Part 2. The Design of an Interactive Decision Loom

In this section of the book, I examine the process by which an organization can design an interactive Decision Loom and provide a description of the four capabilities that are required to enable its implementation in any public or private organization.

The approach taken to describing the Decision Loom and understanding its interaction with the required capabilities

The call for an interactive process to address complexity and dynamic change is not new. Robert Waller pointed to the problem in 1982 at a conference in which I participated at the University of Pittsburgh: [41]

> *This comes down to a design problem. On the one hand is complexity in all of its richness. On the other hand we see the human, restricted in terms of short-term memory, but with marvelous capabilities for long-term information retention, for judgment, for utilizing experience, for intuition, and, yes, for passion.*
>
> *In engineering terminology, an interface device must be sought that will link humans and complexity, while preserving the original properties of each. Anyone who regularly deals with real problems in government and industry can testify that such a device has not yet been found and perfected. In fact, a dominant feature of organizations in both the public and private sectors is a continual shadow boxing with problems.*

The purpose of this part of the book is to address the problem that was so insightfully identified by Robert Waller nearly 30 years ago. The reason it has taken me so long to develop a response is that I had to finish the Journey described in the first part of this book in order to fully comprehend the extent and complexity of the problem he had identified and to test and eventually provide a viable solution.

41 Waller, 1983

The basic design: it's not just about a decision-making process and its capabilities

As with a conventional loom, we need to look not just at the threads but also to remember the importance of understanding how the loom works and how the weaver manages the interaction of the loom's parts and the threads.

The transformation of traditional business and public decision-making processes into a more systemic process suited to the complexities of the 21st Century is not simple. It requires an organization to develop an interactive decision process interlinked with at least four important capabilities, around which this part of the book is structured. This section outlines and explains how the capabilities and the decision process interact and enrich each other and provides a sketch of how they can be translated into an effective decision-making design for any organization. Here are the capabilities:

- Having an enterprise mindset that is open to change
- Thinking and acting holistically
- Being able to adapt the business design to changing conditions
- Making decisions interactively using a variety of methods

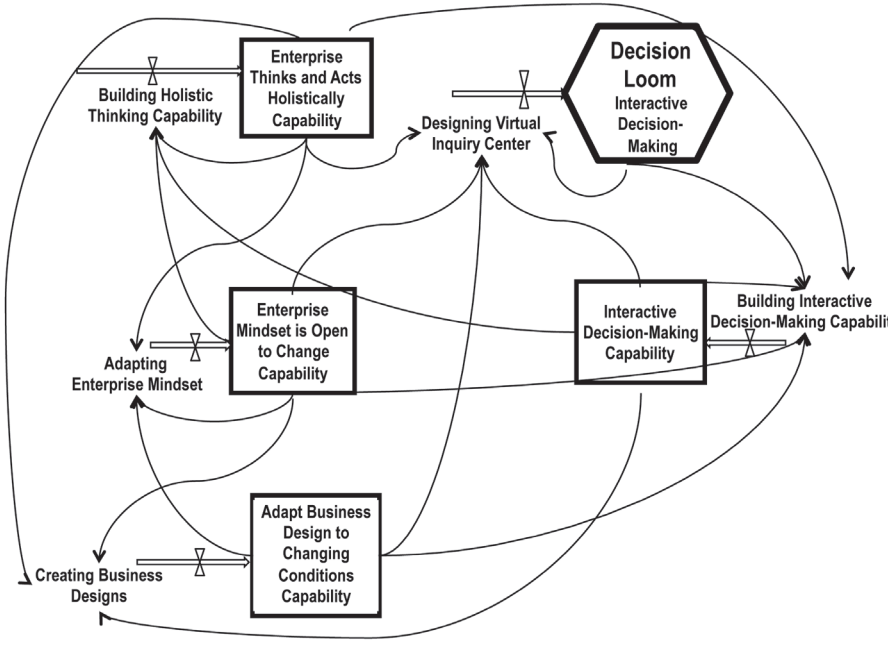

Figure 4: A stock and flow model of the Decision Loom[42]

This modified stock and flow chart displays the four capabilities and the Decision Loom as described in this part of the book. Kim Warren[43] defines capabilities by using a portion of Robert Grant's definition[44]:

> *As Grant observes, resources are things a firm has, while capabilities are things it is good at doing. Common English usage too implies that a capability is about getting something done, while a resource is some useful thing (whether tangible or intangible) that can help to get those things done, but is not the activity itself.*

This stock and flow diagram illustrates the interaction of the four things a firm must be good at doing. They are shown as four rectangles

42 I have taken some artistic license in modifying a traditional Systems Dynamics Stock and Flow Diagram to illustrate the extent to which the five activities of this part of the book interact with each other.

43 Warren, 2008: p. 629

44 Grant, 2005

representing stocks. The purpose of the four capabilities is helping to develop and improve the Decision Loom as an interactive decision making process that is shown as a Hexagon.

The most important point of this illustration is that the Decision Loom and the capabilities form an interdependent system. The rate at which a capability is built depends on its own level and the accumulation of other capabilities. The dependence on its own level creates a positive feedback loop in which the capability bootstraps its own development. The interdependency between these capabilities requires an enterprise effort to ensure system-wide balanced growth. This is critical because a shortage of one capability could create a bottleneck in the growth of another. In systemic terms the slowest accumulating capability can limit the improvement of the overall system.

For example, the capability to create innovative business designs depends on the firm's capability to think holistically and to provide an effective mindset. Without the capability to think holistically, the business designs are likely to ignore the possible beneficial interdependencies between the components of the enterprise. This point is clearly made in the hypothetical example of the 'Reliable Computer Company' discussed in Capability 2 where the entire system is negatively affected because individual functions within the enterprise optimized their own performance at the expense of other functions – eventually leading to a dissatisfied customer who purchased a competitive product.

An additional purpose of this chart is to show the reader that there is no prescribed set of rules as to where to start reading or implementing your version of the process. A lot depends on the enterprise in which you are attempting to improve the decision-making process. For example, should you start with improving your understanding of how to create an enterprise mindset capability? Or, are you in an enterprise that is more likely to want to start with a demonstration (pilot project) of the value of thinking and acting holistically? There is no single key to unlock the vault of benefits. A deep understanding of these capabilities (accumulating stocks) and an appreciation of their interaction is more likely to provide the most value.

A brief description of the required four capabilities:

1. **Having an enterprise mindset that is open to change:** This capability is a necessary preparation for successfully achieving the other capabilities; unless the enterprise mindset is sufficiently open and willing to accept necessary changes, essential learning cannot take place. Assessing this capability is a useful reality check: in some cases the mindset of the enterprise is simply so fixed on what worked in the past that it is difficult for it to even understand, much less consider, a truly systemic design.

2. **Thinking and acting holistically:** Here we are concerned with the development of systemic thinking tools; this approach does not come naturally to most organizations as many managers and staff have learned to apply linear, either/or thinking and action while holistic approaches require both/and thinking. In this vein it is important to understand that logical and analytical approaches are not excluded from the design toolset, and some will indeed reappear in Capability 4. Holistic thinking means that logic and analysis are not the dominant modes of thought but are only used when appropriate. In particular, they are not appropriate to designing the decision-making process of an entire organization; a key lesson of design thinking is that the strategy of separating out and then optimizing different functions usually reduces the effectiveness of the whole.

3. **Being able to adapt the business design to changing conditions:** Here we look at three different business designs along a mechanistic and organismic continuum: make-and-sell, sense-and-respond and anticipate-and-lead. Although the capability uses the term 'business design', this should not be interpreted as meaning that the designs only reflect private sector activities. In the more detailed description of this capability that comes later, several examples of public sector applications of the different business designs will be shown.

   The dominant mindset of the 20th Century was focused on the make-and-sell design, and the dominant approach was to predict what would be purchased and by how many people. With the conviction that the estimate of potential participants was correct, the enterprise built the capacity to achieve

economies of scale. Today, in a more complex and dynamic environment, the ability of the enterprise to predict future desires based on past behavior has been severely diminished. This does not mean that the make-and-sell design no longer has a place in our approach to decision-making. However, because of the costs associated with incorrectly estimating the demand for future preferences, other designs are assuming increasing importance. See also Episode 6 in *Part 1*, which describes how Eastman Kodak's unwillingness to change its large and highly efficient ability to produce film in the face of developing technologies lost them the chance to adopt an anticipate-and-lead design which could have secured the company a leading position in digital image processing.

The success of a business design depends on how well it addresses the critical elements of the entire marketplace in which it operates. But it is much more difficult to predict with any certainty how those critical elements will unfold. In Capability 3 we show how considering different future scenarios provides a way to evaluate the business potential of different designs. For example, a make-and-sell strategy will not succeed well in an environment where customers expect to have a significant role in the design of the products they want to buy. A sense-and-respond strategy would be much more appropriate in that environment. On the other hand, a sense-and-respond strategy might be a costly failure if customers are not able or willing to participate. Finally an anticipate-and-lead design can flop if the direction chosen is not perceived by consumers or constituents as something new that better meets a need (even an unarticulated need) or if the enterprise cannot meet the technical challenges of developing the new products. A famous set of counter examples of this were the failure of Apple's Newton PDA and the success of its iPhone.

4. **Making decisions interactively using a variety of methods**: Here we provide a sample of decision support tools available to make decision-making more interactive and attempt to classify them according to the three dimensions: creativity & imagination, logic & analysis and collaboration & dialogue.

> Use of these tools must be a capability found in the Decision Loom, if the threads of knowledge are to come together in a meaningful answer to complex and dynamic problems. It is vital to understand the potential and limitations of these tools when it comes to the design of a decision/learning system for the enterprise. The chapter ends with examples of applying some of these decision support tools in the development of successful solutions to complex business problems.

The four capabilities, acting as interacting parts, all contribute to the development of the interactive decision process which facilities integrating decision-making across the enterprise

The Outcome: Greater interaction across the enterprise leading to an enterprise that is greater than the sum of its parts.

The Decision Loom becomes a central function designed to serve the entire enterprise. As was pointed out in Part 1, the concepts of single- and double-loop learning are crucial; single-loop learning takes place whenever mistakes are identified and corrected, but this process rarely transfers learning throughout an organization as it characteristically involves only those who were involved in the original problem. When double-loop learning is developed, the values and procedures of the organization are also modified by local learning and the process of learning in one place can therefore adapt to what is learned in another. In this sense, double-loop learning is the capability to learn from mistakes and reinforce the actions that led to success; in essence, learning how to learn. A wealth of experience gained during the learning journey has identified the key components of this capability and the steps needed to develop them.

Described here briefly, the Decision Loom and these capabilities do not follow each other in a linear sequence and they can operate at different times at different levels in an organization. Thus every organization will develop them in its own particular way; there is no fixed recipe for this. The key lessons that contributed to my ability to identify each capability as required for this decision-making design are described in the 'Lessons Learned' following *Part 1*.

A little self-reflection on almost failing to understand the importance of interdependencies and an early warning to those who are certain the path they have chosen should not be challenged

An example of focusing on the parts and not the interaction of the parts occurred in my own journey. My initial approach to the thinking about interactive decision-making was based on a presentation at a Marketing Science Institute meeting in Boston around 1980 where one of the speakers quoted the poet T. S. Eliot asking, "Where is the knowledge we have lost in information?" I looked up the poem, 'The Rock', and found that Eliot preceded that question with another: "Where is the wisdom we have lost in knowledge?"

That led me to suppose that if T.S. Eliot had been a Knowledge-Management Consultant rather than a poet concerned with man's relation to God, perhaps he would have added three additional lines, and with some slight modification, developed a decision hierarchy composed of parts that needed to be understood. It went something like this:

> Where is the *wisdom* we have lost in understanding?
>
> Where is the *understanding* we have lost in knowledge?
>
> Where is the *knowledge* we have lost in intelligence?
>
> Where is the *intelligence* we have lost in information?
>
> Where is the *information* we have lost in data?

And rather than lines of poetry, he might have illustrated it something like this:

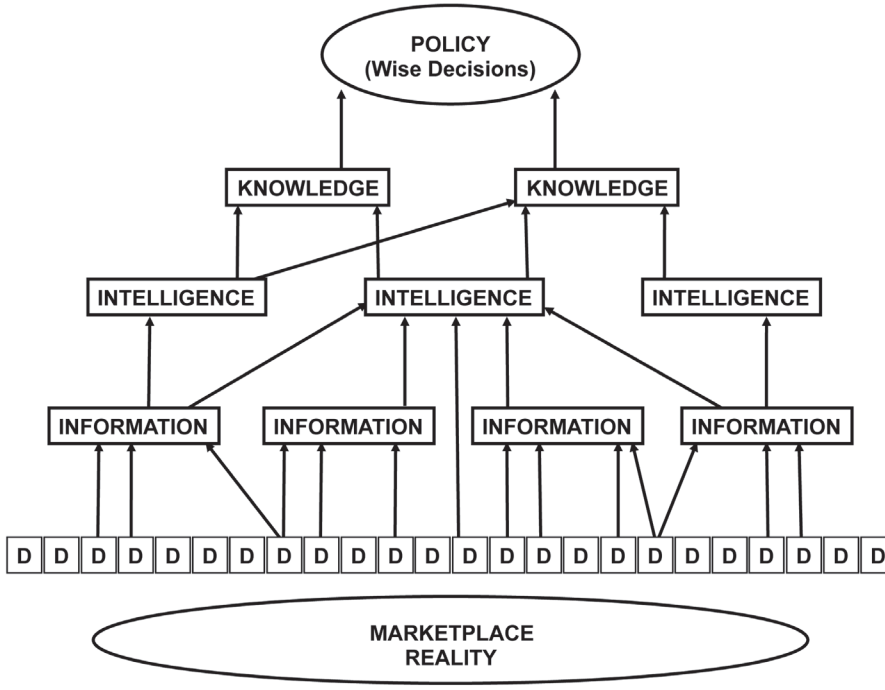

Figure 5: Refinery decision hierarchy

My inclination to use poetry aside, the design of a decision hierarchy is not new.[45] In my case the refinery metaphor of the decision hierarchy fit nicely with my background and training which led me to believe that many facts (represented by the Ds for data) – sometimes collected through interviews, sometimes generated from transactions or records, or through observation – are distilled into information; that the information is then transformed into intelligence, and then knowledge: all of which eventually provide understanding that is used to develop wise decisions.

45 Rowley (2007) points to Ackoff's contribution to the current discussion: "… authors often cite Ackoff's 1989 paper as a source for the hierarchy."

Thinking systemically: value lies not solely in developing and understanding a hierarchical structure of the elements but also in improving their interaction

The simplicity of the 'parts' hierarchy was challenged by the conclusions of Harold Wilensky from his study of a wide range of cases from international relations, economics, politics, and welfare in the United States and abroad as far back as 1967:

> High-quality intelligence designates information that is
>
> ***clear*** *because it is understandable to those who must use it;*
>
> ***timely*** *because it gets to them when they need it;*
>
> ***reliable*** *because diverse observers using the same procedures see it in the same way;*
>
> ***valid*** *because it is cast in the form of concepts and measures that capture reality (the tests included logical consistency, successful prediction, and congruence with established knowledge or independent sources);*
>
> ***adequate*** *because the account is full (the context of the act, event or life of the person or group is described); and*
>
> ***wide-ranging*** *because the major policy alternatives promising a high probability of attaining organization goals are posed or new goals suggested.*[46]

I found further complications; what happens when the collectors of the information and the users of information do not share the same perspectives? For example, creative personnel in advertising or design believe their ideas cannot be assessed by asking potential customers whether they would use a service or buy the product that is being developed. Market researchers, on the other hand, believe there are methods available to capture the underlying values and preferences of potential customers so that an assessment of the potential value of the new idea can be made. Equally, financial personnel are looking for customers' willingness to pay for a new product or service so they can calculate an expected rate of return to justify the use of enterprise capital.

46 Wilensky, 1967

Faced with these complications, I became uncomfortable with studying the parts of the decision hierarchy that I had portrayed with a refinery metaphor that transformed raw data into wise decisions. Jerry Zaltman (now marketing professor emeritus of the Harvard Business School) explained my discomfort. He introduced me to 'knowledge disavowal':

> *Knowledge disavowal refers to the avoidance of knowledge in order to maintain the status quo or to avoid a difficult choice or threatening situation. It does not include the avoidance of information for reasons related to its perceived lack of relevance, timeliness, expected utility, or the cost of acquiring it. Knowledge disavowal is as systematic and pervasive as pro-knowledge phenomena and is found in all settings.*[47]

An example of knowledge disavowal is given in Episode 6 of *The Journey* when Kodak's management accepted the solid evidence that their silver halide chemistry was likely to be replaced in ten years by digital technologies. The knowledge disavowal took place in their selective decision, based on strongly held beliefs, to use digital technology to enhance silver halide technology rather than adopting a straightforward plan to replace it with digital technology. In this case knowledge disavowal proved to be extremely damaging.

On a more personal level, Jerry's insight reminded me that, after developing the refinery decision hierarchy (Figure 5), I had received overwhelming support and commendation from my peers for developing the simple and easily understood hierarchy. This very positive reaction led me to 'avoid' considering alternative approaches that could challenge the direction I had taken and was the basis for continued commendation from my colleagues. In essence I fell prey to Leon Festinger's theory of 'cognitive dissonance.' Here's the brief version:

Festinger identified key behaviors that individuals will use to avoid being put in the uncomfortable position of finding out they may be partially or completely wrong.

> **Selective Perception**: Once we take a position on an issue, we will avoid information that is likely to increase dissonance. This selected behavior results in our making choices in what we read or see and includes finding or being associated with

47 Barabba & Zaltman, 1991

like-minded people who will help buffer us from information or ideas that contradict our belief and/or position.

The More Important the Decision – The Greater the Dissonance: The importance of the decision (in my case a significant amount of time I devoted to developing my version of the hierarchy) leads to greater internal resistance to conflicting information once the fallacious decision has been made.

I had also conveniently 'forgotten' the findings of Ian Mitroff's 1983 book *The Subjective Side of Science*. Ian conducted extensive personal interviews with scientists about their beliefs about the moon before and then after the Apollo mission brought back moon rocks. After studying the before-and-after responses he found that each scientist's prior belief about the geological characteristics of the moon had a significant effect on their observations upon actually viewing the moon rocks.

In my case, the extent of my knowledge disavowal was both wide and deep. I completely ignored all of my experience in political campaigns, government service, and the political in-fighting among functions and departments in large corporations. In each of those experiences I saw the effect of social arrangements and the political context on the development, use and mis-use of information. In essence, the benefits found in the simplicity of the nice, neat hierarchy that had evolved in my thinking had led me to 'avoid' concepts that were inconsistent with the direction in which I was headed.

This does not, of course, mean that the hierarchical relationship is not valid and helpful in discussing the components. It is how it is understood and used that really matters.

Jerry and I attempted to visualize these social and political effects with the following chart incorporating the concept of the 'law of the lens.'[48] We pointed out that the interaction of the parts of the hierarchy is complicated by assumptions, truth tests, expectations and rules about decision-making that create a lens through which managers and researchers as well as information users and information providers get different views of the decision and its context.

48 Ibid., p. 44

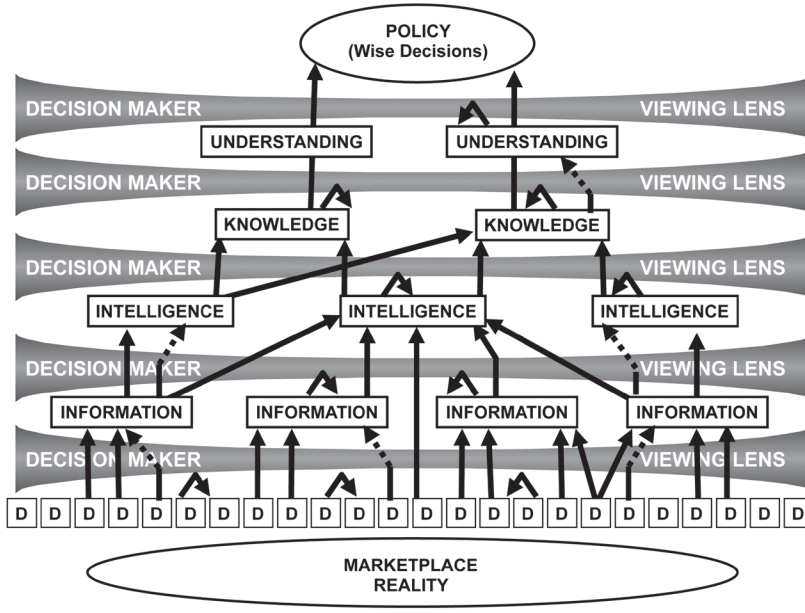

Figure 6: Refinery decision hierarchy modified by the Law of the Lens

In this more realistic illustration, the bent and rejected arrows between the elements illustrate the impact of a possible 'distorted' viewing lens used by the individuals involved in collecting and processing data into information, intelligence, knowledge and understanding, and eventually into a wise decision. The arrows recognize that the viewer's predisposition on the issue directly affects how people see and accept or reject reports from their researchers, and how they determine what is eventually considered in a decision. From the perspective of the person making the final policy or action decision, the chart points to the need to know not only what information was rejected or modified (illustrated by the dotted lines emerging from the filter) but the reasons for the rejection, modification and acceptance as well.

It is important to understand the extent to which individuals in the decision process differ – and not simply focus on who may be right or wrong. For today's complex issues, for which there are multiple 'right' answers, an understanding of why people differ (because of their underlying assumptions) is as important as understanding what might be perceived by many as the 'right' answer.

Today, both analysis and synthesis are necessary, but synthesis becomes more important as we face an increasingly unpredictable future. We need a mindset that understands that a complete system is composed of *interdependent* parts that cannot be divided into *independent* parts.

Each part of the enterprise must rely on, and interact with, the rest of the parts if the enterprise is to succeed. Today, problems are best solved not by breaking them into functional bits, but by carrying them into the next larger system and solving them through integrative mechanisms.

But even 'carrying them into the next larger system' has the potential to lead to bad decisions if they are viewed through a distorted lens. As was clearly shown by Ian Mitroff, the most powerful and dangerous case of the distorted lens is the predisposed mind. That is, a mind that is only prepared to see what it expects to see and that filters out what does not fit comfortably with its understanding of how things should be.

Knowledge creation, dissemination, and application are themselves not separable processes, and the viewing lenses that we use mean that we all have the potential to experience and believe in different realities. This represents both a danger and an opportunity: a danger when the result is conflicted decisions; an opportunity when the sharing of different understandings creates a robust sense of reality and leads to better decisions. What I eventually came to understand is that we need a process that permits the enterprise to accommodate and share different notions of reality. It has also led me to understand that the purpose of a decision-making design is to provide an enterprise with the means to improve the way it inquires about its opportunities and problems.

The lens of learning

These different 'notions of reality' were further explored by Peter Senge, who along with Chris Argyris and others has opened our thinking to the importance of learning and the way in which it occurs. In The Fifth Discipline, Senge describes those predisposed mindsets (mental models) as "deeply ingrained assumptions, generalizations, or

even pictures or images that influence how we understand the world and how we take action."[49]

C. K. Prahalad also provided a very active description of the role and importance of dialogue as a method of overcoming the predisposed mind in the learning process:

> *Dialogue means interactivity, deep engagement, and a propensity to act – on both sides. Dialogue is more than listening to customers: It entails empathic understanding built around experiencing what consumers experience, and recognizing the emotional, social, and cultural context of experiences. It implies shared learning and communication between two equal problem solvers. Dialogue creates and maintains a loyal community.*[50]

Prahalad's description provides the basis for a plan of action for both individual and collective learning. The value of his description is that it provides the first step in getting people to listen to others because there is a commitment to share between two equal partners. It implies a faith that understanding is made richer by suspending one's own assumptions and beliefs long enough to consider those of others. Once this understanding is achieved, it prepares us for the really hard work of developing a solution to the problems we now better understand. Managing the interactions of the four Capabilities that follow offers an experienced-based 'sketch' of how to develop viable solutions to the many intractable problems we all face.

49 Senge, 1990, Argyris, 1991, pp. 99-109, and Argyris, 1994, pp. 77-85.

50 Prahalad & Ramaswamy, 2004