BRINGING FORESIGHT INTO SYSTEMS THINKING
– A THREE HORIZONS APPROACH –

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ABSTRACT

A primary goal of systemic intervention is the improvement of the 'system in question'. The definition of the system in question is often itself a function of multiple stakeholders and is not a fixed object. Boundary critique can be helpful in clarifying the ambiguity, assumptions and the power dynamics around agreeing what the system is that is to be improved and for whose interests.

However, there is another dimension of ambiguity which is time. Improvement implies some change from a *present condition A* to a better *future condition B* which eventually becomes a new *present condition B*. Where the environment is about to go through a significant change of pattern (a paradigm shift), the criteria of improvement will be different, depending which paradigm is being considered. For example, energy success in an unrestricted environment can be completely different from energy success in a restricted environment dominated by climate change.

In this paper we will introduce the idea of three ways of looking at the future using a method called the *three horizons*. It will point out three distinct ways of looking at the future, each of which will strongly colour boundary critique and therefore affect what is considered to be a successful or 'improved' system. The foresight framing suggests improvement to sustain the current system, improvement which is a disruptive innovation and may reconfigure the system and improvement which is transformative and may actually result in the collapse of the systems in question.

Keywords: Systemic intervention, Foresight, Time, Boundary critique, Critical systems thinking, Three horizons

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Taking up the theme of the conference, learning across boundaries, in this paper we wish to explore, not boundaries in space or connoting inclusion, but boundaries in time; hence the title, *bringing foresight into systems thinking*. Although a review of the literature shows some references in the systems literature to futures thinking, and although a similar review of the literature shows some references in the futures studies material to systems thinking, the connection between the two appears marginal. We are dissatisfied with this gap and are researching and learning across these fields. We would like to share some of our very provisional thoughts at this stage of the research.

A primary goal of systemic intervention is the improvement of the system in question. The definition of 'the system in question' is often itself a function of multiple stakeholders and is not a fixed object. Boundary critique (Midgley 2000) can be helpful in clarifying the ambiguity and the power dynamics around agreeing what the system is that is to be improved and for whose benefit. Let us describe some essential features of systemic intervention.

For a given situation in question:
- *Systemic* – attending to wholes, connectedness and non-linear behaviour, with a special emphasis on boundaries concerning who and what is included, excluded or marginalized
- *Intervention* – purposeful action by an agent to create change
- *Systemic Intervention* – purposeful action, incorporating reflection on boundaries, aiming to bring about some *improvement.*

Clearly, what constitutes improvement is a judgement call (Churchman, 1970), and like any judgement call depends on the stakeholders making it. Midgley and Pinzón (2011) point out that one of the most critical judgements prior to settling the specific meaning of improvement in a given case, for example of conflict resolution, is the determination of the boundary of the system.
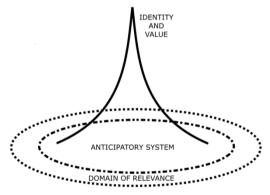

Figure 1 – Basic form of boundary critique

Figure 1 represents a simple, basic form of boundary critique for a single stakeholder, or where there is agreement between multiple stakeholders. The outer broken line determines the boundary between what is perceived as relevant to the intervention and what is considered irrelevant. The inner broken line represents the negotiated agreement as to the system in question, which is subject to the intervention. The peak represents the 'centre of gravity' of the sense of identity and underlying values that make the system in question meaningful. In the case of stakeholders in contention, it would be necessary to use several of these diagrams with degrees of overlap. This is a more sophisticated analysis not dealt with in this paper (but see Midgley, 1992, 2000; and Midgley and Pinzón, 2011). An important element of boundary critique is not taking boundary judgements for granted, but comparing and contrasting different possibilities for setting boundaries, in order to explore the likely consequences for stakeholders and the issues that concern them (Ulrich, 1983).

The boundaries represented in the above exposition are essentially about content, and tend to be spatial and semantic in character; who and what is included or excluded. Mapping boundaries helps to surface assumptions and clarify agreement about what is in and what is out of the system in question. In this paper we wish to suggest that it is also worth considering the dimension of *time* within boundary critique.

In foresight practice, we talk about 'temporal windows'. Typically, forecasts adopt either short windows (econometric models project between 6 to 24 months into the future, and strategic planning usually proceeds in 5 year steps) or very long windows (80-100 years, such as when forecasting climate change). For the most part, foresight authors often use the term 'looming issues'. Kelly et al (2002) summarize the challenge of the middle region of around 10+ years, where more established futures methods show diminished effectiveness. Thus

> "..businesses must learn to anticipate and adapt more quickly to an increasingly complex environment in which many political, economic, social, cultural, and technological forces are shifting, interacting, and even colliding." p3

However, to relate time to the systems idea it is necessary to go beyond the simple linear, sequential view of time (short, medium and long term). This is especially true where the situation of interest is going through some kind of transformative change. We need to consider the *qualities* of the temporal window of interest.

One way of doing this is to distinguish between the kinds of systemic improvement that have a sustaining role and those which have a transforming role, as shown in Table 1.

Table 1 – Sustaining or Transforming Improvement

Sustaining	Transforming
• Supporting and reinforcing the current dominant pattern • Relatively restricted specialist viewpoint on 'systems in question' • Innovation that is captured to prolong the status quo	• Shifting to quite a new pattern with transformed fit to a radically different context • Wide angle view of the 'system in question', taking a holistic approach • Disruptive innovation which renders the status quo obsolete

Shifting to a new pattern involves some form of strategic thinking and foresight (Miller 2007). I will describe the various disciplines of foresight and futures studies using a framework introduced by Sharpe (2008). Foresight can be classified into four types according to the extent to which the decision maker has agency to do things and the degree of uncertainty they are facing. This distinction classifies four basic modes of futures methods, as shown in Figure 2.

If the decision maker has relatively low agency, for example when planning in a going concern, and the operating environment is relatively stable and certain, then the classical methods of forecasting followed by resource planning in relation to those forecasts can be effective. These methods generally assume a predictable world where, for example, the measurement of past trends can be extrapolated into the future without any problem. The limitation of these methods is that they assume the continuity of a fundamental pattern with perhaps minor incremental changes. Innovation will tend to be dominantly reinforcing the status quo.

If the decision maker has high agency in a relatively stable and certain operating environment, as for example when implementing the rollout of a proven manufacturing enterprise, then the method of road maps into the future applies. Galvin (1998), the former Chairman of Motorola, summarises their nature and role thus:

> "A 'roadmap' is an extended look at the future of a chosen field of inquiry composed from the collective knowledge and imagination of the brightest drivers of change in that field . Roadmaps communicate visions, attract resources from business and government, stimulate investigations, and monitor progress. They become the inventory of possibilities for a particular field. In engineering, the roadmapping process has so positively influenced public and industry officials that their questioning of support for fundamental technology support is muted." p803
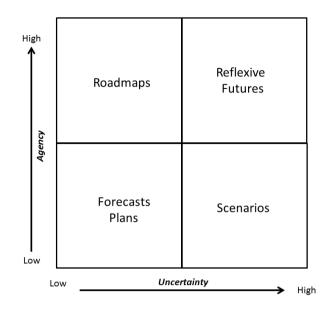
Figure 2 – Four Broad Categories of Foresight Method

If the decision maker has relatively low agency but faces a very high level of uncertainty, then the method of multiple future scenarios applies. The origins of scenario planning in Shell illustrate this (Wilkinson and Kupers, 2013). Although Shell is a massive international company, its size and impact relative to the total energy market and the geopolitical context of energy indicates that it has relatively low agency compared to its global involvement. Also, the uncertainties over a 20 to 30 year exploitation time span surrounding the geopolitical and geological conditions necessary for economic oil extraction and refinement are considerable. The basic scenario method researches these uncertainties and distils them down into several alternative possible futures. These are not forecasts, and nor are they roadmaps of action pathways to be taken, but rather they are narratives of possible future conditions based on the imaginative interpretation of a wide range of information. Their application in strategic thinking is sometimes referred to as 'wind tunnelling' (van der Heijden 2005), in which the strategic direction of the company is tested for robustness in more than one potential future.

However, the range of concepts and practices associated with the term 'scenarios' has greatly enriched since scenario planning was first launched in Shell around 1970 (Wilkinson and Kupers, 2013), and certain aspects would now appear in all four boxes. Bishop et al (2007) propose a classification based on eight kinds of technique. Van Notten et al (2003) position methodologies according to the ways in which they treat project goals, process design and scenario content. Yet another approach is that of mode-level analysis proposed by Voros (2006), which is based on a set of thinking modes combined with a series of interpretive levels to analyse prospective methods in terms of which mode(s) and what level(s) they operate with or at. Cross-referencing the dimensions of agency and uncertainty as proposed by Sharpe (2008) and portrayed in Figure 2, brings yet another perspective.

It is interesting that, in the foresight disciplines, there is still relatively little methodology for the fourth box where both agency and uncertainty are high, and yet this is the area which is increasingly the operating environment for government, commerce and society more generally. One expression that describes this fourth area is 'reflexive futures'. This might also be characterised as strategic exploration. The high agency component of the decision making is reflected in a practice of setting a strong vision of a future state of affairs in which the actor is occupying a desired position (much as Ackoff, 1981, recommends in his Interactive Planning systems approach). The uncertainty component of the decision making is treated in qualitatively different time zones, each with its own dynamic. By qualitatively different we mean features like the differences between predictive, transformative and emergent. In this way the decision maker is operating in an expeditionary mode where progress is made according to current knowledge but strong feedback is incorporated into adapting any decision to match the emergent circumstances rather than simply 'push it through'. 'Reflexive futures' implies adaptive strategy and adaptive leadership (Pascale, 1999).

Despite the fundamental differences between the high agency / high uncertainty context and the others in figure 2, there is still a strong tendency to apply methodologies aligned to those other three contexts, thus leading to inconsistency between theory (figure 2) and foresight practice, and therefore inadequacies and even sometimes disasters in decision making. Miller (2006) sums up the essence of this situation:

> "Three of the many reasons for this inconsistency between theory and practice were/are: a fear of the future that drives a deep desire to know (divine) what will happen (clients want predictions); recent (post WWII) relative systemic stability and the related success of planning in this context; and lack of experience with, and hence under-development of, the conceptual tools and behavioural conventions that make it practical to embrace non-predictive approaches to decision making with success. Old paradigms do not cede easily and the attachment to predictive approaches rooted in trend analysis, forecasting models, multi-factor calculations, etc. are tightly integrated with the way risk is managed and decisions taken in industrial society." p341

Going back to systemic intervention, I argue that the kind of improvement we are interested in will be a function of how we see the future of the system in question. If the improvement is to move from a sustaining pattern to a transforming pattern, then a significant shift is involved, sometimes referred to as a 'paradigm shift' or a change of disciplinary matrix (Kuhn, 1977). This places the requirement for foresight firmly in the fourth zone. Hodgson (2007) describes the difficulties associated with facilitating strategic decision making in the transformation zone:

> "Part of the assumptions set is the view of time and change held by the strategy owners. Consider the example of a strategy based on an analysis of trends, and aiming to reach a certain goal over a time span in which the trend is still valid. Two ways of looking at this can be called the linear and the sophisticated. The linear is most common and relates to the cognitive difficulty people have in visualising trend bends driven by nonlinear dynamics, for example exponential curves. The sophisticated version takes into account nonlinear trends but still places them within the shape of environment or

context. If a new business ecology emerges or there is a paradigm shift then this discontinuous view of time leads to conclusions that are far off the mark." p 290

In other words, even sophisticated methods can be locked into the old paradigm. To deal with these distinctions in anticipating the future, Hodgson and colleagues have developed a new framework called the 'three horizons' (Sharpe and Hodgson 2007; Curry and Hodgson 2008: Sharpe, 2013), which co-defines the different qualities of time range that reflexive futures thinking requires. The framework is described in Figure 3.
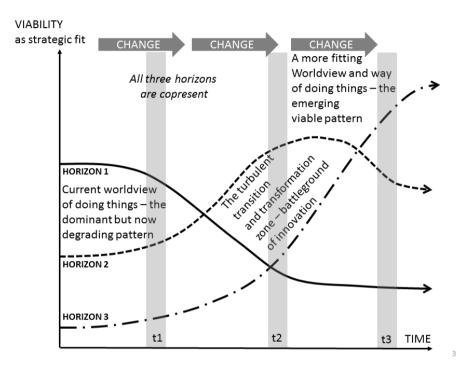

Figure 3 Looking into the Future with Three Horizons

In Figure 3, the line label *Horizon 1* represents the viability in a given context or environment of the current dominant pattern or structure of the system in question. Its viability is considered to be degrading due to increasing mismatch with the changing external conditions. The line labelled *Horizon 3* represents a different transformed pattern which, although seemingly with minor significance early on, turns out to be a much better fit with the changing external conditions and so becomes the dominant viable pattern. The line labelled *Horizon 2* represents the turbulent, even chaotic, situation of transition from one pattern to another. An example of this is disruptive technology, which may stimulate both creative innovation and resistance in equal measure until the technology becomes normal (Christensen, 1997). It is often not culturally feasible in real world business environments (due to conservative attitudes, sunk investments, etc.) to jump straight to Horizon 3 early on, when the strategic fit appears low. For this reason, compromises are made and a turbulent tension is experienced between competing pressures to conform to Horizons 1 and 3. The resulting trajectory is represented by Horizon 2.

The three lines in figure 3, taken together, unfolding over time, represent three potential futures. In particular circumstances, *Horizon 1* may prevail by sustaining innovation that merely reinforces the status quo. An organization may strongly push its 'success' formula, not realizing that it is out of date, and may ultimately overshoot relevance and collapse (Sterman, 2000). This is what happens when companies resist hearing the 'bad news' that more radical change is needed. In other circumstances Horizon 3 may prevail, when a far-sighted company spots a change in the environment and moves wholeheartedly to align with it, even if this means lower profits in the short-to-medium term. This is not the most usual reaction to accepting the importance of change, however. More often, companies find themselves on a bumpy Horizon 2 trajectory, as they seek to chart a strategic course that keeps stakeholders on board who are advocating both Horizons 1 and 3. So Horizon 2 represents a turbulent but not sudden transition.

Note the way the lines are drawn is such that they are all present in any given slice across the time axis. By way of clarification, this can be thought of in three stages. At t1 the H1 'business as usual' world is dominant but beginning to fail; H2 innovation is on the ascendency; H3 is still a fringe possibility often discounted or unnoticed. At t2, H1 is already in serious decline; H3 is noticed and is beginning to attract resources that displace H1; and the innovation in H2 is generating a high variety of experimentation. At t3, H3 has become the dominant paradigm now much more fit for purpose than H1. However, and importantly, H1 has not gone away. Essential elements are maintained but in a different role, often more related to basic infrastructure. H2 is calming down as H3 is stabilising the new pattern. Of course, in the fullness of time and with constant change, H3 will become the new H1.

This three horizon approach offers the prospect that different systems methods might be more useful and appropriate depending on which aspect of foresight is being attended to. Alignments cannot be precise, but more a reflection of the predominant orientation of any given systems method.

Operational research methods that are linear and algorithmic are useful in the more deterministic and predictive world of forecasts and extrapolation. Systems methods that account for dynamic feedback correlate better with the world of roadmaps, where performance on the pathway is subject to strong feedback influences. In the domain of scenarios, where there is high uncertainty, there is also increased dependency on human judgement, so approaches like critical systems heuristics and soft systems methodology fit well. Perhaps the most promising systems approach for the reflexive futures category is the relatively undeveloped field of anticipatory systems. Miller, Poli and Rossel (2013) are exploring and developing a research network around what they are calling the 'discipline of anticipation'. This is a potential field that is opening up and is of great interest to UNESCO.

An alternative approach is to organise systems methods from the perspective of the three horizons. The qualitative distinctions between the horizons also suggests that different systems methods may be more suited to problem-solving and decision-making according to the horizon perspective adopted by the decision maker. A broad representation of this is

given in Figure 4.This is not intended to be comprehensive or finalized, but rather to suggest an approach for further investigation.

The key question behind more detailed mapping of systems methods onto the horizon chart relates to the structural pattern of the dominant horizon in a given time phase. This pattern will to tend to restrict the behavioural range and lead to 'lock-in'. Assuming our improvement time horizon is short term in *Horizon 1*, then we are likely to be dealing with well-established systems, however complicated they might be. Methods of systems analysis, such as systems engineering, have been well developed for these situations. If our short-term improvement is more innovative in *Horizon 2*, then techniques that are strong in exploring feedback, such as system dynamics, would be more appropriate.

In the middle zone of turbulent transition, where *Horizon 2* is dominant and the pattern shift is disruptive, methods using assumption sets based on the previous history of system behaviour and assuming continuity into the future will fall out of alignment with their changed environment. This suggests approaches like SSM for accommodation of diverse views in the midst of the turbulence. The future viability of a system in the radically different operating environment of Horizon 3 might be modelled and anticipated by application of the VSM through a strong system 4. To increase the variety under consideration for transition, especially with multiple stakeholders or disciplines, Team Syntegrity (Beer 1994) is another interesting area to explore for hybrid understanding. Providing the group with agency have truly shifted their perspective towards *Horizon 3*, then methods like interactive planning will be more appropriate, as these support people in *learning* into the future and reinventing their activities.

In the longer term zone, where the strategic interest is in trying to fathom the radically different nature of Horizon 3, then those methods which allow for more innovative possibilities will be particularly relevant. Although anticipatory systems as an applied field has not yet been well developed, there is growing interest in this form of systems thinking as supportive to foresight work (Poli 2010). A third perspective comes from considering what the qualitatively different attractors for Horizon 3 might be in the context of making a transition across the fitness landscapes to the new stable state of *Horizon 3*. Finally, since the assumption sets will be rather different in each horizon mindset, the application of both critical systems heuristics and boundary critique could help clarify the whole three horizon pattern and the different assumptions and boundaries between H1, H2 and H3. This analysis is summarised in Figure 4. It must be stressed that these positions are indicative and will still depend on how any practitioner decides to use them.
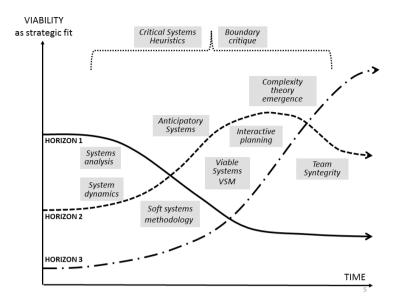
Figure 4 – Orchestrating systems methods for three horizons based foresight

A comprehensive account of the different forms of systems thinking can be found in Midgley 2003.

CONCLUSION

The ideas in this paper are based on the first author's long experience of applying both scenario planning and systems thinking in strategic management, and the growing sense that there is an interesting and productive step to be made in stepping back and seeing the two fields as complementary and even having some common underlying foundations. Poli (2011) and Hodgson (2013) have explored this from a philosophical and theoretical orientation. However, in terms of the more practical side of bringing foresight into systems thinking, we believe it is valuable to think in terms of time boundaries, as seen in the three horizons model. Table 2 examines the implications for understanding systemic improvement.

Table 2 – Three Modes of Systemic Improvement

Horizon 1	Horizon 2	Horizon 3
Identify and repair self-defeating feedback. Identify missing necessary feedback.	Identify and displace self-defeating feedback and feedback that creates lock-in.	Challenge buried assumptions.
Seek optimisation.	Seek unmet need.	Seek new visions and patterns of viability.
Be efficient.	Be the disrupter.	Be the future.

The implications for systemic intervention practice can be summarised in five points:

1. Recognise that improvement is entirely dependent on a time horizon to realise that improvement.
2. Build this consideration into the conduct of boundary critique to clarify the system in question.
3. Raise awareness of whether the improvement desired is mainly H1, H2 or H3 in its emphasis.
4. Determine which mode of improvement is most likely to generate the desired results.
5. Match the appropriate systems concepts, systemic problem structuring methods, etc., to the methods of and approaches to the desired mode of improvement.

This paper aims to open up one approach for further research and consideration, and provoke further questioning.

Acknowledgements

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