

## Shift Happens: Managing at the Speed of Change



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It seems like today we're all focused on the economy. While it's certainly relevant, I'd like to offer some thoughts about the bigger picture – about how the world is changing in ways that we cannot fully comprehend and most certainly cannot fully predict, let alone manage. Doesn't it feel like – daily struggles aside – the world is accelerating? We are changing at rates never before experienced and probably only represent the proverbial tip of the iceberg. In fact, many experts predict that the pace of change will only accelerate, drastically impacting our businesses, our schools, our healthcare system, our communities, and certainly our personal lives.

It may ultimately lead to what some futurists call “technological singularity”: the point at which accelerating technology becomes so advanced that it surpasses the capabilities of the human brain. Basically, technological change could accelerate to a point at which humans can no longer proactively manage it...it manages (and changes) by itself. I'm not sure I completely buy it, but if it's true, it's a frighten notion. However, in many ways, the pace of our change represents a tremendous opportunity for economic, political, social, and professional development. And what it means for our organizations is compelling...

In 2006, Karl Fisch, a high school technology teacher in Colorado, developed a video and slide presentation called “Shift Happens” (you can easily find it on YouTube). Consider some of his thought-provoking findings regarding the pace of change in the world:

- The 25% of the population in China with the highest IQs is greater than the total population of North America. Translation: they have more honors kids than we have kids.
- China will soon become the number one English speaking country in the world.
- Name this country: richest in the world, largest military, center of business and finance, strongest education system, world center of innovation and invention, currency the world standard of value, highest standard of living? England in 1900. [Probably could be said, too, of Rome and Greece before them.]
- The US Department of Labor estimates that the average US worker will have 10-14 jobs...by age 38.
- There are 540,000 words in the English language – that's five times more than during Shakespeare's time.
- There are 3000 books published every day.
- A week's worth of NY Times contains more information than a person was likely to come across in their lifetime in the 18th century.

- It is estimated that 40 exabytes ( $4.0 \times 10^{19}$ ) of new unique information will be generated worldwide this year – which is more than in the previous 5000 years combined.
- Third generation fiber optics are now being used that can carry 10 trillion bits per second down a single strand of fiber. That's 1900 CDs or 150 million phone calls every second. It is currently tripling every six months and is expected to do so for the next 20 years.
- Predictions are that by 2013, a supercomputer will be built that exceeds the computation capability of the human brain. And while technical predictions further out than about 15 years are hard to do, predictions are that by 2049, a \$1000 computer will exceed the computational capabilities of the entire human species.

Basically, his premise is that the world is changing in significant and pronounced ways. In fact, to alter a familiar saying: the more things change, the more they change (rather than stay the same).

Sure, we've had significant changes before – the agricultural revolution (which allowed us to more efficiently feed a growing human population), the industrial revolution (which facilitated higher productivity, growth of cities, new forms of transportation, and new standards of living), and the information revolution (where the speed of information transfer facilitates accelerating communication, knowledge transfer, problem solving, and commerce).

But the pace of this change is what is fascinating. Consider this: based on population growth, the worldwide economy doubled every 250,000 years from the Paleolithic era (2.5 million years ago – the "Stone Age") until the Neolithic Revolution (about 10,000 BC – the Agricultural Revolution), at which point the economy began doubling every 900 years. That's a considerable increase! And the Industrial Revolution of the mid-1800s caused the world economy to double every 15 years (that's 60 times faster than the agricultural era).

If the expansion of technology – which really is responsible for the previous significant changes – continues to accelerate and we witness similar revolutions in the future, some experts predict that the economy could double every quarter and possibly every week! In fact, one statistic I found says that the worldwide economy could increase between 60-250 times what it is today sometime in the next 40-60 years (Robert Hanson, "Economics of The Singularity," 2008). Mind blowing.

But see the pattern? Every major period of change has led to an accelerating pace of change.

Ray Kurzweil (inventor, futurist, author, and MIT-trained scientist) claims that the rate of change itself is growing exponentially. While change has always been accelerating (witness the statistics above), we certainly notice it more today.

There's even a phrase for it: Moore's Law (named after the founder of Intel, Gordon E. Moore). This phenomenon describes a long-term trend in computing hardware, in that since the invention of the integrated circuit in 1958, the number of transistors that can be placed inexpensively on an integrated circuit has increased exponentially, doubling approximately every two years (Moore, "Electronics Magazine," 1965).

We really see this phenomenon all around us. The Minneapolis Star-Tribune had an article on Singularity a few months ago (Karen Youso, February 21, 2009) that illustrated a few compelling examples. One is the telephone. Since its invention in 1875, it took over 100 years to go from a crank-style to push button. Then the transformation accelerated – from cordless (but still on landlines) to headphones and speakerphones to cell phones (a different technology altogether) and from analog to digital to 3G to 4G. The hardware – the phones themselves – continued to get smaller and smaller, and smarter and smarter. Now your phones take pictures, play music and videos, send texts, show GPS, connect to the Internet, keep your calendars, play games, even serve as construction levels – they've basically become 3x5 personal computers that also place phone calls.

You could probably come up with hundreds of similar examples – from changes in travel (horse to chariot to train to car to plane to jet to whatever’s next – personal transport devices?); changes in medicine (herbs and natural remedies to penicillin and antibiotics to new forms of bio-pharmaceuticals and stem cell solutions); changes in computers (from massive supercomputers to mainframes to personal computers to integrated smart phones and netbooks to whatever’s next)...you get the picture.

Technical knowledge today doubles about every two years, and some predict that technical knowledge may double every 72 hours in the next 3-5 years.

That’s incredibly fast change. So “...survival, naturally, depends on innovation, especially in times of economic uncertainty,” claims Youso in the Star-Tribune article.

And Fisch states: “The corporations that survive and go on to excel are going to be the ones that use this time to increase their use of technology and data gathering, and find new and innovative way to use it.” Youso expounds: “They are the ones who will be bringing us more and increasingly sophisticated robots; medical treatments delivered directly to cells, turning on and off as needed; instant information so you’ll know who the person is who just waved to you across the street and why you know them...avatars [little virtual images of yourself] that try on jeans [at the store, allowing you to] never leave the house.”

Sound ridiculous and far-fetched? So was the smart phone 10 years ago. Or the Internet 20. Or landing on the moon 50. Or getting from Minneapolis to Paris in seven hours 100.

“We aren’t going to experience 100 years of progress this century,” says Kurzeil. “Rather, we will witness on the order of 20,000 years of progress this century – at today’s rate, that is.”

So what are implications for our organizations and our society? I believe there are several major implications for our accelerating technological change:

**Implication #1:** Organizations must change – to keep up (and indeed perhaps create) some of this discontinuous change, organizations must:

- Have flexible operations – more adaptable processes; more fluid work systems where materials, resources, and activities quickly transfer between suppliers, partners, and customers.
- Rely on closed-loop, data-based decision making – they must have the information technology to facilitate rapid access to data, must have agility in quick decision making and execution, and must be adept at making rapid transformations (starting new plants/sites, acquiring new technologies, identifying and developing new products and solutions, creating new work structures, building new capabilities, and so forth).
- Have quick planning cycles – be skilled at identifying shifts in their environments (new technologies, new competitors, new regulations, new market needs); be savvy at research and development (for products, processes, solutions); have responsive, proactive voice of the customer (VOC) methods to anticipate market changes; have systematic ways to innovate products, processes, and business models.
- Have a highly adaptable workforce – trained employees (and partners) in how to deal with and manage change; employees that have skills that are transferable – the “soft skills” of communication, leadership, conflict resolution, analysis, decision making, project management – that can apply to new situations and emerging environments.

**Implication #2:** The educational system must change – if technical knowledge is indeed doubling every two years, then half of what a student learns about technology as a freshman in college is out of date by the time he/she graduates. Former US Secretary of Education Richard Riley speculated that the top 10 in-demand jobs for 2010 did not even exist in 2004. John Moravec, director of the University of Minnesota’s College of Education and Human Development’s Leapfrog Institutes states: “We send kids to school, they move grade by grade, using the 18th-century model, and during that time, the whole world has changed so much. How relevant is that education? We’re training them for jobs that existed 20 years ago, not for those that’ll exist when they finish school...”

**Implication #3:** There will be massive implications on our society:

- People will live longer, thanks to accelerating improvements in healthcare and medical technology, which will impact our healthcare delivery system, our health insurance system (even more than today’s debates are suggesting), and our long-term care system.
- Technology maybe used to better address community and social problems like pollution, energy, climate change, crime, poverty, hunger.
- Singularity, however, may have a negative side – a risk of institutional control, loss of privacy (remember the book “1984”?), more deadly terrorist attacks, or – as some futurists predict – a threat to human’s existence itself (as machines begin to adapt themselves, challenging human’s place as superior beings on this planet).

That’s a bit far out for me, but the pace of technological change has significant implications on our social, political, and economic policies.

And all of that aside, there are major implications – and a major opportunity – for organizations that can harness, and indeed create, contribute, and manage the pace of change for their benefit. Companies (think Google, Apple, 3M) seem to be creating the change rather than responding to it. Therein lies the lesson probably for all of us.