



## An Executive Overview

### Measuring Business Edges and **INVISIBLE** Powers

Practices, Processes, Systems, Knowledge, Learning, and Value

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### ***Background: Successful Metrics - Beyond Belief!***

Metric investigations originally pursued at Texas Instruments (Operations Research Group) during the late 1960's (Thoreson/Blankenship) were reactivated during the period 1987 - 1997. To our knowledge the recent work constitutes the largest and most comprehensive corporate research projects ever undertaken targeting the business metrics and measures necessary and sufficient to genuinely **optimize a business enterprise**. The extent of the analysis included approximately two hundred thousand (200,000) corporations spanning one hundred countries. Particular emphasis was placed on "information technologies" and their proper measurement. Information technologies include, but are not limited to, **information systems, learning systems, knowledge systems, core competencies, intellectual capital, best practices, innovation, reengineering, competitive edges and winning strategies/tactics**. Early in the effort "VALUE OF" was added as a priority of highest degree. Thus, the value generating capability and actual measure of value was added as a qualifier to each topic entities listed above. Teams of various size and composition were engaged. Co-authors Henry and Vogel were consistent members during the period 1990-1997. J Thoreson and Dr. John Blankenship have published <sup>(Ref. 1,3)</sup> the more complete results.

Accurate business measures for such entities as corporate knowledge can be readily achieved with a measurement method named Information (Info Edges) Technique for Optimum Performance (ITOP®). Part of the comprehensive scope is a result of redundant terms (synonyms) that have crept into the language due to the lack of previous standard measure and other reasons not pertinent here. For example, practices and processes are synonyms. Best practices are best processes because all practices are composed of processes and visa versa. Knowledge and competency are synonyms. To measure one is to measure the other. However, the unit of measure is consistent - **uncertainty**. The measured diagrams herein are a very small subset of the team accomplishments.





## Why Spend the Time and Energy?

The long and incredibly large effort from our highest esteem academic institutions has failed to yield tools necessary and sufficient for business optimization. Proper measurement is a prerequisite to management. An investment cannot be considered prudent if the outcome of the investment is indeterminate. Management cannot long pursue a course where energies and funds yield worthless outcomes. Two rapid ways to fail are (1) to devote energy and resources to low worth activities and (2) the inability to properly measure the value of work activity. A few of the deficiencies are listed below.

- Measuring the enterprise "state" or condition relative to optimum performance.
- Identifying and measuring the positions of economic value creation in firms.
- Identifying and measuring the highest next value gain point in a corporation.
- Determining and measuring strength of enterprise competitive edges.
- Measuring information systems worth in the enterprise.
- Measuring the state of business practices relative to best.
- Measuring the placement and degree of competency, knowledge and learning.
- Determining competitor strengths and weaknesses.
- Identifying customer largest economic gain possibilities.
- Identifying prospect largest economic gain possibilities.
- Measuring strengths and weaknesses of supplier processes.
- Identifying lowest cost supplier - the cost leader.
- Identifying highest value supplier - the value leader.
- Isolating the biggest winning, highest return next economic internal investments.
- Isolating the biggest winning, highest value customer/prospect investments.
- Tools for maximizing actual value delivery and worth of the enterprise.

The lack of effective tools and techniques for addressing the above causes managers to operate with blinders in the choice-making processes. Goal navigation is made difficult, at best. The risk and likelihood of destructive decisions is high. Enterprises struggle to survive.

## Talk versus Measure

"History unfortunately is a study in how professional philosophers and scientific "priesthood" lose contact with reality. Each generation has idea peddlers and professional talkers. Some of this yields goodness, but largely it is corrosive. The problem is determining the difference.<sup>(Ref . 1)</sup>" The difference is in the ability for the "talkers" to quantify/measure what they espouse.

The collection of measures here accomplishes definitive scaling for most of the prominent management philosophies. Our analysis finds that most management science methodology has been largely overstated. Proper measurement is the major missing link.

## Difficulties and Obstacles

Proper worth measurement for processes, systems, competitive edges, competency, practices, and value creation is made difficult by a common attribute. Each and all of the above objects to be measured are **invisible**. The **missing metrics** all deal with the non-trivial task of measuring **invisible powers**. The chart is an attempt to describe the hierarchy of difficulty and availability of tools and techniques for measuring, managing and controlling various classes of objects.

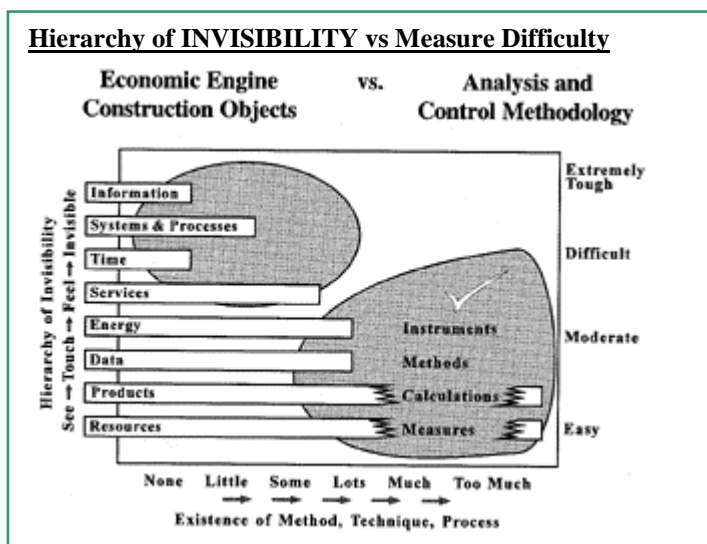
For example, one can visually see land, earth, metals and physical objects. The tools are available to measure the length, height, weight and so on. The compositions of ingredients in durable products are easy to measure. The same is untrue with service offerings (service products). The





composition of a service is not nearly so easy to see, to "bolt together", to make consistent or to measure. The components are **invisible**.

It is a mistake of the maximum degree to equate **invisible** with non-financial, intangible, marginal or low worth. Energy forms and forces are always invisible. Gravity is invisible, but powerful. Electricity and magnetism are invisible but form a basis for wealth in many industries. Wind is invisible, as is pure air. Heat is a powerful ingredient in industry and in life but is also invisible. Thermometers are examples of instruments that were invented to measure the invisible heat content (temperature).



Systems, practices, processes and information are a bridge between the durable goods "touch-feel" world and the mental "visual-feel" world. "Bridge" was used in reference to systems and processes because many processes include durable resource ingredients. However, every process that includes directed action includes an information component to some degree. Large classes of processes include little other than information (logic, sequence of activity, structure). Knowledge and information system processes are in this class. Data sits on the bridge. Data is physical (letters, numerals, operators) but when fused with memory and interpreted with respect to consequences, often causes directed action. Knowledge exists only in the mind and so does information. Information is not hardware or software. It is "wetware" and resides between the ears. Whereas the quantity or weight of literal symbols can easily measure data, information content (knowledge) is properly measured by the potency - **the power**. High performance, when and if capitalized, creates wealth.

### Similarity in Measures - Proportionality

In temperature measure the Centigrade thermometer is different than Fahrenheit and different again from Kelvin. All measure the same entity, heat or lack of it. The scales are convertible from one to the other. Such a thing has happened many times when multiple groups successfully accomplish an important measure. The creation of the "standard" is a separate issue from the measure itself. A standard implies agreement to unify onto one of a set of alternatives.

There is a "standard" measure for information oriented objects. The measure is uncertainty reduction. What has been missing is the "instrument" for determining the number of "units of uncertainty" attributed to an object intended for measurement. To the extent that any goal is valuable, the incremental goal gains are valuable. Hence, the goal gain provoking information is most valuable. The amount of value is equal to the number of uncertainty units reduced times the goal gain reward per unit. The significant missing element is the **quantification of the units of uncertainty**. The value of an information object is able to be determined by the number of units of uncertainty that is reduced by having it as opposed to not having it. Knowledge differentials, competency differentials, intellectual asset differentials, and information system differentials are calculated as the difference in units of uncertainty times the value per unit. That is commonly accepted measurement practice and valuation practice. Our team focus is placed on information content measurement because all the remaining durable components in practices, processes and systems have adequate measures.





## Surveys - NOT Proper as an Information Measure System

Consider the futility in using a poll technique to measure the actual degrees of temperature. The choice of the "right" temperature measurement units (Fahrenheit, Centigrade, Kelvin) is arbitrary. All three systems yield a correct temperature measurement to a different scale. The choice is one of convenience. The use of polls might have utility in selecting a "standard" scale to use but not to guess at a specific temperature. For example, what is the current temperature in Bogota? The "poll" method is inappropriate. The uncertainty may not be reduced at all.

Likewise, a proper instrument CANNOT use subjective weighted scoring for information objects. The answers heavily depend on the participants. Different groups arrive at different answers.

Surveys don't count when actual measurement is a real requirement. Just consider the results that Moses would have gotten from "polling" about Christ, the Lord and Christianity in zero BC/AD.

Voting is a weak excuse for measure!

Moreover, the answers are not easily repeated over time. Polling results are corrupted to a degree from the bias of the "weight assignors" whether consultants or surveyed executives. Unwanted biases creep in. Consulting is a form of polling and is inappropriate also.

Unitizing information and knowledge with consistent "units" is an obstacle. Confusion arises because of the expectation that by this time in history an accepted "standard" metric (weight and measure) exists for everything. There is no such *standard* unit scale for information content potency and will not be anytime

soon **even though a proper scale exists**. The fact that there is not a *standard* is only a roadblock to those searching for such a crutch. Every standard scale was once "pending." After thousands of years there is barely a standard temperature measurement. Instead we have Fahrenheit and centigrade and Kelvin. Note the standard process, identical instruments but different units. In distance measure we have yards and meters. There is no "standard" language or vocabulary.

### Performance: Capitalized, Monetized and Not Rewarded

There is a popular belief holding the thought that high performance and productivity creates high rewards and wealth. Such is not the case. Numerous situations cause high performance to create zero or even negative worth. A few common causes will be mentioned. First, efficiency is not the only dimension of performance. There is nothing quite so useless as doing with great efficiency, something that need not be done at all. It is the intersection of efficiency and EFFECTIVENESS that holds highest potential. Second, unless there is a structure for monetizing performance, the performance cannot be economically capitalized. The "best" athlete may go unrecognized and unrewarded for lack of competing in events that provide significant economic returns. In addition, it is the TEAM events that may be rewarded to the point that individual excellence is invisible. Third, the performance attributes may not be measured at all or measured improperly. The performance of one industrial team is only clear when compared to competitors for the same goal (competitive edges and/or best practices). Disciplined value measurement is largely missing in industry. Forth, extremely high performance may create such an abundance of an otherwise rare item that the value dissipates. An excellent example of all these dynamics is present in the plight of American farmers. The high performance of growing food crops has often outstripped the demand. The price deteriorates to the point that milk is poured down the drain and grain rots in the storage cribs.

The "performance" of information transfer is an interesting case because of the separation of physical transportation versus electronic information content transfer. As recently as a few generations ago it took weeks or months for a physical trip to exchange an idea, a fact, a





message or view a far away land. The designer(s) of new products and features needed to create physical models. A person, prototype model or document needed to be physically transported to the receiver by means of a physical delivery system. The time, cost and energy were extensive. What were months in physical transfer are now one day with such services as Federal Express, United Parcel Service and Airborne Express. Moreover, if the object is a knowledge object, the transfer is immediate via phone, TV, fax or other electronic messaging. Knowledge discontinuities are much shorter.

## Economics and Value

A good working definition of value is the combination of functional utility plus emotional utility of an object during use by the receiver. John von Neumann, an early cyberspace economist<sup>(Ref 5)</sup> explains that capturing or achieving an economic utility function requires that the goal be able to be measured. A metric guidance system (Scorecard) is absolutely required for optimizing the corporation.

Economists describe an important principle of **revealed preference**--meaning that actions and deeds rather than words or espoused beliefs reveal value preferences. Economics is supposed to describe how people **act**, and are therefore concerned with value as it relates to **action**. This pragmatic view is consistent in other disciplines. "Walk the talk" is a similar doctrine used by human resource personnel. Dr. Peter Senge talks about theories espoused versus theories in use. Measurement here addresses the actual.

The potential of most things is unlimited. Potential knowledge might be anything or everything. Potential value might be unlimited. We desire measures that add up to something actual and/or cross-foot with known quantities. Information content within practices, processes, and systems holds peculiar characteristics that confuse most traditional models. For example, information has extremely wide elasticity. The term information arbitrage is appropriate. Averages do not work well in value analysis. It is rather like placing the feet in a fire and the head in a freezer. On average the temperature is about right. Generalities fail because value is personal, situation specific and goal specific to individuals and groups (corporations). Very little data can cause a huge information action consequence ( e.g. stock tip). To be of high action value the information must be available ahead of the time of need (Ahead of Time). Once potent, high value information diffuses over time. When everyone knows a thing, it holds little worth. Information dissipates leading to the phenomenon in economics of "regression to the mean."

The measurement system is becoming clearer. The measure of goal achievement or lack thereof provides a basis for both functional and emotional utility. Monetary units (dollars) can be incorporated appropriate.

## Value ledgers and Value Accounting

The asset and expense accounting as practiced by the financial and accounting profession is woefully inadequate to address value. The fact that every penny has been corporately accounted and completely balances drives a passionately held view of completeness. Instead, the entire sets of formal corporate expense "books" contain little of the sufficient "intellectual" content. The participants are blind to the catastrophic design flaws. Here are two. First, economic value is represented as worth beyond cost. By rule, all items in the accounting journals are exactly represented by their cost. Therefore, value content (worth beyond expense) is totally illegal in an expense accounting system by design. If any item is entered at other than cost, the journals become dreadfully out of balance. As a consequence all value-oriented content is eliminated. Professionals that are sanctioned to police cost accounting purity make certain to purge all evidence of value content from their systems. Second, by definition economic value is that which





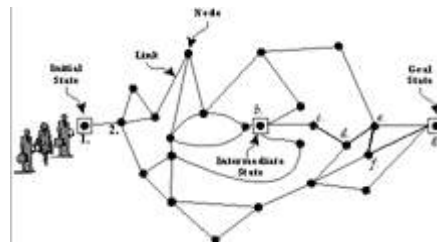
is gained by the recipient when put into use by the receiver. Thus, proper value accounting must account for the amount of value received and used by each customer.

If accomplished by the same method as expense ledgers, value ledgers would need to be activated for each customer and tabulate the functional and emotional utility gained for each offering supplied. Such a system is not practical, not advised and not necessary. A whole different approach is warranted. Investigation into measuring "intangibles" and non-financial parameters is largely a waste. We suspect that invisible and intangible have been equated. This false link is devastating.

## Goal Oriented Information Cause and Consequence

Richard Bellman, a noted Operations Research pioneer, described the **superior** (optimum) policy as one which causes the critical **choices** to be made consistent with maximizing **goal gains**.

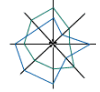
The policy - *"An optimal policy has the property that whatever the initial **state** and initial choices are, the remaining (future) choices must constitute an optimal policy with respect to the **state** resulting from the first choices."*



The good news in this statement is the attribute that actual achievement of goal is open to all starting points or current states. One does not need to be perfect. Perfect is not optimum. The necessary and sufficient condition for reaching the optimum is the requirement to locate the next largest goal gain step and work on that path. The largest next path gain will always be located in the position of greatest uncertainty. Risk and uncertainty are synonymous. Thus, learning to maximize certainty and minimizing risk are equally effective (dual) tactics. Learning happens as explained by Dr. Peter Senge (organizational learning) and Dr. Gary Hamel (core competencies). The bad news is the absolute requirement to correctly measure the actual current "state" of the success ingredients. The success ingredients are information differentials because information is the enemy of uncertainty. Information content (knowledge) creates measurable bias toward "best" choices.

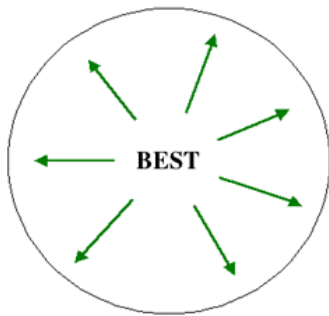
The proper scorecard measures the extent of the value creating goal components so that the weak components can be improved/replaced and the strong components reinforced. The management and strategy issue then becomes one of determining which are the weak and strong components with sufficient confidence and clarity to launch action. Strong and weak here mean potent and impotent information content/knowledge. The optimal policy describes **informed choice**. Information and intelligence become the singular determinates of sustained success and optimization.



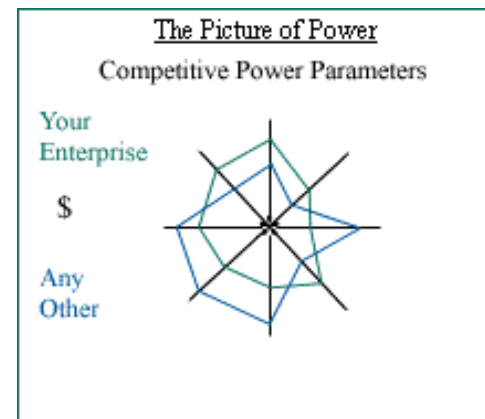


## Competition and Competitive Edges - A Major Uncertainty Source

Consider the core basis of competition. COMPETITION arises at EVERY instance where two or more parties target the same open goal (to win something contended). "Open" means that the future outcome (the winner) is not preordained or predestined. The fact that each outcome of each competitive event is not predestined guarantees each future win/loss outcome to be positioned squarely in a situation of risk, uncertainty and doubt. Only choice possibilities and probabilities are guaranteed. Uncertain choices come with fearful risk. Inaction, error and failure are constant undesired companions of risk and uncertainty. Competition and free choice guarantees that there are no absolute guarantees. Emotion abounds. Consequences follow choices.

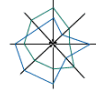


"Best" systems resist the pressures best and perform best. The ONLY enemy of risk and uncertainty in the universe is information in some form. Exceptional information is the ONLY thing in the universe that holds the power to alter the winning odds. Consistent winning requires continuous favorable odds, and the single source is information. Thus, all aspects of **business performance and productivity are information based**. Proper measures and metrics form a guidance system that directs the enterprise toward the goal. Improper or missing measures causes random wandering and lackluster performance (at best). The graphic illustrates a view of edges where bigger is better. Better and better information yields improved likelihood of winning. In turn this creates best chances of producing the desired (goal) outcome.



Our teams found it most beneficial to use competitive edge analysis as the primary thoughtware vehicle in accomplishing and showing the power metrics. Such thinking forces the thinking outside the confines of the home enterprise. Myths are much easier to see and discard. We were pleasantly surprised (shocked almost beyond belief) to find practical solutions to answer all the measuring voids and deficiencies mentioned at the beginning of this article.



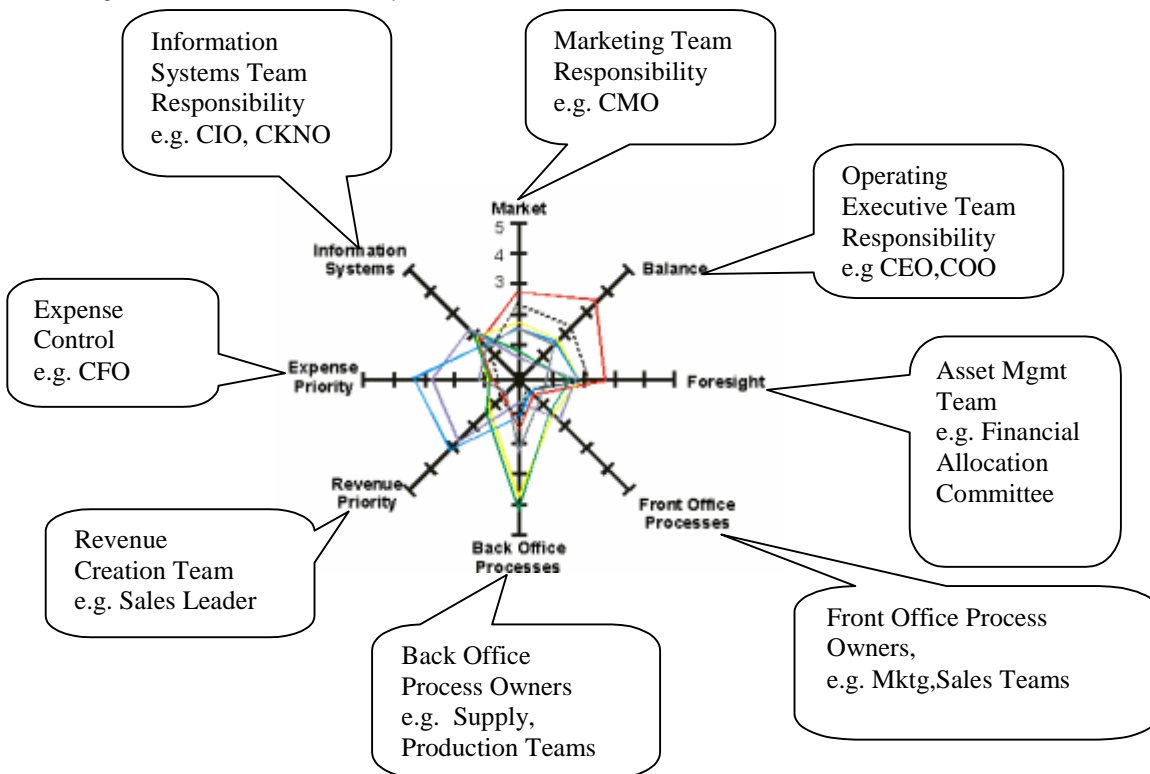


## Operating a Global Strategic Measuring System

ITOP operationalization is straightforward, simple and impressively economic; albeit massive. The team created a system capable of calculating and mapping the "edges" for all prospects and their customers. This was the "market" system. Next, all customers and their customers, prospects and their suppliers were included. This was the "operating group value chain" system. Next included was all the competitors of our customers, our prospects, our suppliers, and ourselves. This was the "comprehensive competitive analysis" system. The system included our suppliers, our suppliers competitors, our customers suppliers, and so on. This is the "supply chain" system. In all the data warehouse included more than 200,000 corporations in 100 countries. The analyses shown here are available for all.

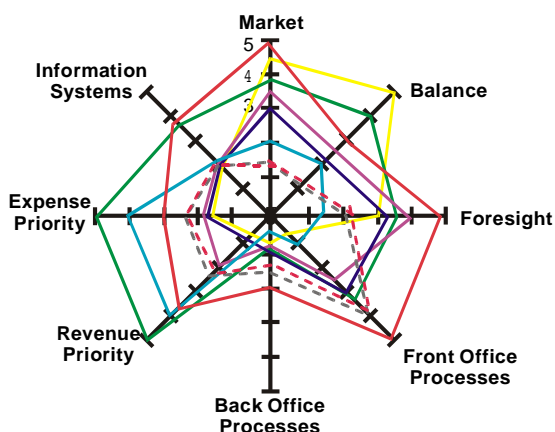
### For Example - Functional Mapping, Group-Team Specific Mapping- Getting Personal

The following are actual scorecards from a subset of thirty-two competing entities in petroleum refining. The profile will approximate organizational structure and functional responsibility. Sales, production, marketing, human resources, reengineering, and so on are performance "mapped" in comparison with competitors. A value delivery audit has been accomplished.

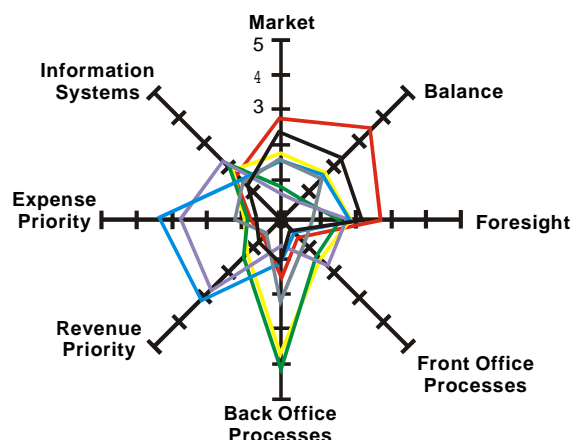


Note: The diagrams in this paper are purposely not current. These are 1995/1996 edge diagrams. Use for instruction and illustration only. Do not use for action or decisions regarding these corporations. Things have changed since these were first created.





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



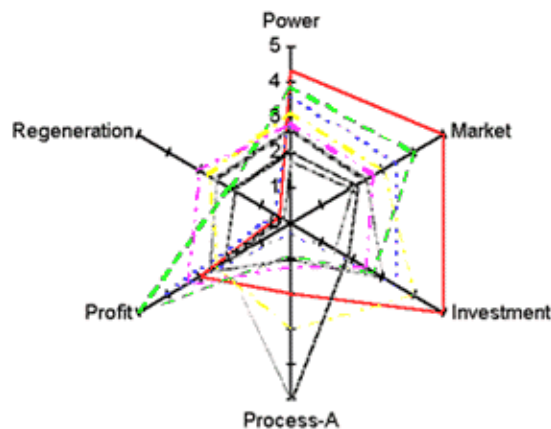
Chevron Corp  
 PDV America Inc  
 Coastal Corp  
 Valero Energy Corp (Valero)  
 Ashland Oil Inc  
 Amerada Hess Corp  
 Phillips Petroleum Co  
 Murphy Oil Corp

## Finding The Leaders -

Comparisons between and among the diagrams are sufficiently robust to locate the topic leaders in critical business topic such as those below.

- ✓ THE Cost Leader
- ✓ THE Supply Chain Leader
- ✓ THE Process Leader (Best Business Practices)
- ✓ THE Price Leader
- ✓ THE Reengineering Leader
- ✓ THE Edge Leader ( Competitive Edges)
- ✓ THE Org Learning Leader
- ✓ THE Information Systems Leader
- ✓ THE Economic Value Creation Leader
- ✓ THE Knowledge Leader
- ✓ THE Intellectual Capital Leader
- ✓ THE Value Delivery Leader
- ✓ ETC. Refer to the list at the beginning of the article.

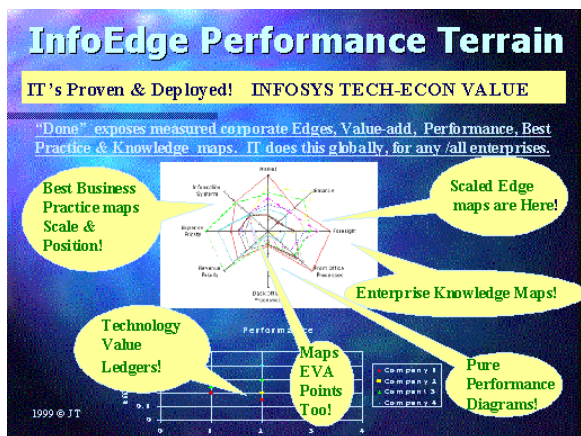
The collection is more extensive than can be reasonably presented in this briefing. For example, there are a set of more elevated views. This view accumulates and reduces the set to the fewest recommended. Process re-engineering (**Process-Adaption** in the diagram) is a meaningful metric. "Regeneration" is the ITOP metric that measures **organizational learning** and its derivatives including R&D, and innovation.





## Summary of Business Metrics Scorecards

The proper application of Information Economics permits the creation of a value-oriented edge diagram for any or all enterprises. The example shown below was presented at a measurement forum sponsored by the American Management Association. The intellectual capital is "mapped" because information content IS applied intellect.



**Economic System Worth**

Enterprise System Topic	Enterprise Value Magnitude (Worth units in \$millions beyond cost)				
----For Time Period 1994 --- Lyondell DuPont Mapco Amoco Shell					
Customer Information Systems	\$134	\$1382	\$35	\$853	\$106
Supply & Production Systems	-53	236	4	214	0
Asset Allocation Info Systems	81	1618	39	1067	106
Can do any/all Etc... Or can do real rank of "best's"					
Total Information Systems	\$349	\$4382	\$11		
Reengineering Systems Rel-to Best	1	7	11	19	23
Organizational Learning Rel-to Best	1	3	6	2	8

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The position of the value creating edges, practices, processes and systems have been shown. Extensions include systems integration and innovation measures for actual business organizations. Intellectual capital is the common ingredient - applied knowledge.

## The Calculation of the Economic Value of Information and Retained Information - Knowledge/Intellectual Capital

The value of information objects and/or information systems can be directly estimated by applying the thoughts below.

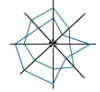
- Information causes a Bias in Directional Action
- Positive bias Reduces Uncertainty - as in a bias for the correct answer
- Increased true Certainty and Less Uncertainty Improves Decisions
- Better Decisions/Choices Result In More Effective Actions
- Effective Action Choices cause Improved Results and Performance to Goal

The logic and mathematics for analyzing choice structures has been around as early as the mid 1800's. The communications engineering archetype alone permits measuring the "elusive" value of information.

Suddenly, the investment portfolio and improvement tactics are clarified. The largest gain available to the enterprise will be located at the largest gap point. It is as simple as that. The necessary and sufficient "state" measure for operations research value maximization have been satisfied. **The next largest goal gain for future action illuminates. It does so Ahead of Time!** The future uncertainty is reduced and so is the risk.

This prospective ability to see ahead is not mystical or magic and not clairvoyance. Nor is it forecasting! It is merely applied logic. When one properly measures and scales the actual information content/applied intelligence of an object with respect to goal, any variation is always caused by uncertainty, which by another name is missing information.



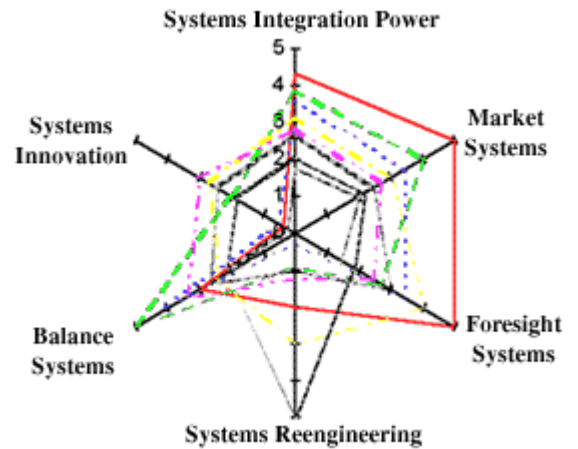


## Other Templates - Wide Possibilities

That shown here in no way exhausts the possibilities but it is thought that the wise will take special note of the **power**. We would feel remiss not to include one of the most notable "missing" scorecards.

The systems integration scorecard has not been possible until now. Shown is the high level scorecard for systems integration for the same corporations in the example. Systems are a dual form of practices and processes.

Because all winning tactics (edges) in competitive situations are information edges, it follows that the high value investments will always fall into the class of information improvement. It does **not** follow that these are the type of information systems that one commonly thinks about. The information improvement may be product information systems, manufacturing method systems, supply chain systems, advertising systems, management systems, human resource systems, organizational learning systems, or innovation systems.



The **integrated**, total combined Power of all the Man-kind and Machine-kind systems. e.g. The Whole People Team and the machines they choose to bring and use. Included are information systems, knowledge systems, transportation systems, construction systems, systems of business conduct, systems of production, systems, problem solving systems, political systems, wellness systems, and so on. From all the universe of systems, choices are actually made and put into use. Some do it best. **Composite Edges.**

Learning and inventing new and different systems and components.  
**The Sustaining Edge.**

The system to align and balance all the various systems necessary to sustain and grow the enterprise.  
**An Edge.**

The system to implement alterations in any/all systems due to previous choice errors or new improvements.  
**An Edge.**

The systems in use for addressing the market and choosing what to provide that is worthy.  
**An Edge.**

The look -ahead systems to see ahead sufficiently far to choose investments that foster vitality and viability.  
**An Edge.**





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