

Playing the Wild Card

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Abstract

Life never quite runs to plan. Just when we think that we can see the road ahead, something turns up to make a mockery of our planning. These unforeseen circumstances can be both good and bad for us. Such are the vagaries of life. These surprises can have a major impact on our lives or they can be fairly minor in effect. We tend to take the minor surprises in our stride, but the more significant ones lead us to a period of reevaluation. In futures literature, surprising events tend to be known as wild card events. They are defined as low-probability, high-impact events that have the potential to completely disrupt our plans for the future. Much of futures work is about anticipating a range of possible futures. We normally call these visions of the future scenarios. When we inject wild card events into our scenario set, we normally call the result a set of wild card scenarios. Their purpose is not to replace the original scenarios but to enhance our understanding of them. In this way, if we play our wild cards right, the future ought not to be as surprising as it could be.

Keywords

wild card scenarios, anticipating crises, futures planning

Introduction

An awful lot about futuring can be learned from considering the simple act of flipping a coin. When we think about flipping a coin, we would normally expect two possible outcomes (futures, you might say)—a head or a tail. And yet, these are not the only possible outcomes. The coin could be flipped, fall to the ground, bounce on a road, and roll into a drain. Alternatively, the coin could land on its side showing neither a head nor a tail. Again, the coin could be spinning in the air to have a bird swoop down and catch it at that point. In the terminology of futures, we can say that there are two probable futures (either a head or a tail being the most likely outcomes), but a very large number of other possible futures, where the boundary to that number is the limit of our imagination. When we codify those possible future outcomes, we create a set of scenarios to describe those possible futures. We are not

predicting a definite future, we are simply anticipating what those alternative futures might look like.

Life never quite runs to plan. Just when we think that we can see the road ahead, something turns up to make a mockery of our planning. These unforeseen circumstances can be both good and bad for us. We may be pleasantly surprised if our football team wins a match that we had thought that it should lose, or we may be disappointed if our cricket team loses a match that they ought to have won. Such are the vagaries of life. The strength of the scenario approach to futuring is that it allows us to consider a wide variety of possible futures.

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These surprises can have a major impact on our lives, or they can be fairly minor in effect. We tend to take the minor surprises in our stride, but the more significant ones lead us to a period of reevaluation. Winning a major lottery prize has the potential to change our lives—both for the good and otherwise—while finding a banknote in the back of a sofa is hardly likely to lead us to give up working for a living. What is true for us as individuals is also true for us collectively, both in smaller groups such as families and workgroups, and in much larger groups such as communities and society in general. We all have the capacity to experience surprising events.

The surprising events tend to be known as wild card events. They are defined as low-probability, high-impact events that have the potential to completely disrupt our plans for the future.¹ Of course, much of futures work is about anticipating a range of possible futures. We normally call these visions of the future “scenarios.” When we inject wild card events into our scenario set, we normally call the result a set of wild card scenarios.

If we are to avoid being unduly surprised by unanticipated events as the future unfolds, it is usually wise to introduce an element of wild card thinking into a scenario set. We shall look more closely at why wild cards are used in the next section. From there, we shall move on to consider the different types of wild cards that a futures project can use. Not everyone is surprised when wild card events happen. In the fourth section, we shall consider who is likely to be surprised by wild card events, before, in the final section, considering how wild card scenarios could be constructed. In this way, we shall be able to see what wild cards are, and how we might play them.

The Purpose of Wild Cards

The use of wild card scenarios lessens the chance of being blind-sided by future events. While we might not know for certain exactly where the surprises will come, it is important to introduce an element of flexibility into our thinking to provide us with a degree of resilience to potential surprises. Wild cards are a

useful device for anticipating future events. In this section, we shall examine this view in some depth.

When we produce a set of scenarios, we will have developed a range of visions of the future. These are not forecasts of the future, but pictures of how, under a certain set of assumptions, that future could unfold. The question then arises of how useful those scenarios are. If we could travel in time to the future date to see what actually happened, or if we waited for that anticipated future to unfold, we would be able to utilize the benefits of hindsight to gauge the usefulness of that set of scenarios. Of course, we presently do not have the capacity to travel in time. We also need to gauge the usefulness of the scenario set as the future unfolds rather than after it, particularly in the context of constructing policy and laying down strategic plans. So we are still left with the problem of finding a means to determine how useful our scenarios are. One way of tackling this problem is to use a set of wild cards to stress test the scenario set. We can use wild card scenarios to broaden and deepen our scenario set. They help us find the limits to the usefulness of the scenario set by finding the point at which the scenarios break down.² This is an exercise to determine the reliance that can be placed upon the scenario set. We need to consider this in a little more detail.

When we think about the future, almost any future event is possible—given enough imagination. However, this is not a useful approach to the future because it does not help us to anticipate a set of plausible futures for which we can develop a number of policy responses. By limiting ourselves to plausible futures (and excluding a set of implausible futures), we have started to define a set of boundaries to the scenarios we are considering. As the process of scenario building continues, we further limit the future possibilities under consideration through subsequent rounds of redefining and limiting those boundaries. The result is a set of bounded visions of the future in our scenario set.

The introduction of wild card events allows us to expand those boundaries from within the framework of the scenario set by introducing a number of implausible, but credible, future

surprises. The point of this exercise is to broaden the scenario set to the point at which the individual scenarios in the scenario set cease to be convincing. At that point, we will have found one of the limits of the usefulness of the scenarios.

For example, many current scenarios for business assume that China will remain a dominant force in the global economy for some time to come. What happens if it doesn't? What happens if China follows the same developmental path as Japan (stellar growth falls away and modest growth ensues, followed by an economic implosion and stagnation)? If we accept the possibility of that process as a wild card event, then it would be prudent to introduce it, at least as an element of wild card thinking, into our scenario set. The question then becomes one of the degree to which our business scenarios can withstand the economic implosion of China, especially if it happens over a very short period of time. It allows us to consider the possibility of a major discontinuity in an important and established trend.

The injection of a number of wild card events into our scenario set allows us to expand the boundaries and limitations that we have placed upon them. In this way, we can broaden our scenario set to gain a better understanding of their vulnerability to the core assumptions being wrong. They also help us to construct a number of milestones into the future by which we can gauge our strategic response to unfolding events.

Each of the scenarios within a scenario set has its own internal logic that makes the core story of the scenario convincing. Essential to this core story is a model of how it is envisaged that the world will work at that future date. What happens if the model is wrongly formulated? It could be that one or more key elements of the model is not an adequate description of the world, in which case it is highly likely that we will experience a number of surprises if we act upon that flawed understanding of the world. For example, in the first decade of this century, most financial scenarios were based upon the assumption that the Efficient Market Hypothesis was correct.³ An implication of this was that markets would correctly, and adequately, price

risk into financial instruments. We now know that this is not the case. Had a wild card event (that the Efficient Market Hypothesis was wrong) been introduced to these financial scenarios, then, perhaps, the financial meltdown of 2007–2008 might have been less severe. Some did model this wild card, and those institutions that had played it in their scenarios did very nicely through the financial meltdown.⁴

The introduction of a number of wild card events allows us to test the robustness of the internal workings of the individual scenarios in the scenario set. In this way, we can deepen the scenarios to gain a better understanding of their internal workings. This is especially important if we are to use the scenarios to provide a roadmap into the future at the level of developing policy and constructing strategic plans for the future.

Wild card scenarios are best seen as a complement and an enhancement of a given scenario set. They can be used to broaden and deepen our understanding of the scenarios that we have produced. They can be used to stress test the scenario set. They provide a guide to the future usefulness of that set in the development of policy and strategic plans. They can alert us to potential discontinuities in our thinking and allow us to introduce unintended consequences into complex adaptive systems by incorporating extreme events into the scenario set. It is almost as if a set of wild card scenarios could act as an insurance against the original scenario set being wrong.

The Types of Wild Cards

So far, we have assumed that all types of wild card events are broadly similar. This assumption is not quite correct because not all wild cards are the same. It is now time to start to open up original definition of wild card events, examine exactly what the components consist of, and consider how they might be used in a set of wild card scenarios.

We originally stated that wild card events are those that have a low probability of occurring and a high impact on our ability to continue with our normal daily lives. They have such an impact on us that we have to readjust

our plans for the future.⁵ This is a very wide range of events. It could range from the possibility of an alien invasion of conquest (the “Mars Attacks!” scenario⁶) to a global financial collapse (a scenario in which we see ourselves as currently living). The main difference between the two is that we are likely to regard, from the perspective of formulating policy and creating a strategic plan to deal with the eventuality, the global financial collapse scenario as more credible than the Mars Attacks! scenario. This distinction leads futurists to distinguish between Type I wild card events (low probability, high impact, high credibility—the global financial collapse scenario mentioned above) and Type II wild card events (low probability, high impact, low credibility—the Mars Attacks! scenario mentioned above).⁷

In many cases, the purpose of devising a set of wild card scenarios is to assist a policy formulation process of the organization commissioning the study, which means that we would normally be interested in developing a set of Type I wild card scenarios rather than Type II wild card scenarios. We stated earlier that one of the uses of wild card scenarios would be to stress test a set of scenarios. To be more precise in our language, we would need to develop a set of Type I wild card scenarios. For example, in the stated case of a global financial collapse, much policy effort is currently being expended on bringing the global economy back to a state of growth. What would happen if that policy made matters worse rather than better (a global deflationary wild card)? What would happen if a runaway global inflation was the unintended consequence of current policy actions (a hyper-inflation wild card)? A consideration of these Type I wild card events would be useful in ensuring that the policy medicine does not kill the economic patient.

Every now and then, the insertion of a set of Type II wild card scenarios can act to introduce an element of novel and disruptive thinking into the policy formulation process. For example, in the Mars Attacks! scenario, one could ask what the consequences for, say, the banking system would be of an alien invasion of conquest. How would it affect family life? The list of questions is almost endless, but the

answers do yield something useful—an analysis of the way in which we live from the perspective of an outsider. If the goal is institutional reform, then Type II wild card scenarios are a useful way of framing that conversation.

It would be convenient if the conversation about the types of wild card events were to stop here. Unfortunately it does not. We ought to consider the whole issue of what we mean by a low probability. By definition, wild card events do not happen very frequently. This means that there is a very limited data set on which we can base our probability calculations. In many respects, the result of this exercise is highly subjective and introduces another dimension that we have to take into account.

Society in general sees a close connection between seers, prophets, visionaries, and maniacs. Futurists often complain of the “Curse of Cassandra”—to be perpetually right in forecasting the future, but nobody ever believes the forecasts.⁸ This adds another dimension to wild card events—the question of disputed credibility. What one group sees as an absolute certainty is dismissed as pie in the sky by the vast majority of people. Futurists have a term for this—*paradigm blindness*—where our belief in our mental model of the world is so ingrained that we cannot conceptualize an alternative.

Those suffering from paradigm blindness would interpret a wild card event as a Type II (low probability, high impact, low credibility) wild card. Those who could see through the paradigm blindness would see the same event as a Type III (high probability, high impact, disputed credibility) wild card event. To these people, that event has a high probability of occurrence, which would lead them to dispute the low credibility ascribed to the event by those who see the same event as a Type II wild card event. We ought to note that the distinction between the “low” probability of the Type II wild card event and the “high” probability of the Type III wild card event is a very fine one. Both are subjective probabilities, and the likelihood of the wild card event actually occurring is not very different between the two. It is more a question of whether the event

occurring is seen as believable. Ascribing a “high” probability to an event is more the statement of the belief that it could happen rather than ascribing a higher chance of it actually happening.

What happens if the visionaries win the argument? A situation could develop where we can anticipate a Type IV wild card event. This is where an event is ascribed a high probability (it is very likely to happen), a high impact (it will do us a lot of harm—or good), and a high degree of credibility (we can all see it happening). These are, perhaps, the most dangerous wild card events. It is a situation where we can all see the event from a long way off, but we are helpless to do anything about it. Many of the global problems that we currently face (climate change, global poverty, global security, and so on) have the nature of Type IV wild card events. We can all see them, we all agree that they have the potential to be very disruptive, and we all find them highly credible. And yet, there appears to be little we can do to ameliorate them. In this respect, they are wicked problems.⁹

In our discussion of wild card events so far, we have not questioned the view that the events have a high impact. There is the possibility of a surprising event that has a low impact, which we ought to consider. By definition, a low impact event will not affect and disrupt our plans for the future. It may, however, be a portent of a disruptive future that we have yet to see. In this case, the event is best viewed as a weak signal of an emergent future rather than a wild card event.¹⁰ There is a close relationship between weak signals and wild card events, the difference being the degree of impact that they have upon us. It is beyond the scope of this piece to consider this further, but it is also a point that we ought to keep in mind.

Although in popular terms, we see wild card events as Type I and Type II events, we do need to bear in mind that Type III and Type IV events are in the mix as well. What we dismiss as the ravings of a madman might actually be a description of a Type III wild card event that we just haven’t seen as yet. The key to the difference between Type I and Type II, and Type III and Type IV wild card events is the issue of

whether we ascribe to the event a low or high probability—in other words, whether or not the event surprises us. We now need to move on to exactly who it is that is surprised by the event.

Who Is Surprised by Wild Cards?

It is unrealistic to presume that all emerging events will become apparent to all people at the same time. We have assumed this state so far, but now is a good time to relax that assumption, and to consider who is likely to be surprised by the wild card events.¹¹

It is generally useful to have a model of how issues emerge into the public consciousness. One model that we find particularly useful is the Molitor Forecasting Model.¹² In this model, there are five phases of awareness to an emerging issue, two of which are informal and three of which are formal. We shall consider each briefly and we shall use the example of the growth of awareness of climate change to demonstrate the point.

At the beginning of the process lies a form of Visionary Awareness. In this phase, those people who are noticing the emergent issue are not seen as part of the mainstream of society. Indeed, they are often treated as outsiders and shunned for being so far detached from the conventional wisdom. Usually their work reaches the public domain through such genres as science fiction or specialized journals. In the 1960s and 1970s, a number of science fiction authors discussed the possibility of a rapidly changing climate.¹³ They tended to be dismissed as fictional accounts because the causal mechanisms were rudimentary and not fully developed. We lacked a narrative about how to get from here to there.

As that narrative is developed, we move into the phase of Elite Awareness. In this phase, the causal narrative becomes more fully developed, but not generally accepted. Those who are aware of the emerging issue start to include a greater number of specialists who are increasingly convinced of their argument and who are frustrated by a lack of general acceptance of what they can see but that very few others can see. We would consider the “Limits

to Growth” report commissioned by the Club of Rome in 1972 as a piece of Elite Awareness about climate change that did not gain general acceptance. This is another example of the Curse of Cassandra, which continues until some large event fires the public awareness of the issue.

We would argue that, in the case of climate change, that large event was the Ethiopian Famine of 1983–1985. This is the event that fired up the Band Aid response in the developed world. To the general public, this was a Type II wild card event. To the elite who had been aware of the issue of climate change, this would represent a Type IV wild card event. An event such as this acts to move the emerging issue from the informal to the formal, as it enters the phase of Public Awareness. This does not happen overnight. Public awareness grows through a gradual process but has not yet reached a point where, collectively, people feel that something needs to be done about the issue. In the Public Awareness phase, the issue remains slightly distant, slightly abstract, something that happens somewhere else to someone else.

Eventually, the emerging issue will cause a wild card event to happen closer to home. As it does, some will interpret this as a Type III wild card event by disputing the causality and questioning the credibility of a recurrence. Others will argue it to be a Type IV wild card event and point to its likely recurrence. If the emerging issue is truly such, then, eventually, those who argue for it to be a Type IV event will gain the upper hand over those who argue it to be a Type III event. The evidence will simply accumulate. For example, the floods experienced in the United Kingdom in 2000 were claimed by some to be evidence of climate change, but dismissed by others as a one off event. When 2006 became the hottest year on record in the United Kingdom, the band of climate skeptics had shrunk considerably. By the time that we saw the smallest extent of the summer Arctic Ice Cap in 2012, there were hardly any climate skeptics left. When the awareness of the public about an issue becomes general, we move into the phase of Government Awareness.

Of course, Governmental Awareness about an emerging issue is not the same as actually doing something about it. That represents the fifth and final phase—Legislative Awareness. In terms of the issue of climate change, this is roughly where we are at the moment. The public perception of the weather in the United Kingdom is that the years are becoming hotter in the summer, colder in the winter, and stormier all year round. Government needs to be seen to be doing something about this, but is hampered by what it can actually do. Effective action to prevent climate change needs to be undertaken at the global level, but it is incredibly difficult to reach a consensus on global action. If prevention is difficult to achieve, then mitigation is an area in which effective action might be taken. The problem is that mitigating the force of nature is extremely expensive. Eventually, a balance will be reached where the consequences of Type IV wild card events can be dealt with and the gap between what the public demands of government is brought more in line with what government can actually achieve. In the case of climate change, it may take decades to reach this point.

An important conclusion from this section is that the same event can be viewed as a Type I, Type II, Type III, or Type IV wild card event, depending upon the perspective of the viewer. In the case of climate change, the view of the majority of people has shifted over the years as the evidence base has mounted. There will still be some residual climate skeptics who will argue blindly that climate change is not anthropogenic, that the climate models are incorrectly formulated, that the data is being misinterpreted, and so forth. We need to be respectful to this view because the people holding it may turn out to be seers of a new Visionary Awareness that we all have yet to see.

How Do We Play Our Wild Cards?

Before we start to think about a methodical approach to the construction of wild card

scenarios, it is worth stepping back to consider where they come from. We have alluded to this earlier when we discussed the purposes of wild card scenarios. Any set of scenarios contain a core set of assumptions about the future. These assumptions could be fixed and constant for the scenario set, or they could be variable within the scenario set, representing a number of critical uncertainties about the future.

The process of broadening and deepening our understanding of our scenario set involves stretching the fixed core assumptions within the scenario set and testing the limits of the critical uncertainties by exaggerating their relationships. For example, in a set of U.K. climate scenarios, a core assumption might be that, by the middle of this century, the average temperature had risen by 3°C. A wild card exaggeration might be to ask how our conclusions would differ if the average temperature had risen by, say, 6°C. In this case, all we would have to do is to consider that our original assumption had understated the impact of global warming, that is, the climate model correctly stated the direction of the change but had understated its impact. This would broaden the scope of our scenario set.

Alternatively, we could imagine that the model was correct in generating the conclusion of global warming, but had mis-stated the impact by the middle of this century. For example, we could introduce a wild card to ask how our scenarios would look if, contrary to expectation, the average temperature in the United Kingdom had fallen by 3°C. To make this wild card credible, we would need to have some sort of causal model to explain it. For example, we could take the view that global warming had led to the melting of the Arctic ice cap, the result of which was to reduce the salinity of the North Atlantic. That had the consequence of moving the Gulf Stream either south or to greater depths in the ocean (it does not matter which), resulting in the U.K. weather reverting to a latitudinal norm (the United Kingdom is at the same latitude as Canada and Siberia). In this case, the climate model was correctly stated, but had wrongly indicated the direction of the change

that we could expect from it due to an unexpected consequence of the relationships within it. In this case, we have rearranged the relationships within our scenario set to deepen its scope.

It is important to note that in both of the cases above—the broadening and deepening of the scenario set—the wild cards came from within the scenarios themselves. In this regard, we can say that they were endogenous to the scenario set. In the first case, we simply exaggerated what had already been assumed, and in the second case, we simply rearranged the relationships within the scenario set. When our scenarios involve a complex adaptive system, there is a very reasonable likelihood that this will happen in any case and that our scenarios ought not to be too surprising to those who had considered them.

We ought to note that our scenario set will also be liable to be subject to exogenous wild card events—events from outside of the core assumptions and relationships within the scenario set. As we mentioned above, any scenario set is an abstraction from reality. Much is left out. Normally, we can safely leave out of consideration a multitude of nonimpacting relationships. For example, it is very difficult to see how the breakfasting habits of the population would have an impact upon U.K. climate scenarios. Just occasionally, those matters that have been left out do actually turn out to be material. Many futurists will recognize the “oops I hadn’t thought of that” moment. When these possibilities do come into view, an easy way to insert them into the scenario set is as wild card events.

If we want to get to grips with these “unknown knowns,” as Donald Rumsfeld may have liked to have called them, it is best to do so in a systematic, rather than a haphazard, way. Futurists have a number of techniques to bring a sense of order to the vast array of possibilities of the future. It is customary to consider the Political, Economic, Social, and Technological (PEST) dimensions of a problem. This PEST analysis comes in a variety of formats, sometimes to include the Environmental dimensions (to give us a “STEEP” analysis—where the environment is a

key determinant) and sometimes to give us an additional Legal dimension (“PESTLE” analysis—where the legislative framework is a key determinant). There are no hard and fast rules about which framework is used. The key point is that the exogenous factors—those that have been left out of the original scenario set—have a role to play when constructing wild card scenarios.

Exactly how many exogenous wild card factors are used is usually determined by the budget of the project. The limits to the number of possibilities are determined by the limits of our imaginations. When devising a wild card scenario set, it is best not to stretch the incredulity of the participants too far. For many commercial scenarios, the Mars Attacks! scenario mentioned above would be a step too far. However, a destructive virus introduced into a corporate computer network with malicious intent might have more resonance. The two would have different levels of credulity for a corporate audience, but the course of the wild cards could well take a broadly similar path. If we want to be systematic in the production of a set of wild card scenarios, we would consider producing a set of endogenous wild card scenarios, with the purpose of broadening our understanding of the possible futures, and a set of exogenous wild card scenarios, possibly developed within the STEEP analysis framework, with a view to deepening our understanding of the scenario set.

The developing complexity of the scenario set—the core scenarios with the wild cards inserted into them—is best managed through the use of a cross-impact matrix. In this device, the impact of each wild card upon each scenario within the set can be mapped. Not all the resulting cells will prove to be of equal interest. The skill of the futurist lies in selecting which cells then warrant further investigation.

Conclusion

We have seen that wild card thinking can be used to broaden and deepen our understanding of a given scenario set. There are a number of types of wild cards that can be used in different

settings, depending upon the purpose of the scenario exercise. Whether they have a lower or higher probability depends upon who is likely to be surprised by a potential wild card event, and the degree of foresight that they can bring to that exercise.

In constructing wild card scenarios, there are methods to do so in a systematic way. Although the story lines of the wild card scenarios can appear to be a bit fanciful, if they have been prepared in a methodical and systematic way, they can add a great deal of insight into a given set of scenarios. They help to develop a much richer storyline within a set of scenarios.

Of course, it is entirely possible that one might like to develop a set of wild card scenarios in their own right, without linking them to a particular scenario set. This can be a worthwhile exercise, but it lacks the focus that is given when they are linked to a scenario set. In this circumstance, they may be of use in developing a plot for, say, a piece of fiction. Their use in developing a storyline for a disaster movie stands out as a use to which an unattached wild card scenario could be put. However, it is hard to see how such an exercise would enrich our understanding of emerging futures.

It is quite likely that our interest in wild card scenarios would be more utilitarian in purpose. We would construct them to aid our understanding of the future. We must always remember that their purpose is not to replace the original scenarios but to enhance our understanding of them. In this way, if we play our wild cards right, the future ought not to be as surprising as it could be.

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Notes

1. This is the approach adopted by John L. Petersen in *Out of the Blue: How to Anticipate Big Future Surprises* (Madison Books 1999), which is seen as the leading authority on wild cards.
2. See “Wildcards—Signals from a Future Near You” by Marcus Barber (*Journal of Futures Studies*, August 2006), which discusses “stretching,” “expanding,” and “cracking” a scenario set.
3. For a fuller discussion of the Efficient Market Hypothesis and its failings, see *Keynes: The Return of the Master* by Robert Skidelsky (Allen Lane 2009), chapter 2.
4. One imagines that the clients of RGE Monitor, the global financial analysis firm headed by Dr. Nouriel Roubini, fall into this category. Dr. Roubini famously called the global financial meltdown in a client newsletter of February 2008.
5. This section draws upon “Research and Action toward the Upside of Down” by Oliver Markley (*Journal of Futures Studies*, March 2011). While not entirely agreeing with Professor Markley, we have drawn upon the structure laid down in this article.
6. Reference is made to the 1996 film “Mars Attacks!” The theme of an alien invasion of conquest is one that occurs frequently in wild card scenarios. It is seen as plausible (it could happen), but not credible (we have nothing by which to gauge the wild card).
7. This is an important distinction between our view and that of Professor Markley, who sees Type II wild card events as high probability, high impact, and low credibility.
8. Could the current financial crisis have been foreseen? The Financial Stability Report (*Bank of England*, April 2007) stated “strong and stable macroeconomic and financial conditions have encouraged financial institutions to expand further their business activities and to extend their risk-taking, including through leveraged corporate lending, and the compensation for bearing credit risk is at very low

levels. That has increased the vulnerability of the system as a whole to an abrupt change in conditions.” This warning, half a year before the run on Northern Rock heralded the financial crisis in the United Kingdom, went largely unheeded.

9. See *The Price of Fish: A New Approach to Wicked Economics and Better Decisions* by Michael Mainelli and Ian Harris (Nicholas Brearley 2011), chapter 12, for a full discussion of wicked problems—those which are messy, circular, inconsistent, and aggressive. Problems for which there may not be a solution.
10. See “Was It a Wild Card or Just Our Blindness to Gradual Change?” by Elina Hiltunen (*Journal of Futures Studies*, November 2006) for a discussion of the relationship between weak signals of an emergent future and wild card events.
11. See “The Wild Cards in Our Future” by Edward Cornish (*The Futurist*, July–August 2003) for a discussion of how 9-11 was a complete surprise to most of us, but not to a small number of futurists who had been tracking that possibility for some time.
12. See “Molitor Forecasting Model: Key Dimensions for Plotting the Patterns of Change” by Graham T. T. Molitor (*Journal of Futures Studies*, August 2003).
13. See *The Drought* by J. G. Ballard (Penguin 1968) as an example of this genre.

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