

The Human Strategist: Dancing on the Edge of the Possible

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Research on the Fringe

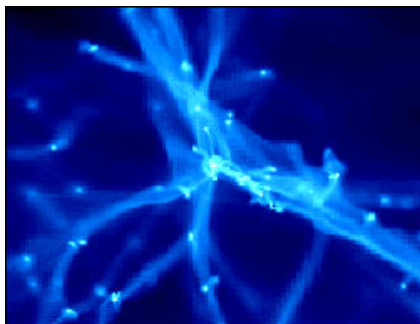


Image from the University of Chicago's Audrey Kravtsov's simulation of the universe

I follow technology and science. Actually, that's putting it mildly. I subscribe to Scientific American and the Technology Review. I read almost everything written about technology and new science in the Wall Street Journal. I've been known to attend lectures on astrophysics and read books on quantum theory for leisure. I regularly try to attend Cal Tech's Enterprise Forum where new technology businesses are discussed and dissected. And I am on a mailing list for the American Physics Society so that every other week or so I get an email letting me know not just what the latest published papers are about, but what the papers that are *about* to be published are about. I get this

great collection of abstracts actually written in almost-English and which I understand about 90% of the time.

Here are a few examples from the last few emails that caught my attention:

Neutrinos make for small extra dimensions

Fundamental theories of particle physics and cosmology often require the use of extra dimensions that might be "curled up" to small scales. The existence of oscillating neutrinos (as recently confirmed by Sudbury Neutrino Observatory data) places constraints on how large any extra dimensions could be. Using the latest neutrino data, the authors' most conservative bound suggests that extra dimension should only be visible on a scale less than 0.82 micrometers (approx. one millionth of a meter). Thus, currently planned gravitational experiments are unlikely to detect these dimensions if they exist.

Computational capacity of the universe

All physical systems register and process information. The laws of physics determine the amount of information that a physical system can register (number of bits) and the number of elementary logic operations that a system can perform (number of ops). The amount of information that the Universe can register and the number of elementary operations that it can have performed over its history are calculated. The Universe can have performed 10^{120} ops on 10^{90} bits (10^{120} bits including gravitational degrees of freedom).

Patterns in food web structures

Natural ecosystems are connected via intricate networks. Past modeling of these "food webs" involving small systems has not allowed discovery of significant universal factors across all webs. Now a larger study of seven sufficiently detailed webs has led researchers to discover that a single parameter, the linkage density, determines many important properties such as distribution of prey and number of predators. The advantage is that measuring the linkage density in real-life ecosystems is relatively easy and may allow a greater understanding of ecosystem interactions.

Single photon LED

A light-emitting diode that fires one photon at a time has been created. It is a potentially inexpensive, easily manufactured component for quantum cryptography and other applications. The researchers believe this is the first electrically driven single-photon source.

Short pulses of entangled light for quantum communication

Researchers have created pairs of entangled photons, the basic resource for quantum communication, in a form that is suitable for transmission over long-distance optical fibers. This will allow for realistic complex quantum communication protocols.

This is what is called "fringe" research in my domain. It's a process of keeping abreast of items in one or more disciplines that have not yet entered the mainstream. It can also be done in fashion or pop culture or politics, anthropology, philosophy, biology, medical research or Shakespeare studies. Every discipline avail-

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able to us continues to develop and progress— new ideas come forward, there is an interplay between the disciplines and progress occurs.

Dancing on the Edge of the Possible

What I like about reading material that varies so widely is that it stirs the thinking processes in my primary occupation – business strategy. Doing excellent work in business strategy requires a broad understanding of a number of disciplines, including business model design, markets and competition, specialized industry and/or industries knowledge, macro- and micro-economics, business functions, financial markets, globalization, politics, regulatory and legal environment, human dynamics and organizational behavior, leadership and corporate governance. This is actually just the tip of the iceberg, but it gives an idea of the breadth of background required of a good strategist.

To expand the above list further, though, are two critical skills that enable strategists to really see the potential application of developing technology and its impact on an organization's strategy and business. In order to do that, one has to establish a mental framework for becoming aware of the fringes of technology. The first skill is the ability to do divergent thinking. *Creative Destruction* by Richard Foster and Sarah Kaplan has an excellent description of this skill: "The tool of intuitive genius, divergent thinking can readily change the definition of the problem to be solved, or the context in which the problem is solved. It involves the ability to switch from one perspective to another fluently, as well as an ability to pick up on or make unusual associations."

The second skill needed is the ability to make use of a creative style which has been labeled "Observer" and derives from the power to notice details. In her book, the *Five Faces of Genius*, author Annette Moser-Wellman describes five different creativity styles and advocated creating working environments that support the use of all five. She also suggests that individuals can expand their creative ability by learning how to use styles that are not their natural style. It is the power to notice details, combined with the "Alchemist", the power to connect domains, that makes the use of science and technology research so exciting in a strategy context. Combining these together allows a strategist to dance on the tightrope edge of the possible, balancing current reality against an unknown but possible future and a mythical dream world of ideas which may never come to fruition.

Boundaries for the Future

As strategists, it seems to me that we are called upon not just to codify the organization's view of itself and its future, but to help create that future. We help to frame the issues that will drive the creation of a vision. We set the boundaries on the length of view that we look at (do we look at 3 years out, or ten, or twenty?). We set the boundaries on how we define our products (do we make objects to sell consumers or a dream to sell our markets?). We set the boundaries on the organization's structure and its ability to meet the needs of customers (do we expand customer service or quality control or the back-office?). We set boundaries in defining stakeholders to be addressed and prioritizing these needs (do we directly address the needs of globalization and social constituencies or do we focus on our product and known customers?).

In order to set boundaries, however, it is necessary to stretch and test boundaries. Most parents of young children and teenagers are pretty familiar with this process in action. It seems to be the modus operandi of youth to test the boundaries imposed by parents, society, school, and just about everyone else. In our very

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young, we relish this testing and see it as positive when our two year old starts to explore her world more directly. Somehow we expect older children to grow out of it— we don't relish it quite so much when our teenage son starts to push the boundary of independence and disappears for a night on the town with his friends. And later, when we enter into the world of work, pushing the boundaries is an even less sought-after behavior. It is often actively discouraged in many companies. Even progressive companies prefer to channel their boundary pushing activities into very narrow channels, such as research and development, where it can be 'controlled'.

So strategists have the enviable, and yet challenging, job of becoming boundary pushers in their own companies. They're the ones who have to ask questions like:

- What if a new form of power, based on nano-technology or biomass conversion supplants the power systems in our products in the next five years and its adoption curve is more rapid than we anticipate?
- What can we learn about the linkage density in food webs that could be applied to our understanding of our industry's inherent network and what does that mean about future alliance opportunities?
- How might the single-photon source technology encourage cheaper encryption and jeopardize our company's internal security mechanisms?
- How might new findings in particle physics change the outlook of the next generation of consumers, much as the Newtonian mechanics and Einstein's relativism changed previous generations?
- How will our company deal with the accelerating rate of change in scientific development?

Logically, and economically, our companies cannot afford to have everyone on their staffs engaged in the active pursuit of these longer-term boundary -setting exercises. However, in order to provide a good strategic planning environment, it must be recognized that *someone* at the company has to be thinking this way. This type of boundary stretching cannot be outsourced to the occasional consultant (although they can certainly assist in broadening a corporation's outlook), nor can it fall onto the over-filled plate to of the CEO. Whether undertaken by a designated staff or delegated out to various functional areas that then maintain internal communication, this is an exercise that must take place. It is imperative if companies are to survive and adapt, to continue to serve their constituencies and to provide for the greatest value to their stakeholders. It will be necessary to prepare your staff to dance on the edge of the possible in order to recognize the probable.

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Physics and Astronomy Online—<http://www.physlink.com>

New Scientist—<http://newscientist.com>

Simulation of the Universe—<http://cfcp.uchicago.edu/lss/gal.html> — simulations were performed at the National Center for Supercomputer Applications by Andrey Kravtsov (The University of Chicago) and Anatoly Klypin (New Mexico State University). Visualizations by Andrey Kravtsov.