DEVELOPING EXPERTISE IN MANAGEMENT DECISION-MAKING

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ABSTRACT

Experts and novices approach decisions in remarkably different ways. The quality of decision-making by a novice largely depends on the ability to conduct a rational analysis of the decision situation. An expert makes use of a highly developed model of the decision situation and the decision is not the result of the "rational" process. We begin with a critical evaluation of the commonly accepted definition of the rational decision-making process. This leads to a revision with systemic, iterative, and adaptive properties. A description of decision situations with reference to their appropriateness for the application of expertise is the basis of an understanding of the domain in which expertise may be developed. Next, we present the process for the development of expertise. The rational process, as revised, is the foundation for the development. The attributes of expertise developed as described closely match characteristics of expertise described in the research and application literature.

INTRODUCTION

The need for effective decision-making and high quality decisions is common to many fields. The requirement is particularly acute in business where the quality of management decision-making directly affects the performance of the enterprise and how well it meets its objectives. Expertise in decision-making is an essential skill for a manager and an understanding of the acquisition of expertise is necessary to its development.

Two elements are necessary to the development of expertise in management decision: one is experience and the other is a model or schema that relates experience to the reality of the organization and its environment. Expertise in other areas, e.g., surgery, playing a musical instrument, driving a racecar, typically involves coordinating mental processes with physical ones. While physical attributes are largely irrelevant to the development and exercise of managerial expertise, the process of developing managerial expertise nevertheless has many elements in common with the general process for developing and applying expertise.

The point of departure for a discussion of expertise in decision-making is the decision process known as the "classical" or "rational" process. Following a brief review of this process, we suggest a revision that addresses several of its shortcomings. We next turn our attention to expertise, particularly as applied to management decisions. This development begins with schema of decision types that reveals where expertise may be applied. We note that some
decisions are best made using a (revised) rational process and others using expertise. Finally, we illustrate how the rational process is the basis for developing expertise in management decision making.

RATIONAL DECISION-MAKING

The apparent variety and complexity of management decisions motivates the use of a classification scheme to bring order to a discussion of decision-making. Classes include decisions under certainty, risk, and uncertainty; single and multistage decisions; group or individual decisions; decisions with monetary or non-monetary objectives; and so forth.

Independent of classification, the decision-making literature consistently presents a "rational" process for decision analysis generally involving five steps. This process is:

- First: recognize and define the decision situation
- Second: Identify alternatives
- Third: Evaluate alternatives
- Fourth: Select the best alternative
- Finally: Implement the chosen alternative

This particular statement is from a basic text in management (Griffin, 2008) and reflects content from a specialized source on management decision-making (Harrison, 1999).

There are many variations on this basic theme, all with similar characteristics. A popular definition (Bazerman, 2002) is illustrative. In outline, the process is:

1. Define the problem
2. Identify the criteria
3. Weigh the criteria
4. Generate alternatives
5. Rate each alternative on each criterion
6. Compute the optimal decision.

Other authors have presented additional variations from both the behavioral sciences and the quantitative disciplines. These are notable more for their similarities than their differences. Harrison summarizes them succinctly (1999, p. 37-38):

There are various views on the process of decision making. Simon (1960) assigns three major elements to the process (1) finding occasions for making a decision; (2) finding possible courses of action; and (3) choosing among courses of action. Witte (1972) advances the notion of decision making as a total process involving discernable and separate activities: (1) information gathering, (2) development of alternatives, (3) evaluation of alternatives, and (4) choices. The
process espoused by Schrenk (1969) focuses on three elements: (1) problem recognition, (2) problem diagnosis, and (3) action selection. Janis (1968) envisions a decision-making process with five stages: (1) recognition of a challenge, (2) acceptance of the challenge, (3) meeting the challenge through a choice, (4) committing oneself to the choice, and (5) adherence to the choice. Eilon (1979) advances a comprehensive process composed of eight stages, which begins with information input and culminates in a choice. Mintzberg and his associates (1976) offer an incredibly complex formal structure derived from twenty-five "unstructured" decision-making processes that are then organized into a general model of interrelated strategic decision processes. Fredrikson (1976) proposes a method for organizing noneconomic criteria in a decision-making process that includes four stages: (1) developing a criteria set, (2) posing criteria questions, (3) scaling the responses, and (4) choosing among alternatives. Nutt (1989) advances a decision-making process made up of: (1) exploring possibilities, (2) assessing options, (3) testing assumptions, and (4) learning.

The salient point is that the "rational" process does not vary with the characteristics of the decision. Given the diversity of decisions and decision environments, it is an open question whether a sequence of five steps, more or less, will be universally successful in addressing the scope and variety of management decisions. We further observe that sequential processes, such as described here, are characteristic of a mechanistic world view (Ackoff, 1981) and note that the antecedents of "rational" decision analysis are the perfect information assumptions of competitive market theory. This theory is the product of a mechanistic worldview.

BEYOND "RATIONAL"

The rational process described above (along with its several variants) is inappropriate as a procedure for making decisions. In summary form, the assumptions that render it ineffective are:

a) The process is sequential; once a step is complete, it is not revisited.
b) The process is complete; all alternatives are identified.
c) The process is deterministic, in the sense that the decision-maker understands the relation between alternatives and outcomes. The relation may involve probabilities (risk) in which case the decision may involve an expected value.
d) Perfect information about outcomes, and their probabilities, for each alternative is known.
e) There is unity of purpose. The analyst (decision-maker), if not an individual, is a group of undifferentiated individuals with a unitary purpose.

A superficial comparison of these attributes to the real-world management decision environment reveals the assumptions as unrealistic. A decision process based on them will necessarily be ineffective.
The nature and variety of management decisions renders the formulation of a completely effective decision procedure problematic. However, an improvement on the existing rational process is not difficult to conceive. There is a prima facie argument that a decision process with the following characteristics will produce superior decisions.

a) Systemic  
b) Iterative  
c) Adaptive (to new information)  
d) Self-correcting  
e) Active (in seeking new information and innovative approaches)

The formulation of a revised process incorporating these characteristics involves synthesizing several well known, but seemingly disparate, conceptual structures and research results.

A SYSTEMIC APPROACH TO DECISION ANALYSIS

We propose a revision to the "rational" process that exhibits the above characteristics and consists of seven elements: (1) Understanding the decision opportunity, (2) Formulating the correct goals for the decision, (3) Identifying and involving the correct participants in the decision, (4) Framing the decision correctly (including understanding relevant alternative framings), (5) Generation of alternatives, (6) Choice: selecting an alternative and (7) Learning, to improve future decision-making.

The star-shaped graphic of Figure 1 presents the relation among the elements in the process. Characteristics of the process are:

a) Elements are systemically interactive. Each point of the star connects to all other points, indicating the joint and reciprocal influence of all elements in the process.  
b) The process is iterative. Consideration of any element of the decision may prompt a re-evaluation of any other element to accommodate newly developed or revealed information or perspectives.  
c) The process concludes only when all issues related to the elements at the points of the star are resolved. Selection of an alternative occurs only when the process is stable: there is no revision to any element.  
d) The process accommodates a broad range of perspectives and approaches. Multiple framings of the decision situation are required.  
e) The process facilitates the development of expertise, in situations expected to recur. Conducted properly, the process will reveal the crucial relations extant in the decision situation.
f) The process encourages *post hoc* analysis as the basis for individual, and organizational, learning. Statements of expected outcome statements are an essential part of formulating alternatives.

Each of the elements of the decision (points of the star) makes a distinct contribution to the decision. Each element controls, and is controlled by, each other element. As noted, choice occurs only after all interactions are fully developed and all implications assessed.

Choice is the disjoint step marking the end of the process. Competing alternatives typically reflect different framings of the decision situation, different goals, and perhaps, different motives of participants. In most situations, the choice is from among competing framings of the situation rather than competing alternatives developed from the same frame.

**Figure 1: Decision Star**

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**ELEMENTS OF THE STAR**

The analysis process represented by the Star contains elements well documented in the literature on decision-making. A brief review follows.
Opportunity for a decision typically arises from a Gap Analysis which identifies a "gap" between the present state and the desired state. Huit (1992) cites Arnold (1978) in identifying four types of gaps:

1) something is wrong and needs to be corrected;
2) something is threatening and needs to be prevented;
3) something is inviting and needs to be accepted; and
4) something is missing and needs to be provided.

Tunnel vision (stating the problem too narrowly) represents the major difficulty in problem identification as it leads to artificially restricting the search for alternatives.

SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis identifies strategic decision opportunities. The “O” and “T” in SWOT usually involves one of the four types of gaps noted above. Harrison (1999) describes a procedure for identifying strategic gaps.

Goals reflect organization mission and strategy. The goals for a specific decision involve interpretation of mission and strategy as applied to the decision environment. Different interpretations (which easily arise from different framings) can easily lead to conflicting goals or a lack of goal clarity. Both Drucker (1973) and Ackoff (1981) describe how suboptimization can easily lead to conflicting objectives. Individual psychology can be the source of different perspectives on goals. It is widely acknowledged (Myers, 1988) that individuals with a task orientation will view goals differently than those with a people orientation.

Who Participates in the decision is a consideration overlooked by many researchers. The notion of the decision-maker as an individual actor is deeply rooted in the assumptions of the perfectly competitive economic model. The organization in the 21st century has moved far beyond the simplifying assumptions appropriate during the Industrial Revolution (see Ackoff, 1981 for elaboration). From a different perspective, Vroom & Jago (1988) use characteristics of the decision to determine who should participate in the decision process. March (1994) addresses decisions with multiple actors who may have inconsistent preferences or identities.

How the decision is Framed is crucial to the decision process. "Frames are mental structures that simplify and guide our understanding of a complex reality." Russo & Shoemaker (2002). They argue coherently that the quality of the eventual decision depends significantly on how the situation is framed. Poorly framed decisions will be poor quality decisions. Proper framing is a necessary attribute of a good decision and aggressive efforts to identify many framing alternatives for the problem are required.

The variety of potential frames is extensive. Included are: (1) the functional perspective (Finance, Operations, Marketing, etc.), (2) the ethical perspective, (3) the “green” perspective, (4) the cross-cultural perspective, (5) the quantitative perspective (can we formulate the decision in an optimization model?), and so forth. Frames are not exclusive and the eventual best
perspective on a decision may well be the result of a combination of frames. Undoubtedly, “frame blindness” (Russo, 2002) is a serious impediment to quality decisions. The most notable argument for multiple frames is the famous quote by Alfred P. Sloan, Jr. (in Drucker, 1973): “Gentlemen, I take it we are all in complete agreement on the decision here.’ Everyone around the table nodded assent. Sloan continued. ’Then, I propose we postpone further discussion of this matter until our next meeting to give ourselves time to develop disagreement and perhaps gain some understanding of what the decision is all about.’”

The importance of framing to both problem solving and decision-making is apparent in the popular and highly regarded *Ackoff’s Fables* (Ackoff, 1978). The insight provided by each fable is nearly always based on a framing of the situation different from the one expected. The multidisciplinary (or interdisciplinary) approach recommended in Management Science and other fields acknowledges the value of different perspectives (leading to different framings) in both problem solving and decision-making.

How individuals frame decision situations reflects the paradigm they find most effective as a guide to understanding the environment. The German *Weltanschauung* describes the concept.

Alternatives are the product of problem solving activity. Each framing of the decision situation presents a problem and the solution to the problem (there may be more than one) represents an alternative for the decision. It is, of course, necessary that the alternative include a statement of the expected effect of its adoption. The linkage is direct: from frame to solved problem to decision (action) alternative to expected outcome.

Choice (actually making the decision) may, in view of the foregoing, be construed as selecting the frame and outcome that best serve organizational objectives. The decision-maker(s) must determine which framing of the decision best represents the true environment and which alternative (for the selected frame) presents the most desirable outcome. Stated thus, the choice would appear perfunctory. However, the perceptive decision maker(s) recognizes that there may be uncertainty about (1) which frame is most appropriate, (2) the linkage between proposed action and projected outcomes, and (3) the desirability of the outcome in a future environment.

Learning is a *post hoc* activity, based on a comparison of projected outcome with reality as it occurs. Senge (1990) discusses this process in some detail from the organizational perspective. We will return to this topic later as we discuss the process for developing expertise.

**SYSTEMIC INTERACTIONS**

The idea of recursion in decision-making is not new. Harris (1998) describes a recursion between criteria and alternatives. The process presented here extends recursion to all points of the Decision Star. In the following paragraphs, we discuss the analysis process as a systemic interaction of processes.
The decision analysis begins with recognition of an opportunity for a decision. Typically, a complete understanding of the decision will not be present from the outset. This is particularly true for a new or unique decision. Further, an alternative may present along with the opportunity, but it is generally wise to avoid an immediate decision, especially if circumstances suggest the decision is an important one. The initial action of the decision-maker is to describe the opportunity, define the specific goals for the decision and articulate the frame as completely as possible. The next step is to validate the opportunity, goals, and frame.

Opportunity validation most conveniently involves evaluation by another individual with a presumed interest in the decision. In the ideal case, this individual will frame the decision differently or, perhaps, have a different perspective on the goals for the decision. It is well established (Connolly, 2000) that multidisciplinary teams make superior decisions to those made by individuals or groups with a single, or narrow, vision.

The participants in the decision drive the process. Alternative frames, goal clarity, and viable alternatives all require participants with varied perspectives and commitment to the best possible decision.

The Star graphic with direct links connecting Opportunity, Goals, Participants, and Frame illustrates the systemic interaction of these elements of the decision. Each participant will contribute a (potentially conflicting) perspective on these elements. A systemic, iterative process with the objective of resolving conflicts and producing a completely articulated statement of alternative frames and associated action alternatives is essential to achieving the best possible decision.

As the process proceeds, each element potentially prompts a revision to other elements. Thus, a new frame will require a revision to the goal statement, and possibly a fuller understanding of the opportunity. A new participant will contribute a new perspective on goals (possibly based on the perspective of a different part of the organization), potentially prompting a revised perception of the opportunity.

The iterative process concludes with the definition of several alternative frames for the decision with corresponding action alternatives. including expected outcomes. The process should continue until:

a) Alternative frames are fully developed,
b) Goal clarity, for each frame, is achieved,
c) The opportunity is validated for each frame,
d) Participants are satisfied that no additional participants will contribute new perspectives (i.e., that additional frames are unlikely),
e) There is complete articulation of action alternatives corresponding to each frame, including statements of expected outcomes.
Observe that the adoption of a ‘frame centric’ representation of the conclusion of the process involves associating different characterizations of opportunity, goals, and actions with alternative framings of the decision. Other representations are, of course, possible but they lack the scope of the frame-based process.

The analysis process concludes with the choice of an alternative. Once the choice is made, the analysis is concluded and the attention of decision-makers is turned to implementation and to anticipation of the next opportunity.

CATEGORIES OF MANAGEMENT DECISIONS

The discussion thus far has been general, independent of the characteristics of any particular decision or environment. How decisions should be (and are) made do depend on the nature and circumstances of the decision. We now undertake a consideration of how decisions vary and how the decision process must reflect the variation.

The most basic classification scheme divides decisions into two major categories: routine and non-routine decisions (Drucker, 1967 or Harrison, 1999). The recurring/non-recurring characterization is also used. This scheme is significant since it is typically determines (1) which decisions must be subject to study and analysis, and (2) which decisions may be made using rules and models to guide the decision maker.

The accomplished manager obtains high quality decisions in both routine and non-routine contexts. Sometimes the manager makes the decision; sometimes others make the decision under the direction of the manager. As noted earlier, the Vroom & Jago (1988) model indicates which is most appropriate.

The routine/non-routine characterization of decisions is a useful starting point. Non-routine decisions do not provide a good domain for the application of expertise because they do not recur and acquisition of experience, necessary to expertise, is not possible. Non-routine decisions require analysis if a high quality result is required.

Routine decisions do recur and permit the development of expertise. In some cases, the application of expertise can be routinized (or programmed), as in the case of specifying stocking levels in an inventory system. In other cases, the attention of the manager is required in every occurrence.

Routine decisions have characteristics that remain largely the same from one occurrence to another. This attribute allows organizations to gain experience in making these decisions and to develop expertise in making them to pursue organizational objectives. Harrison (1999, p. 21) characterizes the structure of routine decisions as

- Procedural;
- Predictable;
- Certainty regarding cause/effect relationships;
- Recurring;
- Within existing technologies;
- Well defined information channels;
- Definite decision criteria;
- Outcome preferences may be certain or uncertain.
Non-routine decisions, again from Harrison, are

- Novel; unstructured, consequential, elusive and complex; uncertain cause/effect relationships; nonrecurring; information channels undefined; incomplete information; decision criteria may be unknown; outcome preferences may be certain or uncertain

Routine decisions are often part of a smooth flow of events and may be difficult to identify. Non-routine decisions are, by their nature, more easily identified.

Drucker (1967) described a four-category structure for management decisions and used the terms “generic” and “exceptional” for routine and non-routine decisions:

1. Truly generic events. Here, the occurrence of the decision situation is only a symptom that requires an adaptation of an existing procedure. Drucker cites inventory decisions as illustrative of this class.

2. The apparent exceptional event which appears unique (and may be unique for a particular organization), but which occurs commonly elsewhere. A merger or acquisition decision is illustrative of this class.

3. Truly exceptional events. These decision situations have not occurred before and are unlikely to occur again. The correct response to the development (by a competitor) of a substitute for a major product would fall into this class.

4. Exceptional events that are a first/early occurrence of a new generic category. Internet based attacks on a company’s database or other internet-based attacks illustrate this class.

Of these categories, numbers 1, 2, and 4 provide opportunity for developing expertise, although number 2 requires a broader purview than the single organization. Expertise in this category generally occurs in consulting firms and in corporate (as contrasted to business) strategy functions. Categories 1 and 4 provide significant opportunities for developing expertise.

Category 1 requires further attention. While this category includes many programmable decisions, there are also many not capable of being programmed. Several factors contribute to rendering a recurring decision un-programmable. Some of these are:

a) The decision environment is dynamic or unstable

b) The decision environment cannot be described abstractly or symbolically due to discontinuities, un-measurable variables (these may be psychological or behavioral), unknown causal relations, lack of complete understanding of the relation between alternatives and outcomes
c) Computational complexity. In spite of exponentially increasing capabilities of computer-based systems, many problems remain intractably large, particularly when required decision intervals are short.

d) Goals are ill defined and, possibly, shifting.

We assert, but cannot demonstrate, that the majority of management decisions fall in to the non-programmable area of category 1.

The opportunities for developing expertise thus lie in this non-programmable area of category 1 and in category 4.

Klein (1999) offers a contrasting perspective on the use and development of expertise in decision-making. Decisions in Drucker's category 1 may be made either by an expert or, if certain conditions obtain, using the rational procedure. Drucker's categories 3 and 4 require the rational procedure (or an equivalent technique) since there is no basis for developed expertise. Decisions using expertise (Recognition Primed Decisions, or RPD, in Klein's terms) are appropriate under the conditions described in Table 1.

<table>
<thead>
<tr>
<th>Decision Characteristic</th>
<th>Recognition Primed Decisions (RPD)</th>
<th>“Rational” Choice (Comparative analysis)</th>
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<tbody>
<tr>
<td>Greater time pressure</td>
<td>More likely</td>
<td></td>
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<tr>
<td>Higher experience (expertise) level</td>
<td>More likely</td>
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<tr>
<td>Dynamic conditions</td>
<td>More likely</td>
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<tr>
<td>Ill-defined goals</td>
<td>More likely</td>
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<tr>
<td>Need for Justification</td>
<td>More likely</td>
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<tr>
<td>Conflict resolution</td>
<td>More likely</td>
<td></td>
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<tr>
<td>Optimization desirable</td>
<td>More likely</td>
<td></td>
</tr>
<tr>
<td>Greater computational complexity</td>
<td>More likely</td>
<td></td>
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<tr>
<td>Group decision necessary</td>
<td>More likely</td>
<td></td>
</tr>
<tr>
<td>Inadequate levels of experience (expertise)</td>
<td>More likely</td>
<td></td>
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</tbody>
</table>

Adapted from Klein (1999), p. 95

We further note that decisions involving "rational choice" often involve a group process, while an individual (the expert") typically makes "RPD decisions."

The foregoing makes clear that expertise is appropriate in some decision situations and not in others. Heerken (2011) demonstrates the difficulties encountered in attempting to apply expertise in non-routine situations. Where expertise is not available or not appropriate, decision-makers employ the rational process for the decision. Our interest is in the development of expertise and we argue that rational choice processes are at the core of the development of expertise.
DEVELOPING EXPERTISE

The rational choice process, as described by the Decision Star, is effective for Drucker categories 3 and 4: the decision is truly unique or is a first/early occurrence of a new category. Opportunities for developing expertise thus arise from category 4 and those decisions in category 1 (generic events) not capable of being programmed.

In decision circumstances requiring rational choice, the focus of the decision-maker is on making the right decision. It is not on developing expertise in making the type of decision represented by the situation at hand because the decision is not expected to recur. The non-expert makes the decision, and moves on to other pursuits. The developing expert follows a different path.

The attention of the developing expert is on ways to structure the decision situation to gain insight into the relation between characteristics of the situation and good decisions. We see here the difference between analysis for decision-making and analysis for developing expertise. For decision-making, analysis is about the circumstances of the decision that presents and the effectiveness of the resulting decision. The developing expert looks beyond the present circumstances with the objective of developing a model or schema for describing the salient features of the situation.

At its core, expertise involves structuring knowledge and information about decision situations so that the structure leads to high quality decisions. To develop expertise, one must begin with a model or schema and then incrementally refine it.

The development of expertise is a dynamic process. Experts continually refine their expertise and adapt it to new circumstances and changing conditions. The renowned psychologist Samuel Messick (1988) described characteristics of expertise.

It also appears that experts, in contrast to novices, not only have a vastly richer store of relevant knowledge accessible in memory but also structure and continually restructure knowledge in more complex ways. In particular, experts construct complex schemas or mental models that combine some of the dimensions and simpler schemas used by novices into integrated functional patterns, while at the same time discarding as redundant or irrelevant some other dimensions that novices attend to. Thus, experts develop mental models representing new and adroitly usable patterns of perceiving, thinking, and acting that direct, organize, and control both the acquisition of new knowledge and the processing of information in the course of problem solving.

We now understand that the model or schema is the starting point for the development of expertise. Expertise begins with a starting point model and that model is refined with each successive occurrence of the decision.
CREATING THE EXPERT'S MODEL

The Decision Star of Figure 1 is the starting point for the expert's model. The Process itself will develop from the Frame for the decision. The Frame of the decision-maker will contain information relevant to the present decision and the Frame for the developing expert will contain information relevant to the category of decisions represented by the present instance. Both the decision-maker(s) and the developing expert will use the Frame as the focal point for organizing their understanding of the Opportunity for the decision, the Goals to be served by the decision, the perspectives (including alternative Frames) offered by other Participants in the decision, and nature of the Alternatives for the decision.

The developing expert employs the structure of the Decision Star to develop the "mental model" for the decision situation. This is a different use than that of the decision-maker. The decision maker is addressing a (Drucker) type 3 or 4 decision. In this case, the Frame for the decision-maker is a 'single use' construct while the Frame for the developing expert is constructed as the foundation for expertise. These are very different uses. The developing expert is keenly interested in how the proper Frame for the decision changes in response to different interpretations of Goals, or different perspectives on the Opportunity for decision.

Figure 2: Expert Process
After several experiences with the decision, the developing expert evolves a unique and personal model for the decision. Achieving experience with the decision, the expert will attend less and less to inputs from other (potential) participants, and more to variations in goals or opportunity, particularly as they affect the model or frame of the situation.

The expert "analysis" becomes a reduced version of the Decision Star, one that represents the evolutionary development of expertise. Figure 2 suggests the nature of this process.

The evolution from the star to the expert process involves several steps. These are not sequential or even necessarily disjoint.

a) The number of participants diminishes until only the developing expert remains. Participants are useful for contributions to initial framing and formulation of alternatives but once the frame is developed, they add no further value and may easily become a distraction. The developing expert typically seeks out a coach or guide for the development process. This coach structures and manages the deliberate practice (Anders, 1993, 2006, Colvin, 2008) necessary to the development of expertise. Leonard and Swap (2008) describe a structure for deliberate practice (which they call 'Guided Experience') designed for use in a managerial environment.

b) Alternatives relate to frames. As the frame used by the developing expert evolves, single alternatives become associated with variations in opportunities as perceived. The more highly developed the expertise becomes; the less likely it is that multiple alternatives will be considered for a single decision. The characteristic of the expert decision is that just the right decision is produced, one that matches the nuances of the opportunity.

c) Choice vanishes altogether. Using the frame, the expert relates the characteristics of the opportunity to a single alternative for the decision: there is no need for choice. Where the novice may see several possible choices for a given decision opportunity, the expert sees only one: the one calibrated to best address the opportunity.

d) Goals may vary, depending on the circumstances surrounding the opportunity and general organizational considerations. The expert recognizes the salient characteristics of the opportunity and adapts the response so that appropriate goals are met

e) As indicated above, the expert attends to Opportunities and Goals and whether variations indicate the need for an adaptation of the Frame for the decision. If not, the expert decision is reasonably direct, assuming the characteristics of a RPD (Recognition Primed Decision) as described by Klein (1999).
The object of learning is the frame. The standard for evaluation of the outcomes is whether the frame properly represented the situation and whether the alternative was the most effective one possible under the circumstances. A positive answer further validates the frame and a negative one prompts modification of the frame to account for circumstances not properly accommodated.

Following this developmental sequence, we observe that the Decision Star is the starting point for the development of expertise in management decision-making. This construct, as an evolutionary restatement of the "rational" decision process, is used to address both routine and non-routine decisions.

**COMMENTARY**

Existing models for analysis of management decisions are deeply rooted in concepts of organization and the management process that exhibit the philosophy and assumptions of the 19th century. Organizations, and management, in the 21st century exhibit radical differences in comparison to 19th century models. One of the primary areas of contrast is decision-making within the organization. The presentation here pursues the goal of showing how analysis must change and, in fact, is changing to reflect new organizational models and management processes. Gary Hamel (quoted in Barsh, 2008) puts it thus:

*The outlines of the 21st-century management model are already clear. Decision-making will be more peer based; the tools of creativity will be widely distributed in organizations. Ideas will compete on an equal footing. Strategies will be built from the bottom up. Power will be a function of competence rather than of position. In terms of the future of management, we're at the beginning of what will be a fairly long journey. You can see some of the pieces starting to come together, but we're not there yet.*

There is little doubt that a linear and sequential analytic process is inappropriate to the function of both manager and organization in the 21st century. Systemic, iterative processes have been evident in organization for some time and an objective presentation of the nature of these systemic processes is long overdue.

**REFERENCES**


