

# "FORESIGHT"

## A VIEW FROM THE EMERGING SCIENCES OF COMPLEXITY

by Mike McMaster

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### SUMMARY INTRODUCTION

Those who have a Crystal ball can look into the future. The rest of us are consigned to looking into the past. As a predictor of the future, however, looking into the past ranges from the extremely dangerous to the merely useless when conditions are changing rapidly and adaptively. But then, how else are we to make plans which provide for success in the future?

What we want to be able to do is see the **structure of the future** as it is currently manifest in the structures and processes of the times. Each era of history has its own strategic issues and its own possibilities for approaching the challenge of future success. Each is based on new understandings that match the philosophy, science and technology of the times.

Foresight is the ability to see the **shadow of the future** being cast based on the expectation of continuous integration.<sup>1</sup> The future will be related to the past when we get there and, while none of the specifics can be foretold, understanding the unfolding patterns can provide a great advantage for the impact of current action on future success.

The implications for strategy and organization are profound.

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### FUTURE AS POSSIBILITY

Time, in the Western world, has been as an arrow going from a past into a future. This directionality of time suggests a relationship between the past and the future which enable us to forecast and plan. Like most of the scientific ideas of our heritage, this one is useful for a certain scale of things. Also like most of this scientific heritage, we are discovering that there are scales and conditions where the linear idea is not so useful. In most of the past century or

more, the pace of change has been so slow that seeing time as a linear directional flow could be sufficiently useful. The extension of the past into the future with variation was sufficient for effective strategy.

The corporate giants of America remained dominant by betting that more of the same only better and cheaper would succeed. And it did. IBM need only continue to refine its product and its service. Avon only needed more sales people and the constant application of its formula of success. The only requirement of Sears was to continue to sell basic goods to middle America. Midas Muffler only needed to keep manufacturing. IBM, Avon and Sears required negative results to consider significant change and each is still largely trapped in old interpretations of its environment and its business. Midas saw the **structure of the future** and changed its major form of doing business-into a franchise system-long before the idea was thought of by others. Midas transformed from thinking of itself as a manufacturer to thinking of itself as a marketing business.

In the historically predictable environment of recent decades, strategy became an exercise in prediction and planning. It was not always so. In other times and other views of time, strategy was a matter of knowing the questions to ask and a matter of answering questions at a depth which provided unique understanding of what was occurring. Strategists of the past were required to be profound thinkers. Having information was not enough. Planning was peripheral. Depth of understanding was everything.

Strategy is returning to its former position of importance and demanding rigour. The rate of change in the world is destroying the ability to predict by casting forward from the past. The kind of change is demanding new ways of looking, new ways of thinking and new ways of understanding temporality and change. Visa International, Connor Peripherals, Microsoft and that handful of companies which have come from nowhere to dominance did not arrive there by strategies which depended on a corporate past nor the accepted strategies of their industries. Nor did Japan burst on the scene based on strategies which were extensions of the past.

To understand the rate of change that is occurring, we must understand something of the history of ideas that are the source of the technology that is changing so rapidly. The rate of change in human affairs is the result of new thinking. The rate of change of new technology and the changes it is causing are not merely a faster version of what has always been occurring. Technology changes are what have been happening all along but our ideas of change itself have changed along with the thinking that is at the heart of the explosion of the technology change. Lyotard said that society is now a "society of computers, information, scientific knowledge, and rapid change due to new advances in science and technology."<sup>2</sup>

The cause and effect of linearity is giving way to a new cause and effect. Even the multi-linear cause and effect of dynamic systems theory is insufficient. Emergence is the cause and effect of complex adaptive systems <sup>3</sup> where time is a function of possibility rather than a mere extension of the past. We thought, consistent with a linear time and the linear cause and effect that goes

with it, that if we had enough information about the past then we could predict the future. Foresight was a matter of quantity and quality of information.

The past, however, is an interpretation with an ever widening **cone of variation** extended back from the present moment. This cone is constituted of events and interpretations which expands backwards from the current moment or current interpretation. The future is an ever widening **cone of possibility** extended forward from the present moment. There is no future waiting to happen. There are probabilities which are related to other current moments **for which we cannot have total information** but the further "ahead" we project, the more of these are likely to dramatically disrupt any extension of our own current moment and our extensions of the past. The greater influence on the future that will happen are those other interpretations being made right now by other entities similar to ourselves.

You can project your own life ahead for a short time with great confidence **except for the possibility** that some event—a bomb planted in the next room without your knowledge or a driver already on the way who will crash into you or a loved one or an undiagnosed health condition that is about to activate —already in motion will affect that projection. The affairs of nature and society are no less disruptive. The Chinese and the ex-Soviets were not prepared for what happened. The Bosnians and the Serbs couldn't see what was going to happen. IBM didn't see the potential impact of the PC. GM didn't predict the Honda. America didn't see the Japanese as competitors. In each of these cases, there was no shortage of strategists present—at least in American corporate and political life.

What can be predicted in a linear cause and effect approach is an extension of the past. In other words, we can predict with accuracy what will persist and the kinds of relatively minor changes that can be expected in those things that we expect to persist. The kind of change that we can predict is alterations of existing things or the end of the existence of a thing. The end of the serial on radio was predictable as competing mediums were developed. The end of the hula hoop was predictable as a trivial item. The improvements in technology for radios, engines, automobiles, aeroplanes and kitchen appliances were all predictable in time. Those things that are predictable by "anybody"—even though many fail to see them in time—are because the **structure of the future** is more or less obvious at all times.

I once saw an interview with a typesetter who had just lost his job to a computer based system. He was angry, hurt and bewildered. His genuine surprise tugged emotion from the hardest heart. Yet, it took nothing more than a small awareness to know that computers had been taking over jobs such as his for about 10 years. The source of his bewilderment was his lack of connection to the **structures of the future** that were in place long before the first typesetting job was lost let alone his own job.

The explosion of computers, FAX, Internet and fibre optics was not predictable. Even less predictable was their impact on areas previously little affected by information and communication. The huge losses of IBM and Sears as well as the fall of the Soviet Union and the Berlin wall were not predictable. Neither the strategists and executives of these companies and

countries nor the CIA managed to predict the events. Those concerned-those whose real commitments made it imperative to predict-failed to predict what in hindsight were predictable. (Saying these were not predictable is a pragmatic statement. That is, in retrospect they were predictable, a few people did predict them, but the fact was that the predictors could not be heard and the normal means of prediction failed to produce successful action.) The foresight to predict these things existed but was so little shared that those who possessed it could not get listened to.

A major challenge of prediction for the day is to identify what organizational forms will dominate the next few decades and what forms will arise from those. New organizational forms are now being generated at a pace that has never been seen in the past and we cannot predict what forms will come to dominate corporate life. Yet our survival depends on successful action in this area.

The **structure of the future** for new organizational principles and forms is partially already here in the technologies of computers and communication. It is also in theories and research being done in interpretative philosophy and complexity. The strategic advantage of the next couple of decades will turn out to have been gained by those who say that the major questions have to do with organization. And the time for action in that arena is now.

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## PREDICTION AS INTERPRETATION

There is an approach, however, which is a match for this understanding, this ability to predict. And the results of that approach are consistent with the kind of foresight needed by strategists. That is, the foresight needed is to know the direction of things in time for adjustment to be made and for survival and success to be achieved.

What can be predicted is not end results and end forms. What can be predicted is process, organization, integration and continuation of kind rather than specifics. The scale of prediction has changed. Foresight is a matter of interpretation rather than information. There are tools of interpretation that provide foresight which is not merely extended hindsight. What can be predicted in a compound complex adaptive world? This is a world of **emergent cause and effect** with constant occurrences which are not extensions of the past but creations of the past. Not until we get beyond our merely linear even multi-linear-cause and effect thinking and move to interpretative approaches that can include emergent cause and effect will we become competent in this required field of prediction.

Emergence is a new kind of cause and effect. It is the cause and effect of living entities and the phenomena related to them. It is that kind of cause and effect where "the interaction of the elements or entities gives rise to higher-level properties **that are not apparent in the lower levels nor predictable from those levels.**<sup>4</sup> Examples include intelligence from a grouping of neurones, life from a collection of cells, prices and a marketplace from a collection of

merchants, Internet from a collection of computers, the phenomenon of Microsoft from a simple programme and a few suppliers to an exploding market. At a very simple level a "team" emerges from the interaction of some groups of people but, no matter how many structured approaches we apply, many times no such phenomenon occurs.

Consider how it is possible for the Swedish company Stora to have survived for over 700 years.<sup>5</sup> Obviously it could not have predicted a future this long. Conditions in the world have dramatically changed many times in that time period. Yet Stora remains and prospers. It's strategies have altered over time. The strategy of Stora has been emergent rather than predictive. By being aware of its own basic purpose-the survival of the enterprise and the provision of livelihood for its members-and the **structure of the future**, the corporation has allowed what emerges from its environment and its own actions to be the source of its future action.

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## THE STRUCTURE OF THE FUTURE

The challenge of foresight is to see the **structure of the future** rather than the content, detail or shape of the future. This demands that we escape from the tyranny of form, of the physical, of the material and that we develop an appreciation of process, change and emergence. The structure of the future is contained in the present and in the past reinterpreted through the lenses provided by a new view of the present. The new view is seeing the nature of the environment as a compound complex adaptive system.<sup>6</sup>

The **structure of the future** is the relationships of an existing compound complex adaptive system. That is, it is the relationships between an organism that survives by adapting, the other similar organism that are part of its environment, and the larger adapting systems-industries, economies, communities-which it is influenced by and which it influences. The structure includes relationships to technology and the larger forces which affect the larger environmental context of the company. The structure also includes those forces which affect the smaller units of the enterprise-its individual employees.

Let's use IBM as an example. Now that we all know what IBM should have done based in the much easier "aftersight", let's consider how the **structure of the future** might have provided foresight. How we'll do it is to begin with an historical understanding of the business that IBM was in and the ways that it conducted that business. These were available to anybody **at the time** but did not reveal themselves in the approaches being used. Specifically, those approaches were focused on existing customers and future predictions of demand based on trends and analysis. [The original predictions based on similar approaches were extraordinarily bad-a total demand for 15 machines. Everyone "knew" the forecasting approach was now safer because there was existing experience and data.] The following are not in any necessary order. It is the interplay of factors that produce the patterns of meaning in complex adaptive systems.<sup>7</sup>

- The mainframe and its increasing power were the beginnings of an industry. The conditions in which it was succeeding were those that existed before computers existed or were in general use. From the perspective of complex adaptive systems, that means that the product is impacting its own environment and the new machines are encountering different conditions. The mainframe itself was creating the possibility and usefulness of smaller machines.
- Small computers were developed as "dumb" terminals to support the mainframe and were of themselves unimportant. However, the trend was to make these terminals increasingly intelligent. Again, the activity of an original entity changes its own environment and, in this case, it moves from being a "server" to becoming a competitor. But the move is unrecognised due to the language and thinking of "server to a master machine".
- Computer chips were becoming smaller, cheaper and integrated. That allowed the above two factors to increase velocity of development and became another element of the **structure of the future** that was different than the structure of the past. These chips were not a crucial part of large machine development and so were largely ignored as a factor. (The integrated circuit was invented for computer use but the first uses were washing machines and elevator control. It took about 10 years for the use in computers to catch on.)
- The increase in peripheral effectiveness for input, output and storing data increased ease of use and decreased the size of the machine so that more and more people and businesses could use them. This altered the structure of the marketplace and suggested changes in future machine design and use.
- Breakthroughs in technology in other fields, such as communications, dramatically impacted data and information which were at the heart of computers usefulness. As these changed, the number of people using them increased and the particular uses multiplied.
- Organizational forms began to change as people became educated in computers and their use. This began to move the market from specialised experts applying the processing power to specialised problems towards moving computers into the hands-and minds-of many new people and organizations. Even more, the organization implications changed the way that people could co-ordinate their action and these beginnings demanded still further changes to computer availability and use.

While not complete, the list suffices. The point is that the **structure of the future** altered beyond recognition from the structure that existed in the early days of the computer. This suggests specific directions that the future will take. Much more importantly, however, it suggests that the future **will** take different directions. This calls for a great increase in awareness, creativity and searching for new possibilities. As is frequently the case, the success of the past casts a shadow over the future that makes it forbidding and difficult to see.

Robert Axelrod's happy term, "shadow of the future" is useful here.<sup>8</sup> He has studied extensively the nature of co-operation and competition as important elements of the **structure of the future**. His work has explored how strategies compete. His work has developed to new levels

recently by incorporating work with complex adaptive systems models in conjunction with the Santa Fe Institute. The issue of concern is how single elements which are themselves adaptive can succeed in an environment of other adaptive beings. His findings indicate that if there is no view that current action will have future consequences to other participants and hence back to oneself in the future, then aggression and destructive competition will pay. If, however, there are future consequences to current actions from other players, then the future casts a "shadow" backwards to our current action and suggests co-operative behaviour as the fundamental context. Within this framework, competition is still going strong but the nature of viable competition changes.

Strategies compete with each other in a very impersonal way. That is, the strategies themselves must be adaptive and emergent if they are to succeed in a world of other adaptive strategies. In the current era of change, one of the main features of strategies is that they be emergent. That is, a strategy is no longer a matter of analysing the past trends and projecting them into the future. The nature of analysis has changed. The nature of projection has changed. The nature of the production of strategy itself has changed.

What is being called for in this approach is a shift from prediction to interpretation. Interpretation here is not meant as the application of science or logic to analysis. What is being referred to is a creative process of interpretation which goes beyond scenario planning into scenario generation and exploration. Scenario planning was an early step into the domain of realising that interpretation of trends, processes and conditions was more powerful than the interpretation of things like market data to assist in strategy development. Current status and recent history were seen to be trivial compared to larger trends. The success of scenario planning had to do with the ability to construct likely models of the future rather than in predicting which particular model would be "right".

Such an approach allowed for the adaptability of strategy to a world of emergence and did not require a foresight that didn't exist. Those who made good selections of principles from which to generate scenarios found that they were prepared for events as they unfolded and for which specific, detailed and costly preparation was not necessary.

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## THE ORGANIZATION OF FORESIGHT

The interpretative approach required today is to see that interpretation has moved to a deeper level of abstraction. That is, it is our interpretations of the way that things work, of the nature of things, of what is **structure** and what is merely form or result, that determines our approach to strategy. Foresight as strategy has gone through cycles. At its best times, foresight has emerged from considering the profound questions of the times. At its worst time, foresight has been merely a matter of prediction based on analysis of trends and their extension. Strategy at its worst has been merely a matter of planning based on "more of the same" with little concern for foresight or even current understanding.

We are coming into a high point for strategy where foresight is demanded. The source of this foresight will be new thinking, new and more powerful questions, and an understanding of the relationships of structure and design as well as all the connections to internal and external entities. Actually, the choice of interpretation models for what is internal and what **is** external will be one of the significant elements of foresight. Those who want to attain foresight would do well to consider the explosion of life forms in the Cambrian era. The relative amount of change in life forms of that era-the beginning of almost all life forms as we know them-will be instructive in this period of rapid development of both technology and the life forms known as organizations.

Life **is** organization. An explosion of life forms is an explosion of kinds of organization. In the Cambrian era, it was organization of cells for survival. In the current era, its organization of human beings for survival in mutual productive enterprise.<sup>9</sup> This explosion of forms will result in a number of new relatively stable models **after** there have been many tried. It isn't the survival of the form that matters, however, because human organizations can change their forms many times. What matters, in the arena of foresight, is that the forms of organization match the condition of the environment and the purposes of the enterprise. The particular matches that emerge with the aid of design will be those that have connected to the environment in ways that produce access to the **structure of the future**. This means that they are connected to many environments and can generate information for themselves that extend their ability to survive the current environment and those that are coming. The greatest reward will go to those who develop the organizational forms that have not only foresight but "future reach". That is, those that influence their environments-mainly other human organizations- and thereby have impact on the **structure of the future**. These are the companies that influence what happens to their industry. They generate information and use it in ways which appear to be demonstrating foresight.

This new approach directs us to the structures of our organizations and their processes as the sources not only of responses to the world, of implementers of strategy, but also of strategy itself. When strategy is emergent it requires organization which is a match for the **structure of the future** and therefore expresses that future in its form.

Organization, when thought about at all, has been thought of as the implementer of strategy. A good organization design is one that carries out what those with foresight-strategists and executives-have decided based on their predictions. A really good organization also provides information and feedback to these experts. Neither of these will be good enough in the future. The organization itself is the source of crucial information. The organization itself has better foresight than any of the individuals within it. The new challenge is to design an organization that is intelligent, that adds to the intelligence of each person and that processes information in ways from which foresight and the strategy to go with it emerge.

3M may be the example of this which is easiest to understand. It has a very large percentage of its current sales mix, at any time, provided by new products. The products are not the result of individual foresight nor, specifically, are any of them the result of corporate strategy. The

corporate strategy is to create organizational design and management practices that continually encourage new product development. The foresight of 3M is to see that the organization itself is the source of invention, information and activity that is connected to the **structure of the future** and thus provides all of the foresight required in the places where the action based on that foresight will occur. Policies such as devoting 15% of time and resources to unaccounted for efforts at innovation will have the desired result emerge rather than be directed and controlled into being.

The source of the challenge of foresight is not so much the rate of change as the vast size of the space of possibility. The particular challenge to foresight is to select the portion of the space of possibility to explore and then to develop approaches that explore more of this space faster than others. This will appear as effective foresight in the marketplace. The selection of the space of possibility which is likely to produce rich returns for the investment in its exploration is the key question for strategists today.

The problem is increased because the vast space of possibility is not standing still. Selecting the space of possibility to explore needs to take into account that others are also looking for the best space to explore and that their success or failure will affect the outcome of your choice. The selecting process and the selection will also affect the impact of the choice that you make on your own organization. Your success or failure will impact your competitive environment and may then alter the value of the choices.

Making these choices requires an understanding of corporate intentions, organizational design and those portions of the **structure of the future** which are the best fit for the previous two. That is a matter of deep understanding of the world (including other organizations), your own organization and the development of interpretations that relate the two.

Theories being developed by John Holland<sup>10</sup>, Robert Axelrod, Stuart Kauffman<sup>11</sup> and others exploring the nature of complex adaptive systems at Michigan University, the Santa Fe Institute and other locations provide new approaches to exploring large spaces of possibility. These theories even help select strategies for choosing which space and how much of it should be attempted based on current states of technology and organization. However, the fundamental choice of the space of possibility to explore is beyond these efforts. The fundamental choice is based on an interpretative understanding that is prior to any method of organization and any method of exploration. It is not until one invents the questions to be answered-the questions of the times that one can design organizations to match. It is not until one invents the organizations to match the questions that one can design strategies for searching possibilities.

The **structure of the future** is a matter of personal, or corporate, interpretation that provides the beginning point for those approaches that develop and exhibit foresight. Most fail to see that it is those conversations which explore possibility and the interpretations or theories that are generated from these conversations that provide the selection criteria for which spaces of possibility get explored. The flexibility at this kind of conversation, distributed throughout an organization, provides the richest basis for generation and for choice as well as developing the

natural ability of the organization to pursue those choices. The final frontier of foresight is understanding the **structure of the future** as a set of generated interpretations that never settles down to a correct or even a best one. Being a set of generated interpretations that doesn't settle down, and being about a space of possibility too vast to explore (even by theoretical means), we can engage the whole organization in a process of continuous creation that positions us to forever be connected to the past, present and future.

It has been said that Merlin's foresight was merely a matter of revealing, at the appropriate times, what he already knew that others didn't. Another way of saying that is that he knew the future was already present and that his power was in interpreting that present and revealing his interpretations in theatrical manner. His legendary magical powers were assigned because he influenced the actual future of his people not because of correct predictions of that future. Any foresight we are attributed will be for similar reasons. We will be seen to have foresight if we develop the constantly adapting interpretations that keep us connected to a fast changing **structure of the future**. It is the success of our actions over time, revealed to the rest of the world at appropriate times that will have our organizations be successful throughout rapidly changing times-if not turn us into legendary figures of the arts of foresight.

TO [OUTLINE](#)

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#### Footnotes:

1. This term is from recent work of Robert Axelrod that was presented at the "Complexity and Strategy" conferences jointly sponsored by the author with his partners and the Santa Fe Institute in San Francisco and London. It extends work presented in his earlier book 'The Evolution of Co-operation' and suggested to me the term I'm using here "**the structure of the future**." The relationship of the two will become apparent later in the article.
2. from "Postmodern Theory" by Best and Kellner
3. Complex adaptive systems are those systems which survive by adaptation or learning. These systems largely create their own environment due to the fact the most significant components of their environment are others entities like themselves. This definition of such systems is my interpretation of the work being done at SFI and by others such as Francisco Varela of Ecole Polytechnique in Paris presented at the London conference on 'Complexity and Strategy.'
4. Christopher Langton and others at SFI have developed computer programmes which demonstrate this emergent cause and effect. These produce simulation platforms that can be employed to investigate the phenomena in a wide variety of areas.

5. From a presentation of Arie de Geus, ex Shell executive, at the "Complexity and Strategy" conference in London. A brief look at this material can be obtained from the RSA in London and more detail from Arie's (so far untitled) soon to be published book.

6. Compound complex adaptive systems is the term Murray Gell-Mann of the Santa Fe Institute used at the "Complexity and Strategy" conferences for those domains which arise from the interplay of other complex adaptive systems and exist by interacting with an environment of other complex adaptive systems. He explores this more fully in his latest book "The Quark and the Jaguar."

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7. I use the term "system" here in the broadest sense as defined by J. W. Gibbs quoted in John Warfield's book A Science of Generic Design "any portion of the material universe which we choose to separate in thought from the rest of the universe for the purpose of considering and discussing the various changes which may occur within it under various conditions" and, as John and I agree, we would omit the word "material" from the quote.

8. see reference [1](#) - He uses the term to refer to the degree to which we expect our current actions to affect our environment and therefor affect our future. He has extended this to exploring the co-evolving strategies and how they affect each other depending on assumptions about future learning.

9. Presented by the author at the "Complexity and Strategy" conferences and more fully developed in his recent book "**The Intelligence Advantage: Organising for Complexity**".

10. Presented at the "Complexity and Strategy" conferences and outlined in his new book "**Hidden Order: How Adaptation Builds Complexity**".

11. Presented at the "Complexity and Strategy" conferences and more fully developed in his latest book, "**At Home in the Universe**".

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