

## Supply Chain Value Measurement

It is easier to perceive error than to find truth, for the former lies on the surface and is easily seen, while the latter lies in the depth, where few are willing to search for it. Science has been seriously retarded by the study of what is not worth knowing, and what is not knowable. Johann Wolfgang von Goethe

### **J. Thoreson , Value Metrics Researcher**

Author of:

*The Information Advantage, Ahead of Time* and co-author of *Information Secrets*

### **Elliott Mendelson, Enterprise Applications**

Enterprise Systems Performance Executive  
Sun Microsystems

January 2000 © Copyright 1999 - All Rights Reserved

ITOP® is a Thoreson registered Trademark

## I Introduction

One day, an expert in time management was speaking to a group of young executives and, to drive home a point, used an illustration the participants will never forget.



As he stood in front of the group of high-powered achievers he said, "Okay, time for a quiz" and he pulled out a one-gallon, mason jar and set it on the table. He also produced about a dozen fist-sized rocks and carefully placed them, one at a time, into the jar. When the jar was filled to the top and no more rocks would fit inside, he asked, "Is this jar full?"

"Everyone in the class yelled, "Yes."

The time management expert replied, "Really?"

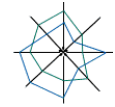
He reached under the table and pulled out a bucket of gravel. He dumped a considerable amount of gravel in and shook the jar causing pieces of gravel to work themselves down into the spaces between the big rocks.



He then asked the group once more, "Is the jar full?" By this time the class was on to him. "Probably not," one of them answered. "Good!" he replied. He reached under the table and brought out a bucket of sand. He started dumping the sand in the jar and the sand worked into all of the spaces between the rocks and the gravel.

Once more he asked the question, "Is this jar full?" "No!" the class shouted. Once again he said, "Good." Then he grabbed a pitcher of water and began





to pour it in until the jar was filled to the brim. Then he looked at the class and asked, "What is the point of this illustration?"

"One astute member raised his hand and said, "The point is, no matter how fully our schedule is, if you try really hard you can always fit some more things in it!"

"Not quite," the speaker replied, "that's not exactly the point. The truth this illustration teaches us is : **If you don't put the big rocks in first, you'll never get them in at all.** What are the 'big rocks' in your life -- time with your loved ones, your faith, your education, your dreams, a worthy cause, teaching or mentoring others? Keep this scenario in mind as the supply concept of optimizing the supply chain evolves in this article.



One cannot effectively manage what one cannot measure. It is a business prerequisite to define a measurable goal.

### **I.1 Who is the Boss?**

Who exactly do you work for and why? For most of us "work" is a necessity that consumes as much as one third of our lives. Anything that consumes that amount of time is an important item. Time is a precious commodity.

We work to better family health and well being. We work to create a better life for others and ourselves. Some work to promote their religious beliefs. Some work to promote their cause. Some work to create intellectual or economic wealth.

These statements tell "why" we work, but not for whom. We work **for** those that depend on us and in business those are customers. They are the only ones that determine whether we succeed in business or not. Each person does not exactly work for the "boss" or "for" the corporation because we work **with** these people to serve our customers. Sometimes they are not called customers. Clients, subscribers, beneficiaries, taxpayers, and students are all customers in some context. Customers are one of the **BIG ROCKS** in the glass jar.

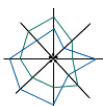


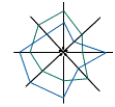
Suppliers are an extension of the company team in the pursuit of providing customers with goods and services. It takes

a network of support to service consumer needs.

### **I.2 Source of Suppliers**

Suppliers become suppliers because of our choice not to make something ourselves. So far people and the machines that people have built to lessen the burden construct all things in business. People create the supply chain by choices. Customers have choices also. They can do for themselves, choose a competitor or choose to favor our home firm. The competitive terrain is not level. Some companies create advantages that are more powerful than others. One of the largest advantages that your company can possess is the capability to measure the value that your corporation (and supply chain) is delivering. It is not possible to effectively manage something that cannot be measured (von Neumann). Value measurement has been elusive.





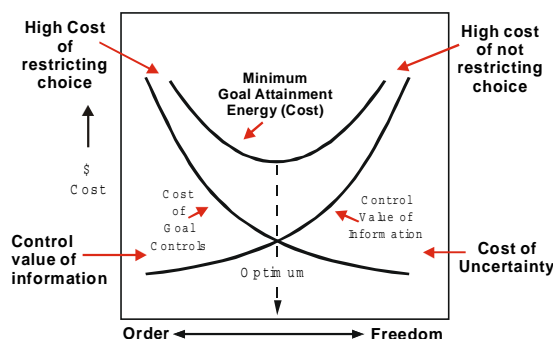
Therefore, the first management prerequisite is to institute supply chain value delivery metrics and measures that determine the "goodness" of supply administration. One may think that such a thing has been done. THAT thought may be the one that avoids addressing the issue and starves the corporation by depriving essential directional navigation information. The GOAL is to choose the best suppliers.

## II Measuring the Supply Chain Value Contribution

The notion of improvement has been around for a long while. If nothing changes, the expense structure will remain (or decay). The economics of actually implementing improvement has been disappointing. Instituting transformation requires that very skilled (and expensive) personnel be devoted to improving the supply chain.

Dr. Arthur Laffer offered the familiar model for industrial management and for economics. The graphical representation looks like the following.

Total cost curve for optimizing freedom and control



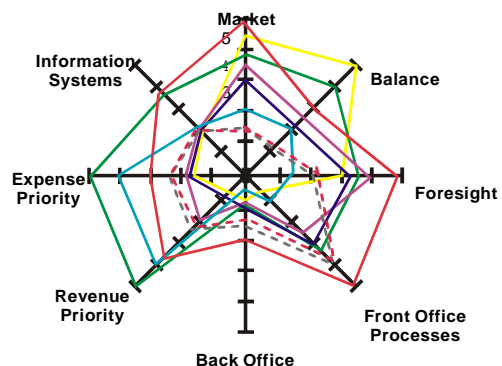
Among other things this model suggests that there is a point of diminishing returns where the cost of the next increment of expense reduction is more than it is worth.

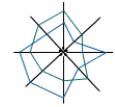
Most peculiar in the diagram is the declaration that it is the cost of information that is the limiting factor. If not very careful, information systems cause more expense than they are worth! Not all the waste is in building and operation of technology systems. Included in the choice making buried in the Laffer diagrams are product design systems, training systems, executive decision making systems, expense control systems, sales systems and pricing systems.

Systems changes, process changes or practice changes may accomplish such a thing. However, the way time works is that time devoted to one thing takes away from the time spent on another. The management issue becomes one of choosing which are the BIG GOLD ROCKS and which are not!! Which devotion of precious resource will yield How does one know the largest gains? How and when does supply chain improvements count most? The only answer is to measure the economic value of the supply chain with respect to competitors.

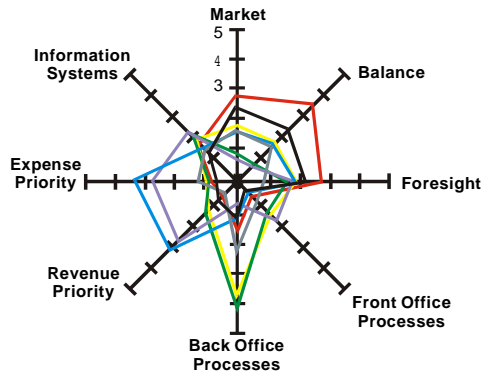
### II.1 Case Example

The following value map shows real corporations where the largest economic monetary gains to be made are in the topic of supply and production (back office).





On the other hand the companies represented in this next map should consider a different allocation of resources because there are larger gaps other than supply.



The sixteen companies above each are in the same industry competing for the favor of customers. The new era of knowledge management and systems integration have ushered in a technique termed ITOP. ITOP creates value delivery "maps" for whole industries simultaneously. In so doing the value creation strengths (and weaknesses) become exposed in full view.

The companies depicted here are competing in the petroleum refining industry but any or all companies of any type can be evaluated with equal ease.

"Supply chain" in this diagram is depicted as "back office." All of the companies in the first diagram need supply chain improvement. The amount of economic value to be gained is equal to the size of the gap between where any company currently stands and the outer edge of the "ray."

The second diagram of companies has very different opportunities.

Two are strong in supply. Much of their economic success is driven by supply excellence. In the others the largest gaps for value add are in other than supply. Devotion of precious resource to supply chain improvements will not yield the largest gains that are available.

Devotion of precious resources needs to be targeted at the highest return topic. **Stealing precious resources from other more needy internal groups is exactly what destroys the total corporate goal achievement.**

The point is, which profile is your company? Are the **big rocks** visible in your corporation?

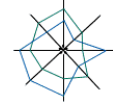
### III Looking Before Leaping

What has just been presented here is intuitive. If one were able to see the value maps, the choices would be simpler. That is what makes the tragedy on the scale of Othello. The maps have been missing. Companies are blinded. Companies make incorrect choices for their improvement efforts and those resources are either wasted or not keeping pace with competition. The corporate strength is weakened either way. Supply chain is not immune.



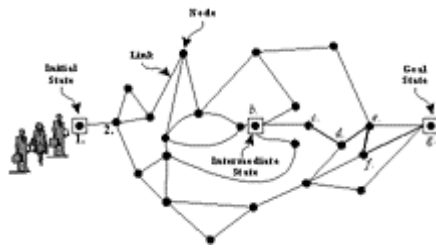
-When the corporate guidance system is corrupted, ineffective choices are made. Such a thing creates huge waste of resources. Often the company does not survive. It is practically impossible to see because the measurements all along the way suggested that the proper choices were evident.





### III.1 Optimizing Success Odds

Enterprise optimization is the subject addressed in the field of operations research. A noteworthy pioneer was Richard Bellman. He stated a number of requirements for business optimization. Critical success actions are not soft "nice" to do things. They are absolute "must do" requirements - laws.



Bellman stated, "An optimal policy has the property that whatever the initial state and initial choices are, the remaining (future) choices must constitute an optimal policy with respect to the state resulting from the first choices."

It is quite simple in theory. Action choices lead to performance wins or losses. Choices are improved by information because choices are biased toward the appropriate path. Risk is reduced and the odds of success are skewed in favor of the holder if the better specific information (subject knowledge content).

Subtly stated is the requirement to be able to measure the competitive "state" at all times. The sole determination of sustained business success and the singular cause of business failure is knowledge and/or information content based. Business optimization has proven to be possible only from a basis of "informed choice." Information systems bias

those choices. Information from proper measures is paramount to see the direction.

The compass is a measuring instrument to navigate geographical terrain. The ITOP is just such an instrument to navigate the competitive business terrain.

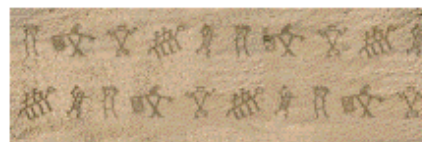


### III.2 Communication Technology

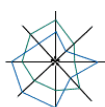
It matters not whether a critical message arrives written on a rock or via high technology computer. The content is the critical issue. Communications is the dominant technology in the universe.

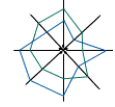


ALL knowledge arrives via some form of informational messages. Some get the message and some do not.



People are not bigger, stronger or faster than other animals on the planet. Yet, people are the dominant species. Why? The ability to communicate strategies and tactics permits a fusion of collaboration to solving problems and achieving joint goals.





#### **IV. Supply Chain Particulars**

Because the supply chain includes much of the corporation cost it is a high candidate for attention. Intuition, observation and scholars would have one believe that the prescription to optimization is primarily dependant upon cost reduction efforts. In reality squeezing supply cost often results in higher total corporate expense. How then is it possible then to effect change and know when these changes are beneficial? How does the corporation know when the supply chain activities and choices are optimal? How do we cut the fat and not the muscle? Would the enterprise be optimized if all the supply chain administration were free? Such a thing is now practical and possible.

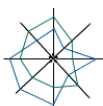
##### **IV.1 Solution Perspective**

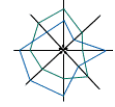
A natural consequence of this type of discussion causes the reader to assume the focus is on inventory and raw material replenishment for a manufacturing environment. That was the Industrial Age. If this is the case, permit me to offer a bit of insight that may change your viewpoint. Consider that the supply chain is alive and active to the same extent in each and every type of business. Moreover, the impact is reasonably the same (and large) in each. Whether the entity is a bank, insurance company or brokerage company the exchange processes and the metrics to evaluate exchange effectiveness are similar. Since all organizations are involved in "exchanges" it is incumbent upon responsible parties to make investment choices that enhance worth. At the enterprise level measurements of success are readily visible. But until recently, there was no methodology or metrics that

clearly articulated the value creation contribution of teams, directors or groups. Supply chain and others value contributions were not measurable. Thus, the value creating resource was often not nourished or rewarded. As a result of the changes in the ways we do business, the need for precision metrics has never been greater. Whether it is to reward positive performance, identify opportunities for new gains, or to compare practices of one organization to another.

It is the choice of each corporation to use anything at all from the supply chain. In a perfect world one might consider doing everything themselves but that is not a good choice and so it is best when the consumer and provider and supply partners are linked at the hip. It is noteworthy in passing that it was **a corporate choice to expand** the supply chain. People work for companies that make things for other people at other companies to consume. Business is - people exchanging things with other people that they have elected not to create themselves.

A provider translates a consumer's need into two parts. One part is for the value-add from the internal production and the other is the choice for outside provisioning. **It is catastrophic to outsource the essence of the value-add because the supplier soon becomes competitor. IBM did exactly this with Microsoft and look what happened.** In a perfect world the provider knows the buyer's requirements ahead of time and is able to deliver the item as required. Both organizations produce at 100% capacity and efficiency so that cost is minimum. There is no down time, no





additional effort, no inventory depots and every item exactly fits the customer quality requirements and buying criteria. Since neither can supply the customer individually, they jointly work together as one fully integrated machine. From a process perspective, optimization is achieved. There is total synergy between buyer and provider and customer.

But this isn't a perfect world. Buyer and provider may not be in close proximity. Providers may not be servicing just one buyer. Demand for a provider's products and services may force the provider into sub optimal operations because the supplier incentive is for "one size to fit all". Customization is not easy. Competition causes pressure, anxiety and fear. The availability of resources, the ingredients, may be short. Even worse, the buyer may not even know that the supplier exists and visa versa. New providers may be needed to replace prior choices. New geographical expansion may be in the planning and new offerings in new territory require stretching previous suppliers and adding new ones. The issues quickly become massive and complex. These factors and many more not identified here influence the dynamics of supply chain management. Dealing with any of these will result in the allocation of time and resources, which translates into expense. Complexity always causes waste.

#### **IV.2 New Approach**

All this complexity can be dramatically reduced with a systematic business approach.

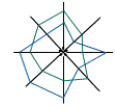
The most comforting feeling in the new method is that the competitive

terrain is still level. The very same thing is likely happening to each supplier - if one could just see it. Seeing the situation of others is a requirement. Perhaps their choices have been worse and yours are best. One never knows until one looks. Your company choices created whatever the issues are and your next choices are going to effect change in SOME direction.

Optimizing the supply chain only requires that the best suppliers in the marketplace (1) be identified and (2) be incorporated into the supply system. "Best" is a big rock. The goal is for suppliers to bring high value to the purchasing corporation and to pass along some of the ingredient value so that purchasing corporation can amplify the worth to the end customer. In this manner we can maximize the customer offering and prevent encroachment from competition. The prerequisite for all this is a comprehensive supplier value analysis and administration system.

In a competitive market place it can be stated that the reason some enterprises or entities have a significant advantage is because they perform in an superior fashion. Advantages result from doing the "right things" the "right way" across the entire enterprise. The whole is greater than the sum of the parts. It is proven that completely optimizing one part does not lead to as good a result as optimizing the whole. The key then to finding which action to address next rests in the ability to locate the highest worth and lowest cost next activity to improve. Management must be able to do this. At all times the supply chain management group needs to conserve





the precious expert resources and manage internal effectiveness. Again, this is merely an extension of the value measurement system.

The supply chain for a moderate sized corporation can involve interaction with multiple industries in widespread geography and thousands of component products and services. The supply chain may involve ten to twenty thousand suppliers and five times that number in candidates. Sixty thousand to one hundred thousand suppliers are not uncommon. Fortunately electronic business-to-business technology now permits comprehensive competitive edge and value analyses at such a massive scale. It is now quite easy to **remotely** calculate (or show in diagrams) the actual monetary value of Supply Chain strength and or Supply Chain deficiencies. The ability to map corporate value creation also exposes the highest economic value add opportunity for corporations, be it Supply Chain or any other functional area without actually being there.

At the beginning of this discussion the question was asked, "How is it possible to make improvements that benefit all interested parties." Internet communications technology covers distance and enables the tele-presence that allows all people in the corporation to see the world of best practices and economic edges. Overcoming the challenges resulting from increased distance between entities, difference in culture, currency, political policies, and language are critical to selecting "best." The expensive on-site, physically present, method can be greatly aided with a preview. Proper remote profiling affords a faster solution at a lower cost, with more

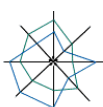
consistent and accurate results. Simply put, the highest performing supply chain in the world can be located - then go ask and inspect.

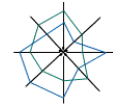
Communications is the only technology that permits spanning distance and synchronizing cooperative actions at the endpoints. The buzzword today that describes this technology is E-Commerce but this only speaks of the linkage between organizations. A better concept would be E-Business. No matter what the manifestation, the fundamental mechanisms are the same, the exchange of goal critical information. Harmonizing goals is the common thread that benefits all interested parties at the expense of none.

### **IV.3 One-Size-fits all ...**

In the golden days past Henry Ford exclaimed, "Consumers can have any color that they want so long as it is black!" This philosophy often works very well in the beginning of a new idea. Soon, however, competition discovers that some people want to be out of the ordinary and highly desire a different look, touch, feel and function to their copy of the offering. Choice becomes important. Mass customization has characterized much of the last half of the previous century. The production dilemma becomes one of how to harvest a good return from lower and lower volumes of like items.

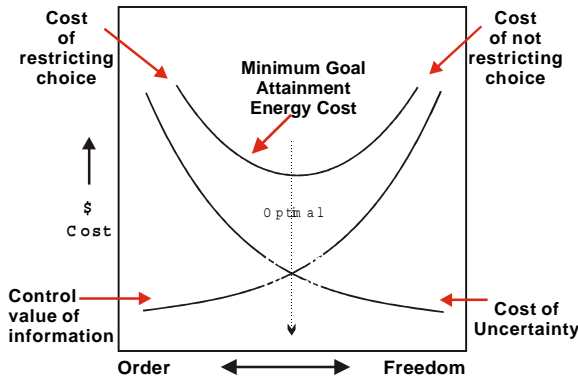
This situation has been well described in the literature with the quite familiar "Laffer" curves. For a long while the curves were used for instruction but could not be implemented.





Many people will be happy to explain the implications of this graphic.

Total Cost Curve for Optimizing Freedom and Control



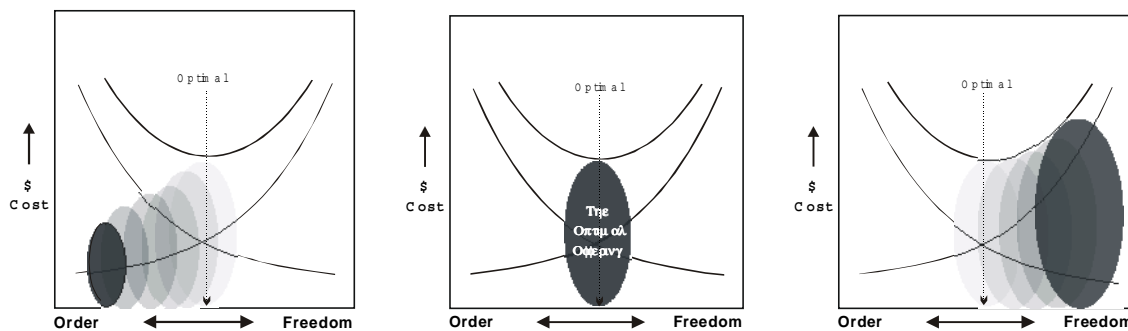
It has been a tutorial for economics and engineering.

What few know, however, is exactly where the position of the "optimal product or service offering" is located in the chart, what it really means and most important of all - the scales. The optimal offering is the one where the ingredients and composition exactly match the buyers purchasing criteria (stated, unstated, real and imagined criteria).

The "Optimal offering" is the middle illustration. It is somewhat hard to visualize what product or service this may be until one discovers that this represents each, all or any product or service. Each of your corporate offerings are represented.

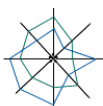
This is a universal positioning for the offering. The expense of ingredients is the lowest possible because the labor, materials and process ingredients are minimum. The price is the maximum because the ingredients exactly match the buyer's highest value criteria. Note that it is in no way inferred that the price is uniform. Price is not a one-fits-all either. Such is the imperfect mass customization world.

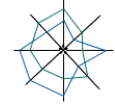
What happens instead is that the ingredients and composition vary. Sometimes the ingredients are too few (left view). In instances like this, supply chain management may be an unknowing party. In the interest of expense reduction, some of the real, but unknown, value adding components are eliminated, or



The "oval" represents the ingredient content of each customer offering. As the oval is moved horizontally it will either shrink or expand to denote the changes in the number of features and/or functions within the offering.

included in the wrong quantity, or at the wrong time, or delivered (packaged) an inappropriate way. In such instances, the unit cost is reduced but the worth is reduced even greater. The net result to the corporation is net negative goal gain.





The opposite view is when the ingredients are greater than the value criteria see any benefit. Often this is termed "gold plating." The real composition may far exceed the desire of the customer willingness to use, afford or pay.

All this became nearly impossible to implement because the scale of the Laffer diagram is either unknown or not able to be measured. The really excellent business masters were able to execute reasonably well by intuition and ad-hoc rules of thumb. It was business art rather than anything rigorous.

### ***V Bold Stroke for SCM applications***

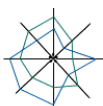
Before leaving the subject it may be beneficial to explain how a supply chain management group can generate all the financial investment to create and sustain the entire supply chain administration for the corporation –for free. It is actually beyond free but we would not want to overstate the case.

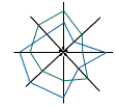
Return to the "comforting thought" mentioned earlier wherein all business supply chains are in the same boat. The same complexities are swarming about each party. It may not be possible to improve your supply until they (your providers) can improve theirs. They may be doing the best they can with what they have to work with. They also cannot see what is happening to them. Thus, your corporation actually needs for them to get better to help you be "best." Joint worth is established. The same service that you need, they need also. Why not create a service and let them use the part that applies to their suppliers.

Notice that such a thing has already been accomplished with the business model of SABRE (American Airlines). Sabre offers selective services to the open market on a fee for use basis (reservations). Such a thing is a service that would need to be done internally (a cost center). However, by offering the service to the outside marketplace, the fees more than offset the entire cost. The reservation system creates a huge profit. More than that, the competitor airlines are obliged to expose their customers, heavy traffic routes and pricing to the "system". In essence the competitors are paying American a fee to for the privilege of giving American (their competitor) important competitive information sufficiently strong as to kill them.

### **V.1 Your SCM Expense can be Zero.**

The similar activity is now possible for supply chain management using the system shown above. As a consequence the revenue and profitability from properly measuring the performance of the global supply chain for others can generate sufficient revenue and profitability to completely offset the entire internal Supply Chain Management expense. Therefore the expense of Supply Chain Management to the enterprise is zero or better.





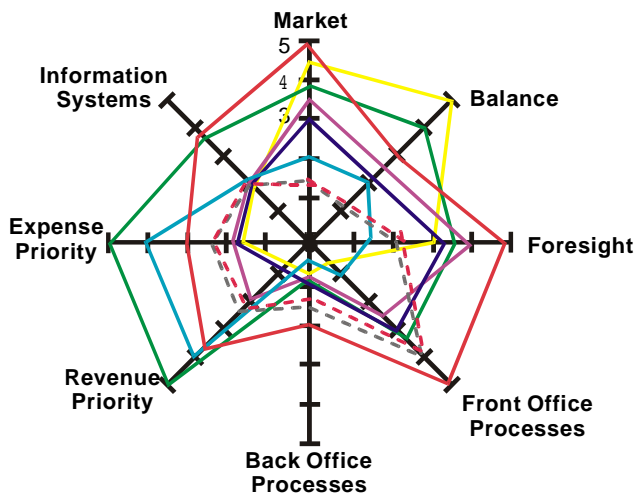
## VI End of Invisible Rocks

The moral of this story is simple to say and now it is simpler to execute.



If all the rocks look the same size then **it will be impossible to pick out the BIG ones that count!**

Each corporation has UNIQUE edges and practices. No two are alike. But, sometimes the recipes of practices are best and create different, bigger winning edges.



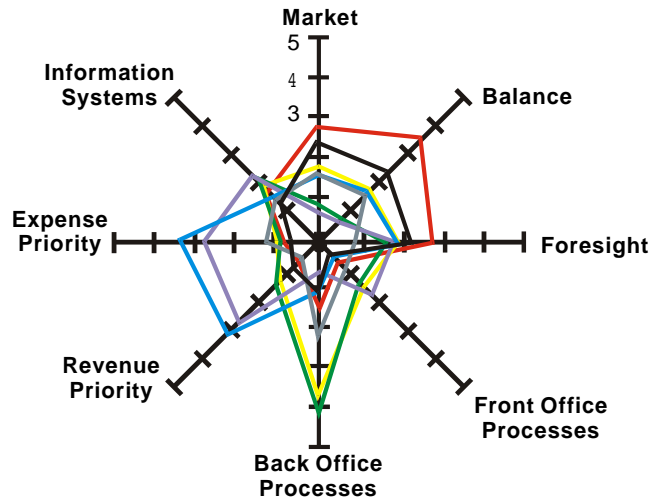
Lyondell Petrochemical  
 EI DuPont DeMours  
 Mapco Inc  
 Amoco Corp (Amoco)  
 Holly Corp  
 Shell Oil  
 Diamond Shamrock Inc  
 Tosco

*"Everything is simpler than you think and at the same time more complex than you imagine. Knowing is not enough; we must apply. Willing is not enough; we must do."* - Johann Wolfgang von Goethe



"Now an army may be likened to water, for just as flowing water avoids the heights and hastens to the lowlands, so an army avoids strength and strikes weakness."  
Sun Tzu - "The Art of War"

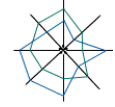
One of the greatest advantages is being able to see the size of all the practices and edges. It is best to do this side-by-side all on the same scale.



Chevron Corp  
 PDV America Inc  
 Coastal Corp  
 Valero Energy Corp (Valero)  
 Ashland Oil Inc  
 Amerada Hess Corp  
 Phillips Petroleum Co  
 Murphy Oil Corp

"Therefore I say, 'Know the enemy and know yourself; in a hundred battles you will never be in peril.'" Sun Tzu - "The Art of War"





## References:

1. J. Thoreson "Ahead of Time", 1999 and "The Information Advantage" , 1996
2. Robert S. Kaplan and David P. Norton, "The Balanced Scorecard - Measures that Drive Performance" Harvard Business Review (Reprint 92105), 1992
3. J. Thoreson and J. Blankenship "Information Secrets" 1997
4. Howard J. Snavely, "Accounting Information Criteria", The Accounting Review, April 1967
5. John von Neumann and Oskar Morgenstern, Theory of Games and Economic Behavior, Princeton: Princeton University Press, 1944
6. Ray Stata "Organizational Learning - The Key to Management Innovation", Sloan Management Review, MIT, vol. 30, no. 3, Spring 1989
7. Samuel B. Griffith, Sun Tzu - The Art of War, Oxford University Press, 1971
8. W. Gibbs "Software's Chronic Crisis", Scientific American, September 1994
9. Peter M. Senge, The Fifth Discipline, Doubleday, 1990
10. D. Powell, " The Productivity Paradox", Computing Canada, Vol. 18, Iss. 24, November 23, 1992
11. P. Drucker, Post-Capitalist Society, Harper Business Press, 1994
12. A. Lederer, J Prasad, "Systems Development and Cost Estimating Challenges and Guidelines", Information Systems Management, Fall 1993
13. S.C. Johnson, "No Doubt About IT", ComputerWorld, August 15, 1994
14. M. Parker, R. Benson, "Enterprise Wide Information Economics Latest Concepts", Journal of Information Systems Management, Fall 1989
15. Michael E. Porter, Competitive Advantage: Creating and Sustaining Superior Performance, The Free Press, 1985
16. Claude E. Shannon and Warren Weaver, The Mathematical Theory of Communication, University of Chicago Press, 1949
17. M. Parker, R. Benson, "Information Economics: An Introduction", Datamation, December 1, 1987
18. Barbara McNurlin "Uncovering the Information Technology Payoff", (report) United Communications Group, 1992, Rockville, MD
- 19 Paul Gray (book review) Information Systems Management, Fall 1989
20. Tom DeMarco, PeopleWare, Productive Projects and Teams, Dorset House Publishing Co., 1987
21. S.N. Levine, The Financial Analyst's Handbook: Second Edition, Dow Jones-Irwin, 1988
22. D. Hubbard "The IT Measurement Inversion" CIO Enterprise Magazine, April, 15, 1999 and web site <http://www.hubbardross.com/articles.htm>
23. R. Bellman, Applied Dynamic Programming, Princeton University Press, 1962
24. J. Thoreson "Value Tao Grande" <http://www.edges.net>
25. Valuable Information Ltd - website <http://valuinfo.vwh.net>
26. J. Thoreson "The Super-ordinate Optimization Technique" <http://www.cyber-edges.com>
26. M. Oliver, L. Johnson, J. Thoreson "Commerce, E-Commerce and Systems Integration Made Simple" <http://www.edges.net/LJMO-Systems-Integration-Value.pdf>
27. J. Blankenship and J. Thoreson "Business Intelligence Maps and Enterprise Optimization" <http://www.edges.net/ITOP-Value-Maps-People.pdf>
28. B. Patterson and J. Thoreson "Killer Business Scorecards" <http://www.edges.net/Killer-Scorecards.pdf>
29. J. Hartnett and J. Thoreson "Simply Optimum Systems - A Marketing Dream" <http://www.edges.net/JTJH-Kiss-SOS.pdf>
30. W. Clements and J. Thoreson "Measuring Corporate Intellectual Capital: An Economic Approach" <http://www.edges.net/Intellectual-Capital-measure.pdf>
31. J. LaTronico and J. Thoreson " Obstacles Removed" <http://www.edges.net/JLaTJTobstacles.pdf>

Special ITOP Unpublished Papers available on the world wide web.

