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Seeing in Multiple Horizons: Connecting Futures to Strategy

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Abstract

This paper describes a futures method called the "Three Horizons" which enables different futures and strategic methods to be integrated as and when appropriate. The method is still in development. It differs significantly from the original version described in the management literature a decade ago. The approach has several strengths. It can relate drivers and trends-based futures analysis to emerging issues. It enables policy or strategy implications of futures to be identified. And it links futures work to processes of change. The paper connects this latter aspect to models of change developed within the 'social shaping' school of technology. Finally, it summarises a number of futures applications where this evolving technique has been used.

Keywords: scenarios, visioning, strategy, social shaping, discontinuity

Introduction

One of the gaps in futures work, at least from a practitioner's perspective, is between the work of scenario builders in constructing a range of plausible and coherent futures, and that of the vision-builders in helping organisations to identify a preferable future, based on a set of preferred values, and to act on that preference. To be sure, there are techniques which enable scenarios to be used in support of vision-building, even if the notion that scenarios should be used in this way remains contentious in the literature. In this article, we outline the use of a futures technique, "Three Horizons",

which connects the present with desired (or espoused) futures, and helps to identify the divergent futures which may emerge as a result of conflict between the embedded present and these imagined futures. In doing so it enables the futures analysis to be connected to underlying systems and structures, to the different speeds of change in different parts of the system, and also to tools and processes which facilitate strategic analysis. It is especially helpful where there is a potential transition (or transitions) which are likely to be disruptive rather than incremental.

In presenting this technique, we acknowledge that it is work in progress; that much of our present understanding of it has evolved through practice in the context of futures and strategy projects; and that to date the evolution of Three Horizons has been informed overly by the perspectives of its initial practitioners, who are based in the UK and who have a bias towards structural and systems-oriented futures practice.

A brief representation of the model is shown in Figure 1. This shows three conditions of the same system, over time, against its level of viability in its changing external environment. A number of different aspects of thinking about the future are mapped onto this diagram, as will be explained in the paper.

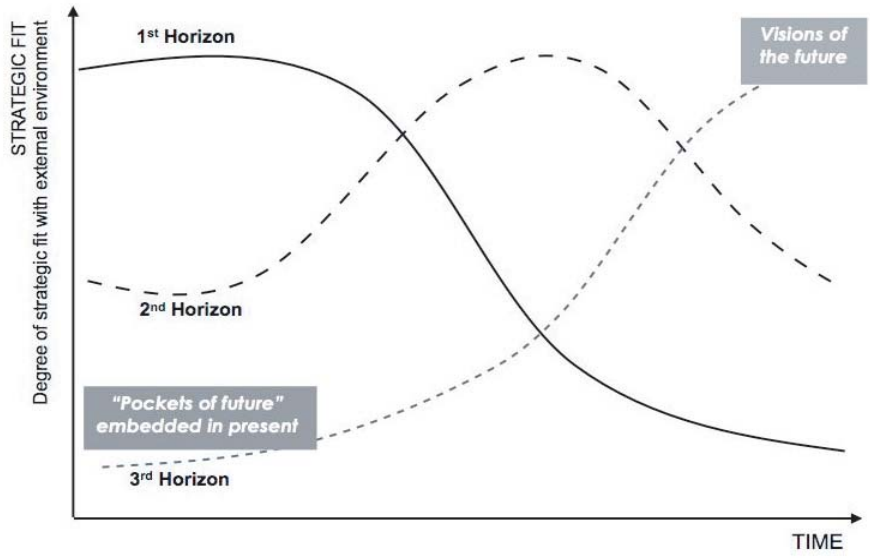

Figure 1. Schematic of the futures-oriented Three Horizons model

In summary, the futures-oriented version of the model, shown in Figure 1, comprises:

1) '1st Horizon': the current prevailing system as it continues into the future, which loses "fit" over time as its external environment changes;
2) '3rd Horizon' ideas or arguments about the future of the system which are, at best, marginal in the present, but which over time may have the potential to displace the world of the first horizon, because they represent a more effective

response to the changes in the external environment. Although the diagram suggests there is only one such '3rd horizon', in practice, especially in the early stages, there will be several, or many, 3rd horizon arguments being articulated. This is explored later in the paper.

3) 2nd Horizon; an intermediate space in which the first and third horizons collide. This is a space of transition which is typically unstable. It is characterised by clashes of values in which competing alternative paths to the future are proposed by actors.

It follows that the order in which they are explained here is relevant. A short discussion of an example at this stage may help to articulate this in a less abstract manner. The example of energy is used elsewhere in this paper, and will serve as an introduction here.

Horizon 1, at least in the affluent world, is a world in which fossil fuel sources are dominant, in terms of consumption, production, and distribution infrastructure. It is also generally centralised. The prevailing consumption model is that energy is "always on"; continuous power is supplied to whoever wants it and can afford it. This prevailing system is falling away because of concern over carbon emissions and resource shortages.

Horizon 3 advocates propose, generally, the production of energy from renewable energy sources; some also advocate more local or decentralised energy systems; there are some who propose reduced consumption. Some link high levels of energy use explicitly to degradation of eco-systems and biodiversity. Emerging technologies (such as combined heat and power) are championed; different energy-based business models are tried (for example service-based energy companies). Other Horizon 3 actors point to hydrogen-based energy futures; some to an energy future based on nuclear fission.

In these cases, "weak signals" for Horizon 3, or "pockets of the future embedded in the present" can be seen, for example, in green critiques of energy policy; in the increasing use of wind turbines on new sites; in the UK's "Transition Towns" movement; in the emergence of new energy businesses; and in continuing research into solar, fission, and other energy technologies.

Horizon 2, then, becomes a space of both conflicts and options. There are some options in which the technologies espoused by Horizon 3 advocates are given significant public (and fiscal) support, as has happened to a significant extent in Germany. There are options around approaches to demand reduction, whether through changes in values and behaviour, or changes in energy management systems.

Other options represent responses of the prevailing energy industry to those factors which are identified as challenging the current Horizon 1 model. These might include 'cleaning' existing energy supply technologies (such as 'carbon capture and storage') or investment in existing technologies which are regarded as clean (such as nuclear power). In some areas, though generally no longer in energy, Horizon 1 actors can simply contradict (or ignore) the frame, or frames, being used by Horizon 3 actors as the basis for advocating change. This is one way of understanding the arguments over whether the year of 'peak oil' was several decades away or rather more immediate.

It is worth observing that the time periods covered by different horizons vary with the subject or domain under scrutiny. Broadly, the 3rd horizon will cover the period over which the significant elements of a system can be changed. For energy security, which involves significant infrastructure issues, the 3rd Horizon period is likely to be about 50 years away. For the computer industry it would be shorter.

It should also be noted that the technique as presented here has been used to date principally as a practitioner's tool. It is a model which, on the basis of the practice, seems to allow workshop groups (who may be inexperienced in futures techniques) to construct reasonably rich futures models, and have fairly complex structured conversations about them. However, it is a practitioner's technique which is also underpinned by a body of theory. The article seeks to explore both practice and theory.

A Brief History of Three Horizons

The first published version of a 'Three Horizons' model appeared in a well-regarded management book, *The Alchemy of Growth*, by Merhdad Baghai, Stephen Coley, and David White (1999). It proposed that managers should engage simultaneously with short-term, medium-term, and long-term futures, portrayed as a series of evolving curves, each naturally more valuable than the last (see Figure 2). In this it had some similarities with the S-curve model popularised by Theodore Modis (1998), which portrayed the evolution of businesses and services as a succession of S-curves, without ever properly resolving the question of how one gets from the bleak and chilly winter at the end of one curve to the warm fecund spring of the next.[1]

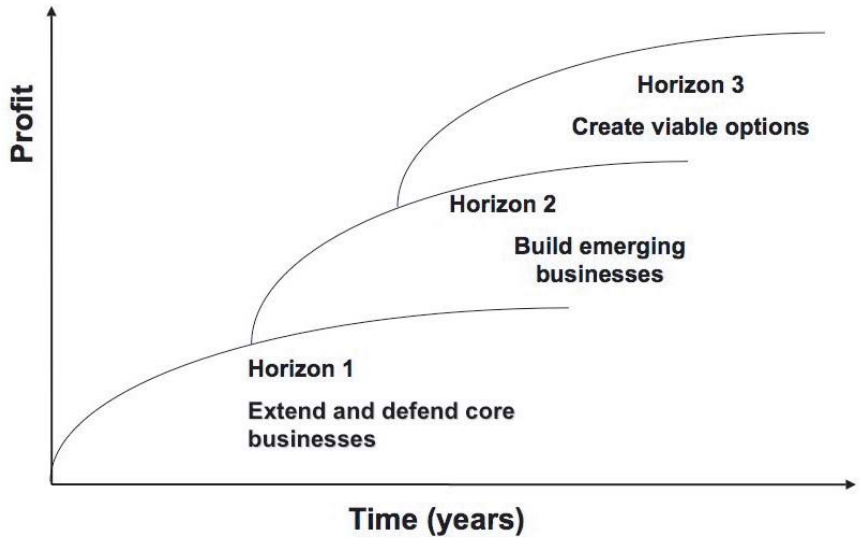

Figure 2. The original management-oriented Three Horizons model
Note. From *Alchemy of Growth*, by Mehrdad Baghai, Stephen Coley, & David White, 1999, New York, Orion.

Shortly after the publication of *The Alchemy of Growth*, one of the present authors (AH) used its model in conjunction with a scenarios tool (Chicoine-Piper, Chicoine-Piper, Galt, & Hodgson, 1997) Scenario Impact Matrix to explore with a group of corporate strategists different impacts across the short, medium, and long term. This provided the equivalent of three settings of a "wind tunnel" to test and develop policies and strategies. What emerged from this experiment was the need to improve the clarity of the qualitative distinctions between the three time periods, so that the changes in structure over time also became clearer, thus affording deeper strategic insight. It also suggested that under each of the three curves it was possible to investigate the distinctive nature of the dominant driving system.

The Three Horizons model was adapted significantly by the consultant Bill Sharpe, working with Anthony Hodgson, for the UK Government Foresight project on Intelligent Infrastructure systems. The specific question it was used to address was how to develop a technology road map over a long period (50 years), where particular technologies could not be described but their likely characteristics could be identified, or at least anticipated.[2] Their version of the model contained a distinctive modification which also made it a valuable tool for futures analysis. Rather than portraying the horizons as successive waves of evolution, they characterised all three as existing in parallel, but with different levels of social and public influence at any one time (Sharpe & Hodgson, 2006).

In parallel, the futures team on the same project, which included both Andrew Curry and Anthony Hodgson, adapted the technique to help address a similar problem in the futures area: the difficulty of understanding longer-run cycles of change, the transitions between them, and the policy questions and shifts which arise at each transition.

The method became a tool to understand the relationship between the initial starting conditions (which were obviously common across the four scenarios in the scenario set) and the worlds portrayed 50 years out, to ensure that the likely rates of change of different elements of the overall system captured in each scenario were plausible, and therefore the overall narratives (Curry, Hodgson, Kelnar, & Wilson, 2006).

Since 2006, when that work was published, the model has been used more extensively across a range of futures problems, by a number of practitioners. In the course of this work, its range of application has been extended. It has been used to connect visions to drivers analysis, and to test policy options, challenges, and path dependency in emerging futures analysis. Since accounts of the initial uses are already documented (as referenced above) and are available online, the balance of this paper will concentrate on the developing theory of the model and on more recent applications.

Three Horizons and Energy Security

The diagram below summarises the way in which the Three Horizons approach was applied to the issue of energy security in a paper written for the International Futures Forum (IFF) by Bill Sharpe, Anthony Hodgson, and Ian Page (2006).

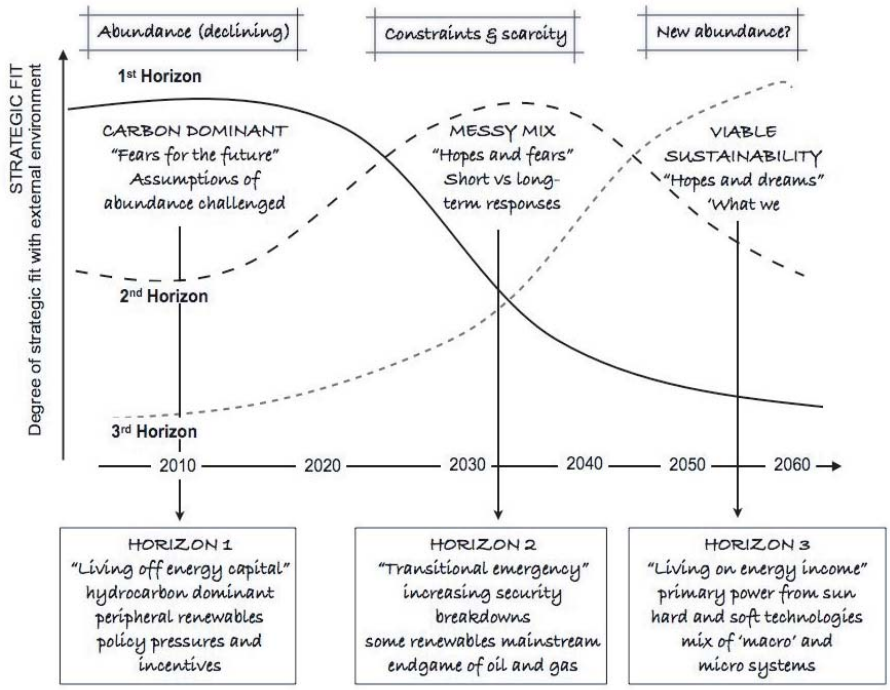

Figure 3. Three Horizons and energy security
Note. Adapted from "Energy Security and Climate Change", by Bill Sharpe, Anthony Hodgson, & Ian Page. Discussian Paper, International Futures Forum, 2006, Aberdour.

Interpreting the diagram, based on their article, we see that Horizon 1 is essentially negative. The underlying assumptions of energy abundance which have shaped it are being challenged, even if such views are contested. This creates a space in which change is widely regarded as inevitable, but agreement on the type of change does not exist.

Horizon 2 is the emerging short-to-medium term future, in which we know the limitations of our current position, but do not have the resources to respond effectively; there is little political agreement, the technology is immature, and so on.

Horizon 3, in contrast, represents an articulation of a possible future in which these limitations have been overcome. It is a positive view of the future. But it is not a view which is universally shared. Others will advocate competing versions of Horizon 3 (for example there is a 'nuclear fusion' version, which offers future abundance by a different route).

In other words, as one stands in Horizon 1, one can see around its edges the elements of future Horizon 3 systems. These will include emerging technologies, possible alternative social institutions, and different business models. However, these face two challenges if they are to replace the dominant system represented by Horizon 1.

The first is that they need to be better developed and better connected; they need to show that they can work at the required social scale. The second is that they need to win a battle of values about the future energy supply system. In Horizon 2 there are

conflicts between groups who attach different values to the problem (for example: security of supply vs resilience vs carbon impact vs competition vs price vs control). The information that all groups have about the future is necessarily incomplete, and therefore claims by one group in support of their preferred future are inevitably challenged by others.

The competition between these values are also inflected by the values and assumptions which have informed the existing Horizon 1 system, since a dominant system does not vanish, but fades only slowly. These voices are still heard strongly in Horizon 2. For example, in terms of energy supply, the need to maintain security of supply is seen as a political prerequisite. Familiar discourses can appear more compelling, simply because they are more familiar. Successful alternative models need either to be seen as likely to deliver this, or they need to reframe the issue effectively (in terms of supply, for example, by bringing demand management into the discourse).

Countries such as Germany and Denmark, which have pursued the development of renewables more aggressively, have done so by reframing apparent conflicts (so that they argue that security is achieved *through* sustainability) and by tolerating some degree of technical instability in the short-term in their electricity grids as the proportion of renewables in the supply mix has increased.

It is worth underlining the extent to which such transitions are inherently both messy and non-linear. In response to the failing system in Horizon 1, different groups will advocate different developments, and there will be different experiments, informed by different assessments of risk, cost, performance, and social and political values. Some ideas fail, despite having substantial resources expended on them. A new prevailing system does emerge from this complex process, but it is impossible to predict the eventual shape of this system. These are essentially processes of political, social, and public negotiation, occurring within complex adaptive systems.

Exploring the Futures-Oriented Three Horizons Model

As outlined above, the axes of the Three Horizons diagram are time (along the x-axis), and level of strategic fit with the external environment, of the organisation or of the network, from low to high (along the y-axis). The latter can also be assessed in terms of prevailing degree of acceptance of ideas within society as a whole about the political, economic, organisational and cultural norms embedded in an organisation or network. Horizon 1, then, at its left hand end, is the world in which we find ourselves today, and the way in which it is expressed and represented in prevailing discourse. The S-curve tailing away to the right represents the failure of any given model if it does not adapt to external change, which is, of course, a well-understood aspect of open systems theory (Katz & Kahn, 1966).

Horizon 3, in contrast, represents a world (more accurately, one of a number of competing worlds) that is desired by those who propose a different service model, a different political, cultural or institutional framework, or a different paradigm. Looking into the future, then, Horizon 3 represents proposals for transformative change. In the present, such proposals can be thought of as emerging issues, and the evidence for these is found only in small "pockets of the future" embedded in the present. These might be, for example, manifestoes by campaigning groups, a feasibility

study by a research institute, a different business model, or a prototype or field trial developed by a progressive local authority. In futures terms, Horizon 3 is a world of weak signals.

Because of the transformational nature of the change that is sought, the trajectory of Horizon 3 is deeply informed by values. It fumbles towards utopia, using the only tools which its marginalised advocates have to hand; the power of voice and experiment. (It is this relationship with values which makes it a useful scenario testing tool, since alternative scenarios are often informed, or ought to be, by competing values and worldviews as well as by different 'logics' or underlying structures (Inayatullah, 2004).)

This leads us to the world of Horizon 2. In Horizon 2 we learn what is heard of Horizon 3 and acted upon by those in Horizon 1. Sometimes, this is merely a recognition of timescales. As the US President Theodore Roosevelt once said, "Do what you can, with what you have, where you are". Adaptation takes time. Sometimes, though, it represents a far more fundamental conflict of values and of discourse. In the case of energy, there are clear conflicts in Horizon 2 around "green" and "clean", between "local" and "centralised", between maintaining consumption and reducing it, between self-contained energy systems and energy systems which are integrated with other social and environmental processes.

Thus, the dominant actors in Horizon 1 can hear the word 'green' but translate it as 'clean', and can disregard the components about integration and decentralisation. Their vision for the long-term future of the industry has some consonance with that of their critics (for their existing Horizon 1 model is not sustainable) but the consonance is limited. The outcome is that the world of Horizon 2 is turbulent and ambiguous. It is also possible that the conflict in this space will produce poor social outcomes. The worlds of the successive horizons can be likened to a 'fitness landscape', drawing on the work of Thomas Homer-Dixon (2000, pp. 304-305).

"The landscape represents, metaphorically, the range of possible relationships between a species, organism, society, or other complex-adaptive system and its environment. ... The metaphor nicely captures the idea that complex adaptive systems can usually improve their fitness in a number of ways ... the metaphor also illustrates how it's possible to become trapped in a less-than-optimal relationship with the environment."

It is worth taking a moment at this stage to acknowledge the underlying assumption which gives shape to the overall model. Effectively it is assumed that in terms of their degree of overall 'fit' to their external environment, systems follow a conventional 'bell curve' distribution over time. This is in keeping with the 'S-curve' model which is widely used in emerging issues analysis (Schultz, 2006). To expand this further, one way of thinking about the curves of the three horizons is to envisage Horizon 1 (at the start of the time period under consideration) as having rfeached the top of its bell curve (and is therefore about half way through its life). Horizon 2, in contrast, has reached the middle of its upward S-curve, and is therefore about a quarter of the way through its lifespan; it will peak and decline during the life of the time period being considered. Horizon 3, meanwhile, is just starting out, and will not reach its peak until the end of the time period. It can take a generation, or more, for emerging issues to

find their way into the mainstream, as the work of Graham Molitor and Jim Dator in this area suggests (Dator, 1999).

In the initial use of the Three Horizons model, in Foresight's Intelligent Infrastructure Systems Technology Forward Look, and in the development of the IIS scenario narratives, the model was used to amplify existing practices. However, with further application of the model, its specific qualities have started to define themselves. In particular, it characterises the space of Horizon 2 as a space of conflict between Horizon 1 (the present embedded social, economic, technical, and institutional structures) and Horizon 3 (a value-driven desired future) rather than as a progression.

The Three Horizons Futures Model and Futures Practice

There are a number of criticisms of conventional scenarios processes, principally from the Critical Futures Studies perspective. First, they frequently do not interrogate sufficiently or seek to critique the underlying values and assumptions of the futures worlds which they create. Second, their emphasis on 'important' drivers of change (whether 'certain' or 'uncertain') encourages participants to pay insufficient attention to weak signals or emerging issues, which might otherwise open up possibilities of disruptive change. (Organisations are generally poor at seeing weak signals, or acting on them, as Peter Saul, 2006 has observed.) Finally, it is sometimes argued that the presentation of scenarios as likely possible outcomes can discourage individuals from believing that their actions can make a difference.

It is possible to take this last criticism one step further. A strong theme of the Shell scenarios practice was that one should not seek to influence the future, but to be aware of possible shifts in the external environment and to be prepared to respond to them as and when that environment changed. Peter Schwartz, the Shell alumnus who set up the Global Business Network, compares scenario-building in *The Art of The Long View* (1996) to an actor who has rehearsed plays by Ionescu, O'Neill, and Shakespeare, but won't know which they are to perform until the curtain goes up.

Adam Kahane (2004, p.14) recalls the underlying philosophy of the Shell scenarios team in the late '80s:

"Shell could neither predict nor control the future of its business environment, and it was therefore impossible for us to compute one right strategy for the company... The management decisions of Shell were never included in the stories: we assumed that the company's actions had no impact on the scenarios."

He later decided that this view, and the underlying philosophy embedded within it, was "disingenuous and self-serving, even irresponsible" (2004, p.17).

The Three Horizons model has something to say on each of these three points.

Futures work as a challenge to values

One of the underlying features of the model is that it requires different possible versions of the future, as read by different mindsets, to be held in view simultaneously. Horizon 3, in particular, has little traction in the present moment other than as an articulation of a future which is constructed quite differently from the present. It is driven by a desire for change. As Hodgson and Sharpe (2007, p.140) write:

"The H3 mindset is seeing beyond our current system, motivated by vision, value, and beliefs. If an H2 entrepreneurial mindset is concerned with anticipating and capturing changing values, then H3 is concerned with driving such changes. ... Thus the organic food movement promotes an outlook on how food should be grown that is fundamentally different from the dominant model of the last few decades." [our emphasis].

It is worth reiterating that there will be multiple Horizon 3 worlds, certainly in the early stages, supported and promoted by different advocates, and largely underpinned by differing values. For example, looking at the future of urban vehicle transport, one future might be dominated by the need to improve the performance of existing vehicles, in terms of fuel, noise and other pollutants, whereas a competing third horizon view might be about trying to reduce the impact of vehicles on community cohesion and vulnerable users of urban space. A second group envisages a reduction in the numbers of vehicles as well as their environmental impact. A third may wish to make car use complementary with public transport systems instead of competing with it, and so on. While they may appear to have more in common with each other than with actors in Horizon 1, this is not necessarily the case. This is partly because they are likely to define the problem they seek to resolve quite differently from each other. The values, desires, and assumptions which underpin these competing projects can be sharply at odds. We will return to this point.

Horizon 1, in contrast, is a world whose values are all too familiar, to the point of being hegemonic. H1 is "the way we do things around here", the world of 'business as usual'. Because all systems decay in the face of change, sooner or later, analysis of Horizon 1 makes explicit the assumptions and values which underpin the current world. Equally, in reviewing the possible paths of adaptation of the current system to construct the Horizon 2 world, an assessment can be made of the extent to which this is a system which is making an adaptive shift to new values, or, on the contrary, is making the smallest possible adjustment to maintain itself, This latter is more likely. As Donald Schon (1973, p.31) noted,

"The resistance to change exhibited by social systems is much more nearly a form of 'dynamic conservatism' - that is to say, a tendency to fight to remain the same. So pervasive and central is this characteristic that it distinguishes social systems from other social groupings."

De-privileging competing futures

One of the particular features of the Three Horizons model is that it positions emerging issues in such a way that neither the prevailing or dominant vew represented by Horizon 1, or the emergent view, in Horizon 3, is privileged. Further, the requirement to understand the structure of the second Horizon, which evolves from the contingent circumstances in which Horizon I is challenged by the new perspectives offered by Horizon 3, means that the values, assumptions, and actors within both H1 and H3 need to be properly understood.

In some futures processes, in contrast, some views of the future tend to be privileged over others. Richard Slaughter (2004) has a well-known critique of conventional deductive scenarios as representing 'flatland', with little space within the futures

process to test or challenge existing power relationships. At the same time, and often as significant in terms of outcomes, weak signals of change are often not given sufficient consideration by participants. Equally, some visioning processes are so energetic in constructing their desired world that they spend too little time on understanding the worldviews underpinning the current model.

In effect, then, Horizon 3 is constructed as the domain of emerging issues, and thereby ensures that these are as visible in the process as the more familiar shorter-term trends which are generally better understood and better rehearsed by participants. It offers a framework which gives permission to think beyond the usual strategic limits without being ridiculed, and also enables participants with competing or divergent views of the future to discover where different viewpoints lie across the three curves, and therefore what conversations between them should be prompted.

Futures work and the process of change

At risk of being provocative, one of the curiosities of futures work is that for a body of practice which is, above all, interested in change, there are relatively few models of change in the literature. The scenarios literature has been particularly thin on this; in visioning, where most of the relevant work is to be found, there is an important process in defining the gap between 'what is' and 'what ought to be', and then setting out to fill it. Indeed, early classic works in the visioning literature, such as Polak's *The Image of the Future* (1973), emphasised the role of visions as a vehicle to channel the energy of social actors, and act as a catalyst for change.

Robert Jungk, one of the community futures pioneers, tells the story of taking some "deeply pessimistic" German youngsters, found by a competition, through a futures workshop, to discover that they produced much more optimistic images of the future. "Asked to explain the contradiction, one of them answered, to general assent: 'It's obvious. In the competition we were asked what kind of future we expected. Here we were asked what kind of future we want' " (Jungk & Mullert, 1996, p.15).

The Three Horizons model aligns well with this underlying model used by Robert Jungk in his visioning work. The review of Horizon 1 serves as a critique of the present, while Horizon 3 permits a desired future to be articulated.

The Triangle of Change

One of the most interesting aspects of the Three Horizons technique, which has become clear only through use, is that the shape of the curves of the different horizons effectively defines a triangle of choice, in the space where the first horizon has started to fall away, the second horizon is close to its apex, and the third horizon is still gaining influence. These choices, obviously, are about the resolution of the conflicts identified under Horizon 2. It is also possible to assess how these might be resolved, and which actors will capture the future social or commercial value. In most of the work done to date, such choices have typically been around strategy or policy issues. But they could equally be about choices in values. The question in this latter case becomes a question about the way in which we need to reframe discourse to enable the 3rd horizon to emerge.

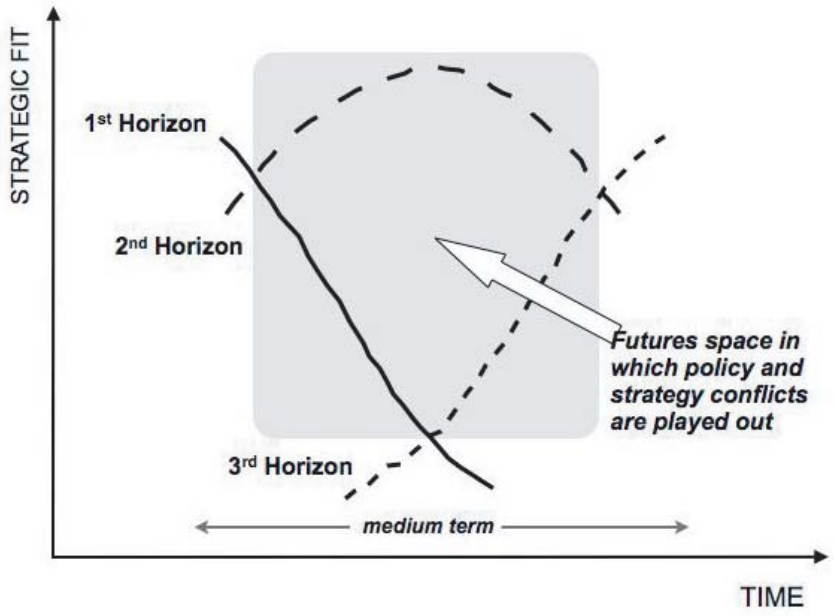

Figure 4. The triangle of change (detail of 3H diagram)
Note. From "*Scenarios with Success,"* by Anthony Hodgson and Bill Sharpe, 2007, in Bill Sharpe & Kees van der Heijden (Eds.), *Deepening Futures with System Structure* (p. 142), Chichester, UK, Willey.

It is worth returning, briefly, to the example of the energy supply industry in the UK, to explore how such conflicts are played out. For energy, one of the conflicts within the triangle is that between the centralised model which has prevailed for the past 50 years, and a distributed model of possible future distribution.

If the centralised model prevails, it will do so by combining the need for a low carbon model (part of the challenge of values from Horizon 3) with the Horizon 1 values of centralised management and control. But if this centralised model is successful, it is unlikely that there will be room for alternatives, other than at the edge of the system, because the investment required to develop the required 'clean' technologies (such as carbon capture and storage, and nuclear), and to rebuild the ageing long-distance grid infrastructure, will be substantial, and likely to squeeze out investment in renewable or local energy systems.

We are able to observe, then, that the Three Horizons model raises questions about how competing systems come into conflict. But to be truly useful, it needs to do more. It needs also to have a view of how such conflicts are resolved. Although this is still work in progress there is a model drawn from the 'social shaping' school that can help.

The social shaping school starts from the premise "that technology does not develop according to an inner technical logic but is instead a social product, patterned by the conditions of its creation and use... Alongside narrowly 'technical' considerations, a range of 'social' factors affect which options are selected- thus influencing the con-

tent of technologies, and their social implications" (Williams & Edge, 1996, p.856).

It derives in part from work done by Fred Emery and Eric Trist (1960) in the 1950s on socio-technical systems. It is possible to imagine that it is more than a coincidence that Emery and Trist also wrote one of the papers which opened up the discipline of futures (1965), or that Emery developed much of the theory on open systems which provides an important basis for many of the visioning techniques used by futures practitioners.

The social shaping literature has tended to concentrate on processes of technological innovation and development, and the social practices and configurations in which they are embedded. Futures work, in contrast, tends to regard technology as one strand among many (a dedicated group of techno-determinists notwithstanding). Nonetheless, almost all futures work involves some consideration of change either in technology, or infrastructure (which can be thought of as embedded technology), or governance and institutions (in effect a technology of organisations). As the social shaping school reminds us, technology involves systems as well as artefacts, and is about social influences on technology formation, and their implications (Williams & Edge, 1996). Technology is not neutral and its outcomes are not inevitable.

From this perspective one of the most relevant social shaping models is the constructivist model proposed by Wiebe Bijker (1997). In brief, Bijker argues that social groups and actors form around technologies, and that in the early stages of this process, there is considerable 'interpretative flexibility' between different groups about the machine or technology in question. In effect, in these initial stages, different groups attach different meanings to the machine in question, and these meanings constitute the machine (1997, p.77).

Clearly, such a situation is socially and ontologically unstable. Eventually, however, "closure" is achieved around a technology, as the level of interpretative flexibility reduces and consensus between actors increases. As a result, a dominant interpretation starts to emerge, which in turn leads to the emergence of a shared meaning about the machine or technology. (This is the "stabilisation" process.)

To summarise, then, "an artifact does not suddenly appear as the result of a singular act of heroic invention; instead it is gradually constructed in the social interventions between and within relevant social groups" (1997, p.270).

So how does competition between such social constructions occur?

Bijker suggests three possible configurations for technologies and their related social ensembles. These can apply to forms of social innovation as well as technological change. As we shall suggest shortly, these correspond to different stages of the Three Horizons model. In the first configuration, "there is no dominant group, and there is, as a result, no effective set of vested interests under such circumstances, and if the necessary resources are available to a range of actors, there wilI be many different innovations" (1997, p.270).

In the second configuration, "one dominant group is able to insist upon its definition of both problems and appropriate solutions." Under such circumstances, he notes, "innovations tend to be conventional."

And in the third configuration, "there are two or more entrenched groups with divergent technological frames". As a result, "arguments which carry weight in one of

the frames will carry little weight in the other. Under such circumstances, criteria external to the frames in question may become important as appeals are made to third parties" (1997, pp. 276-277). Sometimes such conflicts are caused by differing assumptions about future behaviour. For example, in the UK's interactive television market, Sky's 'frame' positioned interactive television as a new commercial channel to the home, whereas the BBC saw it as an extension of television's existing social and entertainment functions (Curry, 1999). However, they are as likely to be driven by differences in values, as in the UK's current conflicts over the proposed further expansion of London Heathrow Airport. These become essentially political disputes, in the broad sense of the word.

Mapping these back on to the Three Horizons model, it is clear that the first of these three applies strongly to the early stages of a Horizon 3 innovation, The alternative proposals that are generated tend to be radical and relatively unconstrained.

But even at this stage some form of stabilisation and closure is necessary if actors who are critical of the frame represented in Horizon 1 can make themselves heard and create the necessary coalition of actors needed to make an effective (visible) critique of the dominant frame. As Horizon 3 evolves, some innovative proposals disappear from the discourse.

The second configuration, of one dominant frame, corresponds to the ensemble of actors around Horizon 1. Even so, even among actors who are attached to this dominant configuration, there are different degrees of inclusion; some are more committed to the frame than others.

The third configuration is, for our present purposes, perhaps the most interesting. It corresponds to that significant area of the model where a Horizon 1 frame is declining but still dominant, and has made some changes to construct an adaptive Horizon 2 frame, but is being challenged by a new framework which has emerged from the battle of ideas in Horizon 3. Strategies to achieve closure are as likely to involve rhetoric as evidence. In the famous "battle of the currents" between proponents of DC and AC in the late 19th century, for example, proponents of DC electrocuted dogs (and other animals) in live demonstrations to demonstrate the differences in the safety of the two systems (McNichol, 2006). In the present emerging battle over the future of aviation, expansionists link aviation to international economic competition while their opponents talk about climate change and sustainability.

Three significant themes emerge from this discussion. The first is about the meanings of time. Hodgson and Sharpe (2007), along with Brand (1999), distinguish between "chronos" and "kairos", differing notions of time made by the ancient Greeks. Chronos is the view of time as sequence or time passing. Kairos is the notion of time as a moment of opportunity, in which choices can be made. Futures work can appear to focus on one or the other, but not both; the Horizons model lays out both to view.

The second is the importance of contested meaning in the conflict between different Horizons. There are parallels here with the work of Thomas Kuhn, who introduced the concept of 'paradigm shift' into our understanding of the history of science. Without labouring the paradigmatic, an important part of the conflict between paradigms is, nonetheless, the lack of a common language, shared references, or a single taxonomy. There are similarities between the shift between competing scientific theories, and between competing Horizons (which after all embrace competing social,

political, economic and technological theories):

"In the transition from one theory to the next words change their meanings or conditions of applicability in subtle ways. Though most of the same signs are used before and after a revolution ... the ways in which some of them attach to nature has somehow changed. Successive theories are thus, we say, incommensurable" (Kuhn, 2000, p.163).

Incommensurability, he notes elsewhere, "becomes a sort of untranslatability".

The third is the role of the relations between different social groups in reaching any kind of resolution. In the early stages of Horizon 3 actors will broaden their coalitions by 'enrollment', effectively 'reframing' their interpretation of the technologies to include new social groups. Again, drawing on the example of electricity supply, advocates of decentralised power production and distribution may attempt to enrol others in their support of combined heat and power plants by underlining their role in reducing social exclusion around energy use.

Where there is competition between two significant frames, some degree of 'amalgamation' is likely to take place, in which the successful frame adapts some elements as a result of the conflict between the different frames. Bijker refers to actors who are attached to a dominant frame, but have low inclusion; these are likely to include, for example, younger scientists or managers within social groups or organisations around Horizon 1.

Understanding Systems and Group Behaviour in the Competing Horizons

It is too early in the development of this version of the Three Horizons model, or of its application to futures issues, to be able yet to propose a typology or schema which might lead to a clearer understanding of the circumstances under which the dominant values in Horizon 1 capture the long-term view, or, on the contrary, the conditions under which there is disruptive change of the type proposed by Horizon 3 advocates. There are, however, some clues.

Mahatma Gandhi, who can perhaps be thought of as one of the greatest of Horizon 3 activists, once said, "First they ignore you. Then they laugh at you. Then they fight you. Then you win." As a summary of the stages of a successful Horizon 3 transition, it is both succinct and complete. But in practice, from the perspective of a Horizon 1 organisation which seeks to maintain its position into the future, the strategy of ignoring the Horizon 3 discourse, or squeezing it to the margins by the application of political or economic power, can work well. For every Gandhi, there is a multitude of Gerrard Winstanleys. The 'Digger' colonies inspired by the 17th century English radical, which set out to farm the commons and share the proceeds of the land, were first attacked by landowners and then broken up by the New Model Army (Winstanley, 1650/1986). Winstanley was arrested.

In other circumstances the Horizon 3 model fails to gain traction because of economic arguments, political preferences, or because it has failed to achieve sufficient engagement with early mainstream thinking, stuck instead on the wrong side of the "chasm" identified by Geoffrey Moore (1998) in his analysis of patterns of technology adoption.[3] Sometimes, the competing babel of different Horizon 3 models makes engagement hard. It takes a process of "social shaping" amongst Horizon 3 visionaries

- still in the early stages of evolution of their ideas and new practice - until a dominant Horizon 3 model emerges among the actors in this horizon. This does not yet mean that this model will represent a challenge to Horizon 1. But it does mean that the ideas emerging in Horizon 3 will start to become coherent enough to start to be noticed by some of the actors in Horizon 1.

In some cases, Horizon 3 will emerge through the policy noise because the prevailing Horizon 1 model is too 'stuck' or too destructive to be capable of developing sufficiently through adaptive change. For example, the combination of consumer desire to promote well-being, and the potentially huge costs to public health and other social expenditure budgets of increasing obesity in the UK, meant that conventional incremental models of product development preferred by the food industry and retailers were not capable of responding sufficiently to the changing environment (Curry & Kelnar, 2004). In such cases, systems tools can offer useful additional analysis or understanding.

Work in Progress

One of the distinguishing features of this version of Three Horizons is its power to provide easy entry for policy-makers and decision-makers simultaneously to do three things:

(a) to appreciate continuity and discontinuity in looking ahead
(b) to distinguish the three modes of thinking and evaluating, and
(c) to orchestrate a wider variety of appropriate futures and strategic thinking tools.

In addition it can help - through visualisation of the critical issues in Horizon 2 - to envisage medium term policy options which might lead to 'lock-in' or path dependency, and thus lead to potential unintended outcomes.

The small network of practitioners developing this approach has already had the opportunity to apply the model in a number of contexts, the variety of which is itself an indication of the possible range of the method. There follow some summary illustrations of ways in which the Three Horizons has so far been used:[4]

1. to frame a policy field of attempting to correlate energy security and climate change issues This was carried out for an informal exercise between a number of UK Government departments by the International Futures Forum [IFF];
2. as a model to test with stakeholders a set of rail industry scenarios for the robustness of their narratives, a method to help participants do some rapid backcasting, and to identify critical strategic challenges embedded in each scenarios. This was done by Henley Centre HeadlightVision [HCHLV];
3. as a framework of researching and exploring new models for supporting the arts. This was carried out be the IFF with a number of philanthropic and arts support agencies in the UK;
4. as a basis for exploring the challenges of introducing a radical new curriculum into schools in Scotland. This exercise, also carried out by the IFF, included headteachers as well as policy staff and educational consultants;
5. as a method to help identify differing rates of change within multiple overlapping systems in a project which developed long-term economic and social scenarios to test a regional spatial strategy;

6. as a way to introduce "evidence for the future" to the Carnegie Commission on Rural Community Development. The framework was particularly helpful to liberate the Commission's thinking on values and vision in contrast to trends and uncertainties in the present environment;
7. as a way to frame the development of a transformational strategy for a a major energy trading company, taking into account a significant paradigm shift in the structure of the energy market over the next 30-50 years In this exercise, conducted by Anthony Hodgson, a set of scenarios were also used as a background for discussing the uncertainties of Horizon 2;
8. as a basis for technology forward-looks in a range of fields such as intelligent infrastructure (discussed above) and the impact of technology on the future of obesity. This work was done by Bill Sharpe.

From these initial projects, and other early applications, it appears possible to integrate other core strategy and futures tools and techniques supportive to strategic thinking. Here are some examples:

- Scenarios: The technique can be used to add depth to the development of scenario narratives, especially those such as Causal Layered Analysis or Manoa which foreground differences in discourse, worldviews, and values. Conversely, the conflicts and uncertainties of Horizon 2 can be structured into multiple narratives using appropriate scenarios techniques.
- Systems archetypes: Each horizon has a characteristic behaviour over time. A deeper analysis of the reasons for this can be derived by applying causal feedback thinking to see what the dominant loops and restraining loops are in each horizon.
- Framing innovation dilemmas: The tension between Horizon 1 and Horizon 3 creates dilemmas where the requirements of actors in both need fulfilling despite their incompatibility (Christensen, 1997). The dilemma resolution method developed by Charles Hampden-Turner (1990) can be used to frame creative thinking around "both/and" resolution.

The work and research done so far suggest that the futures-oriented Three Horizon method allows appropriate futures and strategic techniques to be introduced in a timely way as needed. There is current work, of which this article is a part, to document the method and its applications, and to understand better how it connects to strategic thinking tools and to systems models. We would be pleased to hear from practitioners and others who choose to utilise the approach in their futures or strategic practice.

Conclusion

This version of the Three Horizons model was born out of futures challenges emerging from a UK government Foresight project which existing tools seemed unlikely to handle. As David Snowden (2002) has observed, "We can only know what we know when we need to know it."

In further use since then, across a range of applications, it has proved capable of generating relatively rich futures and strategic insight. In particular it connects the val-

ues-based work which characterises visioning approaches to more dispassionate approaches commonly utilised in mainstream scenarios work (especially in Europe and North America). It promotes consideration of emerging issues that can be identified only through a different mental model than that determined by H1's "business as usual", and makes it necessary to review these as part of the futures process.

In addition, the model links futures to the policy and strategy issues and options which are likely to arise in the medium term, thus addressing a recurring criticism that futures work is too often disconnected from organisational planning and strategy-making processes.

It also has the benefit of being fairly accessible to non-practitioners, which means that workshop participants find it relatively easy to assimilate and to use.

In developing our understanding of the model, we have - to our surprise - found that it appears to reconnect two branches of systems work which emerged from the research of Emery and Trist in the 1950s and 1960s. While it is too early for us to reach conclusions about the significance or value of this, it may be that it helps to promote within futures practice a deeper understanding of the social, organisational, and economic contexts involving technology.

However, it must be emphasised that this is work in progress. The analysis in this paper is based on a reasonably wide range of applications, but carried out by a small number of practitioners and in a limited cultural context. The work to date is offered here in the hope that other futures practitioners will wish to test the model in their own practice, and share their learnings.

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Notes

1. The process by which one migrates from one S-curve to another is usually regarded as unproblematic. But as Gary Hamel observed in a recent interview (Barsh, 2008), "I don't think you shuffle your way from one S curve to the other. You have to jump."
2. Personal email to authors from Bill Sharpe.
3. In his influential book *Crossing the Chasm*, Moore argued that technology adoption did not necessarily follow a smooth adoption path from the small minority of early adopters to the larger (and more profitable) group of the early majority. This was because the meanings and values associated with the technology by early adopters were often fundamental to their lifestyles and identities, whereas this was not true of early majority users.
4. As from July 2008, case studies and related information about Three Horizons applications will be available online at the International Futures Forum website: http://www.internationalfuturesforum.com/publishing.php

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