"Profound Knowledge from a Knowledge Use Perspective"

Deming Lecture
Joint Statistical Meeting

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My first contact with the "Thinking" of Dr. Deming occurred when I was at the Census Bureau. As I'm sure most of you are aware the taking of the Census is an incredibly complex activity; from the making of the maps, developing the mailing lists, creating the Census form, the collection itself, and the publication of results. The Bureau had traditionally built a back-up system in anticipation that in each step of the process something could go wrong. As the person who would likely be held accountable if something did go wrong, I had generally supported this position. Then one day in a discussion on the subject one of our senior members commented that if Deming was still with us, he would describe the Bureau's approach of ensuring quality by developing elaborate back-up systems with his very compelling metaphor, "You burn the toast and I'll scrape it." In essence you end up with a piece of toast that everybody accepts, but you really have acknowledged that a problem is likely and you have built a process to make it tolerable – exactly what Deming had argued against.

Dr. Deming and I had a more personal, and for me more memorable, brief meeting during the taking of the 1980 Census. I gave a presentation at the Cosmos Club on our progress at the end of the presentation he came up and very nicely said, "You are doing a good job, keep it up." The last time we met was at General Motors in the nineties when he was advising us on improving the quality of our products and services.

However, it wasn't until I gained a better understanding of his concept of Profound Knowledge by reading his works, combined with what I learned during consulting engagements and evolving friendships with Russ Ackoff and Peter Drucker that I came to more fully understand and appreciate the value of his thinking. What I appreciated most was the fact that he railed against decision makers and those providing them information, who blindly asserted opinion as fact, out of convenience or ignorance. Instead, he challenged all involved to test their opinions, theories, hypotheses, hunches and beliefs against reality to truly understand what is going on and learn what is necessary to improve the situation.

In preparation for this event I reviewed several of my predecessor's lectures. They were all quite interesting. But Stuart Hunter's Lecture in 2009 really caught my personal attention. In his presentation he described a function he called Statists. That is: "Individuals who, without formal academic degrees in statistics, daily employ statistical methodology in the workplace."

Now with the essence of my education and career in government and business clearly stated, this Statist will focus this presentation on the need to improve the manner in which knowledge developed through statistical practice is designed, collected and presented. I will focus on causing it to be effectively used to create an improved decision making process from which learning can take place. To do so I will speak from both positive and not so positive experiences.

In some ways I'll be discussing how we are now facing different types of questions from how I was initially educated to help those who were seeking information to support decision making

These evolving changes were eloquently made by Peter Drucker in a Birthday letter To Ackoff he asked me to present to Russ on his 80th Birthday in March of 1999:

> *"My warmest thanks for the wonderful contributions you made to me, all of fifty years ago! I was then, as you may recall, one of the early ones who applied operations research and the new methods of quantitative analysis to specific business problems…we had successfully solved several major production and technical problems (in GE and AT&T)…but our work had no impact on the organization and on their mindsets. On the contrary, we had all but convinced the managements of these two big companies that quantitative manipulation was a substitute for thinking. And then your work and your example showed us – or at least it showed me – that the quantitative analysis comes after the thinking – it validates the thinking; it shows up intellectual sloppiness and uncritical reliance on precedent….and your work in those far-away days thus saved me – as it saved countless others – from either descending into mindless "model building" – the disease that all but destroyed so many of the business schools in the last decades – or from sloppiness parading as "insight"*

In essence Peter's comments to Russ highlighted the changes those of us who provide information have faced and are facing. We used to be asked; "How do we do what we do better? Now we are more likely to be asked; "How do we do what we haven't ever done before?"

The essence of my message relative to Knowledge Use is clearly stated in this quote from Russ Ackoff's colleague C. West Churchman whose thinking was often recognized by Deming. ***"Knowledge resides in the user and not in the collection. It's how the user reacts to the collection that matters."***

I will attempt, by telling five stories, to reinforce the approaches of Deming, Churchman, Ackoff, and Drucker to improving decision making by ensuring the collected information is in terms the decision maker will understand and find relevant.

The importance of providing the collected information in terms the decision maker will understand and find relevant was vividly brought home to me 44 years ago in 1972 I was retained to conduct a series of political surveys related to the re-election campaign of Senator John Tower of Texas.[1] The results of our first survey indicated that Senator Tower was running ahead of his likely Democrat opponent Harold Barefoot Sanders, known by most Texans as Barefoot Sanders. At the time of this survey Sanders was running in the Democratic Primary against Senator Ralph Yarborough whose voting record had caused many Texans to label him as a liberal. During the primary campaign Sanders positioned himself as being more conservative than Yarborough and won the primary election. After the primary we conducted a follow up survey and saw a significant shift in voting behavior. Sander's support had grown by 11 percentage point to 45% and Senator Tower's support had dropped 17 percentage points to 36%.

[1] "The re-election of Senator John Tower, The Decision Loom, Triarchy Press United Kingdom, 2011 pp 29-33

I quickly advised Tower's campaign management team of the survey results. The senior advisor informed me that he was uncomfortable in delivering the results because Senator Tower, as the incumbent and a known conservative in a state like Texas, believed he was ahead of the more liberal candidate Sanders. At that point, given the senior adviser's discomfort in delivering the results, I offered to present the information to the Senator without the staff present.

In preparation for an expected difficult meeting, I reviewed an earlier post-election survey we had conducted in 1970 to find out what contributed to Lloyd Bentsen's defeat of George H. W. Bush in the race for the U.S. Senate. That study made it clear that in a campaign where the Democrat candidate was perceived to be as conservative as the Republican candidate, the Democrat candidate generally wins.

In June, 1972 a private meeting was held with Senator Tower in the St. Anthony Hotel in San Antonio, Texas. Upon entering the room Senator Tower who was already sitting down, said, "Sit down young man, I understand that you have some bad news for me, which I am also told is not correct."

I responded to the Senator by stating that the information was accurate but it was only a measurement of voter preferences at the time the survey was conducted and not a prediction of the outcome of the race. I also made clear it was not bad news since it showed that because Sanders had defeated the liberal Ralph Yarborough many voters perceived him to be a conservative. Senator Tower interrupted me and said the survey indicating he was behind was not accurate because it was a well-known fact that Sanders was not a conservative. I pointed out that we should not be focusing on the numbers for and against him but on what the numbers reflected. I also made clear that it was the perception of a large portion of the respondents, influenced by Sanders defeat of Yarborough, that he was conservative. I smiled and told Senator Tower "that was the good news." If the record showed that Sanders was indeed more liberal than Senator Tower, all he had to do during the campaign was demonstrate that in reality, he was more conservative than Sanders. The Senator quickly got over the numbers showing him losing, smiled and said, "You're right, that will not be too difficult to do – that essential finding of this survey is good news!"

He then asked me what he should direct his campaign staff to do now that he accepted the information. I suggested that, in any discussion where he was asked to compare himself to Sanders, he provide explicit examples that demonstrated his position was more conservative and to get as many known conservative *Democrats* to endorse his candidacy.

In the months between June and a follow-up August survey the Tower campaign was able to gain the endorsement of several well-known conservative Democrats. The positive results of this focused effort were reflected in the next survey results that showed from June to August the Texas electorate shifted back to Tower (45%) and away from Sanders (29%):

Another study identified the relative importance of endorsements by two Democrats -- John Connally, a well-known former Texas Governor and Treasury Secretary under Presidents Kennedy and Nixon, and Former Attorney General Ramsey Clark who was a well-known liberal activist, who served under President Johnson. When the respondents

were asked whether they would be "more likely" or "less likely" to vote for a candidate who was endorsed by either Ramsey Clark or John Connally the results were:

	More Likely	Less Likely
John Connally	56%	44%
Ramsey Clark	20%	80%

This information, in light of Sanders' acceptance of a $2000 campaign contribution from Ramsey Clark, reinforced an earlier decision to tie Sanders, as directly as possible, to Ramsey Clark.

In one of the best uses of survey knowledge to influence a specific target audience, the Tower campaign team created a bumper strip and billboard campaign with the following succinct and clear message that typified the manner in which the campaign tied Ramsey Clark to Barefoot Sanders:

I still have that bumper sticker hanging up in my office! In November, John Tower defeated Barefoot Sanders 55% to 45%.

The experienced gained in that campaign and the broader understanding gained from providing information to local, State, and Presidential campaigns across the entire country further convinced me that we needed to change how our firm did business. We needed to direct our attention and resources to make sure the emphasis on our activity was to engage eventual users in a manner that allowed both of us to gain a sense of what the acquired knowledge meant and how it could be used more effectively.

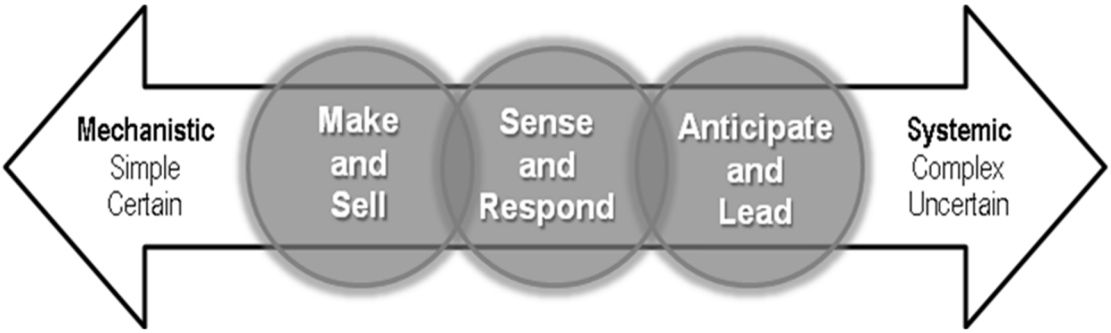
In this presentation, I'll discuss an experienced-based approach that has the potential to help business and public sector leaders use information while facing an uncertain future in a world that will soon be further dominated by digital technologies. I will present these thoughts in the context of the wisdom found in this statement by Peter Drucker:

"One cannot make decisions for the future. Decisions are commitments to action. And actions are always in the present, and in the present only. But actions in the present are also the one and only way to make the future."

Given that I have had the opportunity to work in both public and private institutions, what follows is presented to demonstrate not only how a private firm would conduct it business, but also how public agencies at the local and national level should be conducting their activities

The range of possible operating designs is almost infinite. Here is a brief general classification of possible ways of thinking that I have found useful in discussing this subject. It is not a complete list but is illustrative of the potential range of opportunities.[2]

[2] *Surviving Transformation*, Oxford University Press, Barabba, 2005, pp. 17-27 has a more detailed description.



An array of possible approaches positioned along the "Simple/Certain Complex/Uncertain" continuum.

Make-and-Sell: A make-and-sell design does just that. The enterprise or activity seeks to predict, based on its experience and research, what the market/community will demand. Early developers of train services between large cities with common interests understood this business design quite well. In this design, it is an accepted belief that customers/citizens know what they want and have the means to acquire it. The key to success is to correctly predict demand. The make-and-sell enterprise or activity relies on economies of scale: finding a large market/audience and then setting up a capability to provide what is wanted in an economical way. Performance measurements are gathered through benchmarking and best practice evaluation and the extensive use of causal modeling.

The difficulty in bringing forward information that indicates change is taking place is that the leadership of the make-and-sell enterprise or activity is more likely to challenge claims of forthcoming change and has developed the interpersonal skills to persuade others the enterprise is already on the right path. This will require the provider of information to make sure the individuals who will allocate resources are involved in the design of the research project – including development of measures to confirm whether the findings are relevant and realistic.

For example, when I was working at Xerox, we created a research utilization group to help us design a study to measure future demand for Xerox Copiers. When completed, the study designed by Morris Hansen, a former Census Bureau statistician then a Westat, clearly pointed out that existing model-based forecasts of copier sales and copies had been significantly over-stated. Fortunately, because Xerox leased and did not sell its products, we had records showing not only the number of Xerox copiers in the market but also the number of copies each copier was making at the time the survey was taken. Because we had that detailed information we were able to compare those company records against the results from the survey and found them to be within a few percent of each other, adding credence to the remainder of the survey's measurements. The members of the research utilization group provided that information to their individual management groups to help convince them that the other results were also likely to be correct. When I presented the survey's volume results to Xerox's Senior Executives, rather the ignoring the results because they did not fit an earlier positive predisposition, management accepted the results and made painful significant changes to the inflated forecasts.

In the public sector, a make-and-sell design could be described as "predict-and-provide." This design can be found in government agencies that have been providing services over

a long period, particularly to public constituencies that are characterized by relatively slow and evolutionary change. Given that sometimes there is little direct contact between those being served and those serving, the ability to sense the possibility of change can be somewhat hampered. I am not saying that these agencies are failing to perform at an accepted level of service. The essential point is that when change is evolutionary and predictable it matters not whether you are in the public or private sector.

Sense-and-Respond: A sense-and-respond design starts with the enterprise believing the future is not easily predicted nor controlled. A taxi management system realizes that the people that were going from point A to point B yesterday may or may not be doing the same things today. Therefore, they need a communication system among Taxis that provides them an indication of where the business for that day is likely to be. Given that there are some innovative competitors, like Uber and Lyft, in the market that are also sensing and responding, causal modeling based on past experience is less valuable. In this changing environment, the leadership of the enterprise or activity organizes itself to respond to an understanding of what is actually happening, as opposed to what is forecast to happen. The sense-and-respond approach require*s* decision makers to provide products or services that satisfy customer needs or desires that are not being satisfied by the current market. In this situation the provider of market information faces an audience that wants information that indicates the likelihood or potential of market change, hopefully before they actually occur. With that in mind the data collection process starts by reaching out to selected audiences and saying, "Help me to identify your needs, and let's work together to satisfy them." The people in a sense-and-respond environment are empowered and accountable and spend their time producing customized outcomes in accordance with an adaptive business design.

In 1988, Harvey Bell one of GM's senior engineers who was working on the Camaro/Firebird vehicle platform asked to attend one of our customer focus group to address braking system preferences. At this point in time our research was directed at measuring the "stopping distance" in essence the distance the customer expected was necessary to stop the car going from 60 mph to a complete stop. While our team was busy recording customer answers to our questions on stopping distance, Harvey, with his understanding of drivers of performance vehicles, was hearing these Camaro/Firebird customers talking about being in control of the vehicle while braking. At dinner that evening he asked me what I had heard. I pointed to the number of people who used different stopping distances as their preference. He politely pointed out that what they were actually telling us is that they wanted to be in control while stopping. With that insight and using his knowledge of braking systems and hydraulics, he was able to translate the targeted customer's desire to feel calm and assured while braking into appropriate design requirements. Based on his participation in the survey, his team created new measures for braking performance and incorporated the customer desires into subsequent GM brake testing and evaluation. In subsequent conversations Harvey indicated he now understood that people who are responsible for innovation and design need to be directly involved in determining what and how market information is collected so that it is used effectively.

The leadership of a sense-and-respond enterprise tends to encourage managers to recognize that the unpredictable environment requires giving up control of procedures and processes. Generally the leadership designs the organization to empower people to improvise and adapt.

Government agencies have found that technology has provided them with improved methods of sensing changes in the preferences of the population they serve. Many agencies of government have developed websites that not only describe the current capabilities of their agencies, but also provide their constituencies with the ability to identify limitations and suggest alternative solutions – knowledge that can be used effectively...

Anticipate-and-Lead: An anticipate-and-lead design assumes the future is largely determined by what the enterprise or activity purposefully does to change things. An indications of this design is probably best illustrated by the efforts of Steve Jobs and Apple by bringing to the market the iPhone. The mindset is different in that the enterprise focuses on the future it wants to create and uses temporary models that are designed to help make near-term decisions. Once that expected future is determined, the enterprise attempts to lead the consumer to new ideas based on identifying both articulated and unarticulated consumer needs.

A deeper understanding of these needs is sometimes gleaned from direct observation of consumer or constituent behavior, including what the individual would prefer that is not now available. The ability to anticipate and lead is facilitated by emerging digital technologies, which allow decision-makers to observe real-time behavior by markets and consumers.

Later in the presentation I will discuss how the anticipate-and-lead concept contributed to the development of GM's *OnStar* in-vehicle communication system.

It is about choosing the right combination of one design AND another and not selecting one design OR another.

In a world of increased complexity and accelerated change there is great peril in choosing one strategy *or* the other. Serious consideration needs to be given to using traits of one strategy *and* traits of the other. At TED Conference in 1995, Nicholas Negroponte of MIT made a strong case for how we would move from an industrial world of products made up of *atoms* to a knowledge-based world of products made up of *bits* of information. Since that time, the remarkable growth, decline, and current expansion of purely *bits*-based business has given way to the belief that the opportunity is not a future world of products solely made from Atoms *or* bits, but a future world of atoms *and* bits. As an example, the future of autonomous driving is a great example of the need for both atoms and bits.

Today's successful business design could fail for you tomorrow

In the face of the unprecedented speed of change in the business environment, it is essential that businesses learn to approach transformation in a different way.

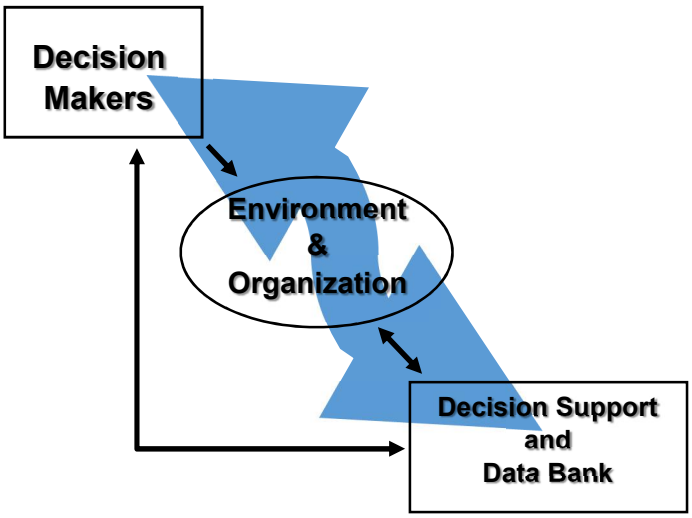
Lacking a crystal ball, we can only assume that the future will be different from the present. The degree of difference is, of course, what every enterprise would like to know. Pursuit of a single answer to this question, however, has led to approaches that require a significant amount of simplification of the future's true complexity – such as traditional point estimates of the expected growth of GNP, price indices, population estimates, and the cost of raw materials.

The inherent futility of these point estimates is that the more items one includes to create the estimate, the higher the probability that one or more of the assumptions underlying the point estimate will be wrong. Yet in spite of such faulty logic, this is the approach that underlies the long-range planning and thinking of many enterprises and governments. A more realistic approach is to accept that we cannot know with precision what the future holds and to learn how to design business plans and strategies to deal with that uncertainty – strategies that allow the enterprise to adapt when the unexpected occurs.

At the introduction of this talk I referenced Dr. Deming's belief that decision makers and those that provide them information need to test their opinions, theories, hypotheses, hunches and beliefs against reality to truly understand what is going on and learn what is necessary to improve the situation.

In *The Decision Loom,* a book I wrote in 2011, I attempted to show the value of a learning process that is supported by an interactive decision support system that addresses the very important concerns Deming raised. At the heart of this approach is the belief that any enterprise's approach to decision-making needs to be a network of interactive decisions that encourage and reward the sharing and application of information. This systemic approach requires an open dialogue and a focus on learning that is based on accepting that we cannot be as certain about what might happen in the future as we once were.

The process begins with the three components that tend to go into any enterprise decision, regardless of how that decision is made:



There are three basic components to many of the decisions processes with which we are familiar:

1. Decision Support and Data Bank – Contains the organization's Decision Process support and its data, information, knowledge and understanding.
2. Decision-Makers – People who use the data bank to make decisions
3. Organization – People who receive direction from Decision-Makers and who use and return information to the Data Bank while implementing decisions.

In this basic model, a Decision-Maker (someone with authority to allocate resources) gets information from the Data Bank (what the organization knows or can acquire) to make a decision which will be implemented by the Organization in the most efficient and effective manner known to it at the time of the decision.

It is important that we insert a learning process into the* decision-making *process

Being part of a broader enterprise system, rather than just solving their own problem, the decision team needs to share its solution with other teams. Everyone has to step back and look at the entire system, because if a problem exists it often is not limited to the specific situation, rather, it is likely to reside in other areas of the enterprise as well.

A more systemic look at the situation might reveal that the conditions of elements within the environment in which products were sold and serviced is changing faster than it did in the past, when this and other product development rationales were created. This finding would lead management to consider reviewing all other decisions that were based on the assumptions that have just been determined to be no longer valid.

In a knowledge-based systemic learning organization, the decision-making process must be more robust. The objective is not only to *make* decisions, but also to *learn* from them. That's where the full learning and adaptation model comes into play. There are three critical concepts underlying this approach:

1 All of the components of the enterprise are regularly interacting with each other.

2 Elements of this system already exist in most organizations. The trick is to integrate and synthesize the decision-making process and the learning functions overall, so as to move from a single analysis to a synthesis of generally available current knowledge.

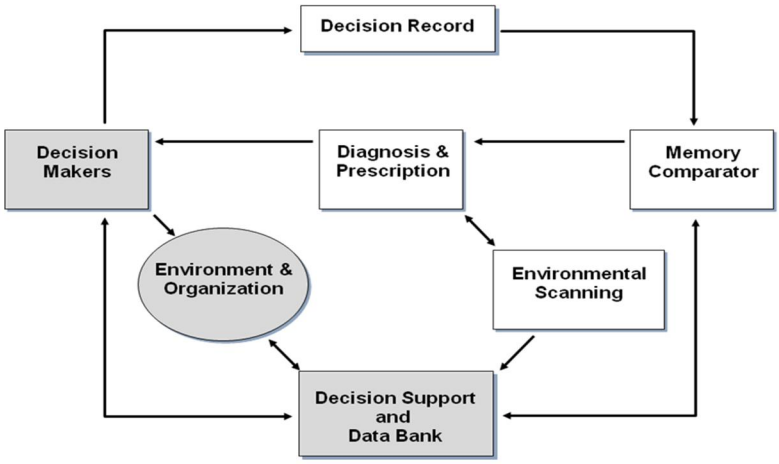
3 In this approach, the Data Bank or Data Warehouse is not fixed in the nature of a physical location. Rather it needs to be an interactive decision support process within the organization that varies depending on what type of decision we're making. In other words, Finance has a body of knowledge… Manufacturing has a body of knowledge… as does the Quality group, Marketing divisions, Design Engineers, etc. The knowledge-use system must be designed to provide methods for each of the functions to share in the knowledge of the other functions.

The goal is to link these resources as much as possible, but we want to avoid the tendency to dump everything into a storage system like a data warehouse, which is merely an IT system that puts everything online. Such systems are useful, and they support organizational learning, but they are not sufficient. Rather, we need to sort, codify, and synthesize information before storing it, so that those who need it can find relevant insights, knowledge or decisions.

The knowledge use system can be as high tech or low tech as the organization chooses. Insights may be stored in a traditional library, a file or a computer system. The basis of this approach is found in another long journey, in this case a journey taken by Russ Ackoff, which has evolved into what he called a "learning and adaptation" model to help improve our ability

to make strategic decisions, and then learn from them.[3]

Basic decision making process, complemented by the learning component of the knowledge use system



The design begins, as shown with the basic three components already described (shaded boxes). To enable continued monitoring, the enterprise will also have to document the information that was used to support the important decisions it has made. This can be accomplished through the use of a decision record. The decision record that captures the decision that was made. It also lists the underlying assumptions that were used, the expectations that were held, and the types of information, knowledge and understanding that were employed in making the decision.

Every enterprise should develop its own Decision Record to capture the characteristics and the needs of the decision process of the enterprise.

The Decision Record serves as the memory to monitor and compare the assumptions and expected outcomes with actual performance. It also makes all aspects of the decision available to future decision-makers. The record is reviewed and agreed upon by the decision-making team, thereby providing the organizational memory of what was decided, why it was decided, and who made the decision.

Once the decision is implemented, we use the memory comparator function to track what was expected to happen against what actually happened, as well as the underlying assumptions.

This comparison of 'before and after' reinforces the importance of monitoring and learning from the implementation of our decisions.

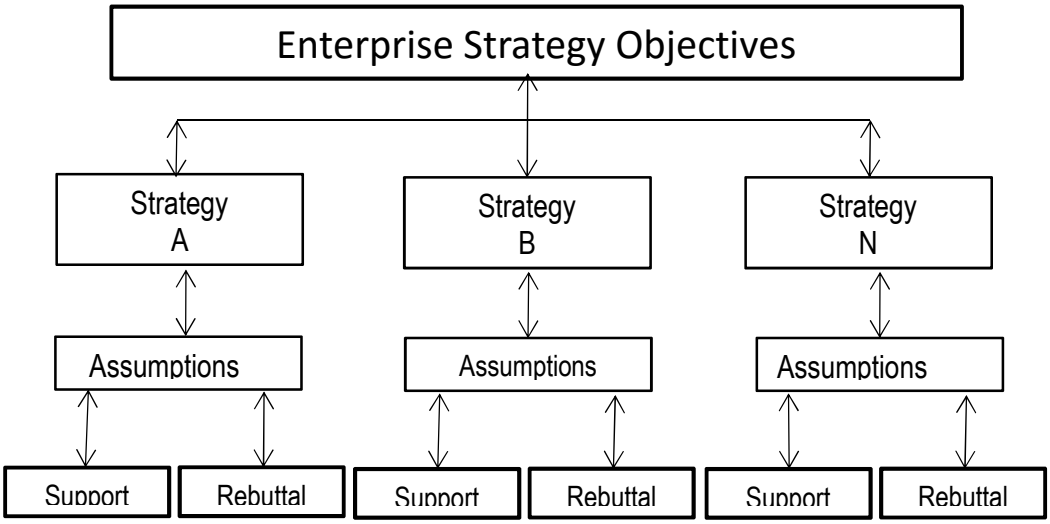
When the comparator function finds no significant difference between what was expected and assumed, and what actually happens, then nothing needs to be done, other than to record this in memory for future reference. If, however, a significant difference is found, the

[3] "Above and Beyond Knowledge Management" Barabba, Pourdehnad and Ackoff, The Strategic Management of Intellectual Capital and Organizational Knowledge, Chun Wei Choo and Nick Bontis, Oxford University Press, 2002. Pp 359 to 369

Diagnosis and Prescription activity tries to find out why and provide possible alternatives to address the differences. Perhaps the information used in the original decision was in error… or the decision-making process was faulty… or the decision was correct, but was not implemented properly…or there were unexpected changes in the containing environment.

We can go even further, by using Environmental Scanning tools. Often, organizations don't clearly state the parameters of their decisions. What were the deliverables? What were the underlying assumptions? Did we assume the economy would remain stable? Environmental Scanning is a broad based function, which should be a continuous process which adds more current knowledge to our ability to make strategic decisions and learn from them. It is here that we monitor both the environment and the organization, providing our decision-makers with information and knowledge that tends to exist beyond their daily radar screens. Without maintaining a constant monitoring the enterprise risks becoming myopic. I say that because the scanning information is used not only in decision diagnosis, but is also fed into the knowledge use system for future reference as well as providing early warning to management of a change occurring in one of their underlying assumptions. This is where the 'Adaptation' part of the Learning and Adaptation Model comes in. By scanning and assessing the strategic implications of internal and external forces, we are able to focus beyond issues that are merely relevant to a specific decision, and understand what might be happening within our organization or the larger environment that could impact the effectiveness of our overall decisions.

Learning how to avoid crises brought on by changing conditions of a more complex and uncertain future.[4]

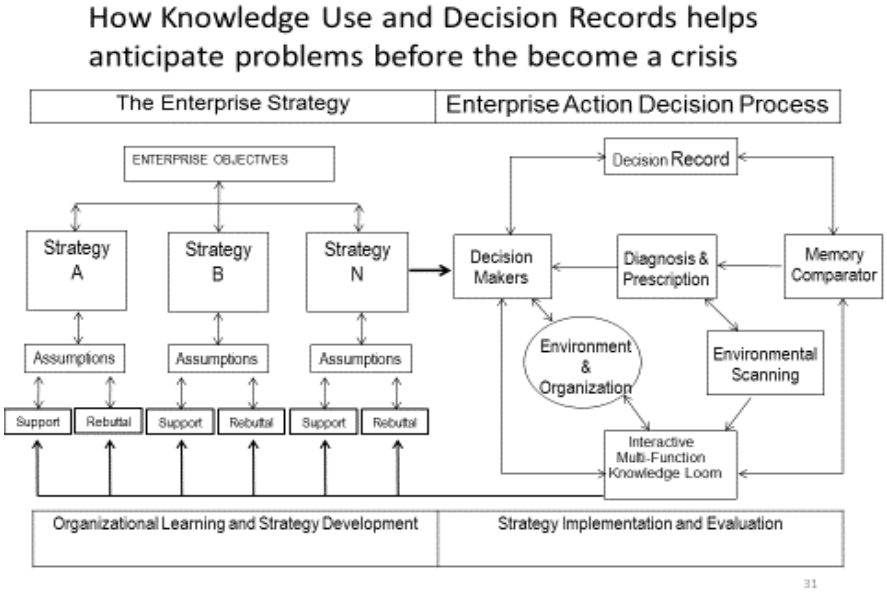


The initial step to ensure the knowledge use process helps to anticipate problems and provides an early warning before they become a crisis is to document the rationale behind the enterprise strategies.

As shown under Enterprise Objectives, the enterprise lists both the overall supporting and rebuttal information that underlie the accepted assumptions that were used in developing

[4] "The Decision Loom…an interactive decision-making process" The Decision Loom, Vincent Barabba, Triarchy Press United Kingdom, 2011 pp 157-173

Strategies A through N).



With that in place when Strategy N is implemented, those responsible for the interactive decision-making process will be in a position to monitor that information by evaluating how a current decision has turned out and, through environmental scanning, begin a tracking program of the information that was critical to accepting the assumptions underlying Strategy N. If during their review there is a change, either positive or negative, in those assumptions the leadership of the enterprise is informed of the change and of possible consequences – either to the general strategy of the enterprise or to a specific action. If the firm has developed techniques similar to Systems Dynamics Modeling, simulations can be conducted to determine the effectiveness of alternative actions available to the enterprise when considering the effect of the changing conditions found in the implementation of Strategy N on the underlying assumptions of other proposed and existing strategies.[5]

If the model appears complex, that's because organizational learning and adaption is complex, and there are many interactions between the various elements. This is not a flow diagram. Rather, the model offers a two-dimensional representation of an integrated, cross-functional process that leads to an improved decision-making process that incorporates organizational learning and offers advance notice of problems or opportunities.

Implementing this activity will not be easy… but it is certainly feasible. The difficulty will be in changing the mindset of the enterprise so that the following, which I believe would gain Deming's agreement, actually occurs: All enterprise functions share their knowledge in a form that can be understood by others.

1 All enterprise function share their knowledge in a form that can be understood by others.

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1. [5] **"**A Multi-Method Modeling Approach for Creating New Business Models: The OnStar Case**"** Vincent Barabba with Mark Paich, Nick Pudar et al. The 31st Annual Franz Edelman Award. 2001. [Application Award for Best "Real World" application of Systems Dynamics" 25th International Conference of the Systems Dynamics Society, Boston, MA. 2007]

2 The enterprise takes the time to create Decision Record that lists the reasons behind the decision. This ensures that the enterprise will reinforce its beliefs when the decision turns out to be correct, and learn to question existing beliefs when it doesn't.
3 Discovery. The enterprise determines that the value of learning from past decisions is greater than the cost that might be incurred in litigation that is brought forward because the basis of a decision is now available through discovery.

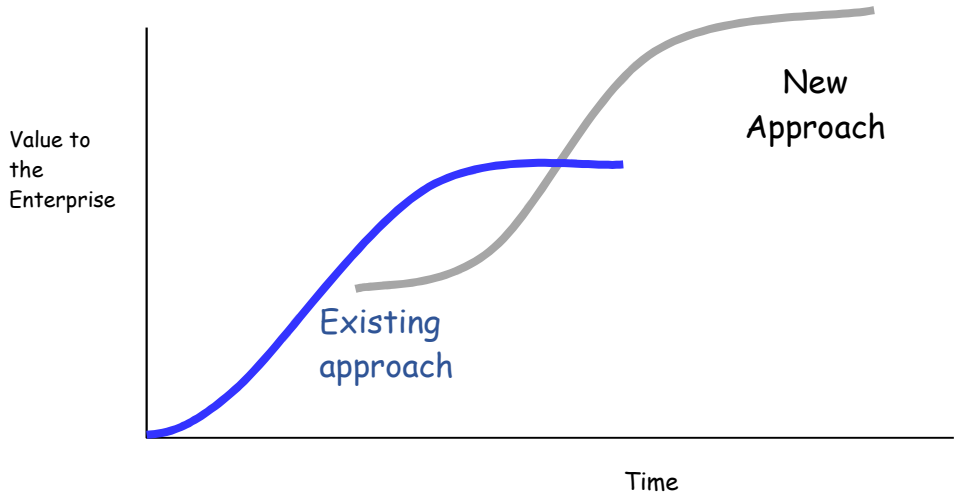
Learning to live with the uncertainty associated with change

Recent experience has shown that, even when an enterprise has thoughtfully considered alternative scenarios one still cannot always predict which of those futures will emerge. However, if the enterprise knows what conditions could occur – and why, it then has at least two options: it can determine how much it wants to spend to ensure its plans are robust across the range of possible scenarios, or take action to allocate sufficient resources to try to bring about the scenario that offers the best competitive position.

Although planning for a 'certain' future based on past experiences may have worked in the past, this activity provides a way to choose among business designs and to minimize the negative impact if the future turns out to be different than expected.

It also sets the stage for thinking about how to start with your destination.
Traditionally there have been two primary approaches used in attempting to grow and improve the value of the enterprise: (1) Improving the manner in which the enterprise or activity is currently being conducted or (2) Moving into promising new approaches. Today it is important to understand the impact of the interaction between the two approaches and to uncover a potential underlying set of behaviors that could lead to doing one *or* the other at the expense of doing one *and* the other.

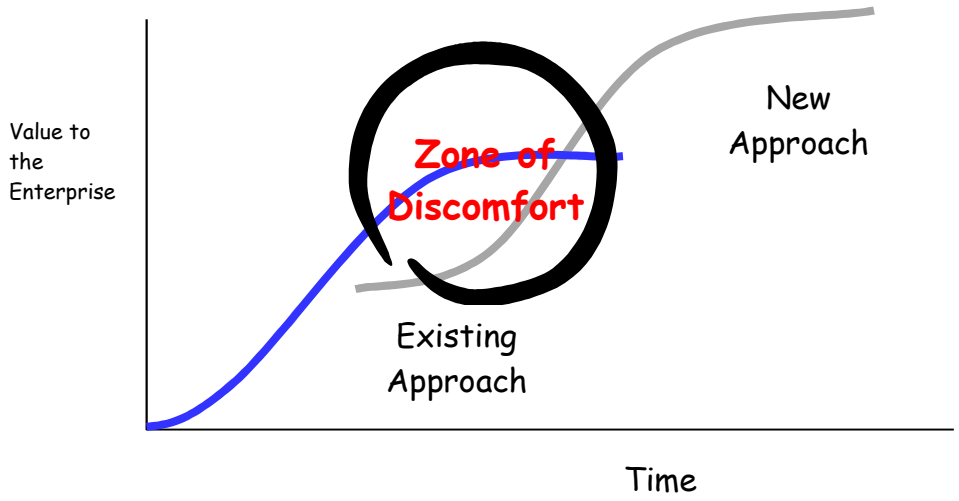
The Implied Value of a New Approach



Here we illustrate the belief that the "New Approach" when effectively integrated with the old approach over time will lead to much greater value to the enterprise.
That assumes, of course, that everyone who has benefited from being in the old approach sees the value to the enterprise and to themselves of accepting the change that will take place when the new approach is enabled. However, if there is apprehension and concerns from those who have benefited while in the existing approach…it could lead to the

creation of a zone of discomfort which if great enough can negate the chances enabling the new approach.

The Creation of a Possible Zone of Discomfort



The Zone of Discomfort is created when those impacted by the change view it from the narrow perspectives of their functional responsibilities, as well their personal benefit, and seek to find reasons not to move forward. To avoid this situation, each function and those involved in the function need to step back and look at the problem from a broader enterprise perspective.

To provide a sense of the need to address this issue I'll discuss two examples; one where the zone of discomfort led to the demise of a successful company and one where addressing it properly led to the development of a new approach that now serves as the basis for moving to a transformational stage for a company recently perceived to be on the verge of collapse.

An opportunity missed…Conducting a strategic assessment of possible changes to customer behavior and market conditions[6]

I joined Eastman Kodak in 1980. As a part of my Kodak 'education,' I was sent to visit one of our largest retail photo finishing customers. On the last day of my visit, I had dinner with the owners, who asked me to ask the our CEO the following question: "What is the time period over which silver halide technology will retain its superiority over digital technologies in capturing images and making prints?"

When I returned from the trip, I was directed to find a way to answer this very important and compelling question.

The experience and eventual success of the process we used at the Census Bureau to address the difficult question of whether or not to adjust the 1980 Census allowed me to

[6] Billion Dollar Lessons, Penguin Group, 2008, Paul Carroll and Chunka Mui provide a more detailed discussion of Eastman Kodak's missed opportunity in digital photography. pp. 88-100
Surviving Transformation, Oxford University Press, 2004, Vincent Barabba, pp. 185-190

convince the firm to apply that approach to this also very important issue.[7]

The process began by gathering input from people throughout the company who had diverse backgrounds in imaging technologies – including members of the research and technical functions who were familiar with the capabilities of digital and silver halide technologies. Teams were formed to take strong positions on whether silver halide or electronics would dominate capturing images by 1990. Each team debated their positions with the purpose of uncovering and assessing the most important assumptions that would have to be true for a particular point of view to be accepted. Out of this debate grew a list of critical assumptions upon which Kodak would develop its longer-term strategy. The process provided management a clear picture that change in the capturing of images through digital technologies would actually happen, and that they had until 1990, that is an entire decade, to prepare for it. Despite this compelling evidence management had a hard time putting in writing that Silver Halide technology would eventually be replaced -- as it eventually was.

With that discomfort as background, and existing photo-finishing customers of Kodak services in mind, several key members of Kodak's management team concluded that:

Technological innovation will enhance the growth of personal picture taking, and today's photographic industry participants [Kodak and its business partners using silver-halide technology] will share in that growth in the foreseeable future…

In essence, Kodak initiated a number of activities that would position them to compete sometime in the future with other manufacturers of digital cameras – in fact they built the first digital camera. However, because of their discomfort with the thought of dropping silver halide, they focused most of their attention on digital methods to improve silver halide technology.

Unfortunately Kodak management did not follow the strategic thinking of the company founder, George Eastman who on several occasions replaced existing profitable old technology with new technology. Instead they chose a path of using digital to improve silver halide rather than replace it. This strategy eventually allowed others, like Sony and Cannon to force the replacement of silver halide technology with digital technology that led to the bankruptcy of Eastman Kodak. This was a classic negative example of Churchman's wisdom that the value of information is in its effective and proper use and not its collection. In this case, the information developed lost considerable value because it was not effectively used to the extent it should have been, which proved very costly to all those involved with Kodak.

An opportunity taken

I went to work at GM in 1985. Eventually, I was put in a position to develop a strategy using many of the same techniques I had experienced in both government and business. Upon completion of the study we shared it with Peter Drucker, who provided an analysis of a new operating business he called 'GM the Merchant.' He highlighted what he saw as the value of migrating from manufacturing to services by emphasizing several important

[7] I gratefully acknowledge permission received from Eastman Kodak Company to discuss the results of the approach used to reveal underlying assumptions found in this section.

trends in his 26-page response:

The steady decline in terms of trade for manufacturing. Manufacturing is now where Agriculture was around 1950… The trend is clear. It means that manufacturing is producing less and less wealth.

As I read your memorandum, it proposes to complement GM the Manufacturing Company with GM the Merchant. A Manufacturing Company makes products and then sells them. A Merchant is a buyer for the customer…

Drucker concluded with some ideas on how to get started.

In fact, I would say the uncertainties of the new venture are so great – and so unprecedented – that further 'studies' would be futile. Only the actual experience of a number of pilots can show what the real problems are, where the real decisions have to be made, which specific structures, procedures and policies are likely to be most successful, and which, no matter how intelligent they look, do not meet the test of reality.

The first pilot – *OnStar:* This story offers an example of why it is important to keep a decision record of the reasons why you choose not to do something. If some of reasons change, revisit the decision.

The history of *OnStar* can be traced back to 1993, when EDS, a GM subsidiary, and Pacific Bell proposed that GM build a land-based, microwave mobile communication and geographic positioning system. We evaluated the opportunity and found customers to be interested, even though they weren't quite sure exactly how the system would benefit them. The study also determined that time and the initial capital costs of installing the necessary microwave towers across the country would be so high that that it would take decades to get a reasonable return on the investment. The decision was made by the study team to recommend that GM not to proceed with the project. The decision was documented and presented to management and the decision not to move forward was accepted.

In 1994, EDS came back; this time with another GM subsidiary, The Hughes Corporation. The new idea, to overcome the capital cost requirements, was to provide a space-based global positioning satellite infrastructure for vehicle location and using existing infrastructures for cellular communication. The combination of both existing infrastructures and satellites required significantly less capital to get started. We decided to proceed on a limited basis.

The initial *OnStar* prototype was introduced on the 1997 as a dealer-installed product that connected the vehicle to a live advisor at a call center. From the very beginning the *OnStar* customer benefit was focused on safety and security, two of the four factors identified in an earlier study of consumers as being important to them, but they believed were not being well served. *OnStar* automatically alerted emergency services if an airbag deployed, indicating an accident. GM's externally mounted and larger antenna, as well as the higher power output of the *OnStar* system, allowed the driver to connect with *OnStar* in areas where normal handheld phones could not get service. With some innovative ideas it is sometimes better to ask, "What will it take to make this product successful?"

rather than, "Given what I can 'estimate,' what are the chances this product will be successful?"

Knowing that consumers had little to no experience with the *OnStar* concept, it was clear we would have to develop prototypes. We weren't going to know enough if we just interviewed potential customers, describing *OnStar* to them in ways they seemed to be having trouble understanding. I presented a case to management that, in essence, they would need to expend significant resources to obtain an 'option' on a possible future activity that could become very valuable. They accepted the option rationale and directed that we determine the most efficient and effective way to get *OnStar* into future vehicles. To ensure *OnStar* kept both an internal and external perspective, that was focused on providing these new services at prices low enough to attract a large subscriber base, GM would factory-install the hardware in many of its vehicles, rather than making *OnStar* an option that dealers could add after the car was purchased which would result in much higher installation costs. This decision was made accepting the fact that many who bought cars equipped with *OnStar* capability might not subscribe to the service.

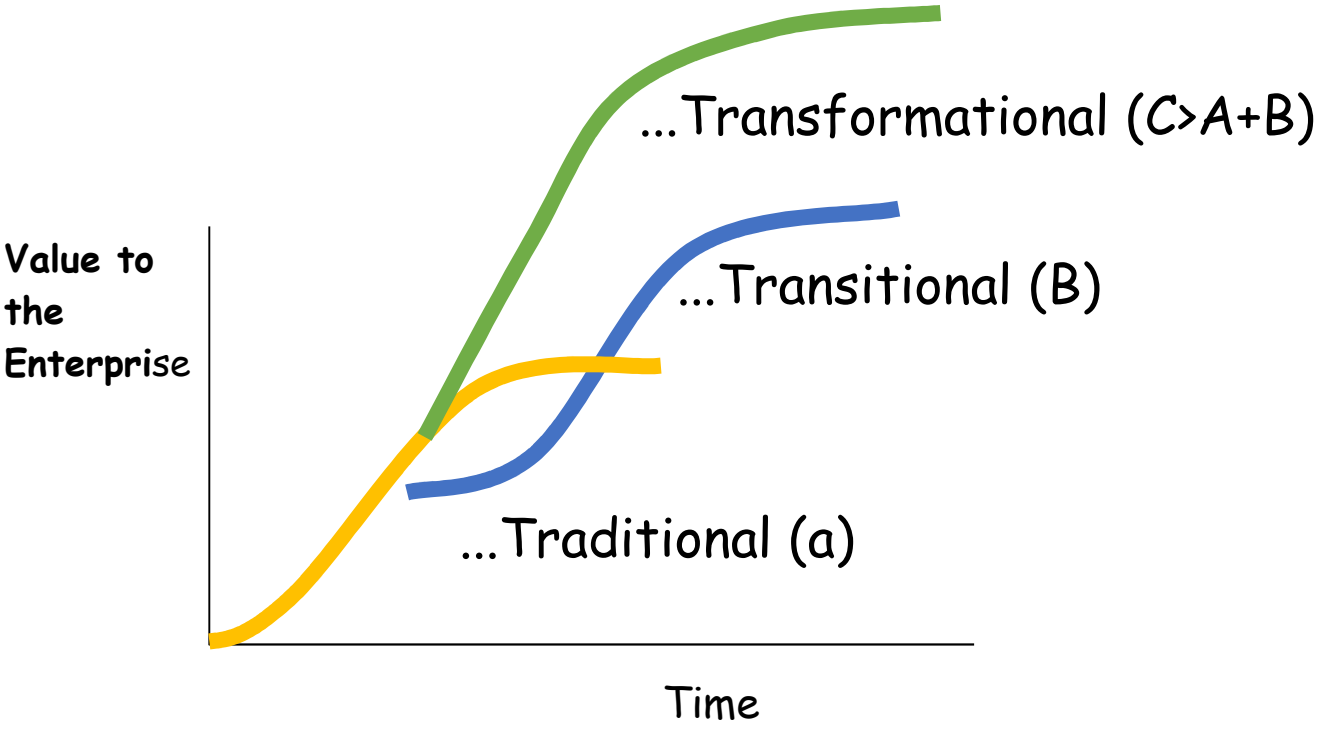
When this strategy was discussed within the enterprise, there was a significant amount of discomfort. For example, we were going to ask the engineering community to install an entirely new untested technology in the vehicle development process on all GM vehicles while existing technologies that had proven successful where already in place.

With basic objectives identified, Nick Pudar was given the assignment to put together a team to develop a Factory Installation strategy. Pudar, with Ackoff's teachings as background, began the process by getting multiple functions within GM to describe the idealized design of what a factory-installed execution should be. He also focused on the implementation timing as a factor in the idealized design. We aimed to have *OnStar* fully factory-installed on all GM vehicles for the 2000 Model Year lineup. This seemed unrealistic to the product development community. Years of past experiences led them to believe that while one vehicle model might be ready for factory installation for the 2005 model year, the product development cycle was too intensive to move faster. However as the engineers gained an appreciation of *OnStar's* value to GM increased, there emerged a strong desire by almost everyone to bring it to market as soon as possible. The team came to appreciate that the *OnStar* service could serve as the basis of a 'platform' of extended services that could improve our return on the capital already invested in the vehicle. As one of the engineers described it, "Normally, we add a feature to the car and get paid just one time for the feature when the car is sold. With *OnStar* it's like having a cash register in the car. Every time someone uses the service the cash register rings and GM gets an additional incremental return on its investment." Although faced with incredible difficult problems of implementation, they were all overcome and factory-installed *OnStar* was included in 2000 Model Year lineup.

Given the uncertainty we had about consumer views of *OnStar*, if we had limited ourselves to a traditional causal model to create a financial capital-based budget review, the enterprise never would have been able to justify the investment in *OnStar that* made it such a success. Taking an option on the future visualized through the principles of Ackoff's concept of idealized design produced a business that has 7 million subscribers in the USA, Canada, Mexico, Western Europe and China, which now generates on an annual basis:

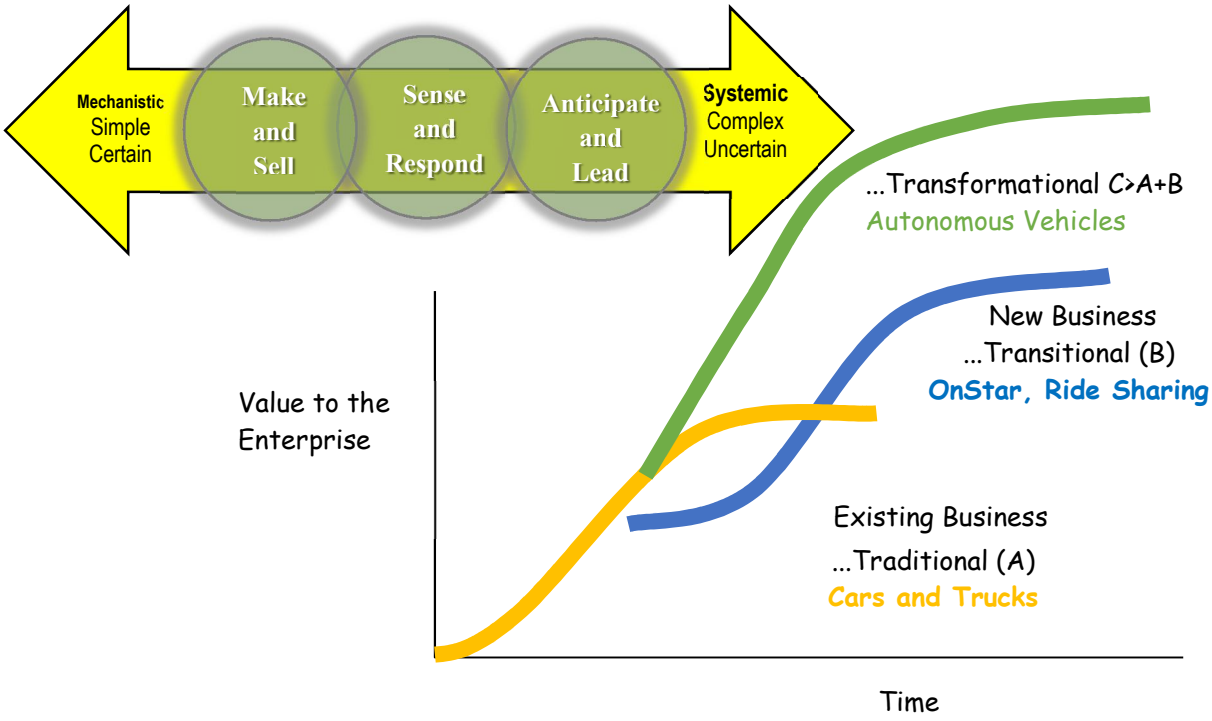
3000 Automatic Crash Responses
4,800 Stolen Vehicle Assistance actions
Over 36 million Turn-by-Turn Navigation routes
Over 6 billion minutes of Hands Free Calls
60,000 Emergency Services
840,000 Remote Door Unlocks
36 million Vehicle Diagnostic Emails
Over 1 Billion Cumulative Interactions since 1997

Connecting Yesterday, Today, and Tomorrow.



In essence we should accept Peter Drucker position that every enterprise has three essential dimensions: The (a) traditional business, which is the basic business and the one for which some will be deeply concerned; the (b) transitional business, the one that some employees have convinced the enterprise leadership should be considered; and the (c) transformational business, which if those involved do not get past their parochial interests on maintaining the status quo will not be achieved. This is a classic problem that occurs when companies try to move into new areas of business. Naturally, no one is comfortable while going through significant changes, but we have to learn to trust one another and begin moving in the right direction for the entire enterprise and the communities it serves.

It is about the right combination of one design AND another and not selecting one design OR the other



Connecting Yesterday, Today, and Tomorrow.
This graphic, provides a truncated version of what is currently in the process of occurring at GM. The move from the traditional making of cars and trucks to transitional activities of *OnStar* and other current activities enabled by acquisitions has positioned GM to take full advantage of their technology developments and further acquisitions to move into a transformational set of actions in the future.

What follows are my suggestions of four capabilities you should have right now if you want to implement a knowledge use system. Create an Enterprise Mindset that is Open to Change

- Create and Enterprise Mindset that is open to change
- Think and Act as a System…where the whole becomes greater than the sum of the parts
- Be able to Adapt the Enterprise Design to Changing Conditions
- Address Decisions Interactively Using a Variety of Methods.

The content of this presentation owes quite a bit to a lot of people so I would like to say thanks to Edwards Deming, Russ Ackoff, Peter Drucker, all my former employers and colleagues…most of whom were smarter than I.

And thank you and good luck to all of us as we face a very complex and uncertain future. And here's hoping, realistically, that some of us not only survive…but thrive!