CGR Management Consultants

Transformation in Manufacturing/Distribution

through Proactive Systems

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Transformation -- the Need for New Thinking

There have been many "flavor of the month" efforts at changing organizations. The most recent efforts use the *reengineering* label. Past labels include total quality management, right sizing, restructuring, turnaround, and so forth. Cynicism abounds as soon as each new label appears.

No manager, however, doubts that change is needed. The purpose of this discussion is to review some of the reasons for disappointment in past efforts, point to where we believe the best near term opportunities are, and propose a way to be successful. In particular, we describe an advancement we call *proactive systems* to improve competitive position.

The "key" highlights important points.

We should define some of the terms we use. *Transformation* is the general process of gaining change in an organization. That change can be by any method -- for example, reorganization, new systems, culture change. *Reengineering* is a form of transformation referring to "radical" changes in operating processes.

Reengineering is also usually, but not always, enabled by new information systems. Often these systems seek to improve *integration*. This is an illusive term that we define later. Proactive systems will play a growing role in transformations because they improve integration.

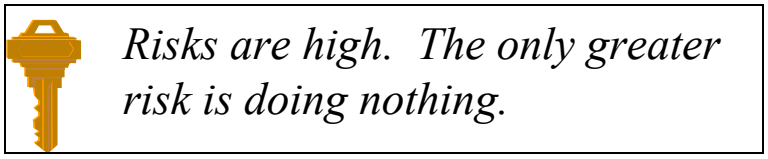
Implementation of any type of transformation requires management persistence. Change is hard. So we also describe a process to reduce risk in the change process. We support our findings with observations and research.

Reengineering -- lessons learned

As reengineering approaches its second birthday as a "movement," there have been several retrospectives, including those by Mike Hammer and Jim Champy, who introduced the term. Results, even by Hammer and Champy's account, are mixed.

One study by the consulting firm, McKinsey & Company,[1] echoes our observation. They report that, of 100 reengineering projects studied, only a few succeeded. The article concludes that three factors determine success in a reengineering transformation.

- Sufficient *breadth* of the process being redesigned -- as defined by the functions and departments included. The process must be broad enough to affect the success of the enterprise. What often happens is improvement in a department, or in a narrow process. But the effort doesn't produce results on the bottom line.
- Sufficient *depth* of the process being redesigned -- the "depth levers" the authors identify include *roles and responsibilities*, *measurements and incentives*, *organizational structure*, *information technology*, *shared values*, and *skills*. Too frequently, reengineering only addresses some of these omitting others that are important. For example, the reengineering focus may be on information systems, to the exclusion of "softer" issues like measurements, compensation, and rewards and recognition.
- Management *commitment* -- keeping focused on the end goal through what is in all likelihood a painful process is vital. This, according to the authors, is the most important factor of all.



These concerns also apply to the implementation of proactive systems. But better planning can sidestep these pitfalls.

In this discussion we describe the roles of technology, project management, and non technical issues on the process of transformation. Our purpose is to share lessons learned in over 1000 operations improvement assignments and to educate our existing and potential clients regarding the proper balance needed to achieve successful transformation.

The cost of being "un-integrated"

Competitive pressure is forcing companies in every industry to squeeze time and cost from their processes. Manufacturers have long emphasized cost reduction in their improvement efforts -- particularly on shop floor and direct labor activity. But today's manufacturing enterprise is very much knowledge based. It is an information factory as much as it is a producer of physical goods.

This is increasingly true in the era of the *agile* enterprise and *virtual* organizations. These enterprises are multiple companies banding together to tackle a market opportunity. Mastering communications within teams of companies surpasses the challenges of department to department coordination within the same four walls. Many who have trouble with the latter find they now must master the former.

The typical cost of a manufactured product is about 10 per cent touch labor, 50 per cent direct material, and 40 per cent overhead that includes much information handling. This is the domain of the so-called "white collar" worker. In a company with this cost profile, these functions will consume several times the resources directly related to production.

How is this 40 per cent spent? What is the deliverable? Too often it is expediting, endless meetings, chasing information, and other "coordination." None of it is value added work that matters to the customer. In other words, it is waste. The company that eliminates this waste will win the competitive battles ahead.

For day to day processing of orders and making goods, for new product design, for better communication along the "supply chain" with customers, distributors, and suppliers, better ways

[1]Hall, Rosenthal, and Wade, "How to Make Reengineering Really Work," Harvard Business Review, November-December 1993, pp 119-131.

of managing information will reduce waste. The term *integration* refers to efforts to improve the way information is processed and managed. But definition of the term has been illusive.

Integration defined

There have been several "waves" in management thinking about integration. Computer integrated manufacturing (CIM) was popular in the last decade. Many companies -- General Motors is notable example -- spent large sums on technology to produce little in return. The failures lay in not addressing the "breadth" factors listed above. Absent were consideration of organization roles, incentives, and the effectiveness of current processes.

Today software systems claim to be "integrated." For example the software used to prepare this paper integrates graphics, spreadsheets, and word processing. Other software packages with a number of related applications eliminate the need to reenter information. They strive to increase their scope. For example, what started as "material requirements planning (MRP I)" changed to "manufacturing resource planning (MRP II)" to "enterprise resource planning (ERP)."

"Integration" extends beyond software to the use of information.

We apply the term integration to the use of information, not just way we process it with hardware and software. We believe integration has three dimensions: *deployment*, *completeness*, and *timeliness*. Deployment means those entrusted with decision making understand their roles in the process and how to act on information. Completeness means that the information needed to make the decision is accessible. Timeliness means the information is available promptly enough to meet customer requirements.

A decision making process is "integrated" when all these conditions are met. Ideally, an "integrated" manufacturer scores 100% on all three dimensions for its key processes. Few qualify today -- and maybe never will. However, the goal of 100% integration is a target worth pursuing. Companies should always strive for improvement.

Alternative paths to integration

There are many paths to integration for any process. They may or may not involve technology. For example, new product development teams collocate to improve integration. Management empowers the teams to make decisions. By being together, sharing information is easier and faster. Thus product development teams increase integration along the deployment and timeliness dimensions.

Cellular manufacturing is a parallel example on the shop floor. Clustering unlike operations gives rapid feedback to workers on quality, cuts production cycle time, and enables companies to match production to actual demand, eliminating dependence on forecasts. Integration increases along all three dimensions.

Quality Function Deployment (QFD) is another integration tool. QFD arrays information to help designers and manufacturing engineers make decisions related to new product design and production. In particular, QFD addresses the completeness dimension of integration. The discipline of QFD forces the team to "fill in the blanks."

There are many ways to achieve integration. Use the best one.

A common mistake is to assume integration has to mean new technology. The consequence of leaping to this conclusion could be a lengthy, expensive, and ultimately unsuccessful endeavor. Business judgment should dictate the role of technology in achieving integration and what matching efforts should accompany the technology.

But technology is too important to ignore in the journey toward integration. Turning it to competitive advantage will be important in surviving in the coming decade. This will be particularly true as the users turn to proactive systems to improve integration of decision making.

New architectures

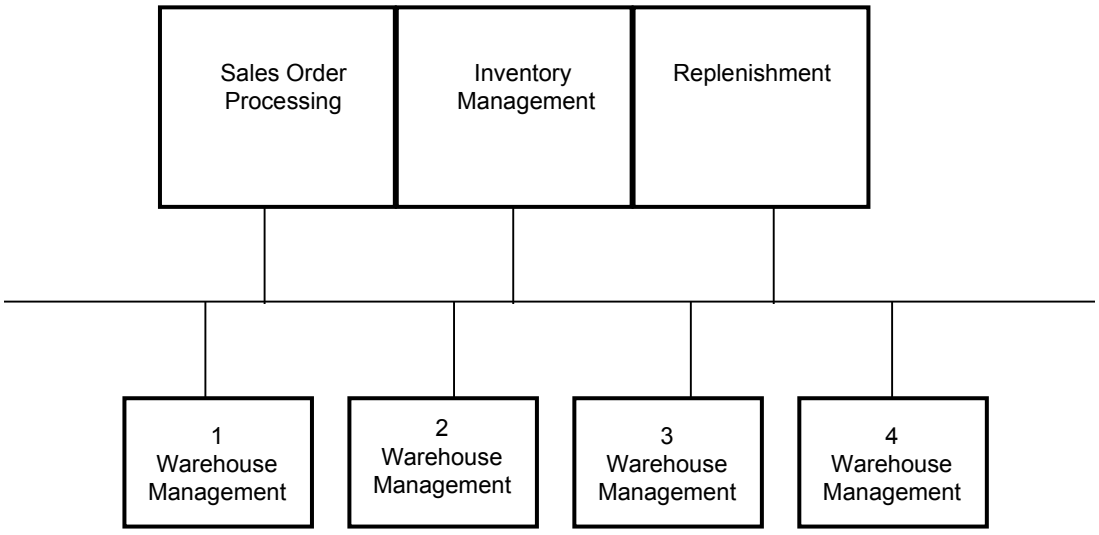
Advancing technology enables new ways to think about process improvement. Here we describe current practice, proactive systems, and how this new thinking will affect the way manufacturers plan and implement improvement.

The traditional manufacturing model

The figure below is an example of a typical manufacturing and distribution company's system architecture. It shows the systems that might define an order fulfillment process that requires the movement of information across several functional departments. In the example here, the departments are sales, inventory planning, and purchasing.

The architecture generally incorporates a data base structure. It is interactive in that the information is available to qualified users at all times. Unlike older batch systems, the information is relatively current, since users enter information continuously.

Traditional System Architecture



Often the organization structure dictates system design. Each department (sales order processing, inventory management, and so forth) has custody of its own pieces of the system. For this reason, the processes the systems support tend to be "sequential" in nature. Information moves from department to department for action. Accountability is fuzzy.

An example illustrates the point. A salesman writes a large order for widgets in the field. The order exceeds the forecast sales of widgets for the period. In a sequential process, the sales department notifies the inventory planners. They check on hand and on order balances and in turn notify purchasing to accelerate orders of widget materials.

The time it takes for this response may be several days or even weeks. The cost of delay could be excess safety stocks, dissatisfied customers from delivery delays, and lost sales. Certainly this activity contributes to the 40 per cent waste in many companies.

The promise (and threat) of new technology

As we have indicated, there are several paths to integrating this process. For example, management could place all three widget functions in the same room or in the same department. By word of mouth people communicate the impact of the big order.

Another integration method is the production meeting. A sales department representative brings up the sales orders in the meeting. Together, attendees check their respective printouts and "discover" the shortfall in widgets. The attendees carry the information back to their departments, passing the warning to the person responsible for widgets.

Many companies improve integration by enabling departments to look into the data generated elsewhere. This access to data across departments is the current standard definition for integration. Information is entered once -- perhaps into the sales system. This is important progress, but it is still "passive." People have to identify conditions demanding decision making action. To do this they use their experience and own personal rules of thumb.

New technology in the form of ubiquitous PCs, LANs, WANs, groupware, workflow, and relational data bases makes these advances possible. But they are only a step on an extended journey toward further integration. We believe the manufacturing industry is ready for a new type of system -- one we call *proactive*. The proactive system and the process of developing it will enable manufacturers to meet the competitive demand for speedier and better decisions.

Proactive systems

Like conventional systems, proactive systems center on major processes. What proactive systems add is a focus on decision maker needs in those processes. Decision makers fulfill *roles* in the process based on customer needs. Thus where decisions are required, such as the case of our large widget order, the proactive system uses preset *rules* to process information. This processing then *routes* information to decision makers, following those rules.

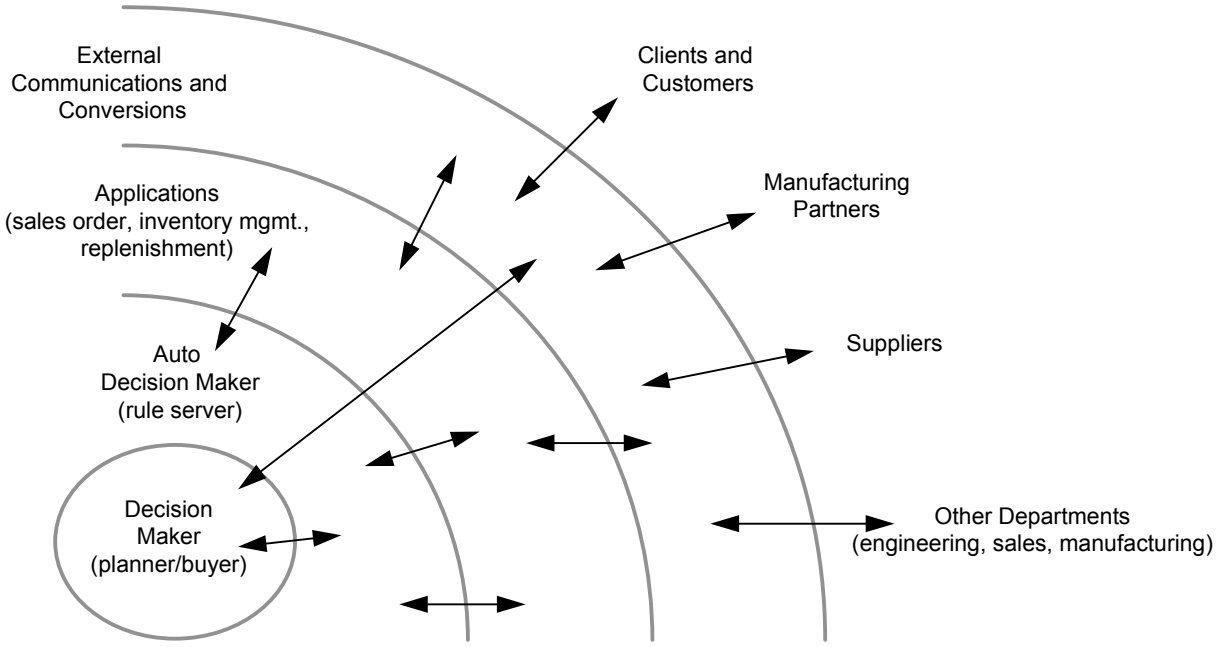
In the figure on the next page the decision maker is at the center. Extending the example of our widgets, we call this decision maker a "planner buyer." Inputs from the external environment of suppliers, customers, and other departments either pass through existing applications like the order entry system or go directly (by E-Mail for example) to our decision maker. The arrows represent data transactions within the system.

So far this is not too different from what exists today in many companies. What converts the environment to "proactive" is the rules server that processes the inputs to our decision maker.

The rules server makes the system proactive.

In the rules server, preset rules shape the direction of information flow. The rules match the needs of the individual decision maker and reflect the authority vested in that individual. They are very much a product of management philosophy on empowerment, continuous improvement, and organization philosophy. Values, philosophy of delegation, and decision analysis, not technology, dictate rules.

Proactive System Structure



For example, the rules could notify the planner buyer by sending a message about the large widget order. They would assume our decision maker would know what to do. The work station would signal the planner buyer about the order. This automated contact makes it "proactive."

The rule designers could be more aggressive. The rules could interpret the sales order, identifying the need for more material. The rules could then print purchase orders and direct them electronically to suppliers. Then the rules could notify the sales forecasting group to review their planning assumptions. Finally, for finance, they might recast income statements and balance sheets to reflect the order, notify the bank of a need for more credit, and print supplier checks.

The net effect is automation of information processing, replacing the production meeting or messengers carrying paper. Just as automation in the factory streamlined metal cutting through numerical control or material handling through robotics, the proactive system speeds information flow. When measured against our indices of integration -- deployment, completeness, and timeliness -- a proactive system moves the organization closer to 100% integration.

Starting on the path to the proactive system offers many opportunities for short term improvement. There may be ways to integrate, permanently or temporarily, the widget fulfillment process without automation. For example, in the case above we combined the functions of inventory management and purchasing into the role of the planner buyer.

In many cases the critical examination of required decisions finds all sorts of alternative solutions that produce faster and better decisions. For example, individual rules where a group of planner buyers all react in different ways to the same situation gives way to uniform "best practice."

A case study

CGR and its partner, Marsha D. Lewin Associates Inc., used proactive methodology in a pioneering application. The demanding environment is a major construction project requiring high levels of integration to achieve on time performance within budget. Lack of integration along any of the dimensions will result in cost overruns and expensive claims.

Most documents, and there will be millions, move electronically between the design team, contractor and subcontractors, and the owner. The times taken for responses to requests for information, submittals, and other contract documents are monitored and reported automatically.

The construction manager and owner chartered the proactive system. Their hope is to identify problems early before they add to cost. They want accountability for prompt decision making. Many documents require design and construction decisions that are time critical. The system reports status of inquiries and responses. Future claims will be less expensive. The paper trail forms during the project and is ready to settle disputes without costly discovery.

The system development process enabled savings in work and cost. For example, one procedure, processing requests for information, shrank from 64 to 17 steps.

The case has application in the manufacturing sector. This is especially true as multiple suppliers, distributors, and manufacturers cluster into integrated supply chains. These enterprises pool design and production talents, requiring complex information networks.

The application was a finalist in the fourth annual Windows World Open Competition.

Software and Hardware in the Proactive System

The case study just described uses a personal computer network with packaged software from leading vendors. These include Microsoft Sound and Office, Oracle, Novell Netware, PCDocs, Beyond Mail, Primavera, Lotus, AutoCAD, and other custom coded applications in Visual Basic and Powerbuilder.

Proactive systems address management practices first, hardware and software second.

Hardware and software should meet a client's specific need. Each client has a unique starting point and set of requirements. These will depend on existing systems, competitive pressures, and future plans for the business. For example, if a standard E-Mail system is in place, it can usually be incorporated into the system. Existing systems may or may not be suitable as the applications layer in the proactive systems design. They should be critically evaluated before proceeding.

A transformation process that works

Like any major undertaking, transformation to a proactive environment requires a certain amount of fortitude and persistence. In a recent article,[2] John Kotter reported eight pitfalls in achieving successful transformation. They are:

Not establishing a sense of urgency
Failure to form a powerful guiding coalition
Not creating a vision
Not communicating the vision
Not empowering others to act on the vision
Not planning for and creating short-term wins
Failure to consolidate improvements and producing still more change
Not institutionalizing new approaches

It's easy to identify with these and understand why such situations would cause a transformation program to fail. But how does one implement them into the process of transformation? Jim Ayers of CGR has described a process used effectively by manufacturers in transformation programs.[3] Following the six steps diagrammed on the next page and described in the following paragraphs will increase the chances of success.

6 steps to transformation

Step 1: AS-IS: Where we are now

Define key processes, the ones with the breadth to make a difference to competitive success. Trace the processes and the systems that support them. Use activity costing to understand their financial impact. Find out who is responsible for each step, what decisions are made, and what information is at hand to make those decisions. Use customer requirements and benchmarking to assess how well the process functions. Make sure to address depth levers.

Step 2: VISION: Where we want to go

Prepare goals for future performance. Top management should retain custody of the goals throughout the transformation. The vision should be sufficient to guide the selection of projects for improvement initiatives. Successful visions address qualitative issues like values and beliefs and quantitative goals regarding cost and prices, market share, growth, and profitability.

Step 3: GAPS: Where we fall short

[2]Kotter, John P., "Leading Change: Why Transformation Efforts Fail," Harvard Business Review, March-April 1995, pp 59-67.

[3]Ayers, James B., "What Smokestack Industries Can Tell Us About Reengineering," Information Strategy: the Executive's Journal, Winter 1995, pp 20-26.

Evaluate current efforts to determine if they are sufficient to reach the vision. A gap arises when performance improvement is needed, but no program is present that will reach that goal. This process validates current efforts that support the vision, argues for changes for the ones that don't, and points to needed additions to initiatives and projects.

Step 4: BARRIERS: What stands in our way

Are there institutional, managerial, or technical barriers to implementation? This task determines which barriers are real or not real and what action will circumvent or accommodate the barriers. The result is early recognition of obstacles and a method for dealing with them.

Step 5: TO-BE: What we can do in the time we have

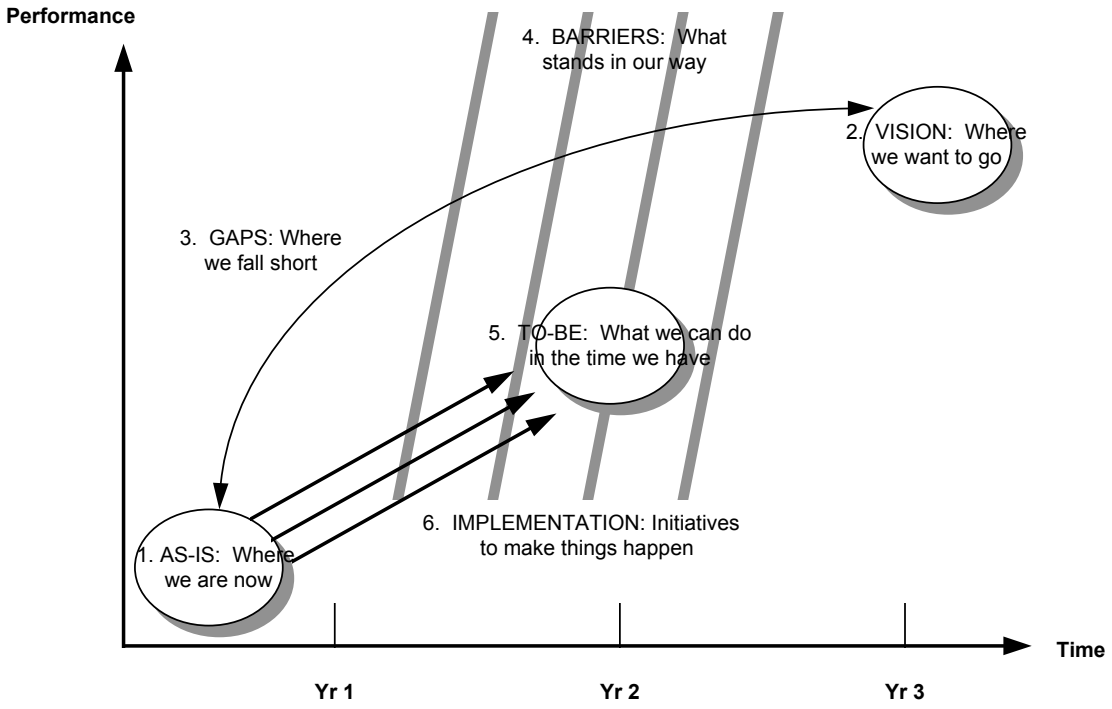
In this step the steering committee establishes the plan for implementation. It includes the projects, initiatives, and key managers for the implementation program. It is complete when all the needed projects are funded, manned, and underway and there is a clear direction that ties all the elements of the program together. Often this process will winnow projects down to a vital few from a situation where too many projects dilute management time and attention.

Top management may decide to move part way toward goals and objectives, rather than undertake to achieve the vision all at once. This is a sound decision, reflected in the figure. But the ultimate vision should remain, and be updated in the light of changing conditions.

Step 6: IMPLEMENTATION: Initiatives to take things happen

This step is the ongoing implementation process. Reviews should update the vision and reconfirm that ongoing projects and initiatives remain valid. Appropriate action should address unexpected shortfalls in progress.

A Framework for Transforming Organizations



How to start

With a major effort, a phased approach is best. Each phase should reflect progress toward the future vision and provide tangible, quantifiable evidence of improved profit and competitive position. The phased approach also builds in "fire walls" that limit risk and assure the project stays on track. In moving from phase to phase, management must recommit to the program.

The prestudy

Before embarking on a program, we recommend a short three or four day situation review. Each organization is different in its starting point and its direction. The prestudy sets a platform for beginning.

Among the issues to investigate in the prestudy are the following:

- Strategic plan for competing. Currently planned initiatives for improvement including systems and other improvements.
- Indicators of process performance. Examples are productivity measures, quality, on time delivery, and so forth. Costs of processes and contribution to competitive success. Assessment of integration levels in decision making.
- "Wants" from functional managers in marketing, sales, production, engineering, and procurement.
- New product and investment agenda.
- Description of the supply chain for major products. Include key suppliers, distributors and customers.
- Systems architecture including hardware and software. Quick assessment of its suitability with respect to other future plans. Baseline estimate of information processing cost.

The product of the prestudy is a work plan for achieving improvements. These improvements will address performance factors for cost, quality, and delivery as well as levels of information integration.

Phased approach

The work plan will describe each future project phase. Although the exact contents of each phase are highly client-specific, they include the following:

Phase 1: Process improvement and system requirements (4-6 months)

This phase addresses non system opportunities for performance improvement and better integration. It covers steps 1 through 6 just described and establishes the road map for proceeding. Non system process improvement begins in Phase 1. This provides for "quick wins," an element referred to earlier as necessary for success. They also get the project operating on a "self funding" basis.

This phase also produces basic decisions regarding the transition of systems. An example is whether to use the existing hardware and software as a base for the proactive system or "start from scratch."

Phase 2: System detailed requirements (3-12 months)

The Phase 1 strategy is the base for a detail design for the system. Non systems changes continue. Detailed specifications define the system and the path for implementation.

Phase 3: Implementation (6-18 months)

The systems environment changes to proactive based on the detailed design. Associated non systems changes continue in this phase as well.

Picking a consulting partner

Transitions to proactive systems are not "business as usual." We believe they require a balanced perspective regarding client needs. This perspective is not just technical but also strategic in terms of business direction and cognizant of the "soft" issues so important to success. Unfortunately, such qualities are rare in most consulting organizations. CGR seeks them in our staff; we have found that business experience, particularly in the implementation process, is a prerequisite for assisting clients to make successful transformations.