



It's **Not** Complicated!

••If applied to risk management, **three frameworks** used in science would result in new ways of thinking about problems and make the industry more effective in dealing with future crises.

BY RICK NASON

RISK MANAGERS AND the field of risk management are still under a cloud of skepticism as a result of the economic crisis. Given the dramatic increases in the sophistication of risk management tools and techniques, investors, directors, senior managers, regulators, commentators, and the general public all want to know not only how things could have gone so wrong, but also what is being developed to prevent future risk failures. New thinking and new frameworks are needed. Doing more of the

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same is unlikely to advance the field fast enough or significantly enough. As Einstein famously said, “We can’t solve problems by using the same kind of thinking we used when we created them.”

A set of three frameworks that are used in science has particular relevance to the field of risk management. These intuitive frameworks put the current state of risk management into context and may provide insights that lead to new thinking and new approaches that will be not only more efficient, but also more effective in dealing with future crises.

The three frameworks are as follows: simple, complicated, and complex. This article explains in nontechnical language how scientists define and use each of these terms, their relevance to risk management, and how this new categorization can produce better risk management thinking. It will be argued that most of the time risk management behaves like a simple system, while ultimately everything within the field of risk management is a complex system.

Unfortunately, the bulk of our management efforts are directed toward a complicated approach, leading to a focus on exactly the wrong issues.

Three Systems

Scientists think of things as being simple, complicated, or complex. A useful analogy is the three tasks of 1) baking a cake, 2) getting an astronaut to the moon and back, and 3) raising a teenager.¹

A *simple* system can be compared to baking a cake. Only a few common ingredients are needed, and there are well-known recipes that can be followed by just about anyone. Making a few mistakes in measurement along the way may affect the results slightly, but as long as the basic recipe proportions are within relatively large margins of error, then the result will be a perfectly edible cake.

In contrast, getting an astronaut to the moon and back is a *complicated* system. An enormous number of processes must be followed and coordinated exactly or the result of the space journey will be disaster. If each process is followed exactly, then the space mission has a high probability of success. Complicated systems are based on well-known laws of nature and thus can be predicted with great precision if one is willing to invest the effort in developing the necessary mathematical algorithms.

Finally, there are *complex* systems. These systems are like raising a teenager, which seems to involve a random series of events with no set of rules, best practices, or recipes to follow. Raising two teenagers simultaneously in seemingly the exact same way can lead to very different results. Each teenager is unique in how he or she responds to various events and attempts at control; furthermore, their responses appear to change randomly over time. Raising teenagers can be a frustrating experience for a parent. (Teenagers generally seem to be unappreciative of the process as well.) The best that a parent can do is set a few broad principles for behavior and deal with each situation as it arises, recognizing that each teenager is an ever-changing mix of emotions and desires.

These three different systems, or ways of categorizing issues, differ along four major dimensions:

1. Linearity, or how much a change in one part affects other parts and the achievement of a successful outcome.
2. The degree to which results are predictable based on known laws of nature.
3. The ability to separate the parts or tasks required.
4. The degree to which the system can be controlled by a set of rules.

These three systems form the hierarchy of how scientists classify and frame the problems on which they’re working. Each type of system requires its own way of thinking and its own management approaches. It would be equally silly to have your grandmother try to run a space mission by

herself as it would be for a team of physicists, engineers, and mathematicians to collectively try to calculate and reason with a teenager who is determined to wear something inappropriate in public.

What Type of System Is Risk Management?

Most of the time, risk management is like baking a cake. However, if you want to be meticulous, then risk management is a complex system—that is, it is like raising a teenager. Conversely, risk management is not like running a space program.

To determine risk management's type of system, first consider the characteristics of the financial world in which risk

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management operates. Most of the time, the world's financial system behaves fairly well. Supply and demand in the capital markets determine prices, and various factors such as arbitrageurs keep prices more or less in line with fundamental values and equilibrium. High degrees of precision, however, are generally not practical because prices are set by a wide variety of market participants, who have their own views on the future and their differing needs and reasons for transacting. Most of the time, the markets are more or less linear, although, as recent events have shown, they have the potential to become highly nonlinear.

Striving for precision and absolute predictability in the markets has proven futile. Even the most skilled modelers of the markets and the economy will admit that their predictions are likely to miss the mark widely, and there's frequently a wide dispersion among the predictions of market experts. Contrast that result to those of a group of rocket scientists, whose calculations for the same endeavor would all be exactly the same.

As the events of various market crises have consistently shown, events in one part of the market can have significant and highly nonlinear effects across all parts of the market. The financial markets are interconnected, and small effects in one part of the market can produce dramatic effects in other, even distant, parts of the market. Separation of the parts—such as making the icing separately from the cake batter—does not exist in finance. The markets are a “holistic” system; the parts are not separable.

Finally, there is the question of whether the markets can be understood or controlled by a rules-based approach. Although the sophistication of financial and risk models has increased significantly over the past 20 years, it's debatable whether the ability to understand and ultimately control the markets and risk has kept pace. The development of Basel II proved to be totally inadequate, and only time

will tell about the effectiveness of Basel III. Ironically, the rather simple rules of thumb—such as basic financial ratio analysis—seem to work as well for bankers as do the more sophisticated models.

Examination of the characteristics leads to one conclusion: The markets are sometimes simple, but ultimately they are complex. Most of the time, simple rules of thumb are sufficient and the markets self-correct to equilibrium. The markets usually behave in a somewhat linear fashion, and valuation follows supply and demand.

At specific points, however, the markets can act in a highly nonlinear and interconnected way that doesn't follow any known set of patterns or even logic. So most of the time the markets are simple, and some of the time they behave like a complex system—but *never* do the markets behave like a complicated system. There are no highly objective rules that yield predictability or control to a high degree of precision such as we see with complicated systems.

The irony is that developments in risk management have very much run along the lines of assuming that the markets are calculable, as in a complicated system. The current thinking from both the risk management community and the regulators is that financial risk will be tamed and controlled with better models and more robust rules and regulations. This view has proven to be folly in the past and will likely prove to be folly going forward.

Issues with Complicated Risk Management

The emphasis on complicating risk management through better models, more sophisticated mathematics, and more rigid rules is leading the discipline in exactly the wrong direction.

Simple systems require simple solutions, such as recipes that are handed down from one generation to the next. The financial equivalent is the wisdom and experience of those bankers who have been through crises before and have managed quite well without the need for stochastic calculus or other, even more esoteric formulations. Just as it's absurd to assume that a Ph.D. in chemistry will make a grandmother a better baker, it's equally absurd to assume that the adoption of complicated processes will solve the issues in risk management.

Complex systems require flexibility and an ability to react in an intuitive way to how the entire situation is evolving. Complicated systems, however, try to break down components into a set of natural laws, leading to rigidity. They deal with the components of risk separately.

Markets are mainly simple calls for an appreciation of the need for approximation. An old saying is relevant: “It is better to be approximately right than precisely wrong.” Recognition that the markets may at times be complex implies that precision will be misleading. The assumption

of complicated, however, is that precision in calculation is not only achievable, but also desirable.

There needs to be an acceptance by bankers, regulators, and risk managers that risk cannot be calculated to arbitrary degrees of precision. Sometimes we simply have to accept imprecision. The quest for more precision through the implementation of more complicated models and rules does not help—and, in fact, may hurt—by giving the false impression of precision.

The fact that risk operates within a system of complexity that does not allow for predictability and control does not mean that the situation is hopeless. Wisdom and elasticity are required. Reaction, creativity, and flexibility replace control. The task becomes managing the uncertainty rather than boxing it up and attempting to eliminate it.

In a complicated system, the focus is on knowing and calculating rather than on thinking and acting, as required in a complex system. Furthermore, there's a relative inaction required of a simple system. Thus, the best response often is no response. Let the financial system come back into equilibrium on its own, rather than try to force a complicated response, which may turn into a highly nonlinear and complex response, such as the reaction to the collapse of Lehman Brothers.

Complicated systems are suited to robotic calculation, while in simple and complex systems the focus needs to be on people. In banking and other parts of the markets, the attention has moved away from understanding the financial needs and risks of the clients (either individually or collectively) to an automated calculation of risk parameters.

Simple mathematical relationships work most of the time—for example, the ratios for liquidity, safety, profitability, and efficiency that are used to determine interest coverage. Yet in a complex system, trying to understand the interrelationships between large groups of people by applying more complicated mathematics is unlikely to improve on the simple rules of thumb that exist. A basic understanding of demographics in a bank's portfolio or in society as a whole is a lot more practical and useful than the most sophisticated econometric model. Responding to the shifting needs of society with a form of empathic understanding will lead to more useful and effective risk practices.

People cause crises; equations do not. Likewise, only people can solve crises; equations and rules cannot. Sociology is a science that recognizes complexity and thus has little to almost none of the mathematical sophistication that risk management does. So one could argue that there is a need for more sociologists and fewer mathematicians in the bank's risk management department.

Finally, there is the current focus on reductionism when a holistic approach is called for. The emphasis today is on

isolating problems and dealing with them in isolation. In a complex framework, there's a need to deal with issues in a holistic manner. Complexity continually demonstrates that all of the parts are interrelated and a reductionist approach will not work. In fact, it will lead to frustration at best and chaos at worst. Attempting to fix one part of a risk system at a time is like phasing in right-side-of-the-road driving in Britain by having only trucks drive on that side for the first month.

Conclusion

While great strides have been made in cataloguing and calculating risk, these developments have not necessarily produced equivalent improvements in the actual managing of risk.

The current emphasis in risk management is on building larger and more robust models. This mindset works well for complicated systems, but the world of finance acts more like a simple system most of the time and ultimately as a complex system the rest of the time. Complicated responses do not work well for uncomplicated situations and may only make them worse.

Risk management's focus has been on precision, but it must learn to accept approximation. While the ideal has been predictability and controllability, the true need is for flexibility. Knowledge and calculation have been praised, but thinking and action are more appropriate.

Eric Hoffer summed it up quite nicely: "In times of change learners inherit the earth, while the learned find themselves beautifully equipped to deal with a world that no longer exists."

Rather than sticking with reductionism, the industry has to adopt holistic thinking and focus not on automation but on people. It's time for a change in the mind-set and thinking of managers, boards, regulators, and risk managers. It's not complicated! ❖



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Note

1. This analogy is adapted from the book *Getting to Maybe: How the World Is Changed*, by Frances Westley, Brenda Zimmerman, and Michael Quinn Patton (Vintage Canada, 2007).