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The Origin, Evolution and Limits of Foresight, Planning and Design, the Design Ecosystem, and the Exploration of the Adjacent Possible

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Abstract

We examine the relationship of foresight, planning and design in the creative process of innovation. We examine the relationship of strategy and tactics. We introduce the notion of Kauffman's (2000) Adjacent Possible and Van Alstyne and Logan's (2007) notion of design ecology and the role they play in the generation of creative innovation.

Keywords: Foresight; Planning; Design; Design Ecosystem; Adjacent Possible.

Introduction

Foresight, planning and design are intimately connected. But, how? It takes foresight to plan and planning to design. In fact one could argue that design is a form of planning and planning is a form of foresight. After all what is foresight other than thinking ahead and what is planning other than employing foresight to think ahead. And designing is nothing more than anticipating what the user will need and hence it is a form of planning and hence of deploying foresight. All three activities require strategy and tactics and if they are to lead to innovation in Kauffman's (2000) adjacent possible one would be advised to consider a design ecology as formulated by Van Alstyne

and Logan (2007). We will examine all of these concepts in this paper and the way in which they relate to each other.

The Origin, Evolution and Limits of Foresight, Planning and Design

Having argued for the connection of foresight, planning and design we now may ask what is the origin of these three interrelated activities and are they unique to humankind. I will argue that the origins of these qualities of foresight, planning and design can be traced to our hominid ancestors, the very first toolmakers. Now I know among my readers there will be those that will claim that other members of the animal kingdom are planners and toolmakers. They will cite the way that birds build nests and the way beavers build dams and suggest that these are forms of planning. They are right they are forms of planning but they are not agent initiated behaviours but rather they are genetically programmed behaviors and they differ from human planning in that there is no way for a bird or a beaver to change their plans as conditions change. What distinguishes human planning from other forms of planning is that human planning is flexible and strategic, that is to say humans can change their plans as conditions change. Another difference is that human planning, as we have already noted, emerges from foresight, strategic foresight at that. Other animals do not need foresight for their planning activities they are programmed to pursue these activities without having to think about it.

Let me also defend my assertion that our hominid ancestors were the first toolmakers as there will be those who will claim that chimps that strip the leaves off a branch and use the stick that they have created to harvest termites from a termite nest are in fact the first tool makers. I will not deny that our simian cousins, with whom we share a common ancestry, are not technically toolmakers and tool users but there are some major distinctions that separate simian and hominid/human toolmakers. The differences are that only genus homo retains their tools for further use, refines their tools, use their tools to make other tools and learned to exploit fire and maintain it for further use. All of these activities require a level of foresight and planning that a chimp does not make use of. The chimp's use of a tool to fish termites is a spur of the moment action that does not build towards any further developments.

The first hominid toolmakers, Homo Habilis and Homo Erectus, did not possess the gift of speech and therefore their ability to plan was likely limited to their tool making and exploitation of fire. The use of fire led to hominids living in groups to exploit the benefits of the hearth. This led to large-scale coordinated hunting and gathering and food sharing, which in turn led to mimetic non-verbal communication (Logan, 2007).

As the complexity of hominid existence increased and new demands on planning emerged, the percept-based thinking of hominids was not equal to the task and in this environment speech and conceptual thinking emerged simultaneously. Our first words were our first concepts and they helped us to co-ordinate those activities. The word water united our experiences with the water we drank, washed with, cooked with, found in rivers and lakes and came down as rain. With the emergence of speech a new level of planning was possible because it is with speech that conceptualization and abstract symbolic thinking are possible. Before speech the brain was a percept processor but with language the brain bifurcated into the human mind capable of both perception and conceptualization. One could talk about and think about things that were not immediately available to one's senses in either the space or the time dimension. With conceptualization a new level of foresight, planning and design was possible. It is also likely that it was with language that hominids now emerged as humans, i.e. Homo Sapiens (Logan, 2007).

Armed with these new mental tools humans perfected the art of hunting and gathering. But there were limits to their foresight as evidenced by the fact that in different parts of the world they hunted many species to extinction. "Every human colonization of a land mass formerly lacking humans—whether of Australia, North America, South America, Madagascar, the Mediterranean islands, or Hawaii and New Zealand and dozens of other Pacific islands—has been followed by a wave of extinction of large animals (Diamond, 2005, p.9)." When hunting could no longer support or sustain hunters and gatherers they turned to agriculture and pastoralism. They turned to this more difficult way of making a living because of their lack of foresight during their existence as hunters and gatherers. It was a tougher life than their existence as hunters and gatherers but it insured their survival. It also required more sophisticated foresight and planning to sow and to harvest but with time it led to new developments in human culture. The success of agriculture and pastoralism led to surpluses that could support artisans, technologists and thinkers, which in turn led to handicraft industries and then to machine-driven industrialization. The industrialization of technology was in part a response to the need to be more productive to feed the increase in population that the success of agriculture and pastoralism made possible. The level of foresight, planning and design took another leap forward. The success of agriculture and industrialization has created the new problems that we now face because of our lack of foresight. With hunter and gatherers over-hunting led to local problems. The lack of foresight of farmers and herders also led to local problems such as soil exhaustion and desertification. With industrial societies the lack of foresight has led to problems on a global scale such as over population, pollution, the depletion of resources and global warming.

We are now facing a new crisis just as severe as the one faced by our hunting and gathering ancestors when they needed to deploy agriculture and pastoralism to survive. Our lack of

foresight at the global level has led to the crisis that our generation now faces, i.e. the challenge to live more in tune with nature.

Why Our Foresight Must Be Strategic

Design that only achieves short-term goals does not incorporate strategic foresight and foresight that is not strategic will no longer succeed not even in the short term because our economic system is on the cusp of a collapse.

As we have asserted above there is an intimate connection between foresight, planning and design as it takes foresight to plan and planning to design, but how do these activities differ. Foresight entails the ability to anticipate the consequences of one's actions. Planning, on the other hand, involves identifying the elements and actions that are required to achieve a particular objective. Planning obviously requires foresight so that the consequences of each of the actions in one's plan are anticipated so that one's objectives are realized not just in the short term but also in the long term. The historical limitations of foresight that we have identified has always been due to the fact that the planning and design has achieved their short-term objectives but failed due to a lack of foresight to take into account the long-term consequences. Designing is the activity of actually attending to the details of one's plan so that they can be realized.

If the foresight deployed in a design is short-term then that design could have some unfortunate unexpected long-term consequences as happened to our hunting and gathering ancestors. They can be forgiven for they did not have the tools to survey their world. We, the designers and planners of the 21st century, have no such excuse. We are able to scan our world on a global level and we also have historic records that contain the lessons of past catastrophes that resulted from the lack of long-term foresight. We are well aware of the problems we face and it is obvious that more than just foresight is needed. We live in a complex interconnected world with many conflicting interests where powerful economic and political interests operate only in terms of their short-term interests. This is the nature of a free market system. The alternative of a planned economy is not a solution either. The environmental record of the planned economies of Second World (communist bloc) countries was even worse than that of the free market economies. This is why strategic foresight and not just foresight is required in which long-term goals can be realized despite the constraints imposed by the conflicting interests of our free market global economy. We must build into our design thinking a social and political component. Good design alone will not prevail. One must be aware of the complexity of the design process and take into account that it is a form of emergence (Van Alstyne and Logan, 2007) and that there one must consider what Logan and Van Alstyne (in preparation) term the design ecosystem.

The Design Ecosystem

We would claim that strategic foresight entails taking into account all of the components of the design ecosystem (ibid.) as described in the following table

Principal Components of the Design Ecosystem:

Primary actors

Users with their needs, desires and expectations

Clients as commissioners, producers, and distributors

Designers as catalysts and pattern providers

Essential activities

Researching, studying

Imagining, envisioning, creating

Creating a business plan, marketing, pricing

Engineering, prototyping, testing

Support issues

Managing, collaborating, financing

Manufacturing, performing, distributing

Using, enjoying, criticizing

Key environmental elements

Technosphere: prior products, services, systems and processes

Societal, cultural and behavioral norms

Market conditions

Legal and regulatory codes

Biosphere: the web of life and the natural environment

Material and energetic inputs

Constraints of natural law

The 'essential activities' and 'support issues' of the above table all require planning and foresight on the part of the designer but it is taking into account the 'key environmental elements' that requires strategic foresight.

A Strategic Foresight Methodology

Isn't it plain that we ought to have not simply one or two Professors of Foresight but whole Faculties and Departments of Foresight doing all they can to anticipate and prepare? - H. G. Wells, 19 November 1932.

The ultimate goal of strategic foresight is to make better, more informed decisions in the present – making it the ideal tool for exploring new markets, products and services, or more generally for successfully navigating the rapids of today's constantly shifting, increasingly complex global environment. – A. Hines and P. Bishop, 2007.

Strategic Foresight is the ability to create and maintain a high-quality, coherent and functional forward view, and to use the insights arising in useful organisational ways. For example to detect adverse conditions, guide policy, shape strategy, and to explore new markets, products and services. It represents a fusion of futures methods with those of strategic management. - R. Slaughter, 1999.

H. G. Wells signaled 80 years ago the need for foresight. His call was heeded by Slaughter (1999), who provides us with a very concise definition of strategic foresight and by Hines and Bishop (2007) who detail how strategic foresight can contribute to business practice. There are a number of approaches to developing and practicing strategic foresight, which originated with the future studies community. Although the concept did not originate at the Strategic Innovation Lab, we have developed our own brand of strategic foresight that we advocate and practice. It is basically a methodology for the identification and design of innovative new products, services, experiences, processes or systems based on emerging signals from the technosphere and the econosphere that match the expectations, needs, desires, and latent behaviors of potential users in the econosphere.

Strategic foresight involves thinking about, debating, planning, shaping and ultimately designing the future. It requires understanding the available choices and then choosing among them while at the same time anticipating and navigating accelerating change. Strategic foresight involves recognizing and making sense of emerging signals from science and technology and aligning them

with newly emerging behaviours in the socio-cultural domain as well as in the market place among potential competitors and at the same time being mindful of both the physical environment and the legal/political constraints under which we must operate. It requires clarity of vision, an honest appraisal of organizational capability, and effective communication, so that change can be instigated and insights converted into opportunities for innovation and success.

Our strategic foresight methodology basically consists of the following steps:

1. Identification of the subject and scope of the investigation.
2. Discovery and analysis of emerging signals in both the technosphere and the ecosphere with particular attention to disruption, anomalies, new patterns of behaviour by both potential users and competing producers, and new market practices. The analysis should reveal the meaning of the emerging signals, the context in which they operate and the potential opportunities they open up.
3. The formulation of imaginative questions that can lead to new perspectives and open up the path to new opportunities. The questions should lead to new perspectives, identify multiple options and invite and frame further exploration.
4. Points of departure should emerge from and build from the answers to the imaginative questions and be formulated as provocative statements. They should suggest scenarios for the ways in which innovative products and/or services will play out in the market place and be deployed by potential users.
5. Scenarios are developed that grow directly from points of departure and existing emerging signals to show ways in which innovative products and services can be developed, marketed and deployed by users. The role of the scenarios is to stimulate the imagination and sketch a picture of the future in which ideal situations and experiences are framed. The scenarios are extremely rich highlighting formal and functional characteristics, platforms that introduce new tasks, actions, interactions, interfaces, relationships, roles expectations, outcomes, and events. The scenarios are developed in terms of narratives, that address the imaginative questions formulated earlier and explore the user experience with the new products, services, systems and environments. The scenarios are also crafted to function as potential business models.
6. The next phase of disclosure is a convergent process where the multiple options developed in the points of departure are narrowed down, disambiguated, and clarified and a detailed business model or plan of action for a project is formulated. The disclosure process also describes the formal and functional qualities of the new products and services formulated within the scenarios.

7. The last step is to pass the new products and services that have emerged from the strategic foresight process through a new product filter which gauges their acceptability, the possibility of constructing them from existing technology, the existence of commercial platforms to produce and market them and their viability as commercial products that can generate a profit.

8. Although the strategic foresight methodology above was described in terms of the design of products or services it also applies to the design of experiences, processes and systems as well.

The Gutenberg Press and the Exploration of the Adjacent Possible

The Gutenberg movable type printing press and its role as one of the forerunners of the Industrial Revolution illustrates the way the Adjacent Possible operates in the technosphere. The technologies from which the Gutenberg movable type printing press descended were the silk textile press, the grape press for winemaking and Chinese block printing press for text. The Gutenberg press met the needs of a new reading public spawned by the emergence of the medieval university and the Renaissance of classical learning both of which trends the printing press reinforced creating an even bigger market for it and the books that it produced. The printing press also found other applications as the producer of the family Bible and the propagation of the Protestant Reformation. The press also met the needs of scientists to capture and store their data in a reliable format that could be reproduced without errors.

The innovation was not just the product of Gutenberg's mechanical skills and inventiveness but also of his business partner's vision and commercial acumen, who wrested control of one of the presses from Gutenberg in a civil suit. Fust used that press to print a 1000 Bibles which he sold in Paris for a huge profit and started the new industry of book publishing. Gutenberg continued to improve his invention and died a poor man.

Perhaps Gutenberg's greatest impact of all was the fact that the Gutenberg press was the first tool of mass production creating absolutely identical manufactured products, namely multiple copies of the same book. It also achieved this feat by mass-producing the type fonts used in the press by pouring hot lead into molds. The printing press served as a model for mass production (McLuhan, 1962; Logan, 2004). The silk textile press, the wine press and the Chinese block printing of a page of text that preceded Gutenberg's movable type printing press that eventually led to mass production is a beautiful example of the way in which the Adjacent Possible is explored and exploited for innovation.

The Adjacent Possible and the Technosphere

A central thesis of Kauffman (2000, p.22) book *Investigations* is the existence of an Adjacent Possible in the biosphere, which is defined in the following manner:

'Autonomous agents forever push their way into novelty—molecular, morphological, behavioral, organizational. I will formalize this push into novelty as the mathematical concept of an 'Adjacent Possible,' persistently explored in a universe that can never, in the vastly many lifetimes of the universe, have made all the possible proteins sequences even once, bacterial species even once, or legal systems, even once. Our universe is vastly nonrepeating; or... nonergodic'.

Kauffman (2000, p.54) extends this claim for the technosphere. "Science, technology, and art tumble into the Adjacent Possible in roughly equal and yoked pace". Thus the generation of new tools and technologies is not by way of imagination and vision alone but also through the stimulation of a knowledge of the technosphere through the agency of the innovators.

The Role of Strategy and Tactics

Our thesis is that innovation arises from the autocatalysis and coevolution of technology and vision fueled by imagination and driven by a vision. Given that technology or the "how" drives the tactical and vision and imagination or the "what" drives the strategic then perhaps it is not a question of strategic versus tactical innovation but rather a mix of the two. In terms of military campaigns where the terms of strategy and tactics were first used the day could only be carried by the formulation of a winning strategy coupled with the appropriate tactics to realize the objectives of the strategy. The etymology of strategy is from the Greek word for a military general "strategos". The etymology of tactics is also from the Greek: "taktikos" for order and "taktos" for arranged. Merriam Webster defines strategy as "the science and art of using all the forces of a nation to execute approved plans as effectively as possible during peace or war. "Whereas they define tactics as "a method of employing forces in combat". In addition to these definitions related to military activity there are also definitions of strategy and tactics used for the business or political arena. Strategy is defined as "a careful plan or method" and tactics is defined as "a device for accomplishing an end". The strategy is the vision and the tactics are the tools.

Successful innovation is not a question of strategy versus tactics but rather the integration of the two. One by itself will not carry the day and so for successful innovation one must have both a strategy that encompasses imagination and associated tactics in the form of appropriate technology. The strategy guides what one wants to do or create and tactics provide the how – how one will realize the successful completion of the strategy. The most important part of the

vision is the ability to read ahead of time the needs and desires of the potential users of the planned innovation.

The strategy or the vision for innovation entails risks and the ability to think outside the box. It is not a safe road, which is why many disdain to travel it and are content to pursue the safety of a tactical innovation in the hope to gain a competitive advantage in the marketplace. This is the reason that most innovations are sterile and lead nowhere. Tactical innovations are more straightforward, less risky and based on prior experiences. This is why when exploring a new and dangerous territory and formulating a strategic innovation it is important to fall back on proven tactics by making use of trusted and proven tools. Tactics are the actual way on the ground in which strategies are executed. To summarize: strategy determines what to do and tactics how to do it. Both are needed to achieve one's objectives and they must be mutually self-supporting. A vision without the means to achieve it for lack of the right tools leads to fantasy. And good tactics without a vision is sterile and do not lead to an innovation worthy of the name.

Innovation is a product of design ecology and the autocatalysis of visions and tools and of strategies and tactics. Tools give rise to new needs and new visions which in turn give rise to new tools which in turn lead to still more new visions and so on and so forth. In this way tools and visions co-evolve.

In Stuart A. Kauffman's (2008) *Reinventing the Sacred* I encountered the following passage, which I believe argues for the value of the strategic foresight concept we are advocating in this essay.

'There is a real economic web, but we don't know much about its structure, how it transforms over time, the roles that diverse positions in the web play in the successes and risks to the firms occupying them, the way this web grows into the adjacent possible, how it self-constructs, and how it spins off into new direction of growth in Schumpeterian gales of creative destruction. But clearly, the structure of this web plays a major role in economic activity, economic evolution, hence in economic growth. We must learn to harness this structure, both to create global wealth and to do so in a way that is consistent with a sustainable planet' (Kauffman, 2008, p.163).

The strategic foresight methodology provides a systemic methodology for exploring the adjacent possible of the ecosphere that Kauffman (2000) has identified in his work. It entails planning and designing and these activities are best pursued by taking into account all the elements of the design ecosystem to insure a creative and innovative outcome that will have value not just in the short term but it will have value in the long term and it will lead to the sustainability of the environment.

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