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The **Future** of Decision Making

How Revolutionary
Software Can Improve
the Ability to Decide
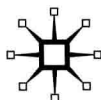
THE FUTURE OF DECISION MAKING

HOW REVOLUTIONARY SOFTWARE CAN IMPROVE THE ABILITY TO DECIDE

ROGER C. SCHANK, DIMITRIS LYRAS, AND ELLIOT SOLOWAY

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Additional Praise for *The Future of Decision Making*

"The authors start from some essential truths about cognition. By combining them with a solid grasp of business realities and software possibilities they are able to describe a realistic future in which machines promote the sharing of human wisdom."

—Eric Domeshek, AI Project Manager, Stottler Henke Associates, Inc.

"These authors have converged to produce a forward-looking book that is as un-hidebound as the methods they are preaching."

—William K. Purves, Professor Emeritus of Biology, Harvey Mudd College

"Decision making is complex, and facts and figures are important, but common sense is even more important. We most often have to make decisions in circumstances when facts and figures are inadequate. This book is an insightful account of how to reintroduce common sense into decision making tools."

—Lawrence Howell, CEO of EFG International Private Bank

"Roger Schank is the right person with the right skills to talk about decision making, about how the mind works and how to develop new technologies to make it work better."

—Sebastián Barajas Caseny, Founder, LearningWorks

"Roger Schank has been pushing the edge of cognitive science for many years. As a co-founder of the Cognitive Science Society and a pioneer and visionary in the field, his concepts change the way organizations think about the choices they face."

—Arthur Stern, CEO, Global Prime

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Introduction

Many organizational employees make well-intentioned but poor choices. This is true for everyone from top executives to line workers. It is equally troubling that these employees rely on software that often makes matters worse.

Having invested significant amounts of money in state-of-the-art information technology as well as hiring and training smart managers, organizations should possess the systems and skills for astute decision making.

However, two problems prevent good decisions from being made. First, organizational systems, processes, and even cultures discourage employees from making intuitive choices. They are taught to ignore their gut instinct when making tough decisions. Instead, they feel compelled to trust the data and to depend on rigorous analysis and the conventional wisdom. This may work in certain circumstances—especially when decisions are relatively easy—but not when options are ambiguous and situations are unfamiliar.

Cognitive science has made great strides in recent years in understanding how the mind works. One discovery has been that decision making is largely an unconscious process. When we believe that it's a conscious activity we ignore factors that are crucial for right decisions while clinging to ones that are less important. We attach too much importance to available data and not enough to the signals we're receiving that run counter to the data—to that voice inside our head that knows from previous experiences that a non-data-driven option is preferable.

The other problem hindering decision-making potential in companies today is that most of the enterprise software currently in use is generic, and its lack of situational and organizational specificity results in poor decisions. Generic software provides information without context. Employees rely on this software for everything from crisis management to hiring. The software may provide tools to analyze alternatives or help match up a candidate's skills with the job specs , but fails to take into consideration situational specifics. Software is generic out of economic necessity—Microsoft Dynamics is one example of this type of generic enterprise software. It is designed for big and small companies, for manufacturers of toilet paper to marketers of cell phones. As a result, it fails to consider specific industry and company factors and the situational challenges organizations are dealing with. The information and recommendations aren't tailored to an individual employee facing a new or confusing situation but for composite companies in composite situations. Just as troubling, this software does not make the right generalizations across industries. In other words, it doesn't "abstract" goals and obstacles, but instead focuses on an object that *seems* common to a number of industries, such as a purchase order. Goals and obstacles—such as why people buy things or what major deciding factors can be abstracted effectively—are essentially the same abstractions with different emphasis regardless of the industry.

Companies must develop industry-, organization-, and process-specific software as well as capitalize on the common sense of the people with situation-specific experience.

Years ago in less competitive times, these issues weren't as troubling. But decision making today has become infinitely more challenging. In the old days, many choices were obvious—the problems were largely black and white and the options were limited. On top of that, mistakes weren't catastrophic; there was a lot of room for forgiveness in the system. Today, little of this former lenience exists. More significantly, the business environment is growing in complexity and is volatile; it

requires a lot more insight to understand. People struggle with "right-versus-right" decisions. They're operating in gray areas where nothing is clear.

For these reasons, misconceptions about the decision-making process and the inappropriate use of generic software have had devastating consequences for businesses.

The good news is that it doesn't have to be this way. Companies can capitalize on advances in cognitive science and software development to make great decisions. Whether it's a split-second choice in the heat of a business negotiation or a long-term strategic decision in a boardroom, we possess the cognitive insight and technology to make highly effective choices.

The goals of this book are threefold:

1. To help decision makers capitalize on the science of decision making. We will reveal what cognitive scientists have discovered about how choices are made and apply this knowledge to common business situations.
2. To give organizations an understanding of a new software design concept that facilitates better decisions. We shall demonstrate how and why this concept is compatible with the principles of cognitive science.
3. To offer insights and advice about how organizations might combine cognitive science principles and this new software concept to develop performance support software (fostering better decision making during the execution of job responsibilities) as well as training software.

The third goal needs a bit of explanation. The ideal enterprise performance support software doesn't exist as of this writing. However, certain aspects of this software exist within the shipping industry and employee training software and we'll use both examples to demonstrate

what is possible. The technology is available. The cognitive science is known. There is nothing stopping organizations from creating this ideal software. It simply requires a commitment to this new decision-making model to put it into practice.

The future of decision making is closer than most people think. We're writing this book to make it a reality sooner rather than later.

Some Fundamental Truths

Let's start with some cognitive science basics:

- Decision making is largely an unconscious activity.

We noted this earlier, but emphasize it here because this principle feels counterintuitive to a lot of people. When managers decide to hire someone, acquire a company, or enact a new policy, they're not thinking consciously or logically. Of course, they like to believe they are. Most business leaders like to see themselves as rational planners. We're taught that this is an attribute of leaders and believe our decisions are a product of research, analysis, conversation, thought, and decision.

But all these steps are just how we rationalize our unconscious decisions. Most people take comfort in the "facts" to justify why they made a risky decision or took a controversial position. They tell themselves (and sometimes others) that they instituted a hiring freeze rather than downsizing because studies show that it's better to save morale than costs in this type of situation. Or they choose to try and gain a foothold in an emerging market because their task force recommended doing so before their competitors recognize this market's value. There's nothing wrong with rationalizing decisions. However, there is something wrong with relying exclusively on data and analysis in making these decisions, especially when the choices aren't easy and obvious. Every day in a large

organization people are called upon to make choices clouded by ambiguity, volatility, and emergency. The individuals who make the best decisions go beyond rigorous analysis and statistical probabilities and depend on what, for lack of a better word, we'll refer to as a "sixth sense."

We might call this sense "instinct" or "trusting your gut," but it's more than that. People who make great decisions in tough situations usually have experienced a number of relevant situations in their past that guide their sixth sense. They're not conscious of this fact, but nonetheless choosing A over B just feels right because of it. As we'll see a bit later, computer software can be designed to capitalize on and help people take advantage of their sixth sense.

- We make good decisions based on accumulated experience.

When facing a difficult decision, we are unconsciously reminded of similar past situations and of choices we made that led to both success and failure. That's why organizations are smart to hire people for jobs where their experiences are directly applicable to their areas of responsibility. Ideally, we would choose the President of the United States based on his prior experience as president of another country; he would have encountered situations in one job that would have been valuable in the next. Unfortunately, we seem to think that being governor of Arkansas, Georgia, or—dare we say—Alaska is somehow relevant experience for the position when it's not. Corporations are smarter than the electorate in this regard. Many companies hire CEOs who have been CEOs before. Even though they may not have faced the exact same situations in the past, they're likely to have experienced the same decision-making categories.

Some managers make great decisions—ones that seem uncanny in their foresight. An organization will hire an unlikely person for a job and she'll turn out to be the perfect choice. These managers invest boldly in an untested technology that rapidly evolves to a state-of-the-art

level. But they aren't prescient. They are experienced. Unconsciously, the choices they face remind them of similar relevant experiences that help guide their decision-making processes.

A baseball movie from the 1950s, *The Kid from Left Field*, illustrates this point. Early in the film, the protagonist, a young boy managing a little league team, calls a weird bunt-steal play that wins the game against the team from Myer's Bakery. Later on the protagonist, now the manager of a major league team, calls the same play and ends up winning the World Series. When asked how he came up with that crazy play, he says, "Well, it worked against Myer's Bakery."

This is how people make decisions. The coach didn't consciously remember using the same play in the little league game, but the experience lodged in his brain. When he was in a similar situation managing a major league team, he was reminded of what happened and it resulted in a successful decision.

- Decisions should flow from goal conflict adjudication, not through half-baked logic.

Here is a story from the shipping industry that illustrates this principle. A captain is navigating his ship through the Suez Canal when the exhaust gas boiler catches fire. The logical response is to stop the ship and put out the fire. Yet experienced captains will keep the ship moving despite a boiler fire because they know that they would probably have to deal with local bureaucracy and corruption in order to extricate the floundering ship from the Canal. And while the notion of putting out the fire seems paramount, veteran captains also recognize that the extent of damage caused by most exhaust gas boiler fires is nothing compared to the financial consequences of stopping a ship—catastrophic grounding, costly delays, local extortion, and so on. Despite the sight of twenty tons of red-hot steel and gushing

fire hoses in the engine room, a savvy captain knows it's best to keep moving.

Consider another shipping story with a less calamitous set of conflicts. A ship's $10,000 anchor detaches and sinks. On the one hand, the captain could wait for divers to show up and retrieve the lost anchor. On the other hand, if he waits he'll experience a costly delay in delivering the cargo. Goal adjudication is not just a matter of weighing one cost against the other. It's also about conflicting interests—there's the owner of the ship who also owns the anchor and the chartering company that will lose money if the shipment is delivered late, and a contract between the two parties stipulating a timely shipment.

In many business situations, there aren't just one or two factors to consider, but ten or twenty. Goal conflict adjudication may involve numerous nuances in which there's no wrong answer and two right ones. Such subtleties are often understood only by seasoned executives—the "old salts" who can steer the right course in even the most difficult circumstances. They have the experience to adjudicate conflicting goals so that their decisions cost their organizations less or profit them more.

Be aware, too, how people phrase these goal conflicts in their minds. Again, this is unconscious phrasing:

In our *Kid from Left Field* example, the conflict would be phrased as, "I don't want to look stupid (by calling an unorthodox play) but I want to win the game."

In our Suez Canal example, it would be, "I don't want the ship to burn up but I don't want to have my crew in jail and the ship impounded by corrupt government officials."

In our anchor example, it would be, "I don't want to lose the anchor, but I don't want to lose the shipping contract if it arrives late."

When decision makers lack the requisite experience or rely too much on logic in their approach, they don't adjudicate goal conflicts. Rather

than being aware of all the factors making one goal more important than the other, they make a choice based on incomplete or erroneous criteria.

- Expectation failure catalyzes learning that translates into better decisions.

Organizations loathe the idea of failure, but failure is integral to on-the-job learning. The best way to learn on the job is to make a decision, assume it's the right one, and discover that it's wrong. This type of expectation failure is emotionally resonant—we are upset when our expectations are thwarted and negative consequences occur. This experience is indexed in a retrievable way by our brains, so that the next time we're in a similar situation facing a similar decision, the experience is recalled on the cusp of the decision and guides us toward a more effective choice. This is how employees learn what to do—and what not to do.

Recognizing the cognitive value of failure will make organizations more tolerant of it as a teaching tool. We're not suggesting that companies tolerate multimillion-dollar mistakes and widespread, ill-conceived choices that harm the bottom line. However, we do advocate acceptance of failure as part of the learning process for young and new employees—be it an on-the-job mistake or in a training scenario.

We'll refer to all four of these cognitive principles throughout the book, explore them in greater detail, and suggest how to incorporate them into software.

Hard Truths about Software

In his book, *Why Software Sucks...And What You Can Do About It*, author David Platt castigates software developers on a number of fronts.

Platt suggests that they create software for people like themselves rather than normal users, making software complicated simply because they appreciate the technical aspects of its complexity, and so on.

This book is right on the mark. We would also add that enterprise software fails in decision making because it doesn't take into account the three cognitive science principles we've just listed. This generic type of software is designed to provide general information for broad scenarios rather than specific problems. It's fine for making small, straightforward decisions where all the variables have been adequately analyzed. But when things become a bit more complicated or involve issues particular to a specific company or industry, then this kind of software is virtually worthless. Because the vast majority of enterprise software fails to adjudicate goal conflicts or doesn't allow people to go with their gut when facing difficult choices, it falls far short of what it might be. The shame of it is that technology has reached a point where it can really help businesspeople make more effective decisions. The increased speed and mobility of computer technology has made it possible to capitalize on cognitive science principles and to create software with these principles in mind.

This software uses indexing language. Here's a story from Roger that will help explain how the mind indexes concepts.

I appeared on a CNBC show about Innovation, and after the show I was contacted by the Chief Innovation Officer at Procter & Gamble. He had liked what I had said and wanted to work with me on creative approaches to making the company's bleach better. When we met, this P&G executive explained why innovative thinking was needed to overcome an inherent problem of the bleach—while it is a highly effective product, it sometimes is too effective—bleaching clothes that you don't want bleached. He used the term "collateral damage" when referring to this side effect. As soon as he came up with this term, he put indexing into operation. Indexing is the way the mind

catalogs information. "Collateral damage" is a term that is used in the military to refer to unintended casualties of war. But it also applies to chemotherapy. When the innovation officer made this connection, he talked to chemotherapy experts, and they explained what they did to minimize collateral damage (i.e., damage to healthy tissue) during treatments. He was able to apply the same collateral damage process to limit the undesired side effects of the company's bleach. He hit upon this innovation because collateral damage indexes a disparate group of experiences that can be learned from and provide the learning necessary to make effective decisions.

Now let's turn to software that employs indexing language. In any given industry, there are at least five to ten experts who know what a decision maker needs to know in any given situation. These experts might be veteran employees of the company, outside consultants, and others in a field who possess great insight into how to do crucial tasks. They can share stories about how they solved common problems and capitalized on common opportunities (i.e., a story about when faced with a decision about whether to violate their strategy of organic growth to make the perfect acquisition, they decided to stick to their strategy). These stories can be videotaped and translated into software using indexing language. For instance, the indexing term we referred to earlier, "collateral damage," captured the inherent goal conflict for a given problem. An example of organizational collateral damage is downsizing the workforce because of the tough economic climate but harming morale by doing so.

Once all this is effectively indexed, the software can automatically "play" a relevant story when a decision maker faces a situation triggered by the indexing or goal conflict. The software "recognizes" this conflict by the information that has been input and provides stories/suggestions from the relevant expert. This expert shares what actions worked and what didn't when he had to downsize and preserve morale.

Think of all the difficult goal conflicts managers face:

- Keeping a talented but difficult employee on board or firing him and losing his expertise.
- Moving forward with a costly research and development (R&D) initiative that could have significant long-term benefits or spending the money on short-term strategies that will better satisfy Wall Street demands for results
- Taking the risk of pulling out of a moribund but marginally profitable market to devote more resources to a hot but uncertain emerging market
- Revamping a process that people like and are comfortable with or implementing a new, more efficient process that will require time and patience to get everyone up to speed

Most organizations make decisions about these goal conflicts without hearing what experts have to say about them at the time they need to hear it. Why did a seemingly sharp organization like Starbucks embark on a massive expansion plan that eventually required the company to close hundreds of stores? Why did the executives at General Motors invest in gas-guzzling SUVs as oil prices trended higher?

If they had software that could adjudicate goal conflicts—the type of performance support software addressed in this book—they might have made much better decisions.

To make a leap of faith and start developing this software, though, requires overcoming a set of obstacles that exist in most organizations.

Obstacles to Good Decision Making

Cost and the status quo are two very different but very formidable obstacles. Companies are reluctant to invest in new software, especially