Our mental models can impose severe limitations on our ability to recognize both opportunities and threats. Being aware of them is more important than ever in a world of rapid change.

From Mental Models to Transformation:

Overcoming Inhibitors to Change

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THE GLOBAL FINANCIAL CRISIS OF 2008 represents one of the best possible examples of the dangers posed by narrow mental models. Before the crisis, many people, including top regulators and senior financial executives, either failed to make sense of what was happening or chose to ignore it because of the profit opportunities. Some of the most basic assumptions implicit in the prevailing worldview before the collapse – such as ever-rising home prices and stock markets – were patently false, but the mindset was so powerful that by and large, objections were not raised.

Some people did see what was coming. In 2003, **Warren Buffet**, relying on his tried-and-tested mental models, called complex instruments such as credit default swaps "financial weapons of mass destruction"; and in 2004, NYU Economics Professor **Nouriel Roubini** discussed the probable collapse of the U.S. financial system. **Nassim Taleb**, **Charles Morris** and **George Soros** also raised alarms years before the crisis hit. Those who heeded their calls were able to benefit from the unprecedented shifts where many others suffered losses.

While narrow mental models can obscure potential threats, the right mental models can open up new opportunities. *BusinessWeek*'s

2008 list of The World's Most Influential Companies included **Wal-Mart**, **Toyota**, **Apple**, **Google**, **Facebook**, **Craigslist** and **Li & Fung** – many of whom rose to prominence by challenging the conventional wisdom in their industries and seeing fresh opportunities that others missed.

If an organization wants to achieve staying power through good times and bad, it can never allow itself to be static. It must constantly test and challenge its current mental models and experiment with new ones. In this article, we will examine some strategies for challenging mental models and overcoming inhibitors to change.

The Roots of Mental Models

University of California Neurologist **Walter Freeman** made an astonishing discovery about the human brain: once it takes in information about the world through the senses, it then proceeds to discard most of it, using what remains to evoke a 'parallel world' of its own. Each individual brain, then, creates its own world, which is internally consistent and complete. Our eyes and ears are constantly gathering information, but our mind is not really processing all of it: unlike a camera, we are not actually decoding all the pixels; instead, like a cartoonist, we are drawing a caricature of what we see before us based on our mental models.

The result is that modern managers continue to be limited – even blindsided – by their own models. When **Napster** rose to prominence, recording companies saw this new model as a significant threat and immediately sought to protect intellectual property through lawsuits against Napster and even their own customers. While they made half-hearted attempts to embrace digital music, their deeply-engrained models were just too hard to break, and the industry has been in flux ever since.

The opposite mistake can also be problematic – seizing every new model that comes along, some of which turn out to be fads. Model management is a delicate balance that entails assessing whether our models are relevant and changing them as necessary. As we will argue, the solution often lies somewhere between revolution and the status quo – and, quite often, revolution *and* the status quo.

Developing a Portfolio of Models

Once we have taken the first step by recognizing the central role that models play in our thinking and action, we then need to take a hard look at our own mental models. Are they the right ones, given how the world is changing? Where can we find new ones? How can we combine the old and new into a powerful 'portfolio' of models?

By the mid-1990s, it had become increasingly clear to **IBM** that its proprietary approach to Web server software was failing. Following the prevailing mindset of the software industry, IBM created proprietary software that it licensed to users. This was the business model that made **Microsoft** one of the most successful companies on the planet, but it wasn't working for IBM. Its Domino Go software had only about two per cent of the Web server market, while Microsoft's had captured more than a quarter. This was a serious concern for a company that was increasingly building its future around e-business.

While IBM, Microsoft and others battled it out on proprietary-server software, a new model had been emerging: an open-source alternative called Apache (so named because the community-generated software had so many patches that it was dubbed 'a patchy' software) had quietly captured about half of the market. When open-source proponent **Richard Stallman** was invited to speak to researchers at IBM, he must have seemed like he had dropped in from another planet. The bearded MIT hacker, who founded the **Free Software Foundation**, described his radical ideas and the world he envisioned, in which "everyone will be able to obtain a good software system for free – just like air."

This idea initially seemed antithetical to any for-profit business such as IBM: from the viewpoint of proprietary software, *sharing* software was the same as stealing it. Treating software like air would vaporize the business. IBM could easily have dug in its heels and fought for the old model of proprietary software, but instead, it heeded signs that it needed to change not only its business model, but its whole way of thinking about software development. It quickly embraced the open-source model, much to the dismay of its lawyers, who pointed out that, as a deep-pocketed player, IBM faced significant risks by climbing into the sandbox with the open-source community. Instead of accepting these objections, proponents within IBM engaged in rigorous due diligence about licensing agreements and even the origins of the code to protect the company from potential liabilities.

IBM's involvement turned out to be a win-win situation for both IBM and Apache. 'Big Blue' contributed equipment and programmers, giving the open-source project added credibility and the service support to increase the comfort level of large clients. By October 2003, Apache was running on more than 67 per cent of all servers. IBM also created a new business model, selling proprietary software and other services that worked on the free, open-source system.

In its embracing of open source, IBM used three strategies that are critical to the process of challenging our mental models:

1. Assess current models

The poor market performance of its proprietary software and the rise of open-source alternatives offered IBM a direct test of new vs. old models. While it might have recognized this shift even sooner if managers had more open minds, IBM made the type of fundamental changes to its thinking and actions that are often difficult for an established firm. By rigorously examining and testing models, an organization can avoid moving to a new model too soon – or

jumping in too late. The market had provided just such a test, but while the failure of its proprietary software made IBM open to abandoning its old models, it still needed to generate new models.

2. Generate new models

By interacting with radical thinkers, IBM researchers were exposed to fresh ways of approaching problems. They also had to keep an open mind to not reject these 'crazy' ideas out of hand. When it became apparent that IBM needed a new model for its server software business, it was able to draw upon these ideas.

A fresh perspective can be very powerful. Many great scientific discoveries were made by 'outsiders' within their first year in a new field. The influence of outsiders is seen in the diverse scientific contributions of printer and ambassador **Benjamin Franklin**, patents clerk **Albert Einstein** and bank clerk **George Eastman**. Innovations also often come from outsiders who are not limited by the conventional wisdom of the current industry: diet soft drinks, electronic cash registers, running shoes, disposable diapers and overnight package delivery are all ideas that came from outsiders rather than incumbents. **Innocentive**, a firm that offers an innovation network of more than 170,000 experts to field questions, found that the further-removed the expertise of the problem solver from the discipline of the problem presented, the higher the likelihood of success. For ways to generate new models, see **Figure One**.

3. Develop a portfolio of models

Although IBM embraced its new model, it was still a for-profit company and did not abandon its proprietary models. Paradigm shifts that are seen as revolutions by early proponents are often not absolute: the rise of e-mail has not eliminated the elegant fountain pen or handwritten notes on fine paper; and while **Apple** is a digital company, its physical stores create a sense of excitement and a customer experience that cannot be found online.

Overcoming Inhibitors to Change

Adopting new models entails giving things up, which is something we humans hate to do. Behavioural psychologists have long recognized that people have an aversion to loss and are predisposed to want to hold onto things, including our mental models.

As the world changes more and more rapidly, 'adaptive disconnects' occur between people adopting models at different rates. Adaptive disconnects can become so severe that a shared view of the world becomes difficult to achieve or even impossible. The divide can grow until, at the extreme, the two sides may not be able to communicate at all because they are interpreting the world through such different lenses.

We see these disconnects every day, between individuals (married couples that have drifted apart over the years), within organizations (battles between the 'old guard' and the 'young Turks') and in societies (divides between the developed and developing worlds).

Introducing new-and-improved models to the world entails two important steps: changing the organization's infrastructure and bridging adaptive disconnects.

Strategies for Generating New Models Figure One

Bring in the radicals: Even heretical ideas may open thinking in new directions, as shown by Richard Stallman's role in helping IBM see the value of open source.

Challenge assumptions: Dell and Toyota challenged the view that inventory was an asset to create more flexible just-in-time systems that transformed their industries.

Travel and explore new ideas: Howard Schultz created the idea for Starbucks after an inspiration on a trip to Europe.

Zoom in *and* zoom out: In the current economic downturn, managers need to look at detailed operational issues but still keep an eye on broader shifts and the opportunities and threats they present. Companies can also look beyond their current competitive group to take a broader view of competition, as cable companies did in providing Internet and telephony services.

Destroy your brand: GE challenged leaders of its units to destroy their own brands, revealing both vulnerabilities and creative options for rethinking their businesses.

Create interdisciplinary diversity: Break the silos. When Pentagon officials sought to understand possible terrorist threats, they turned to science fiction writers and film directors.

Idealized design: Reinventing the world from a blank slate frees creative thinking from the past. In the 1950s, when Bell Labs imagined the entire phone system was wiped out, it unlocked a flood of innovations such as touch-tone, call forwarding, conference calls and caller ID.

Scenario planning: Considering multiple scenarios helps us think about the potential implications of unthinkable futures.

Experimentation: By allowing workers to spend a percentage of time experimenting with their own projects, 3M has been able to come up with radically new concepts such as Post-It Notes.

1. Change the Infrastructure

Mental models are often hard-wired into an organization. Supporting new models entails looking at all aspects of organizational architecture, including incentives, processes, culture, information technology and competencies. While remaking the infrastructure can be overwhelming, sometimes a new mental model can be pushed forward through a series of apparently-small initiatives that fundamentally transform the system.

For example, **eBay** and **Craigslist** fundamentally changed the model for selling used products. The old model of the classified ad saw sellers pay for a few words in the newspaper, whether or not their product sold. eBay offers sellers a much larger audience and at the same time, charges people only after their product is sold. It also offers powerful search tools and creates community mechanisms to rate buyers and sellers in order to increase confidence. This new model, along with the parallel model of Craigslist, has virtually swallowed up the newspaper classified-advertising business.

While it is easier for new companies such as eBay to make such shifts without the burden of legacy systems, established organizations can change their infrastructures along with their mindsets. The transformation of the **New York City Police Department** by former Mayor **Rudolph Giuliani** and Police Commissioner **William Bratton** began with "challenging every single assumption about urban policing." Small-but-significant changes such as a zero-tolerance policy on petty crimes had a big impact because they began eroding a mindset of tolerating some crimes, and they moved from responding after the fact to proactively preventing crime. The changes also provided visible victories. For example, in the past, police didn't bother with panhandlers or squeegee people who washed car windows at intersections. When law enforcement began to crack down on these petty crimes, it changed the way residents looked at the law: they saw the immediate benefits and took it more seriously. Such small changes can become 'tipping points' for fads or revolutions, which spread in epidemic fashion from a few initial carriers across the population.

2. Bridge Adaptive Disconnects

As with rivers and mountains in the natural world, barriers between models can sometimes be crossed, bridged or tunneled through. It is important to keep in mind that if the disconnects between mental models are wide enough, however, they may be unbridgeable, leading to outright conflict or war.

One source of disconnects in the business arena is the often-huge chasms that exist between different functions within an organization, such as marketing, sales and operations. There can even be disconnects between internal R&D and open innovation (with internal researchers rejecting ideas that are "not invented here"). **Procter & Gamble** transformed its new product development by tapping into external inventor networks for innovations such as its SpinBrush and whitening strips. Bridging such gaps through interdisciplinary initiatives can have a dramatic effect. For example, some companies are now drawing together R&D, marketing and operations in new product development, or marketing and finance are collaborating on improving marketing metrics. By bridging silos, organizations can fundamentally change the way they address critical problems.

One strategy for bridging disconnects is to create dialogues by employing 'boundary spanners'. In Science, for example, these include people like **Stephen Pinker** and **Richard Dawkins**, who make complex scientific subjects accessible to the masses, bringing a new view of the world to a great many people. Likewise, within organizations there are often people who stand at the intersection of differing world views who can play an important role in bridging adaptive disconnects.

Ensuring the Transformation Continues

Once current models have been assessed and new models have been identified and carried into the world, the challenge is to continue to test mental models quickly and effectively. There are two basic approaches to the requisite decision process: an analytical, formal process and an intuitive process.

The analytical approach can be codified and explained to others. It is repeatable and follows a well-known process that is taught in business schools, medical schools and other areas where important decisions have to be made. The analytical approach runs through a series of steps: formulating the problem, gathering information, diagnostics, generating options, evaluating these options using a selected set of criteria, making a choice, and developing mechanisms for implementation and feedback, including measures of performance.

The intuitive decision process, on the other hand, depends upon gut feeling. **Albert Einstein** talked about 'a feeling in his fingertips', and **Starbucks** founder **Howard Schultz** shook with excitement in an Italian café when he first had his idea. It was this personal process that allowed Schultz to recognize the mental model for an American café at a time when coffee was viewed as a commodity. Although it took him many years to convince others of the power of this idea, Starbucks ultimately became a cultural icon

To keep your mental models fresh and relevant, we suggest the following strategies:

1. Develop and Apply Intuition

Good intuition is based on deep knowledge of a topic. Nobel-Prize-winning physicist **Enrico Fermi**, who demonstrated the first controlled atomic fission reaction, was carrying out some neutron experiments in Italy during the 1930s. During the course of

debugging these experiments, he had a hunch to shoot the neutrons through paraffin wax instead of shaped lead. This led to the discovery of 'neutron moderation', which ultimately permitted the development of the world's first nuclear reactor. Fermi had a deep knowledge of Physics, but he could not explain why he suddenly tried paraffin wax. The use of paraffin was accomplished "*con intuition formidable*": he felt it in his gut.

Applying our intuition requires that we cultivate the practice of 'letting go'. **Francisco Varela** has described the process for accessing personal experience as deriving from the intersection of introspection, phenomenology and contemplative traditions. He argues that to become more aware and access our experience requires three gestures: suspension, redirection and letting go. In an interview, **Brian Arthur** discussed reaching a "deeper region of consciousness," noting that to access this consciousness requires three steps: total immersion (observe, observe, observe); retreating and reflecting (allowing the inner knowledge to emerge); and acting in an instant (bringing forth the new as it desires) – which is consistent with the practice of letting go.

2. Experiment Continuously

We must also continuously engage in experiments. While some of these will be planned, some will be natural, with insights arising from studying the environment around us. For example, the dot-com explosion and subsequent collapse offered one of the most wide-reaching natural experiments that tested many different business models for using Internet technology. Likewise, we need to develop mental experiments to explore new ways of thinking. In this way, we can engage in 'R&D of the mind' that will test the effectiveness of our models and identify new ways of looking at the world.

One way to learn from our experiments is to conduct 'post mortems'. A common practice among surgeons is to assemble as a team once a week to discuss any complications or negative outcomes from their surgeries during the week. The chief surgeon and senior faculty are present and can offer insights on what went wrong and what lessons can be learned. How often do you spend time understanding a lost contract or a failed initiative?

The combination of intuition and consistent experimenting with models can help to ensure that our models are the best ones for our current situation. In the process of experimentation, we will also discover which models work and thereby reshape our intuition for the future.

In closing

What lessons have you learned from the current economic recession? You may have cut your overhead or scaled back as a result, but have you rethought the mental models underlying your business?

Consider the assumptions underlying your mental models and whether they still hold. For example, if you are in financial services, how do you need to rethink your view of risk management? If you are an investor, how should you rethink the concept of asset-class diversification, when all classes of assets were found to be highly correlated? If you are a regulator, how do you need to change your view of macroeconomic modeling and regulation? For any manager at any firm, what are the lessons for your short and long-term strategies? Which models might reveal hidden opportunities in the current environment?

Mental models are not just an abstract concept. Millions of dollars will be won or lost based on the mindset of the person making the investments.

Before early mariners such as **Christopher Columbus** could set off on their explorations, they needed to reject the model of a flat Earth with waterfalls at its edges. It was not the limits of navigation that prevented others from crossing the Atlantic to discover these new worlds; it was the model of the world itself. Until this model was challenged and rejected, new maps could not be drawn or new worlds be discovered. While navigating the ocean was a huge obstacle, breaking the old mindset was an even bigger inhibitor to change.

How is flat-world thinking limiting your own possibilities? What new threats and opportunities can you uncover with a shift in thinking? Mental models are not just an abstract concept. Millions of dollars will be won or lost based on the mindset of the person making the investments. Companies with staying power will have the capability to challenge and, when necessary, change their mental models to embrace new worlds. ***R***

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