction for supporting information technology.

Historical perspective

The classic approach. Business process definition has its roots in the manufacturing industries. Classical process management is oriented toward improving product quality and process cycle time. It involves a step-by-step approach to defining and then methodically improving processes. These steps are:

1. Define the process and its measurements.
2. Deploy the process and take measurements.
3. Bring the process under control by eliminating variability.
4. Analyze the cause of unusual results.
5. Define process improvements, and return to step 2.

While these steps might appear to yield only evolutionary change and incremental improvements, in practice, quantum leaps often occur. A well-publicized example occurred within Motorola, Inc., when these steps were taken. At Motorola, orders for paging devices had been taking 30 days or more to process. Motorola was able to

reduce the order-fulfillment time—the time it took from when an order was received to making the product ready for shipment—from 30 days to 28 minutes![1–5] The changes leading to this level of improvement were not evolutionary.

In manufacturing processes, the emphasis is usually on describing the flow of material through manufacturing procedures. Often the process can be visualized by studying a floor plan of a plant. The placement of machines, conveyor belts, storage areas for materials and work-in-progress, and even lines painted on the floor are all examined. The focus of manufacturing process definition is on procedures and activities; the role of people is seen as performing steps in these procedures and activities. In this setting, the primary focus is on minimizing cycle times and costs while maximizing the quality of the manufactured product.

The programming paradigm. The primary use of computers in business has been to automate elements of business processes. However, the design and planning of computer applications have rarely begun with an initial consideration of the business processes in which the application programs were to be imbedded. In each of the last three years, an annual survey of corporate chief information officers has named business process support as their number one concern,[6] indicating that the need exists for business process definition to continue to develop as an important part of the software design process.

Not surprisingly, business process definition tools relating to computer application development commonly have used a programming paradigm. They focus on procedures and data. Their primary objective is to show the relationships between procedural elements (i.e., programs or "manual" activities) and the use of data. In this context, business process definition has been used as a means of analyzing how application programs can be integrated and connected and to identify opportunities for automation. People in the enterprise appear as data records, input-output mechanisms, or substitutes for programs.

The need today. Lately, a number of enterprises, including that of the author, have begun to apply process management principles to business processes. Both the manufacturing and programming paradigms are being used to define business processes, but more and more they are seen as incomplete.

Business processes occurring outside manufacturing situations are almost never completely defined. While spontaneously-determined activities are frequently the desired response to unforeseen or special circumstances, the classic response of the bureaucracy is, "Sorry, we don't have a procedure to handle your case." The question today is, how do we handle spontaneous or *ad hoc* activities in the context of a disciplined, predefined business process? Conventional approaches do not offer much help. In the next section we propose a way to address this issue.

The missing element

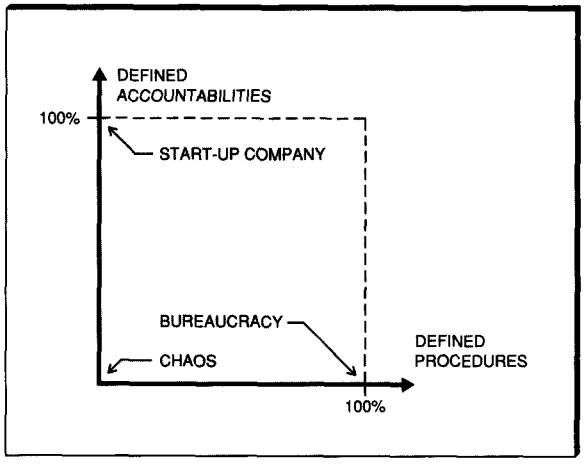
Concern for customers and their satisfaction has prompted many enterprises to begin looking at processes from a customer point of view. It should be obvious that the protocols between a customer and a supplier of goods or services are probably different from the protocols between two computer programs or those followed on a manufacturing plant floor. The process-definition technique described here incorporates a focus on people and their accountabilities: their roles (e.g., as customer, supplier, salesperson, or inventory manager), agreements, and commitments. Further, both the procedural and data dimensions can be integrated consistently and with synergy.

The word "accountability" is used to mean what a person is held responsible for by others—what an individual is counted upon for and the responsibilities a person has accepted. Later, a more rigorous definition will be given.

Considering people and their accountabilities in an organization is not a mere augmentation of the familiar procedural aspects of process definition. Rather, this consideration adds another dimension. Consider the organizational extremes of an organization that has completely defined procedures but no defined accountabilities for its employees, and an organization with well-defined accountabilities but no defined procedures. Figure 1 illustrates this concept.

Examples of the first type of organization abound in well-established bureaucracies, such as the Department of Motor Vehicles in many states. Examples of the second type can be found in most

Figure 1 Organizational extremes



start-up companies. Companies with well-defined accountabilities and no procedures will naturally develop procedures. Organizations with undefined accountabilities and complete procedures will rarely, if ever, create well-defined accountabilities. Examples of organized bodies with both well-developed procedures and well-defined accountabilities are a symphony orchestra, a surgical team, the crew in the cockpit of an airliner, and teams for certain sports.

The optimum for any given organizational entity would fall somewhere within the spectrum shown in Figure 1. It is not the case that the goal should always be to move to the top right of the diagram. For instance, a jazz band playing improvised music would have well-defined accountabilities for the participants, such as providing harmony, rhythm, or the melody line, and very sketchy procedures. The musical notes played are largely not predetermined, but the basic structure usually is. Likewise, most organizations will want to leave room for improvisation and creativity in certain processes or at certain points in their processes. However, a lack of defined procedures without well-defined accountability will lead to chaos.

The technique described here defines a business process as *a series of customer-supplier relationships that produces specific results at specific points in time*. The initial customer-supplier relationship is often between an actual paying customer (sometimes called the "big C Customer") and the first person contacted. This contact is often a salesperson who then plays the role of the customer for the suppliers within the enterprise. The chain continues for as many levels as are necessary to complete the particular customer transaction. At each intermediate level, a supplier for a transaction further up the chain (upstream) is the customer for the next transaction down the chain (downstream). If outside suppliers are used, they appear at the end of a chain. Figure 2 shows a simple example of such a chain.

In Figure 2, the customer interacts with the supplier, the salesperson, who in turn is the customer of the inventory manager. The inventory manager is the customer of the manufacturing manager, who supplies the actual product that the original customer ordered if it is not already in the inventory, and the shipping company that delivers the product to the customer. The manufacturing manager is the customer of an external supplier for materials used to build products. The arrows between members of the customer-supplier pairs represent the communications that occur to accomplish the transactions.

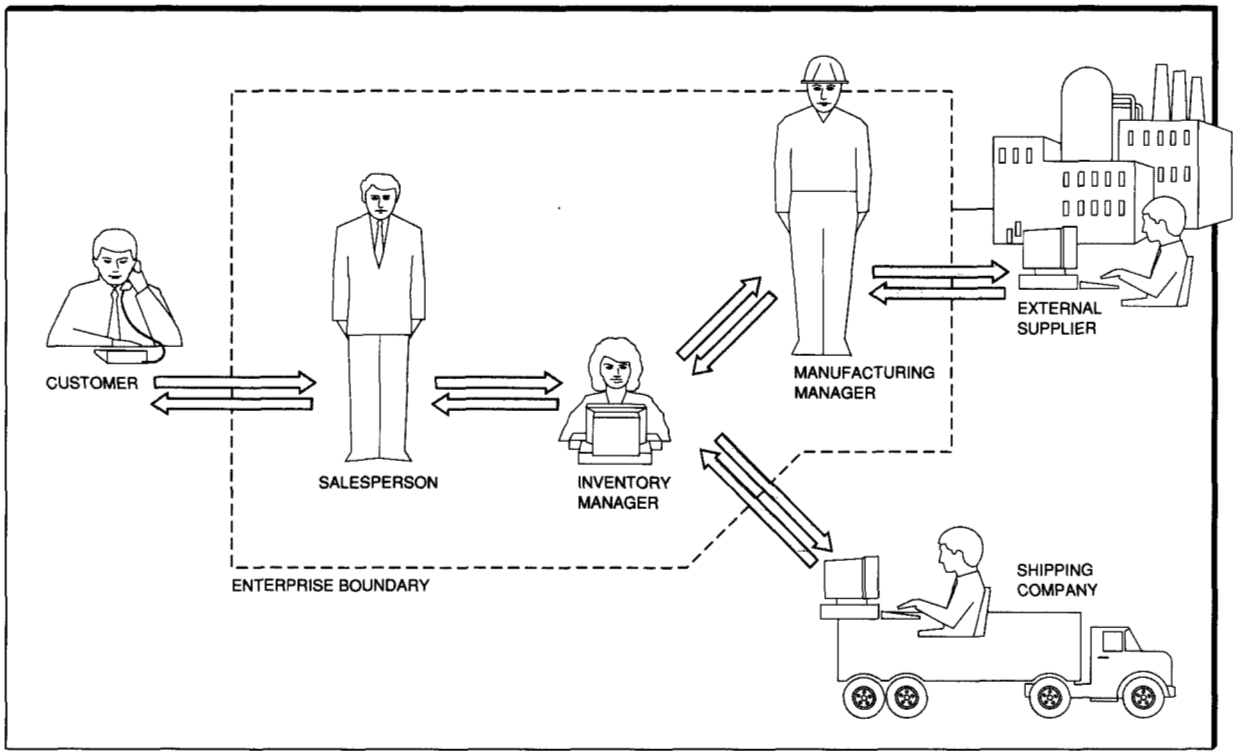
The nature of this communication is the foundation for the business process approach described next.

A new business process approach

Customer-supplier communications. This section describes a rigorous approach to dealing with accountability. First, a model for an individual customer-supplier relationship is developed. This model is then used as a building block for business processes and becomes the basis for understanding accountability.

Conducting business is fundamentally the conveyance of commitments. A customer who places an order, a supplier who accepts the order, and the supplier who provides a product that the customer accepts and pays for are all enacting different elements of commitment. Thus, an order is a commitment by the customer to accept what is being ordered and to pay for it. The supplier's acceptance of the order conveys a commitment to deliver. If the supplier does not deliver an accepted order, the failure is considered a broken commitment. An examination of the following typical business transactions indicates that com-

Figure 2 The customer-supplier chain



mitment is the key element of the communication between customer and supplier:

- Applying for a loan (asking for a commitment from the bank)
- Approving an engineering change request (agreeing that a change is to be effected)
- Requesting a salary increase for an employee (seeking commitment from management)
- Offering a customer a product or service (committing to deliver if the offer is accepted)
- Collecting a bill (receiving payment on previously agreed upon terms)

This approach, based on the theoretical work and practice of Flores and Winograd,[7,8] establishes commitment as the basis for communication in a customer-supplier[9] relationship. The communications between the two parties can be divided into four phases (see Table 1):

1. The *opening* communication that begins the conversation, either a request from the customer or an offer from the supplier

Table 1 The four phases of two-party communication

Phase	Customer Action	Supplier Action
OPENING	Request	Offer
NEGOTIATION	Counter-request Withdraw Agree	Counteroffer Withdraw Agree
PERFORMANCE	Withdraw	Withdraw Report completion
ASSESSMENT	Withdraw Reject Accept	Withdraw

2. The *negotiation* about the supplier's deliverable, the payment by the customer, timing, and any other conditions. Technically, these are the *conditions of satisfaction* for the agreement. Agreement is reached when the supplier accepts the customer's request or the customer accepts the supplier's offer. Obviously,

Table 2 The outcome of two-party communication

Phase	Action	Outcome
OPENING	Customer requests	Go to NEGOTIATION phase (supplier's move is next)
	Supplier offers	Go to NEGOTIATION phase (customer's move is next)
NEGOTIATION	Customer agrees	Go to PERFORMANCE phase
	Supplier agrees	Go to PERFORMANCE phase
	Customer counter-requests	Supplier's move is next
	Supplier counteroffers	Customer's move is next
	Customer withdraws	END
	Supplier withdraws	END
PERFORMANCE	Supplier declares completion	Go to ASSESSMENT phase (customer's move is next)
	Customer withdraws	END
	Supplier withdraws	END
ASSESSMENT	Customer accepts result	END
	Customer rejects result	Return to PERFORMANCE phase (supplier's move is next)
	Customer withdraws	END
	Supplier withdraws	END

either party can counter with a request or offer before agreement is reached.

3. The *performance* or production and delivery by the supplier of the goods or services that were agreed to in phase two—specifically, the fulfillment of the conditions of satisfaction by the supplier
4. The *assessment* and acceptance of the result by the customer. It is at this point that the customer might express satisfaction with the result. The customer's side of the agreement on conditions of satisfaction are fulfilled in this phase.

This formulation describes only the basic actions that occur when everything proceeds smoothly. The four phases are made up of specific "moves" that each player can make, called *speech acts* in Flore's formulation.

Each of the actions represents the conveyance of a commitment. A complete *request* would include a statement of the conditions of satisfaction desired by the requester, including time for fulfillment. The commitment conveyed by a request is to accept what is being requested if the conditions of satisfaction are met. It is essentially the same commitment usually implied by a customer placing an order.

Accepting a request conveys the commitment to deliver the requested conditions of satisfaction within the specified time. An *offer* is the commitment to deliver a proposed set of conditions of satisfaction (including a time frame) if the offer is accepted. If negotiation takes place, the conditions of satisfaction are usually refined with each iteration. When one party *agrees* to the other party's proposed conditions of satisfaction, both parties become committed to a single statement of the conditions for satisfaction. This is not to say that both parties necessarily have the same understanding of these conditions.

When the supplier *reports completion*, the commitment being communicated is an affirmation or assertion that the conditions of satisfaction have been met. If the customer *rejects* the supplier's deliverable, the supplier can rework, replace, or redo the deliverable. Finally, at any point, either party can *withdraw*.

The consequences of withdrawal depend upon which party withdraws, when the withdrawal occurs, and what any prior agreements stipulate regarding withdrawal.

Table 2 describes all of the possible outcomes from each of the actions in Table 1.

As the customer-supplier relationship proceeds through the phases, the focus for the next action shifts from one party to the other. As in a board game, one player moves, followed by the other. In the description in Table 2, the notations indicate which party has the next move. Either party

can withdraw at any time, regardless of whose move is next.

Two additional factors are fundamental. First, when the supplier declares completion, the work either has been completed on time or not. Second, during the assessment phase, customer satisfaction with the transaction can be determined. The arrangement for satisfaction feedback from the customer can be included in the original conditions of satisfaction.

At the completion of a customer-supplier transaction, there are no surviving commitments. In other words, all of the commitments created during the transaction have either been satisfied or one of the parties has withdrawn. If there were to be surviving commitments, then the transaction would be extended to include them.

This customer-supplier protocol has the property of being *complete*: all possible outcomes can be represented. Moreover, it can be scaled up and down. That is, it can be used to describe the highest-level transactions of an enterprise all the way down to the specific actions taken by an individual. These facts have been established empirically by using the model in a wide variety of situations over the last ten years. In a subsequent section, this customer-supplier protocol is used as the basic building block for defining business processes. But first, the basic customer-supplier protocol just described is compared with some of the models typically used to define business processes.

Comparison to classical process-definition protocols. The most striking difference between this approach and the one usually taken to define processes is that classically only the procedural aspect of processes is considered. For instance, each step of the classic procedure is characterized by its inputs and outputs. Little attention is paid to who is responsible for the actions being described. In fact, the practitioners of some process-definition approaches pride themselves in never getting involved in organizational issues. The whole dimension of accountability is ignored.

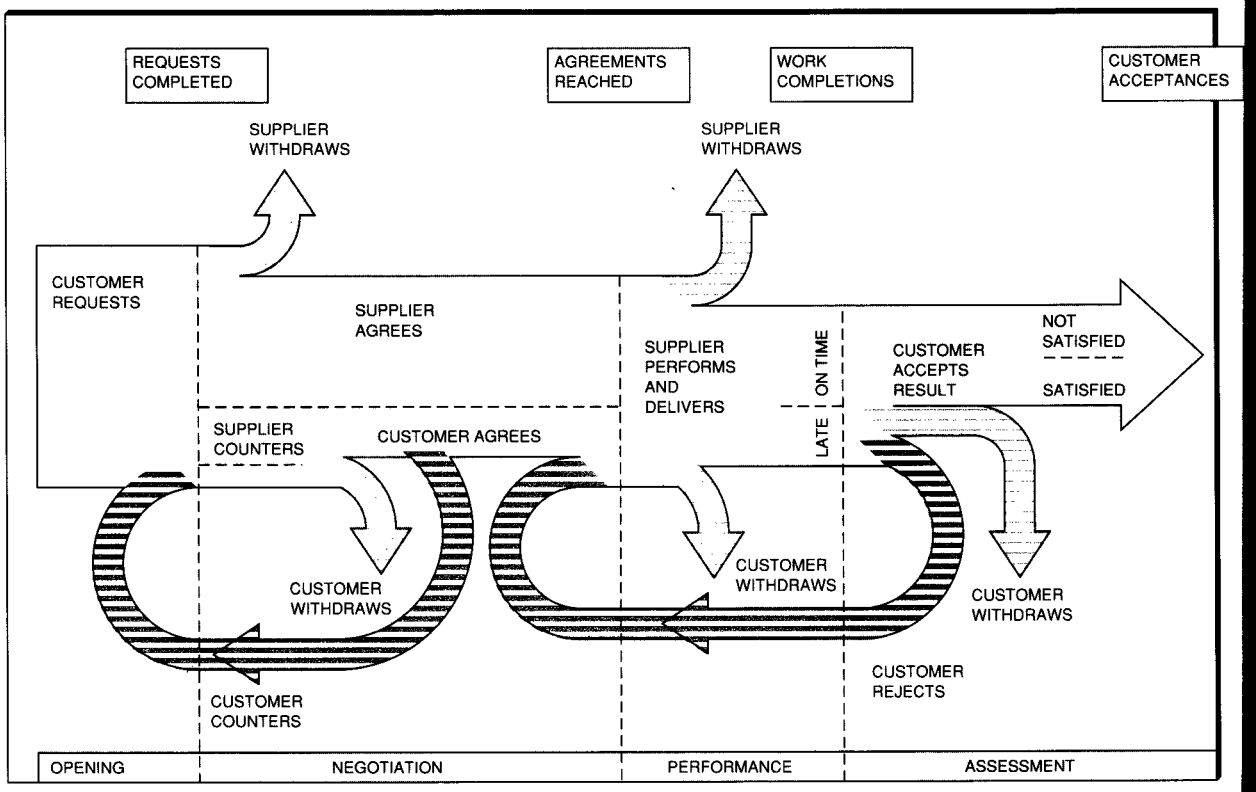
Another aspect of classical process definition, the one usually seen in both the manufacturing and the computer automation areas, is that the requirements for the process are first defined, followed by defining the activities necessary to meet the requirements. Usually, people representing the customer-supplier chains get together to establish these requirements. Since the requirements are set when the process is defined, allowances are seldom made to negotiate additional requirements during the execution of the process itself. Thus, the conditions of satisfaction for the process are usually static, having been established during the definition of the process rather than during the performance of the process itself. Typically, exceptional situations can only be handled outside of the process.

For example, consider a process where the requirement was established for a two-week turnaround time from a supplier. This condition of satisfaction would be built into the process itself. In practice, there will be transactions that could be easily turned around in two days and others that should take two months. By using the customer-supplier protocol defined above, the turnaround time could be negotiated for each transaction when it occurred. As a result, customer expectations would be met more often and the supplier would be seen as more responsive. Also, the handling of emergencies and other exceptional situations can be more easily accommodated.

Another point of comparison is the usual way of dealing with customer satisfaction. Typically, after-the-fact surveys are used. This makes it difficult to identify the root cause of dissatisfaction when it occurs. Using the customer-supplier protocol makes it "natural" and easy to determine satisfaction on a transaction-by-transaction basis as part of the assessment phase.

When processes are defined using classical techniques oriented around procedures and activities, the resulting process structure may be arbitrary. Often, the activities of an organization or enterprise are listed and then grouped logically. The relationships between the groups of processes are then established. It is rare that two different views of the same set of activities result in the same groupings and relationships. On the other hand, when using the approach described in this paper, which starts with customers and accountability, our preliminary results show a much higher degree of consistency among different people looking at the same situations. Starting with the customer-supplier chain seems to result in a more repeatable, consistent view of the processes of an organization.

Figure 3 Measurements of the basic customer-supplier protocol



A related area is process measurements. In past approaches, the measurements had to be tailored to the specific process. However, the basic customer-supplier protocol can be used to standardize measurements. Thus, every customer-supplier relationship can be measured and viewed consistently.

Standard measurements of customer-supplier relationships. Using the customer-supplier protocol to define processes allows a rich set of consistent measurements to be made of every customer-supplier relationship. These standard measurements contain three basic types of information:

1. Time (time for each phase, overall time, timeliness of the supplier completion)
2. Overall outcome and the history of moves leading to it
3. Customer satisfaction

Figure 3 graphically depicts the various times and outcomes using a "pipeline" representation and shows all of the possible outcomes of a customer request. Imagine that some number of requests were made, entering the diagram from the left. Some of these would be accepted by the supplier, resulting in an agreement. However, the supplier may withdraw (i.e., decline the request) or the customer may withdraw before the supplier responds. Finally, the supplier may make a counteroffer to the customer's request. If the customer accepts the counteroffer, then agreement is reached. If the customer makes a counter-request, it is considered that the process is restarted as if with a new request, hence the feedback loop.

Once agreement has been reached, the supplier's performance and delivery occurs either on time or late. However, either party can withdraw prior to this point. In the assessment phase, the customer can:

- Accept the supplier's deliverable
- Reject the deliverable, causing the process to revert back to the performance phase

- Withdraw without taking the deliverable

In any of these cases, the customer may or may not be satisfied with the supplier's performance. Customer satisfaction is considered independent of whether the deliverable is accepted. It is a common occurrence that customers accept goods that they are not completely satisfied with. It is also possible to describe plausible examples of a satisfied customer not accepting the deliverable. Therefore, customer satisfaction must be determined by a specific query, and in practice, may be sampled long after the specific conditions of satisfaction are complete.

Business processes defined using the customer-supplier protocol. Using the example of Figure 2, the use of the basic protocol to define an entire process is straightforward. Each one of the customer-supplier relationships has its own conditions of satisfaction and four-phase progression. However, the relationships are interdependent. For example, the customer's original request (the order) would not be accepted by the salesperson without confirmation from the order-fulfillment manager that the ordered items could be shipped within the time requested by the customer. Filling out some details in the example, the full process might be as follows:

- The customer gives an order (request) to the salesperson. Conditions of satisfaction are item quantities and prices, and the date the items are required.
- The salesperson checks prices and, if correct, requests a delivery commitment from the inventory manager.
- The inventory manager determines if the requested items can be supplied by the requested time. This determination would involve checking inventories and the manufacturing plant. A possible outcome is that new manufacturing would be scheduled. On the basis of these considerations, the inventory manager would accept the salesperson's request or make a counteroffer.
- To schedule new manufacturing, required materials would be checked and, if not on hand or pending in the "pipeline," a supplier would be requested to provide them.
- The salesperson conveys the acceptance (or counteroffer) to the customer, and agreement is reached.
- The inventory is replenished by the manufacturing group if required. This activity would require scheduling manufacturing, which, in turn, might require obtaining materials from an outside supplier.
- The inventory manager packages the order and requests shipment through the shipping company. If the delivery dates do not match the original conditions of satisfaction, other shippers are consulted, and the customer may have to be informed.
- The completion report from the shipping company is a bill of lading signed by the customer. It is forwarded back to the salesperson as a completion report for the open requests.
- The salesperson reports completion to the customer and presents a bill.
- The customer pays the bill and reports satisfaction.

The customer-supplier chain in this example is:

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customer
  salesperson
    inventory manager
      manufacturing manager
        materials supplier
      shipping company
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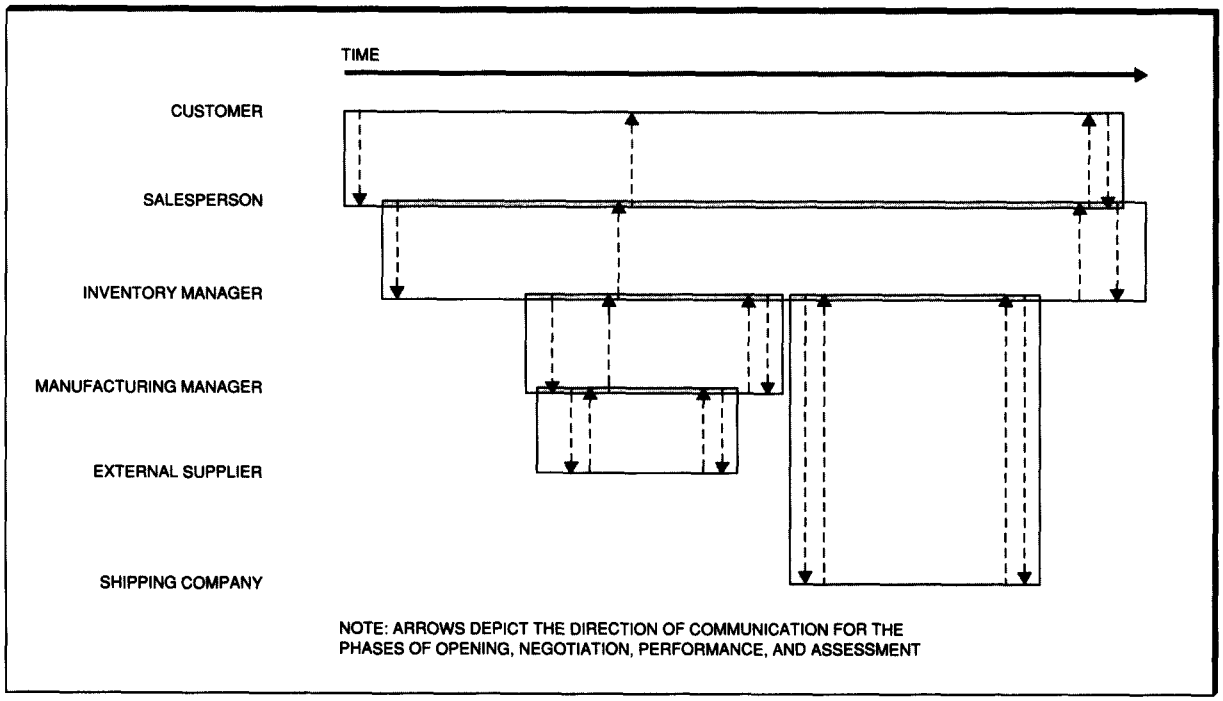
Thus, there are a total of five customer-supplier relationships. Figure 4 shows a graphic representation of the relationships. In this diagram, the roles (i.e., customer, salesperson, etc.) are shown on the left, and time proceeds across the top. Each customer-supplier relationship is represented by a rectangle. The horizontal extent of the rectangle represents the elapsed time of the customer-supplier transaction; the top and bottom of the rectangle are aligned with the customer and supplier roles, respectively. The four phases of the protocol are separated by arrows showing the direction of communication between the two parties.

Types of business processes: Who are the customers? One of the first questions to be addressed when defining business processes is to determine who the ultimate customer is. In some cases, this customer is actually a customer or client paying for the goods or services of the enterprise. However, there are typically many processes that never deal with an external paying customer. A more general way to look for the customer of a process is to answer the question, "Who must be

Figure 4 Graphic depiction of a sample business process



satisfied with the deliverable of the process?" Some other possibilities for the role of ultimate customer in processes are: the enterprise owner or stockholder, the employee, the chief executive officer, the press, the government regulator, the outside auditor, or the labor union.

One area of confusion is in the processes that create new products or services to be offered to a broad spectrum of customers (as distinct from a made-to-order product). Since the product or service does not yet exist, there are no real customers yet. That is, customers cannot make authentic requests for the new product or service, nor is any offer being made. Who then is the ultimate customer of such a process? Today, many advocate using the "voice of the customer" as the proper driving force for new product development. This "voice" is determined by gathering data from interactions with people who can only be *potential future customers*. When determining new product requirements, these potential customers are really acting as suppliers of information, opinions, and predictions. They typically are not expected to place orders or accept an offer. This will occur at some future time, if at all. The real customer in the new product development process is the individual who sorts through all of the input from potential customers and then decides what the requirements are. This person, in effect, is acting for or standing for future customers by being the ultimate customer in the day-to-day process of developing a new business offering.

The management chain of an organization also represents a type of customer-supplier chain. Many of the processes of an enterprise exist within this chain entirely. The new-product process described is an example. In some organizations, top executives create surrogates, "the staff," who act for them and appear as customers in some processes.

Ensuring consistency across organizations. The purpose of business process definition is fundamentally to assure predictability and consistency, from instance to instance over time, as customers deal with the suppliers in a given process. Another possible requirement is for consistency

from organization to organization executing the same basic process. For example, consider two or more organizations that are accountable for different businesses within an enterprise but where consistency is required for income and expense accounting. This consistency could be accomplished simply by having each organization follow the same lower-level process for this function. A stronger form of consistency would occur if all of the organizations used the same supplier for their financial reporting services. In this way, obvious economies can be achieved, but also, there is more certainty that the process is executed identically in all organizations.

Case study observations

A number of case studies have been conducted using the approach described. Generally, when one looks at existing business processes using this methodology, two kinds of insights occur: Omissions are identified and design alternatives become clarified. Typically, the omissions involve missing roles, phases, or incomplete conditions of satisfaction. These are detailed below. Design alternatives include how accountabilities in an organization are structured and the design of the customer-supplier relationship. Examples of alternatives are described later in this section. Both types of insights are valuable in designing new or improved business processes that can offer higher quality results and improved customer satisfaction.

Missing roles and phases. It must be said that leaving out a role or skipping a phase is not necessarily a problem. A problem develops only when the omission occurs by default rather than by design.

In many of the case studies, the most striking omission noted was the lack of a clearly defined customer role. Even worse, when some internal organizations detailed their processes, they appeared as customers to all of the surrounding organizational entities. Thus, there was no clear customer-supplier/customer-supplier chain from the outside customer to the organization in question. When this happens, activities in the process are performed without a context. Conditions for satisfaction are either static, assumed, or unstated. Feedback on customer satisfaction is imprecise, incomplete, or even self-serving. A typical symptom of a process without an ultimate customer is that the beginning and ending points do not map to a complete four-phase protocol. That is, there is no request (or offer) starting the process, the request does not match what the process ultimately delivers, or the customer acceptance phase is missing.

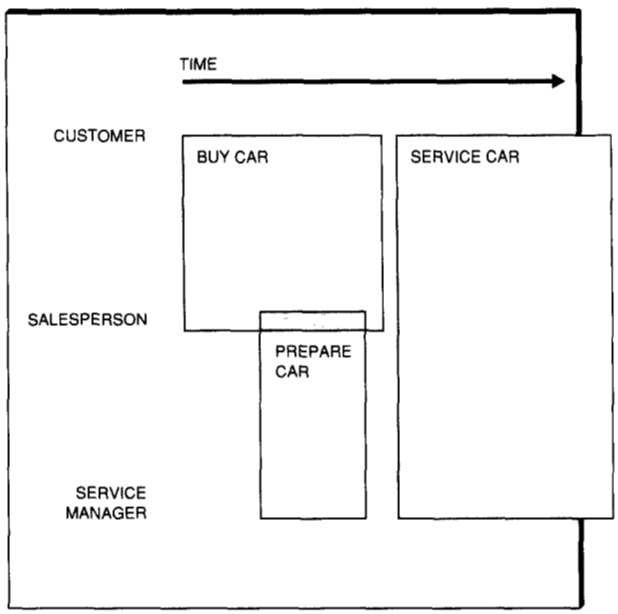
Some organizations play a role in which they have no accountabilities, either as a customer or a supplier. Some mail rooms are good examples of this: work comes in and goes out with no notion of customers, service, or feedback. In processes where internal mail is used to communicate between a customer-supplier pair, the mail room function is typically not included as supplier of service. It is assumed to be part of the background infrastructure. Another example is a telephone-based sales process, where the telephone company is not interposed between the paying customer and the salesperson. There are times, however, when roles in a process can be dealt with more effectively if they are explicitly included in the process rather than considered part of the background infrastructure or "wiring." The following example describes such a case.

One of the business processes examined in our case studies involved the distribution of documents for approval through an organization treated as a background infrastructure service. The process called for reviewers to state disapproval by a cutoff date, after which approval was assumed.

The document distribution department in this study provided duplication and mailing service, but had no accountability to their customers for accuracy, cycle time, or feedback. Document delivery was sometimes late or inaccurate. The solution was to include the document distribution department in the customer-supplier chain and establish the appropriate feedback mechanisms to ensure accurate and timely delivery of documents.

The two most frequently omitted phases in existing business processes are negotiation and assessment. Work appears in an in-basket (a request), and the system assumes that the work will be done according to predefined process and performance standards, and that the customers will accept it. While such procedures are sometimes appropriate, they reduce the relationship to the

Figure 5 Car dealer: Type 1

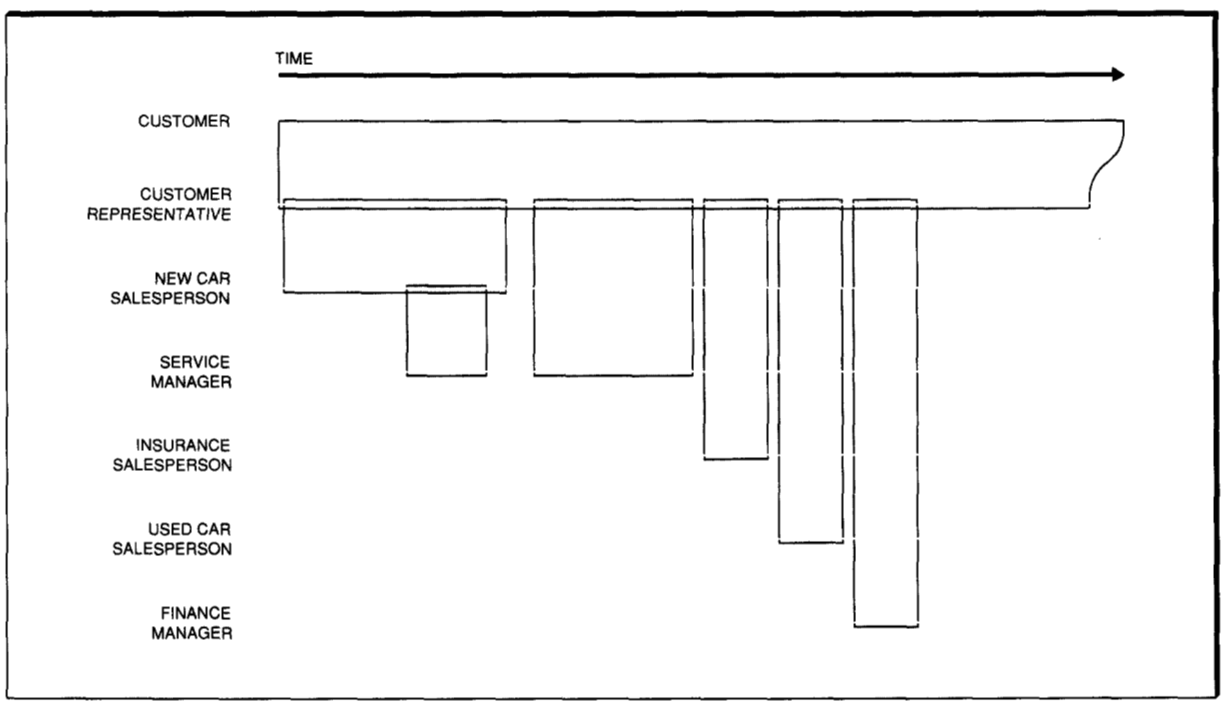


customer to its barest essentials, with the conditions of satisfaction limited to static criteria set during process definition. As stated earlier, static performance criteria for a set of activities can be wasteful:

- There is no way to deal with exceptional, high-priority, or unplanned requests.
- The easier-to-handle requests are sometimes delayed until the last minute.
- The harder-to-handle requests are sometimes rushed through the process with lower quality just to meet the time criteria.
- Rework is caused by not completely understanding what the customer wants.
- Customer expectations are not managed.

When the negotiation phase is missing, it is often the case that the conditions of satisfaction of the customer-supplier transaction are vague or misunderstood. The negotiation phase is the key to managing customer expectations that, in turn, are the key to managing customer satisfaction. Finally, if there is no assessment phase, there is no direct customer feedback.

Figure 6 Car dealer: Type 2

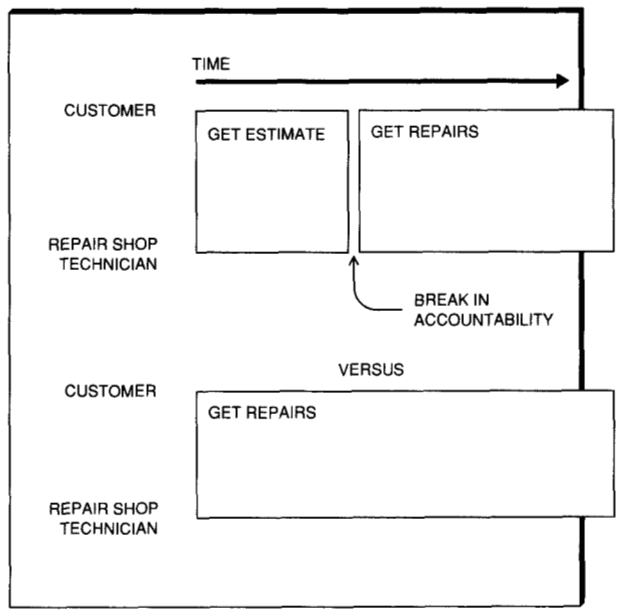


Relating commitments. One of the issues that becomes clear when looking at a process using the methodology described in this paper is how the commitments or accountabilities of roles in an organization relate. For example, consider the typical operation of sales and service in an automobile dealership in the United States. The customer deals with a salesperson to purchase a new car but switches to deal with the service manager to maintain it. The two customer-supplier transactions are virtually independent, almost as if they were two separate businesses. In this case, accountability for maintaining the automobile at the dealership where it was purchased rests with the customer. Figure 5 shows a diagram for this arrangement. The gap between the sales and service transactions indicates the break in accountability.

Contrast this with the typical dealership in Japan where a customer representative is the interface to all of the dealership's offerings for the customer. This person, for instance, suggests a new car when the service history on the existing one indicates it should be replaced and might also handle financing, insurance, and used cars for other members of the customer's family. In short, the customer representative is accountable for the customer's total relationship with the dealer over an extended period of time. Such relationships have been known to extend over a lifetime. Figure 6 shows the customer-supplier transactions in this design. Continuity with the customer and the accountability of the customer representative to manage the complete customer-dealer relationship are both clear.

Estimates versus commitments. One of the most common misunderstandings between a customer and supplier occurs when the supplier gives an estimate that the customer interprets as a commitment. The diagrams in Figure 7 show graphic differences between the two interpretations for an automobile repair shop. In a case typical of the top of the figure, the customer receives an estimate for a price to repair a muffler, for example. Then the customer requests a repair based on the estimate. If the estimate matches the ultimate bill, everything works out well. In instances where the bill is significantly greater than the original estimate, the customer discovers that the quoted price was "only an estimate." In the case on the bottom of the figure, the process is set up to make a commitment for a price at the beginning. Instead of getting an estimated price, the customer agrees to a committed price.

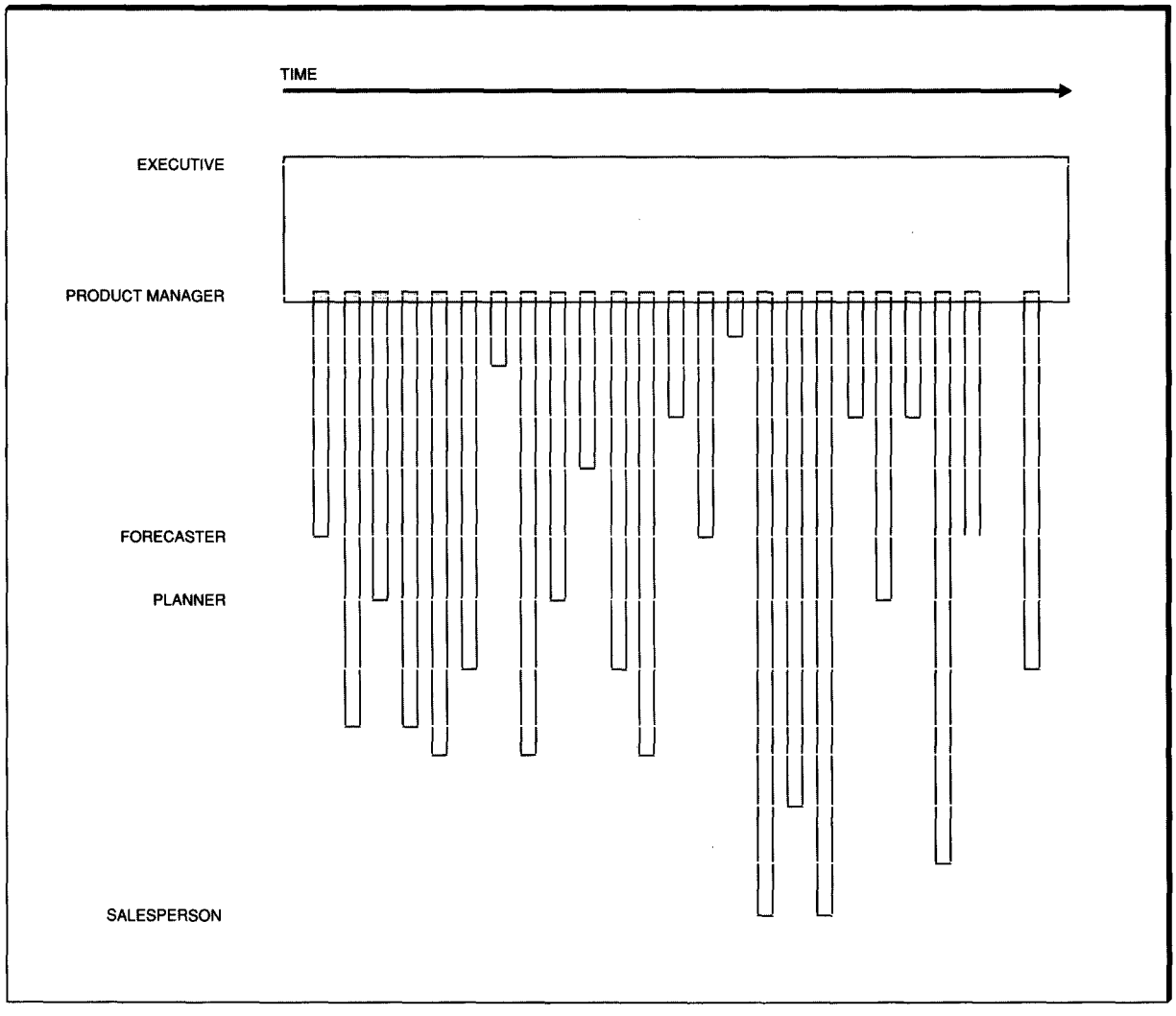
Figure 7 Estimate versus commitment



When the original estimate matches the final bill, the two approaches are virtually identical in terms of the actions performed by the customer and supplier and the outcome of the work. However, when there are breakdowns or unusual circumstances, the consequences and actions taken are quite different. In the case involving an estimate, the customer bears the brunt of a higher ultimate price. In the case involving a commitment, the supplier would have to take the loss of an underpriced job. It is obviously important to distinguish between these two approaches and to select between them deliberately.

Structuring accountability. Accountability can now be understood in terms of a supplier's commitment to fulfill a customer's conditions of satisfaction. The original customer in a business process has no accountability in that process (except to pay the bill or, in general, to meet any obligations created in the conditions of satisfaction). The first supplier in the chain is accountable for fulfilling this customer's conditions of satisfaction. Looking further down the chain, the cascading accountabilities can be seen. In some

Figure 8 Example of a role without any partners



cases, the initial accountability will be completely delegated to secondary suppliers. In other cases, it will be split. In the end, accountability will be distributed throughout the network of suppliers in the process.

Another way to deal with accountability is to look at questions such as "Who is accountable for *X*?" In the process shown in Figure 5, no one is accountable for having the customer's car serviced at the dealer's service department. In the process shown in Figure 6, accountability rests with the customer service representative.

Creating role partnerships. Many of the business processes that we observed characteristically had one role to which all of the accountability flowed. The person in this role made requests of many suppliers, often multiple times each, for relatively small deliverables. For instance, in a product development process, the product manager would request a product volume forecast from the forecaster three different times during the process. Later, a product marketing plan was requested from a person in a different role, and still later, product volume commitments were obtained for the current sales period. Clearly, each of these

topics is related, but in the process being discussed, they were disjoint and unrelated. Thus, the first forecast was not a commitment that the second forecast could build upon. The marketing plan did not necessarily have anything to do with the forecasts, and the period sales volumes did not have to relate back to the forecast or the marketing plans. The pattern of customer-supplier relationships in a process like this is shown in Figure 8.

An alternative to processes that focus accountability on a single role is a process where partnerships are created. For instance, a marketing partner could be created for the product manager. The person in this marketing role could be accountable for all of the activities relating to marketing and, most importantly, for creating continuity between one forecast and the next, forecasts and marketing plans, forecasts and period sales volumes, and so forth. Multiple requests could then be merged into single requests, having the effect of moving accountability further down the supplier chain. Figure 9 shows how the example in Figure 8 would look if this were done.

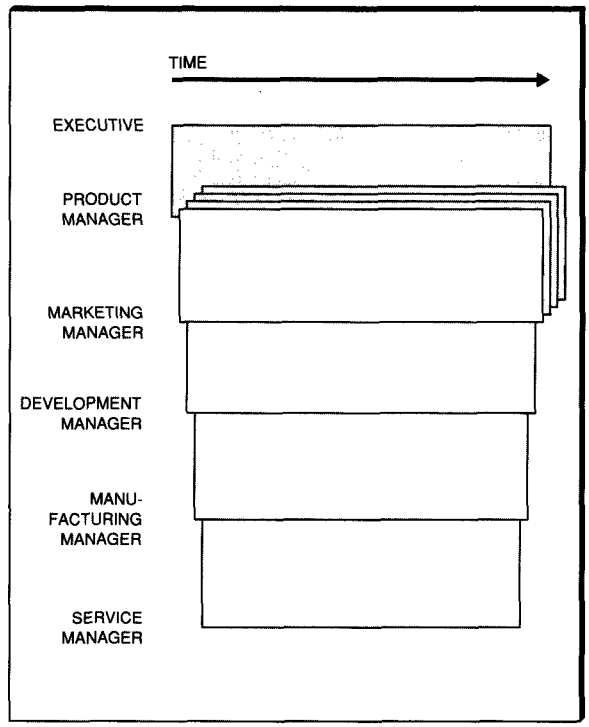
Roles and organizations. The creation of organizational entities can be seen as the collection of roles into groups of people.

Roles are assigned to individuals. Any given individual will typically play several roles within various processes. For instance, a person might play the role of employee in the company's travel expense accounting process and its suggestion process, and the role of approving manager in the engineering change process and the travel expense accounting process. Notice that this individual is playing two different roles within the same process—the person is both employee and approving manager in travel expense accounting. When this happens, the individual is probably not allowed to play both roles in the same *instance* of the process. That is, such individuals may approve travel expenses for their employees but not for themselves.

Some roles have many individuals assigned to them. Examples of such roles are employee, approving manager, salesperson, and claims adjuster.

The job of any given individual can be seen by looking at all of the roles to which the person has been assigned. Also, the roles with which an individual interfaces can be seen by looking at the processes that he or she is a part of. Finally, the patterns of accountability within an organization can be established.

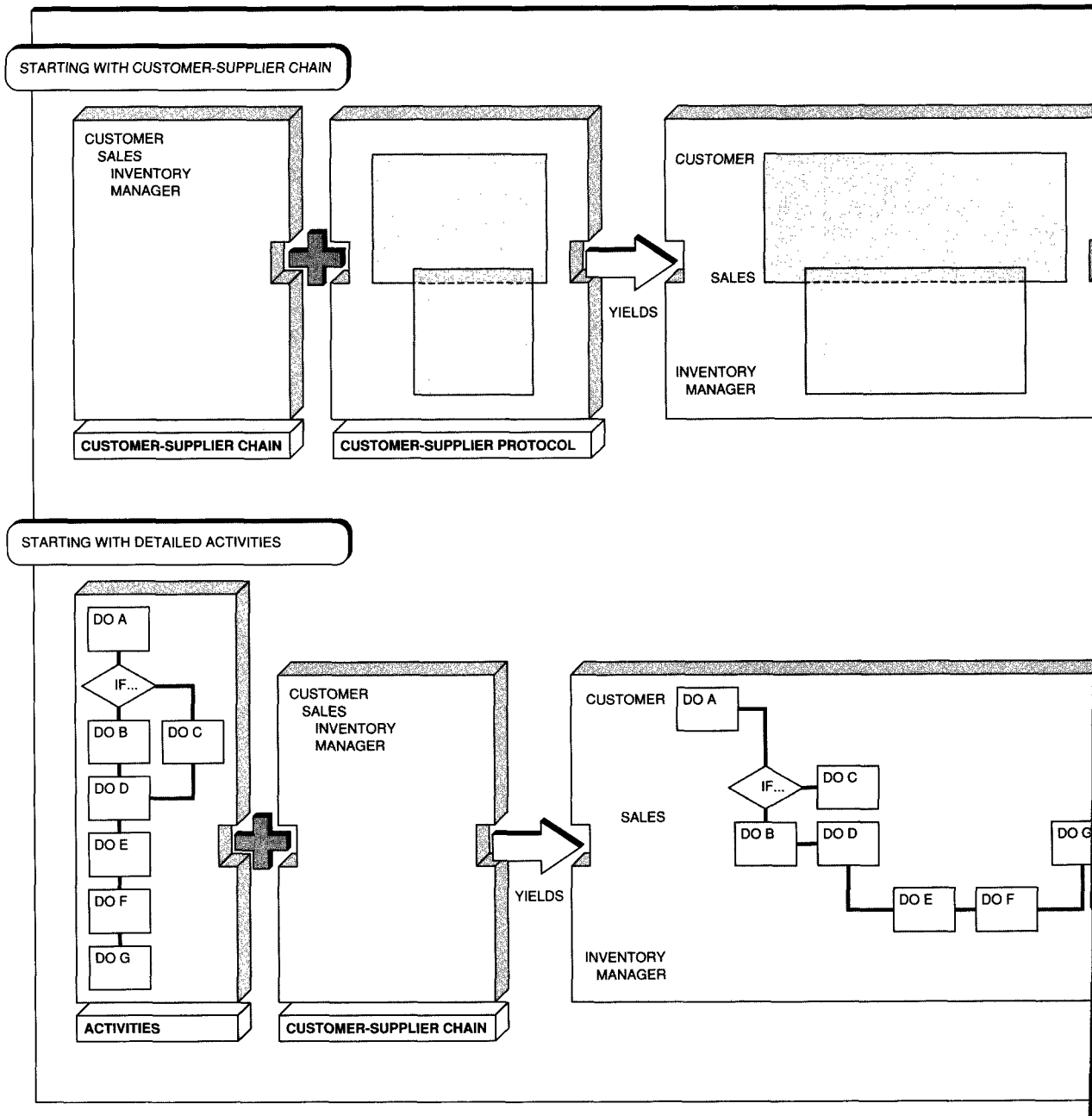
Figure 9 Process showing partnerships



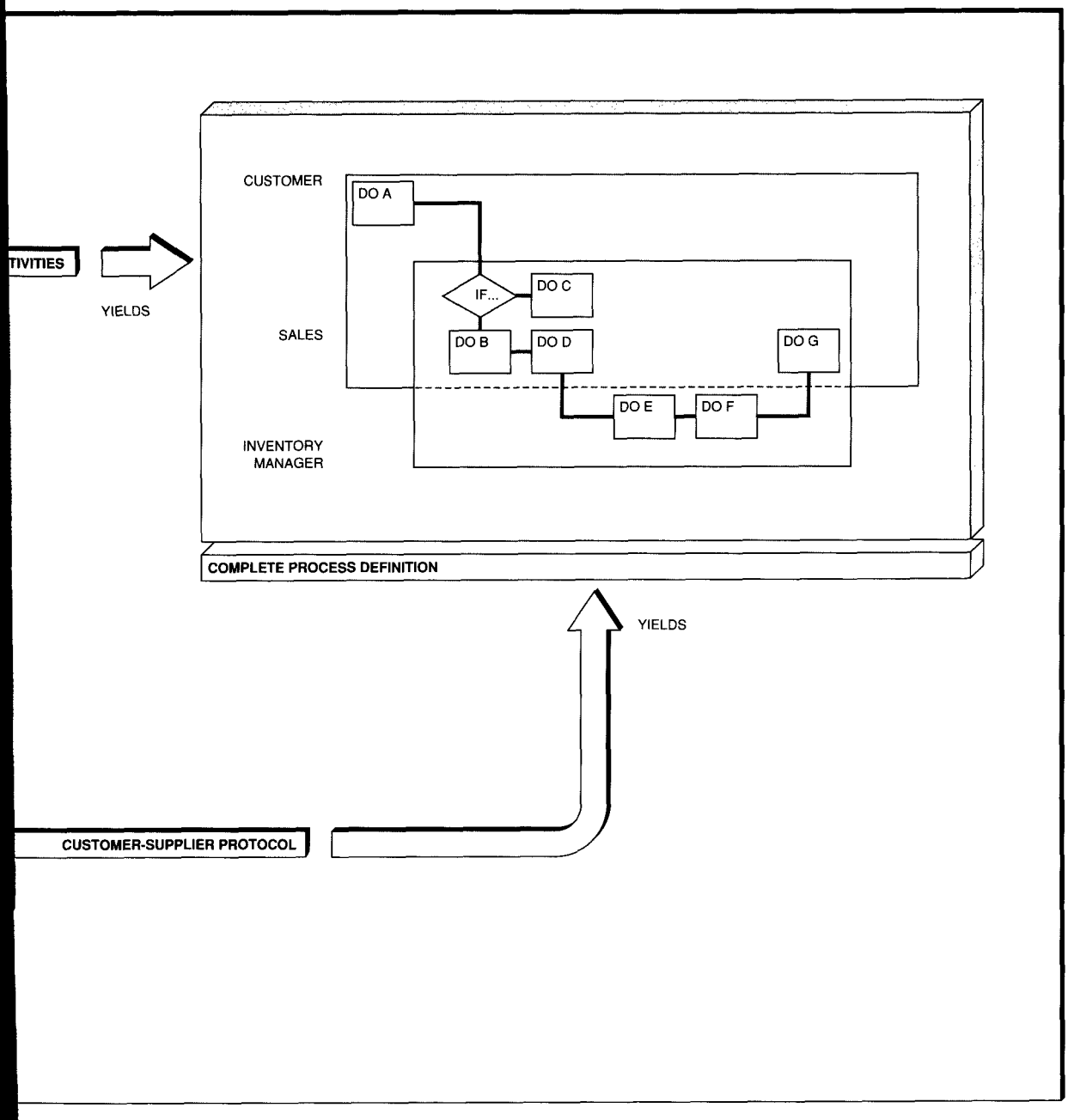
Loops in the customer-supplier chain. In some cases, real processes exhibit loops in the customer-supplier chain. That is, a person in a particular role appears as the customer of a particular supplier and then appears downstream as a supplier. Sometimes this occurs legitimately; other times it is a source of confusion. An example is the client in a process to engage a consulting or accounting firm. The client is the overall paying customer, but also occupies a role as a supplier of information about the client's operation. This information is usually gathered and used during the performance phase of the engagement process. In most engagements, particularly large ones, the client-as-customer role is usually filled by a different individual than the client-as-supplier role.

Designing customer and supplier relationships. Many enterprises have well-developed principles for dealing with their customers. "The customer

Figure 10 Paths to obtaining a complete process definition



is always right" has been used many times as such a principle. The question is, however, what does this mean operationally? A food store near the author's home has "The customer is always right" carved into a huge granite block in the entrance. However, if a customer tries to tell a cashier that a food item sells for less than the amount the computer displays on the register screen, the cashier will not automatically lower the price. How then are these guiding principles used in practice?



The customer-supplier protocol defined in this paper presents a complete checklist of what can happen in any customer situation. The application of the principles to situations involving negotiation, withdrawal at different points, or rejection by the customer can all be spelled out, or at least the desired range of responses can be specified.

All of the same comments apply to supplier relationships. Large corporations typically dictate

how suppliers deal with them. Using the customer-supplier protocol, either party can define how it deals with suppliers or how it wishes to be dealt with as a supplier.

Taking steps toward process definition

The best method for defining a process depends on several factors: whether the process being defined is the existing, "as is" process or a new one, and whether there has already been some progress using another paradigm. In many of our case studies, the groups we worked with had already performed process definition using methods focused on procedural aspects. In other cases, organizations had fragments of procedures representing the work of peer departments and were trying to find a way to fit them together smoothly, filling in the gaps and eliminating the overlaps. The general steps described here handle most of the cases.

Figure 10 shows two paths to a complete process definition. The diagrams on the far right of the figure depict a process with completely defined activities and procedures embedded in the customer-supplier chain and the protocols between the roles of each customer-supplier pair.

Using the first path to define a process seems to be best when no process exists or when trying to integrate several smaller processes. The starting point is to answer the question, "Who is the customer?" As stated earlier, the customer is identified by looking at the person or entity that the process is set up to serve or satisfy. Most organizations have only two or three types of customers. Within an enterprise, a department's or division's customers are usually in the management chain and in the organizations that are served. Obviously, if paying customers are served, they are, as was mentioned earlier, at the beginning of a customer-supplier chain.

It is sometimes surprisingly difficult to identify the first customer in a chain of customer-supplier relationships. An approach to dealing with this is to identify the key interactions that occur between the people involved in the process. Out of examining these conversations, the roles appropriate to the process emerge and the first customer is identified.

Once the customer is identified, the next question is, "What requests does the customer make of us?" or "What offers do we make to the customer?" In the case of the management chain, the question is more often in the past tense: "What request did we accept?" or, stated differently, "What is management holding this organization accountable for?"

Then for each customer type and request type, the roles (people) involved in relating to the customer and fulfilling the request or offer are identified. In defining roles it is usually better to err on the side of too many rather than too few. It is easier to combine roles than to split them up. Often, two or more independent accountabilities have been combined into a single organization and the organization is represented as a single role in the process definition. This makes it more difficult to re-engineer or reorganize one accountability and still preserve the unaffected role accountabilities.

Once the roles are defined, the next step is to arrange them in a customer-supplier chain. The easiest way to do this is usually to try scenarios starting with the initial customer in the chain and "walking" the customer's request (or supplier's offer) through the entire chain. As this is done, the requests being made between each customer-supplier pair in the chain can be identified. When there are complex relationships, such as an agreement to a customer's request conditioned on an agreement from a supplier, it is useful to mark the speech acts that cause changes in the state of the customer-supplier relationships, particularly the point at which agreement is reached.

The final step is to detail the procedures followed to fulfill each role's individual accountabilities. The use of computer automation would be called out, as well as manual procedures. It is often not useful and sometimes not possible to define the procedures that the initial customer goes through to initiate the process. It is sufficient to know the form and content of the expected request. Similarly, suppliers at the end of the customer-supplier chain are often considered "black boxes," or as unknown. If the supplier is in another company, the process definition will usually not affect its operation anyway. Also, it is often possible to simplify the view of an internal supplier by considering it a black box. A sales process that uses

the credit department to get credit for paying customers does not necessarily need to be concerned about the fact that the credit department uses a credit bureau to get financial reports on customers.

As the detailed procedures or activities are described, the actions to be taken when exceptions occur are added. Determinations are made about whether the customer's request will ever be countered with an offer, the response to a customer withdrawal at different points, the circumstances under which withdrawal would occur, the response to a customer's rejection of the work product, and so on. For every exception, there are several possibilities:

- Detailing the procedures for generating or handling the exception
- Specifying that a particular exception is not generated
- Specifying that the individual playing the role being detailed is empowered to choose the appropriate course of action when and if the exception occurs

If detailed procedural definitions already exist, it is relatively easy to incorporate them into the processes illustrated in the second path of Figure 10. The first step is to arrange the procedural steps under the roles in whose behalf they are performed. Finally, the customer-supplier protocol is added for each customer-supplier pair. This step usually reveals missing elements, unclear or unstated conditions of satisfaction, or outcomes that were not anticipated in the prior procedural work. Typically, this can be handled by augmenting the procedures. The lower path from left to right in Figure 10 depicts this sequence.

Defining the data and information elements of the processes can be accomplished in a similar way. Each activity specified will use or generate data. Some data will be generated and used in the same process; other data cross process boundaries. If all of the processes of an enterprise are described this way, there can be a complete mapping to all of the elements of the enterprise-wide data model. If no such data model exists, defining the processes is a good way to create it. In either case, the use and the generation points for each data element are defined as the process details are defined.

At the beginning of this paper we stated that business processes serve both as the means to realize business strategies and as the context for understanding how to apply information technology to the automation of the business. Business processes are the means to render business strategies explicit and precise. This precision can be applied to defining either accountabilities, procedures, or both. By analyzing business processes, elements that would benefit from computer automation can be seen clearly and the benefits quantified. In our case studies, several new opportunities for beneficial automation were discovered. Business process definitions allow the value of the application of information technology to business to be seen and quantified in terms of real costs, customer satisfaction, process cycle time, defects, and more.

Conclusions

The addition of the customer-supplier protocol and the dimension of accountability to the procedural orientation of classic process definition methodologies is of significant value. It allows insights into problems with customer satisfaction, organizational efficiency, quality, employee empowerment, and customer-supplier relations that other views do not offer. This added dimension, it should be emphasized, is not proposed as a replacement for the more traditional views. Rather it is a necessary expansion. Moreover, adding the dimension of accountability does not necessitate formally defining all aspects of the commitments that are made at every step in every process. Rather, this dimension simply provides a new degree of freedom in defining how organizations work.

Acknowledgments

The work reported here was inspired by the published work of Fernando Flores and by many conversations with him over the past ten years. The author's IBM colleagues have made significant and unique contributions to this paper by their work on case studies and their work in developing software based upon this methodology. They are Al Linder, Kathleen Snyder, Sid Decker, Dick Lowenstein, Marc Thorne, Lu Ahnemann, Kathy Center, and Suzanne Henry. Thanks are also due to Bernard Puckett, Steve Schwartz, Ned Lautenbach, and Jack Kuehler, IBM executives who

provided their support for this work at critical points in its development.

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9. Fernando Flores uses the term "performer," but we have chosen to use the classical process management term "supplier" throughout this paper.

Accepted for publication August 11, 1992.

Allan L. Scherr *IBM Consulting Group, 472 Wheelers Farms Road, Milford, Connecticut 06460.* Dr. Scherr is an IBM Fellow and Vice President, Technology, IBM Consulting Group in the Application Solutions Line of Business. His organization is responsible for providing advanced tools for IBM's worldwide consulting practices. Earlier in his career, he directed several organizations responsible for developing, among others, a new midrange system that was the precursor of AS/400®, SNA communications programming, and the distributed processing operating system (DPPX) for the IBM 8100 system. Dr. Scherr was the originator of Time Sharing Option and the overall project manager for the first release of MVS in 1974. He has also held key staff positions, including director on the Corporate Engineering, Programming, and Technology staff and member of the Corporate Technical Committee. Dr. Scherr joined IBM as a staff engineer in Poughkeepsie, New York, after receiving his Ph.D. at the Massachusetts Institute of Technology in 1965. He received the B.S. and M.S. degrees in electrical engineering in 1962, also from M.I.T. While at M.I.T., Dr. Scherr did research on time-sharing system performance and user characteristics. His Ph.D. thesis, comparing performance measurements and results from both simulation and analytic models for time-sharing systems, was the first such study ever made and earned him the ACM's Grace Murray Hopper Award in 1975.

Reprint Order No. G321-5504.