The Self-Organizing Supply Chain

Tom Bellinson

"Inventing is a lot like surfing: you have to anticipate and catch the wave at just the right moment."

-- Ray Kurzweil, Inventor and Futurist, from THE SINGULARITY IS NEAR: When Humans Transcend Biology

My last offering to BPTrends readers was a well researched article based on my own years of experience in the industry. This time, I offer up what I hope will be a thought-provoking discussion that is part book review and part thought piece.

Several years ago, I discovered a book called *Surfing the Edge of Chaos* by Pascale, Millemann, and Gioja. In it, the authors propose a new metaphor for business. They argue that the old "machine with gears meshing" paradigm no longer suits the marketplace. Instead, they propose a biological metaphor.

Biological systems are designed to cope with changing environments. At the same time, they seek equilibrium. As members of our ecological system, humans operate the same way. Our equilibrium – our comfort zone, if you will – varies, depending on our preexisting standard of living. To a poor African villager, having enough food to avoid starvation and a roof to keep out of the rain may be considered "comfortable." To a wealthy westerner, a winter home in Florida might do the trick. Regardless of where one falls on the wealth spectrum, we all seek equilibrium.

The problem is, our environment never stays the same. We live on shifting sands. Once we reach equilibrium, we have a tendency to hang onto the processes that got us there. Just like the old saying, "if it ain't broke, don't fix it," we choose to freeze our behavior once it appears to be "working." Unfortunately, the world around us is not frozen. It is continually evolving and shifting. The longer we go in the same lock-step behavior, the more inappropriate our behavior is for the environment we're in.

Eventually, things begin to fall apart. Our behavior doesn't work anymore. We are thrown into *disequilibrium*. The discomfort of disequilibrium forces us to change. The change is a struggle to reestablish equilibrium. The evolutional path of this struggle looks something like this:
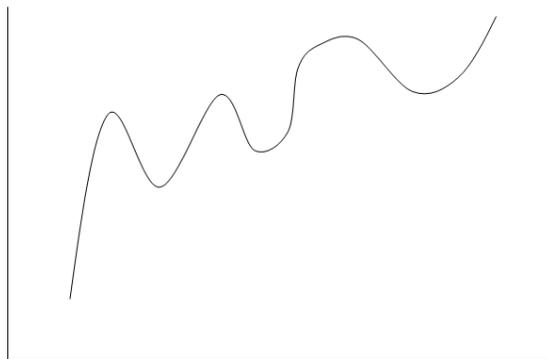
The peaks are referred to in biological terms as "fitness peaks." These are the points where equilibrium is attained. The valleys are where our world has changed so much that we are forced to adapt. Notice that each fitness peak is slightly higher than the last. This is evolution. The struggle to survive makes us stronger.

Markets are borne out of human desire. As such, they are as much biological systems as any social order on the planet, such as ants foraging for food or birds migrating south for the winter.

Like any other social structure in nature, markets tend to be self-organizing. In other words, there is no single individual or group pulling all the strings. Markets change on their own due to countless variables that nobody controls. Influence – yes, control – no. As with our friends the ants, we can understand markets, by understanding their driving goals. The ants' goal is simple: to get enough food to grow the collective.

Markets are driven by consumers. Consumers (us) are driven by increasing levels of personal comfort (whatever that means). Increasingly, comfort, for those of us lucky enough to be part of the world of commerce, is based on technology. We already have the basics: food, shelter, clothing, transportation. So, we seek ways to make life richer and easier. Technology provides us with a continuous stream of new ways to achieve a richer, easier life.

Understanding this, we can look at all of the variables, which must be monitored to function at peak levels, with an eye towards optimizing for "the goal." The challenge is that, as with any evolutionary process, the environment becomes increasingly competitive over time. Because only the strong survive, the race to become stronger speeds up.

Humans evolve at a biological rate. It has been roughly seven million years since early hominids emerged. Modern human intelligence is said to have emerged somewhere in the neighborhood of 100,000 years ago. Modern computers were invented within the last 100 years. We are on the verge of achieving human level artificial intelligence, reasonably within the next 50 years (possibly much sooner). The point is technological evolution is thousands of times faster than biological evolution.

As a result, organizations at the top of their supply chains will increasingly take humans out of the loop and replace them with faster, better, more reliable and cheaper technology. For most of us, this is a painful truth. But, the fact is, there are too many variables which are changing too fast for human intelligence to monitor effectively against continuously improving technological alternatives.

This is not conjecture, this is a fact. One great example of this is in the software used by credit card companies to monitor fraud. Have you ever made a large purchase that was outside of your normal buying habits? Did you receive a call or alert from the credit card company? This happened to me recently. I have never traveled outside of North America. I was planning a trip to Europe and I made a hotel reservation in London. My credit card was immediately disabled until I called the issuer and confirmed that it was indeed I who had made the charge.

Did a human catch that aberration in my spending habits? Of course not. A massive computer system that is capable of evaluating every transaction made by every cardholder against all his or her other transactions, to dynamically determine if the purchase seems "odd," is responsible for this response. Take a moment to imagine the subtle intelligence that goes into this. If the system finds "oddities" too often, cardholders will quickly get annoyed and change credit card companies. If the computer doesn't catch fraud, costs go up. It is a delicate balance that requires incredibly sophisticated reasoning, and it is all done without human intervention. Welcome to the 21st century!

Increasingly sophisticated artificial intelligence (AI) will drive the decisions of supply chain members. As supply chains come to rely more on AI to make operational decisions, the technology across the supply chain will need to become more integrated. We already have frameworks such as service oriented architecture (SOA) that lend themselves to system-to-system interaction. Today, most of these integrations are used to pass basic transactional data back and forth. However, some are exchanging forecast data. As these systems become more autonomous at interpreting forecast information, one could envision whole supply chains that push end-consumer trend data all the way through the supply chain to provide data that is used to optimize production output.

Marketing professionals use the acronym PEST (politics, economy, society, and, technology) to identify external factors that alter the course of a market. Increasingly, the Internet provides us with access to data concerning each of these factors. Humans may never have the capacity to effectively evaluate all the relevant data available with which to make sound business decisions. Computers are better suited.

As time goes on, these systems can offer more subtle suggestions like whether and when it is appropriate to make capital investments in technology to upgrade capabilities. The ability for this type of self-organizing technology to adapt itself to a continuously changing environment means periods of disequilibrium will be shorter and shallower than what is possible under human control. Eventually, the graph shown above may look more like this:
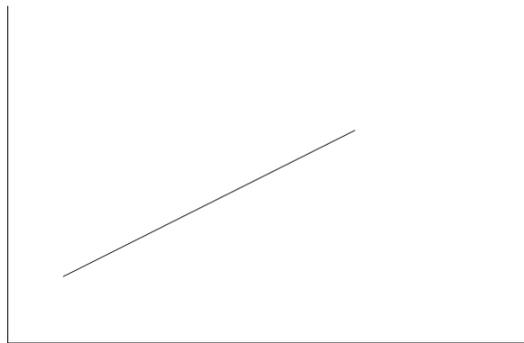
We may not like it, but humans cannot reproduce this type of evolution alone. Whether it is flexible robotic work cells, which can reconfigure themselves to make a wide range of products, or lights-out warehouses, which continually reconfigure bin locations to optimize order fulfillment performance, technology is making change a continuous and instantaneous process. Firms that ignore opportunities to get on the technology bandwagon do so at their own peril.

BPTrends Linkedin Discussion Group

We recently created a BPTrends Discussion Group on Linkedin to allow our members, readers

and friends to freely exchange ideas on a wide variety of BPM related topics. We encourage you

to initiate a new discussion on this publication or on other BPM related topics of interest to you, or

to contribute to existing discussions. Go to Linkedin and join the **BPTrends Discussion Group.**