Principles of Cycle Time Reduction: You Can Have Your Cake and Eat It Too

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Executive Summary
Cycle Time Reduction has become a key agenda for organizations achieving increased customer service and cost reduction. With improved cycle time, organizations can often eliminate, or nearly eliminate inventory while expanding customer offerings.

In this lead article for the first issue of Cycle Time Research the relationship between customer service, cost, and time are discussed. The ability to increase customer service and cut cost through cycle time reduction is developed. Cycle time reduction's complementary relationship to Business Reengineering and Total Quality Management is also explored.

Organizational processes are examined in the context of cycles and interdependent cycles such as the sales cycle or the production cycle. The need to balance or tune such cycles to avoid the "bullwhip" effect is discussed.

Frameworks or constructs for cycle time reduction are presented which focus on management/organization, human resources, operations, product management, and inter-organization. Cycle time reduction is shown to be achieved by adjusting key points of leverage. The framework, along with the points of leverage, provides a methodology for searching for cycle time reduction opportunities.

Introduction
Are you under increasing pressure in your organization to accomplish more and more with less and less? This proliferatory phenomenon influenced the birth of the FedEx Center for Cycle Time Research (FECCTR) at the University of Memphis. The primary focus of FECCTR's research is reduction of cycle time in organizational processes in a way that reduces cost and/or increases customer service. Cycle time research is not just about accomplishing activities with "blinding speed". Rather, it is about reducing time in ways which reduce cost and/or increase customer service—that is, you can have your cake and eat it too—as depicted by the following relationships and illustrated in the discussion below:

My travel agency, which I have used for years, has only one agent I ever wanted to work with; Kathy. Kathy is phenomenal. She knows my preferred airline without being reminded. She knows I want an aisle seat and a low-cal, low-fat meal. (I'm not a fanatic, but if you're not going to enjoy the food anyway, it's a good time to diet). She knows that I prefer direct to connecting flights, what my second and third airline choices are, and which airline to avoid at almost any inconvenience. She also knows which auto rental agency I use and my preference on car size and make. She knows which limousine company to call if I request one. She always has my frequent flyer numbers for hotels, cars, and airlines; and, as a result, she saves me a tremendous amount of time.
Principles of CTR

Unfortunately, when I call the agency and ask for Kathy, she is generally not available because she is assisting another customer. So I leave a message for her to call me, and we begin the cycle of telephone tag, heightened due to my speaking and seminar schedules which are not conducive to being reached easily. Recently, I called the agency and asked for Kathy. As usual, she was busy, so I asked the person answering to have Kathy call Jim Wetherbe. The voice on the other end of the phone said, "Oh, hi Jim! How was your trip to London last week? Did you get your aisle seat? Your low-cal, low-fat meal? Did the limousine pick you up as scheduled?" Incredulously I asked, "Who is this?" The voice replied, "This is Mary." "Well, Mary," I replied, "maybe you can help me."

With no finessing or coaxing by the agency, I am now willing to speak with anyone who answers because they installed call center technology. Every travel agent has access to a computer-based profile of me that includes all my requirements and preferences. Has the travel agency succeeded in reducing cycle time in my interaction with them? Have they reduced cost? Absolutely! Has customer service improved? Absolutely! Instead of having five people waiting to talk to Kathy, any available agent can take the call.

Car rental agencies provide another example from the world of business travel. Most agencies solicit driver's license information, credit card, frequent traveler number, car make and size preferences, insurance needs, and any other special requests upon order placement. Then they assign customers to a "car category" (full size, midsize), or even a specific car (a silver Oldsmobile Cierra). Personally, I like to use rental cars as a testing ground for new styles and models, so I prefer to select my car at the time of rental based on the selection available. I discovered the "hard way" that changing my mind and placing a special order for a "black, Dodge Intrepid" was not wise when I got to the counter and there were seven people behind me.

However, one agency, National Car Rental, through its Emerald Card program, actually allows the customer to skip the line, select any car available on the lot, pass his/her Emerald Card to the agent to record the rental transaction, and receive the rental contract upon exiting the lot. This avoids repeatedly having to provide "transaction data"—i.e., address, license, credit card, insurance, etc. Upon return, the customer presents the contract and receives the receipt. Has National reduced cycle time? Cost? And improved customer service? Absolutely! No waiting in line, and no clerical tasks—customer information is stored rather than entered, and the customer gets the car of his or her choice.

Many companies that use technology to effect cycle time improvements, are in an extraordinary position to do the same as a result of the burgeoning information technologies available today. Unfortunately, many organizations believe compromising customer service is the only way to cut costs. Nothing is further from the truth if proper use of cycle time reduction is employed.

The 3% Rule

One of the key concepts in cycle time reduction is "the 3% rule." When looking at previously unreviewed organizational processes in terms of cycle time reduction, the 3% rule, which is only 3% of the elapsed time for a process is actually needed to complete the activity, is a good place to begin. Insurance claim filing and handling offers a good example of the 3% rule: completing the claim may
physically only take 5 minutes, but it often takes 30 days for the claim to be processed due to waiting, hand-offs, getting lost, getting found, expediting, and so on.

I found the 3% rule to be particularly true in book publishing. I have authored 15 books since 1975. For the first twelve, it took about one year from the time I "dotted the last period" to when the book was actually published. In the 1970's, a book on information technology had a life cycle of about five years. With the way technology is changing, the life cycle today is no longer than three years. With one year of the life cycle lost to production time, during which no revenues are generated, the product life cycle of the book is seriously compromised. Book writing typifies the 3% rule and is a prime candidate for cycle time reduction.

Several years ago I wrote a book that I wanted available quickly. So, out of curiosity, I decided to see how fast I could get one published. First, I created my own publishing company. Any guesses as to how long it took? Would you believe eight days including a weekend to get a book printed and bound with a jacket? In three months, sales of So What's Your Point? (Wetherbe and Wetherbe 1993) had generated sufficient revenue to cover the production costs.

The 3% rule reveals a lot of "low hanging fruit just waiting to be plucked"—there are phenomenal payoffs in cycle time reduction just awaiting discovery.

Three Business Initiatives

Three recent business initiatives: Total Quality Management (TQM), Business Reengineering (BR), (Hammer and Champy 1993) and Cycle Time Reduction (CTR) are popular strategies for improving organizational performance and competitiveness. All differ in some respects but also overlap and have similarities, as illustrated in Figure 1.

CTR, like TQM and BR, is another way of examining organizations to effect improvements. CTR can be combined with TQM and BR initiatives. CTR can be done without doing anything radical as required by BR, but, on the other hand, you may have to do something radical to achieve cycle time reduction.

TQM and BR are similar in the following respects: 1) they rely on having strong, visible, consistent leadership from top management; 2) the goals, measures, and problem solving methods of the organization must intertwine; and 3) there is a strong emphasis on the customer.

Some consultants propose cycle time reduction as an alternative to BR, believing CTR is superior and more useful. They view BR as a "nuts & bolts issue" with emphasis only on reducing costs or downsizing. But BR could deal with time reduction. I see CTR as simply another tool, since it may not be necessary to do BR to achieve cycle time reduction.

Figure 1: Overlapping Relationships of Total Quality Management, Business Reengineering, and Cycle Time Reduction
One big distinction made between TQM and BR is their impact over time, which actually translates to a synergy between the two as depicted in Figure 2.

TQM is a slow, incremental, continuous improvement process. BR, on the other hand, is effecting dramatic improvement through radical means.

The automobile industry demonstrates the difference: the early models of the Japanese imports were basically poor quality, rather unattractive in styling, with unreliable engines. Due to the phenomenal market penetration of the Volkswagen Beetle, Japan turned to Germany for advice in how to improve their products. Gradually, Japanese products improved in styling, quality, and reliability until they surpassed American-made automobiles. Rather than the Japanese products evolving from lousy to great in one year, it was a slow, continuous process. As a result, America looked to Japan as the model for TQM. Then the BR initiative arrived, and could be credited with resurrecting the American automobile industry. Chrysler, for example, has radically improved its ability to get a new product from concept to production in less time with less cost.

It's a Matter of Focus

So, what role does CTR play in relationship to TQM and BR? It's a matter of focus. Of the three common aspects to TQM, BR, and CTR; Time, Cost, and Customer Service (see Figure 3a), the most constraining of the three is time. In fact, time is the only "fixed" variable—and therefore the pivotal focus of CTR, as the name implies. Progressive organizations are realizing, that though in the past economy of scale was a key competitive advantage, today economy of time is becoming key. Sam Walton said that everyone thought the success of Wal-Mart was a result of placing large stores in small towns and evolving to superstores in large cities (economies of scale). In reality, as
he pointed out, the key was having fast inventory turns (economy of time) by replacing inventory with information. Specifically, Wal-Mart, by making use of EDI (electronic data interchange) with its vendors, greatly improved cycle time for inventory turns and replenishment.

Let's look at technology for a moment to try to understand where this disruptive, elegant, emerging phenomenon is taking us. I believe it's taking us on a journey toward customer perfection. It follows that if technology is getting better, and better, and better, then what we are doing should be getting better, and better, and better. And better, and better, and better takes us on a journey to perfect, and perfect can be very simply defined as giving the customer what he or she wants, anytime, anyplace, and anyway she or he wants it (see Figure 3b) . . . at an appropriate price.

Several evolving technologies support the anytime, anyplace, anyway philosophy. For example, using my cellular phone I can call my bank to check the balance of my accounts at anytime, from anywhere, and get information the way I want it. I can do a presentation in Boston that can be viewed simultaneously from sister offices in Chicago and San Francisco, and be simultaneously video-taped for subsequent use by colleagues or customers.

Organizations are putting significant effort into improving functionality, reducing time, and accommodating the needs of people who interact with their organizations.

**From Linear To Cyclical Thinking**

Improving functionality, reducing time to complete a process, and letting people have things the way they want them requires a migration from linear to cyclical thinking. Our thinking must change from viewing processes as boxes occurring sequentially in a line, to envisioning processes as interconnecting circles happening simultaneously.

One of the common mistakes we make is thinking of an activity as a series of steps to be taken toward completion, with the same steps repeated in the same sequence whenever the activity must be done again rather than looking at the processes cyclically. A personal example from academia illustrates the cyclical thinking approach for research (see Figure 4a). Notice how this cycle of activity leads back to step 1—discovering new problems. Occasionally, I am asked why I do not just concentrate on giving speeches (which generates the most revenue of all my activities), and I respond by explaining that I would be ineffective after a few years because my material would no longer be timely.

A cyclical approach to writing has greatly contributed to the number of books I have been able to complete, and has been crucial to finishing the fourth edition of my first book on systems analysis and design. Instead of thinking, "now it is time to rewrite this book," I view the process as one of continual updates. As soon as the new edition is published, I set up a file folder for each chapter. Then, through consulting, teaching, and speaking or as I encounter articles, clippings, or anecdotal information pertinent to a chapter, I add it to the applicable folder.

When the actual time for the rewrite "rolls around," much of the work has already been done. Without linear thinking I have reduced the cycle time! If I were to think of research in a linear fashion, I would have a model best
Figure 4a: Cyclical Thinking Approach for Research
depicted by Figure 4b, and each revision of the book would be a major ordeal.

**Balancing Cycles**

To continue with the cyclical thinking approach, let's examine cyclical processes more closely by discussing balancing cycles—two sets of cyclical processes interdependent at one process point, depicted in Figure 5a.

Suppose we have an organization which specializes in consulting on information technology. Further, suppose that the organization's Marketing department develops business leads and promotes the consulting work of the organization, and can thus be represented by one cycle of processes. A second cycle of processes is the department for Training and Development of Consultants. The two cycles are interdependent since Marketing cannot promote the organization's consulting capabilities if the Training and Development department cannot deliver trained, qualified consultants. Carrying the analogy further, suppose the organization also has a Recruiting department—yet a third cycle of processes (see Figure 5b). The Recruiting department interacts with the other two departments by recruiting new consultants to meet demand or replacements to offset attrition.

**Cross-Functional Cycle Time Problem - The Bullwhip Effect**

One key negative phenomenon to watch for in CTR is the bullwhip effect, which refers to the cross-functional (perhaps dysfunctional) way in which different processes relate to each other. One cycle of activities may be ongoing. Simultaneously, several cycles of activities may be in process. If any one cycle of activity gets "out-of-sync" with one or more of the other cycles, the bullwhip effect has occurred as illustrated in Figure 6.

Referring back to the consulting organization as an example, what happens if, through Marketing's efforts (Cycle 1), the demand for consulting exceeds the consultants' ability to deliver. Recruiting (Cycle 3) increases its supply to meet the demand, Training and Development (Cycle 2) hustles to train the new recruits, and reports to Marketing (Cycle 1) that their demands can be met. Meanwhile, the organization's customers become discouraged because their needs were not being met during the lead time to recruit and train more consultants, and thus reduced their requests for service. By the time Cycle 3 and 2 can respond to Cycle 1's activity, the organization is
overbalanced with consultants—supply exceeds demand—and a bullwhip effect occurs.

**Systems Of Cycles**

This problem of having excess capacity by the time an organization responds to capacity demands is a result of not thinking far enough into the future, of focusing on one cycle instead of thinking systematically—in terms of systems of cycles. Systems of cycles are multiple sets of circular processes interdependent at one or several points.

The apparel industry provides a good example of the systems of cycles and of systemic thinking. If you have checked the labels in clothing or on other items recently, you probably realized that more and more are being imported to the USA from the Far East. In fact, 55% of American flags are made in Korea. In the apparel industry in the United States, $26 billion is lost every year due to cycle time problems. The primary cause is the time span between when the retailer decides to stock an item and when it is available for the consumer to buy is generally one year. One year lag time and "guessing wrong" lead to the monumental $26 billion loss. The loss consists of retail stores having to sell merchandise for less than they paid for it. For example, they bought a suit for $200, priced it at $400 (retail markup is generally 50%), and eventually sold it for $150, incurring a $50 loss. How many $50 losses add up to $26 billion? The loss is conservative since it does not capture the lost opportunity profit or the loss associated with customers who look around, get discouraged, and leave without buying.

![Figure 5a: Balancing Circles for a Consulting Company](image-url)
To further illustrate the magnitude of the problem, let's look at an example of "really getting burned in the apparel industry." The 1988-1989 fashion season was a transition year for pleats on trousers of men's suits. Prior to 1989, men's suits did not usually have pleats—then men changed their minds and 90% of them demanded pleats. When did the retailer have to decide and place orders on what men would prefer in 1989? One year previously—based on guessing, intuition, and historical purchasing trends (a typical scenario in retail buying).

In the fall of 1989, I went into the store where I usually shopped to take advantage of the store's fall sale. I knew exactly what I wanted—pleated trousers in a single-breasted, athletic-cut suit. As I looked through the racks I found only three fabrics to choose from rather than the usual eight or nine. The first suit I inquired about was double-breasted with no pleats; the second, single-breasted, but no pleats. At last I found one with pleats but it was a "portly cut." Finding nothing that matched my criteria, I questioned the retailer about the selection. He enumerated his
problem with inventory requirements: "1) single and double-breasted, 2) short, regular, and tall cuts, 3) regular, athletic, and portly cuts; 4) size variations (i.e., size 40, 5) eight to nine different fabrics, and, now 6) pleated and non-pleated trousers. Dealing with the first five variables was difficult, but adding a sixth makes it nearly impossible! We can't carry every variation, in every fabric. In fact, we are down to three fabrics for each unique fit and style."

At another retailer, I found a broader choice of styles and fabrics. More importantly, what they offered was a choice of some forty different fabrics on display in a book for "touch and feel," style selections, and an order cycle time of one week for domestically manufactured suits for those who could not find a suit off the rack.

How has this retailer accomplished cycle time reduction on this scale? Through a system of interdependent, coordinated cycles (as depicted in Figure 7): 1) the retailer's point-of-sale terminals are connected to their distributor's, 2) the distributor is connected to the garment manufacturer, 3) the manufacturer uses CAD/CAM (Computer-Aided Design/Computer-Aided Manufacturing) for design and production, and can make EOQ (Economic Order Quantities) in small batches, 4) the manufacturer is connected to the textile manufacturer, and, 5) the textile manufacturer is connected to the fiber manufacturer (Dupont). Interestingly, there is an increased likelihood that the retailer will have your desired selection in stock, because they make suits for a particular store based on the cuts and fabrics which are selling. They can be responsive to the differing demands of a downtown store versus a suburban mall, for instance, because they can respond to current demand rather than having to commit a year in advance.

In an effort to deal with the loss issue, the apparel industry has made significant strides in implementing systems of cycles. It is still possible to hire cheaper labor in the Far East but then the retailer must ship overseas which takes time. And what happens if the shipment is enroute when the question, "Do the suits have pleats?" is asked.
Another way the apparel industry has reduced cycle time is through the use of CAD/CAM technology. CAD/CAM has been instrumental in reducing manufacturing costs in two ways: 1) closer proximity to the customer, and 2) the ability to mass-customize, which is often more critical than labor costs in being competitive today. This retailer’s profit margins are up 80% from domestically manufactured men’s suits because of cycle time reductions.

Are you curious about the source of the CTR idea for the suit retailer? It was actually the occupant of the first circle in the system of circles—the fiber manufacturer, Dupont. Dupont saw textile and apparel manufacturers going out of business because of labor costs. Being a “high tech,” innovative company, Dupont forever endeared themselves when they introduced the apparel manufacturers to information technology and CAD/CAM. It took Dupont time to convince the retailer and various organizational participants to share information—such as point-of-sale, production, and inventory—but this information was critical to achieve CTR and eliminate the bullwhip effect. In retrospect, Dupont was incredibly visionary.

The "INGs" Of Cycle Time Reduction

Given that an organization or interorganization should be viewed as systems of interconnected cycles of activity, how do we go about reducing cycle time within them? Trying to reduce cycle time in a large organization or several interconnected organizations is usually a challenging ordeal requiring pressure at the right pressure points.

It's All About Leverage

Consider how to turn an aircraft. Aircraft are steered through the use of a system of ailerons on the wings and the rudder at the tail of the aircraft. In comparison to the aircraft, the ailerons and the rudder are very small; however, leverage allows them to turn the large aircraft. In other words, putting the right combination of a little leverage on the right places allows incredible maneuvering.

Through our research, we have identified five major constructs for organizations to consider for CTR. These constructs can be used as a framework for determining the points of

Figure 7: Apparel Industry Cycles with Point-of-Sales Feedback
leverage of cycle time reduction for an organization. They include:

- Management/Organization
- Human Resource
- Product Management
- Operations
- Interorganizational

Each of the five constructs has a set of possible points of leverage for reducing cycle time. These points of leverage, though nothing more than words which all end in "ing," provide a useful checklist for exploring and discovering CTR opportunities.

When applied to organizations, the idea is to find the "points of leverage" where a small amount of applied leverage can make a big difference in cycle time reduction. For example, how did I get a book published in eight days? What "point of leverage" did I discover to reduce cycle time from the usual six months to a year down to eight days? The answer is anticipatory scheduling—one of the "INGs" within the Operations category of cycle time reduction. Let me explain further.

How reliable do you think authors are about getting books done on time? If you answered, "very unreliable," you were correct. In fact, some books are in their third edition and have not yet been published. As a consequence of this unreliability, publishing companies typically do not bother to arrange any of the production aspects of publishing until the author actually presents the completed manuscript. Upon receipt of the manuscript, however, the publisher must find a window in the production schedule of a printing company. The average printing shop generally has a backlog, sometimes as long as one year, and its schedule cannot be varied—as I discovered in gleaning information about the publishing process.

For my previous books, I did not know what occurred between the time I turned in the manuscript and when the publisher called to say the book was complete. I just knew it usually took a year. When I discovered that I could effect changes in that schedule, perhaps reducing the cycle time to days just by committing to a manuscript deadline date, how do you think I reacted? Do you think knowing that previously would have affected my behavior? In this interorganizational relationship—author, publisher, printing company—the point of leverage was my being able to commit to a manuscript deadline so the printing company could establish a confirmed production schedule. The point of leverage was anticipatory scheduling. And the result? As stated earlier, the book, So, What's Your Point? was published in eight days. Let us explore the constructs for CTR and their associated "INGs" or points of leverage.

Construct I: Management/Organization

Management/Organization is the first category of points of leverage or "INGs" for study in examining CTR. As the category title suggests, these "ING" words are pertinent to reducing cycle time from a management and organization perspective and are discussed below:

Visioning: Visioning is creating an awareness, appreciation, and motivation for a desirable new state or condition. John F. Kennedy's famous "man on the moon by the end of the decade" in his inaugural speech is a classic example. Henry Ford's "a car in every garage" is another. Federal Express' "absolutely,
positively, overnight" delivery to any customer is an excellent example of visioning. Motorola has the successful six sigma quality program and now the 10X cycle time reduction program—to cut cycle time ten-fold in everything they do. Simply creating a shared vision energizes organizations for CTR.

**Front-ending:** Front-ending is planning and preparing for something before you start it, for example, launching a technical project or starting a company. To illustrate, have you ever painted a room? There are two basic *modus operandi*:

1. Buy supplies, get out the brush or roller and just start painting. When you're finished, you may have to spend ten times the time it took to paint to clean up, to scrape paint off floor moldings, and to use a razor blade to scrape windows, etc.

Or you could . . .

2. Move the furniture to the center of the room, drape the furniture with canvas or plastic, put masking tape or masking strips over moldings, around doorways and windows, etc.—taking time to prepare before painting. It may take two hours to prepare, one hour to paint, and one-half hour to clean up.

This preparation time is front-ending and reduces overall cycle time. Designing a car not only for production but also for maintenance is a good example of front-ending to reduce cycle time in auto maintenance.

**Aligning:** One of the things frequently true with interorganizations, is that they are out of alignment. For example, the retailer's view of the world and the distributor's view is very different. A key to reducing cycle time is to get functional areas within an organization or separate organizations to understand the role of each different aspect of their business. For example, the credit function's ideal role is to make certain the organization never loses a nickel. Consequently, when someone "risky" applies for credit, the credit department will operate under the premise "when in doubt, throw them out." This often causes the sales department to refer to the credit department as the "sales prevention department"—the two are out of alignment.

Fingerhut, a direct mail catalog company, did something very innovative in this area: they quit doing credit checks! As with other companies, the credit department was gathering more and more credit information, such as all previous employers, all loans you have ever had, the names of your previous five spouses, at ever escalating costs. Counterintuitively, Fingerhut decided to let anybody order anything out of one its catalogs—one with only inexpensive items in it. If the customer paid, Fingerhut sent them a catalog of more expensive items. Instead of guessing, through inferential credit analysis, whether a customer would pay, Fingerhut gave the customer a chance. Additionally, they avoided the credit approval stereotype traps such as, married people are more likely to pay than single people, or residents in a particular section of a city are a better credit "risk."

The end result is that it cost them less. Fingerhut never risked making a type 2 credit error—refusing credit to someone who deserves it (a type 1 error is giving credit to someone who does not deserve it). Fingerhut's cost to find out whether the customer would pay was the cost of the merchandise not paid for by the customer. In total, they experienced a loss on about 3% of the merchandise sold—which turned out to be less than the cost of operating the credit department in the traditional manner. Those customers who did not pay, were dropped from the mailing list. Fingerhut reduced the cycle time on credit checking to zero. At the same time, they solved their prior "alignment" problem between credit and sales.

**Transforming:** Transforming is the willingness to look different, to change the way an
organization is "shaped" or structured. For example, many banks have changed their operations so the customer, instead of speaking with one person in the checking, savings, installment, and mortgage department, has a single point of contact for all dealings with the bank.

**Flattening:** Flattening is removing extraneous layers from an organization. Peter Drucker (1992) uses a symphony orchestra as an excellent example of a flattened organization: there is no "managing director of flutes," "supervisor of oboes," etc.; everything that needs to be communicated to the orchestra is communicated at the same time by the conductor. Middle management is virtually non-existent.

In the old paradigm of organizations, we assumed we had "dumb terminals," that is, we worked in hierarchical organizations where managers used a "top down" approach. Workers did what they were told to do. Today, instead, we have "intelligent nodes in the network," and they tell managers and group leaders what has to be done because they are empowered and have the wherewithal to make decisions based on the situation at hand. Organizations are flatter and whoever needs to assume a leadership position does so at the right time.

**Balancing:** Balancing, related to aligning, is keeping the various units of an organization stabilized in comparison to each other: i.e., having enough inventory to satisfy customer needs, avoiding the "bullwhip effect." An organization is optimized by sub-optimizing the units within it. For example, the sales department cannot be the only department which specifies what should be in inventory, because they might require one of every kind, color, and shape that the company produces be in inventory. Manufacturing, on the other hand, would likely counterbalance sales by having only one product in one color and one shape, and "we'll make it when you have sold it."

Balancing is recognizing the tradeoffs and making sure they happen.

**Investing:** Investing is capitalizing the idea, product, or organization. Sometimes this requires taking a monumental leap rather than making incremental investments; or doing a "greenfield," as General Motors (GM) did when they created the Saturn Division.

**Consolidating:** Consolidating refers to concentrating, reducing, or compressing inventory or operations to reduce cycle time. For instance, a national, upscale shoe retailer that sells only a few pairs of shoes per day found that twenty percent (20%) of their inventory generates eighty percent (80%) of their sales, yet they typically wanted a complete inventory available at every store.

To reduce cycle time, they decided to consolidate their inventory (they estimated inventory could be reduced by 90%); use overnight express (that's the cycle time part) for shipping shoes which are infrequently purchased from their warehouses; and improve customer service by offering free, next day delivery to the customer's home address or having the shoes available at the store, with a free, deluxe shoe shine. (Since the sales representatives are not very busy, given only a few sales per day, they can double as the shoe shiners.)

**Distributing:** Distributing is essentially the opposite of consolidating: inventory or operations are expanded to reduce time and cost, and improve customer service. An organization's operations, strategic direction, and objectives all play a part in which approach is the right one.

**Implementing:** Implementing is the ability to take an idea or plan and make it happen. The ability to implement is very critical to cycle time reduction. In many organizations, however, too little emphasis is put on this important element. Consequently, plans,
projects, and activities are unsuccessful due to the inability to implement.

**Benchmarking:** Benchmarking is comparing the cycle time of an organization to that of its competitors in the industry as well as to other industries to take advantage of technology transfer, for example, transfer the DuPont men's suits approach in apparel retailing discussed earlier to retail computer sales.

**Learning:** Learning refers to on-going education about what other companies are doing from a benchmarking standpoint, and making continuous adjustments as is done in a total quality program. In other words, continually assess and adjust based upon what is and is not working.

**Construct 2: Human Resource**

The Human Resource construct focuses on the people issues necessary to reduce cycle time. The following "ING" words examine reducing cycle time within the human resource aspects of an organization.

**Empowering:** Empowering is enabling people, by granting them authority, to make decisions at the lowest possible level in an organization, and goes "hand-in-hand" with flattening. One of the easiest ways to affect CTR is through empowerment. In an already flattened organization or a small business, empowerment is extremely effective. Empowering people enables them to add value to an organization. In fact, managers should apply the value-added test when something comes to them for approval. They should question whether or not it is necessary for them to spend time approving the item or if the approval could be done by someone whose time is less costly to the organization. Authorizing an accounts payable clerk to approve third party vendor reimbursement requests up to $1,000 without management approval requires no investment in technology (automation), but it improves the process by reducing cycle time and cost, and increases customer (the third party vendor) service.

FedEx has met this challenge by empowering its employees with immediate checkwriting authorization up to $100 to handle any customer's claim that the employee feels is legitimate. Hewlett-Packard empowered every secretary with a $2,000 limit credit card to obtain supplies or whatever the employee determines is required for "getting the job done" when timing is critical. By doing so, they have eliminated the purchasing approval maze or morass of most organizations.

**JIT-training:** Just-in-Time (JIT) Training, reversing the old thinking of "people are either trained or not trained," refers to providing education on a topic when people need it to perform certain tasks or complete a project. For marketing and sales personnel, a brief tutorial on the computer-based sales forecasting system may be the JIT training they need to be productive for their quarterly sales forecasts.

**Modeling:** Modeling involves allowing people to learn by example. Rather than simply describing a skill or a behavior to an individual, observing the behavior or skill "in action" becomes part of the learning process. Research has demonstrated that cycle time can be reduced as a result of learning through modeling behavior. Through modeling, the learner can attempt to imitate what they observe, and through a process of approximating and then shaping until they can achieve the desired behavior or skill (Bashaw and Ingram, forthcoming). For example, a person receiving sales training can more quickly master sales skills by observing videos in conjunction with receiving instruction on how to make successful sales presentations.

**Self-directed teaming:** Self-directed teaming is the assembling of teams by the team
members (peers) with minimal involvement by management. The team also has significant latitude in determining how to achieve results. It is the opposite of the "arranged marriage" teams compiled by management which everyone generally disliked anyway. Self-directed teaming closely resembles the team picking process which children or youth use when playing games: the best players are the team leaders and they select their team members based on known skills and abilities, generally from best to least skilled.

In organizations utilizing teams, this type of selection process puts self-pressure on employees to improve their skills and be viewed as an excellent team player to avoid last place selection or being omitted altogether (the latter of which might lead to unemployment). Further, due to the ever increasing intellectual content of the work involved, management often does not have the in-depth knowledge required to pick the right team leaders, or how best to achieve results.

Research supports that it usually takes approximately two years for employees and organizations to effectively implement self-directed teaming and be comfortable with the process. The medical community has employed the self-directed teaming concept for years when assembling teams to solve particular types of problems; referrals and recommendations of colleagues provide the pool of qualified professionals from which the team is assembled.

**Cross-functioning:** Cross-functioning is assembling the different business process units to examine the activities they perform, that is, to understand how the "left hand" affects the "right hand" of the organization; or, how the stringent policies of the credit department are hurting sales, as they were at Fingerhut. Cross-functioning can also be interorganizational, as in the Dupont example.

**Case-working:** Case-working is the concept of having one contact work with an entire group of people, and is widely used in Business Reengineering. At universities the case-working approach is used across the functions of recruiting, student loans, and advising to reduce cycle time by providing better information to a student recruit and by helping the student complete the intimidating loan application process. Instead of six to nine months of avoidance behavior in completing the loan application, the student is guided through the process by the case worker, and, if eligibility is high, the student may even get immediate approval for interim use of a loan "slush fund" until final approval is granted. Recruiting, meanwhile, can influence who is considered based on their recruiting quotas for majors, minorities, or other categories.

**Co-locating:** Co-locating means putting people in proximity with each other so they can be productive. Technology can be used to bridge physical gaps or barriers to some extent. However, research supports that there is no substitute for physical proximity. During the Vietnam War, the American and South Vietnamese soldiers worked together best when they shared the same camp, ate together, and slept in that same vicinity. The same is true of faculty. If faculty from Marketing and faculty from Information Technology need to do research together, telling them to do it will not net the results that intermixing their offices will. The need for cross-functional teams to be co-located for reengineering efforts is another example (Wetherbe and Vitalari 1994).

**Teleworking:** Teleworking is using technology to make people more productive by allowing them to do their jobs away from the traditional office site. Resources for this may include videotapes of presentations for people to use when they can make best use of the information, voice mail, facsimile (fax) machines, cellular phones, and notebook PCs. Creativity and productivity are two very important considerations for knowledge workers, who, unlike manual laborers are not
necessarily most productive from nine-to-five. While proximity is important at times, knowledge workers do not need to be together all the time. In fact, research shows that knowledge workers need uninterrupted blocks of time to produce. Therefore, giving them the tools and freeing them from "the office" is crucial to enable knowledge workers to be creative and productive. Have you noticed that when you go to your office, your entire day can be consumed with things that demand your attention, yet when you are not there those same things are taken care of or never occur?

For me, CTR for authoring requires front-ending and teleworking: On Monday, for example, I gather facts and think through the structure for the book chapter I plan to write on Friday morning at 8:00 a.m. on an international flight. Then as the week progresses, my subconscious is working away in preparation for Friday. When I finally sit down on Friday morning, the words just start flowing. Let me assure you that this was not how I initially approached authoring. Back in college and even after, I would sit down and stare at the piece of paper, go get something to eat, come back and stare some more, go mow the lawn, stare some more and finally give up—until I analyzed how I needed to work and realized how conducive front-ending was to my creativity.

Today, some of my most productive authoring time is on airplanes. I have three to four hours of uninterrupted time (unless the person next to me has a high social need), and can respond to the fax sent to my hotel earlier in the day. When I arrive at the airport or next hotel, I am ready to fax my response, or if communication is extremely urgent, I use the cellular telephone on the airplane.

Measuring: Measuring is the process of recording how long it takes to do something and comparing it to previous occurrences to determine variance. Information systems professionals are always asked for estimates and expected to track how long it takes to accomplish their tasks. With new technologies such as object-oriented programming and client-server networks, measuring is crucial to explain why something took so much longer than before or why the project was done earlier than anticipated so the next group can make use of the information in their planning.

Measuring can also be motivating. For example, exercising on a rowing machine, treadmill, or bicycle which provides feedback about your performance can make you exercise more intensively, set new goals, or make the process more interesting (and the time pass more quickly). Unfortunately most employees receive no feedback. They might as well be attending a ball game at which no score is kept and when someone finally tells them the game is over, it is time for them to leave.

Rewarding: Rewarding is concerned with ensuring that your reward system provides valued outcomes—customized to organizational participants—for achieving the desired results as determined by the measuring system.

Construct 3: Product Management
What can be done in the areas of product management to reduce cycle time? The "INGs" of product management include:

Identifying: Identifying what the customer wants early in the product management process is a key to CTR. Best Buy, a consumer electronics retailer and one of the hottest stocks on the New York Stock Exchange, early on did some research to identify what customers wanted. Their primary finding was that customers disliked buying consumer electronics, including the purchase of the service warranty. The main reason was that they disliked dealing with high-pressure, commissioned salespeople and their multi-step approach to qualifying, steering the customer's thinking toward a specific product (usually the one with the highest profit margin), really pushing an extended warranty, and finally writing up the order; then rendezvousing with their
merchandise ten to fifteen minutes after they have paid for it at the checkout counter.

Best Buy, therefore, taking its research findings seriously, has no commissioned sales people. Instead they have product advisors who dress in non-intimidating knit shirts and khaki pants rather than suits and ties and who answer the customers' questions without "product steering." Best Buy has instituted a "supermarket" paradigm with available products right on the shelf below or above the display item. The customer selects the merchandise after getting his or her questions answered, takes it to the central checkout, pays for it, and is "out the door" in an appealing four-step process with reduced cycle time. As a result, Best Buy's overhead costs are lower than Wal-Mart's.

Best Buy's main competition, Circuit City, faced with having to match Best Buy's prices to compete, really pushed extended product warranties since it was the only way for them to realize any profit. In response, Best Buy implemented an aggressive, preemptive strategy of offering all warranties on any of their products at the same low price of $39.95. In doing so, they reduced the cycle time for handling warranties, improved customer service because the customer knows exactly what the warranty cost is upon entering the store instead of having to wait for it to be computed based on the sales price or something far more ambiguous, and have beaten the competition's handling of warranties because the buyer is "preprogrammed" to believe warranties cost $39.95 and will question or refuse anywhere the cost is higher.

Innovating: Innovating involves creating a new, sometimes revolutionary product. It usually involves a creative solution to a problem awareness developed in the identifying stage. Built-in child seats in automobiles is a good example. A simple innovation added high value because it addressed an important problem and reduced cycle time for parents loading and unloading children in and out of cars.

Prototyping: Prototyping is the process of "trial and error/success" in problem solving—in fact, it is fundamental to problem solving. By nature, we follow "trial and error/success" in the way we approach problems. Here are some ordinary examples of prototyping: seasoning food when cooking, then tasting, then seasoning some more until it tastes the way we want it to taste; trying on clothes before we buy them; or arranging furniture after it is delivered versus how it was arranged in your mind's eye at the store. Hanging pictures on the wall is a very good example because it illustrates a key concept in prototyping—the visual. Analytically, we can center and level pictures, yet how many nail holes are we covering when we finally complete the hanging? How did you approach solving the Rubik's cube? Did you think, "this is a 3-dimensional geometric shape rotating on a plus sign?" Or did you just start spinning it until you realized your concept did not work and then try another approach? That's prototyping.

Time-boxing: Time-boxing is determining the completion deadline for a project, dividing the project into pieces that can be accomplished through a heroic effort associated with each piece, then celebrating each piece as it is completed before starting on the next piece. Writing books, developing application systems, conducting seminars, or building a race car all have the common element of a heroic effort at the end to meet the deadline. The more mammoth the task, however, the more likely it will never be completed because one heroic effort is too huge to accomplish.
For example, fifty percent (50%) of the people who finish all the course work for a Ph.D. never get one because they do not finish the doctoral dissertation. The primary cause, is that nothing in their experience has prepared them for the project. The twenty-five page term papers they wrote previously may have all taken an heroic effort, but the whole project might have been done in a weekend. A four hundred page dissertation, on the other hand, would take sixteen such weekends, each with a heroic effort. Since the average time span for writing most dissertations is two years, the chance for success is limited unless the Ph.D. student understands the process and timeboxes the task.

**Mass-customizing:** Mass-customizing is "cookie-cutting" a process or product on a grand scale. Earlier, we discussed the Dupont men's suits retailer's 40 different fabrics, for any men's suit style, available in a week. This is a prime example of mass-customizing.

**Platforming:** Platforming is working off one basic design (platform) to derive multiple products. The Saturn automobile illustrates this technique well. One common platform or chassis serves as the basis for the entire Saturn product line. Their high performance and low performance engines all start with the same engine block with additional valves added to create the high performance engine.

**Deriving:** Deriving, often closely related to platforming, refers to one product evolving from another. Software products may offer the best example of deriving, for versions of a product or even a "rewritten" product may have many similarities to the original. Copyright laws, in fact, have an entire section covering derivative works. The integrated child seat in cars, an example given under innovating earlier, was first introduced in Chrysler sedans, but they quickly derived other versions for other vehicles, i.e., vans by "platforming" the product as discussed above.

**Postponing:** Postponing is waiting as long as possible to decide what the final product is going to be. All Benetton sweaters are white and then dyed different colors at the very last possible moment. When sales of yellow Motorola pagers greatly outdistanced sales of black ones, Motorola had to decide whether it was a fad, a trend, or whether their retailers should stock both colors of cases. By postponing when the low-cost case is put on—from at the factory to at the store—the retailer can adapt to the color preference without needing such an extensive, costly, electronics inventory.

**Reusing:** Reusing, at face value, seems self-explanatory. Related to cycle time, however, it is planned for from the beginning, so reuse is intentional rather than happenstance. For instance, a frequent speaker prepares a presentation intending to use it multiple times, not just once for the initial speech. In software development, reuse has become a major productivity enhancer. Instead of writing code from "scratch," reusable components (subroutines, objects) are used as much as possible to "assemble a system."

**Construct 4: Operations**
The operations area of an organization is generally a good candidate for cycle time reduction, with the following "INGs" triggering operational "points of leverage."

**Conceptualizing:** Conceptualizing means "getting the big picture." Nicholas Vitalari (Wetherbe and Vitalari 1994) has done insightful research on the difference between good performers and bad performers in their approach to problem solving. He found that good problem solvers looked at "the forest" and then decided which "trees" to work on (look at the big picture and find the "points of leverage"). Bad problem solvers focused on the individual "trees" without any knowledge of whether they were even in the "forest." When reviewing an organization's information technology department, for example, bad
problem solvers had a tendency to single out individual PCs for criticism before they examined the company's information architecture.

**Challenging:** Challenging is questioning everything about a process, product, or organization to determine whether it is essential. The approach called "Five Why Questions" (Wetherbe and Vitalari 1994) is pertinent to cycle time challenging. This method involves asking and receiving answers to five questions to get to the "heart of the problem." Five such sets for the organization's operations might be:

- **Why do you have warehouses?** To store our products.
- **Why do you need to store your products?** To make sure we have enough.
- **Why won't you have enough?** Because we don't know how much we need until the end of the month.
- **Why don't you know until the end of the month?** Because that's when we get the sales figures from the sales representatives.
- **Why are you waiting until the end of the month to obtain the sales figures?** (Pregnant Pause)

This type of approach can lead to just-in-time inventory, the elimination of "warehouses," and, consequently, reduction of cycle time.

**Eliminating:** Eliminating is abolishing or removing operational functions, processes, or groups which do not add value or which are unessential to the operation of the organization; such as the "warehouses" discussed above.

**Integrating:** Integrating is more closely coupling operational functions or processes, making them mesh; i.e., an integrated application system as opposed to a modular one, or an integrated suite of software products (Microsoft Office) versus standalone products for each function (MS Word, Excel, etc.). The DuPont to men's suit retailer is an example of interorganizational integration.

**Paralleling:** Paralleling is accomplishing more than one operation at the same time. For example, every time the men's suit retailer sells a suit, they are simultaneously doing market research since their point-of-sale terminals are a first source of marketing feedback (refer to Figure 7).

**Anticipatory scheduling:** Anticipatory scheduling is the process of finding out in advance what scheduling factors influence when something can or will be done. Again, the book publishing window discussed earlier serves as a good example.

**Informating:** Informating (a new word and likely an example of another abuse of the English language from the technical arena) is getting all the information flowing freely so everyone knows what is happening. For the National car rental agency, it means capturing the information from one transaction, storing it, and having it available on an on-going basis, for the next rental by the same customer or the return of the originally rented automobile. In the men's suits example, it means sharing information interorganizationally.

**Simplifying:** Simplifying involves reducing the complexity of operations. The host of different identification numbers most people deal with is a good candidate for simplification. Some stores, Service Merchandise for instance, use the customer's telephone number as the identification number at their point-of-sale terminals—which readily allows them to update the customer's address at the time of sale for mailing catalogs and sale flyers later.

**Standardizing:** Standardizing refers to consistently performing operations in a prescribed, customary, or routine way; using one set of rules for operating. Again, identification
numbers offer a target for standardization. For example, frequent flyer numbers differ for each airline when the customer could as easily be allowed to select his/her own meaningful number. Credit card numbers, for instance, could double as ID numbers for renting cars or providing key card access to hotel rooms. Credit card agencies and banks, show some progress in this area, and now allow customers to select their own PIN, which governs telephone and ATM access to the account.

**Automating:** Automating is using technology to improve or eliminate manual processes. The tendency is to "throw" technology at every operational problem rather than improving by adopting the other concepts that make sense. Implementation of CAD/CAM for suit manufacturing is an effective use of technology; by itself, however, its impact on achieving cycle time reduction would have been much less in comparison to the demonstrated results from collaboration with Dupont, the textile manufacturer, and the other participants in their system of circles.

**Construct 5: Interorganizational**

Having already spent considerable space discussing the system of interorganizational circles, let's look at the related "INGs" for reducing cycle time between organizations:

**Networking:** Networking is communicating and collaborating between organizations whether it be clothing or computers. Mitsubishi is investing billions of dollars in a network called "MIND" to connect all their "keritus" together so they can easily "informate" with each other and become very closely coupled.

**Partnering:** Partnering is being willing to share information and other resources. The main challenge in partnering is getting the partners to behave appropriately in sharing information. A facilitator is probably essential for partnering to occur. Imagine what it is like to combine different corporate cultures, different country/state cultures, different social cultures, and different industry cultures. A recent CTR project involved combining Texans with Northern Californians, Japanese, and Midwesterners–and getting them to cooperate in partnering.

**Risk-sharing:** Risk-sharing refers to multiple companies, such as the partnering companies, contractually agreeing to pool their resources (including allocating the costs) involved in bringing a new product to market, or in marketing the product–essentially sharing equally in the ups and downs of the venture. A representative example might be a computer manufacturer with a hot, new product who wants a retailer to carry it. The retailer is unsure if it will sell. To elicit the retailer's concurrence, the computer manufacturer agrees to share the risk for the profitability of the product.

Risk-sharing or risk-pooling requires a different type of contract, and generally involves all the players up and down a supply chain. Without risk-sharing, especially in the consumer electronics arena, poor coordination between partners could be extensive if the retailer, for example, wishes to carry a product, but the manufacturer refuses to make it.

**Outsourcing:** Outsourcing is contracting with another organization to perform a function, produce a product, or deliver a service to reduce cycle time for the first organization. In an earlier example, we discussed General Motors' use of platforming in production of the Saturn cars to reduce cycle time. In contrast, what did GM do with the entire line of Geo cars? Under a joint venture with Toyota, GM outsourced production of the Geo-Prizm, outsourced another product to Isuzu, and a third to Suzuki, etc. So, the whole product line is completely outsourced. It was another way to achieve CTR and freed GM to make new products or enhance others.

**Virtualizing:** Virtualizing is creating an entity from several different companies which would not otherwise exist, creating the "virtual
organization. Because of my simultaneous involvement with the MIS Research Center at the University of Minnesota, the FedEx Center for Cycle Time Research at the University of Memphis, CSC's Research and Advisory Services, and as a private author and consultant, I am actively involved in organizational virtualization. Like the earlier analogy to pick-up games (see self-directed teams) these organizations may or may not select me to participate in their activities. Although my relationship with each organization is different from any of the others, I could not be doing the quality or diversity of work I am doing without being involved with all of them at the same time. More and more frequently, "organizations" are assembled for a short time to accomplish one activity, and then disassembled. This is much like making a movie in Hollywood.

Conclusions And Recommendations

The five constructs for cycle time reduction and their associated "ING" words are summarized in Table 1. As discussed in this article, the purpose of the constructs and the "ING" words are to provide a framework, checklist, or methodology for investigating potential areas for cycle time reduction. In our research we have found it is very useful to spend time understanding how something works, the adage "do not change something until you understand it" being particularly pertinent. Then as the organizational processes are understood, try to discover which of the "ING" activities provide the greatest point(s) of leverage to achieve cycle time reduction. To publish my books quickly, the point of leverage was anticipatory scheduling to improve cycle time in buying consumer electronics it was eliminating steps, to improve cycle time on suit availabilities for men's suits it was informating and partnering, to improve cycle time for car rentals it was a combination of informating and reusing the information to allow people to more quickly rent cars, for my travel company it was a combination of caseworking and informating.

As seen in the subsequent papers in this first issue of Cycle Time Research each of the research projects use a combination of the constructs and "ING" words to find points of leverage to improve cycle time. As we continue working in different organizations and industries and are able to access more research on the cycle time area, we hope to more fully develop the framework as a rigorous methodology to be applicable to a wide variety of cycle time reduction opportunities.
Table 1

Management/Organization
- Visioning
- Front-ending
- Aligning
- Transforming
- Flattening
- Balancing
- Investing
- Consolidating
- Distributing
- Implementing
- Benchmarking
- Learning

Human Resource
- Empowering
- JIT-training
- Modeling
- Self-directed teaming
- Cross-functioning
- Case-working
- Co-locating
- Teleworking
- Measuring
- Rewarding

Product Management
- Identifying
- Innovating
- Prototyping
- Time-boxing
- Reusing
- Mass-customizing
- Platforming
- Deriving
- Postponing

Operations
- Conceptualizing
- Challenging
- Eliminating
- Integrating
- Paralleling
- Anticipatory-scheduling
- Informating
- Simplifying
- Standardizing
- Automating

Interorganizational
- Networking
- Partnering
- Virtualizing
- Risk-Sharing
- Outsourcing
Principles of CTR

References


Bibliography

