

# industrial management

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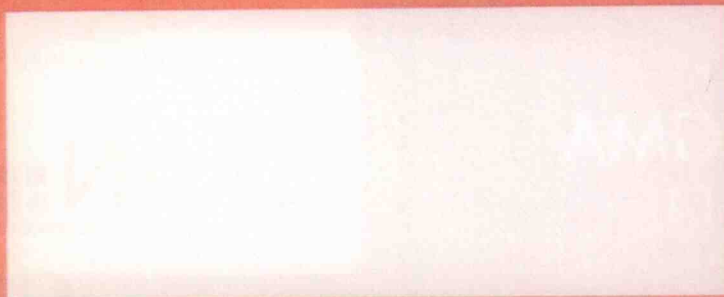
## Information technology: A ubiquitous force

Things that affect every aspect of life carry privacy concerns



## The right approach to Six Sigma leadership

Train teams to recognize when to share or centralize authority



# Information technology: A ubiquitous force

BY FARIBORZ GHADAR AND KATHLEEN LOUGHRAN

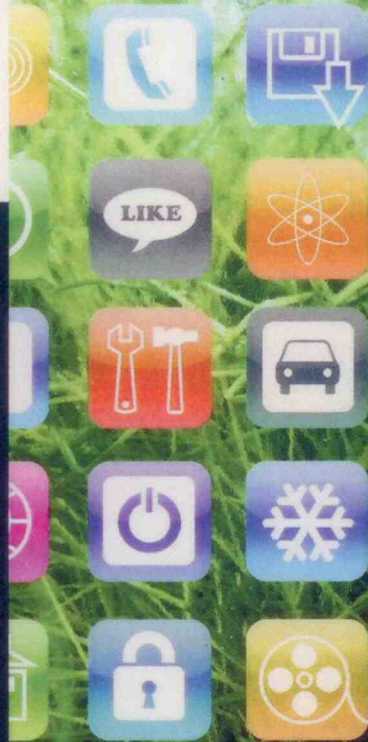
## EXECUTIVE SUMMARY

Information technology and its results touch every aspect of our lives. Statistics reveal that IT will be an ever more vital and multidimensional part of our daily lives. Moreover, technologies that have been underway for years are projected to see significant growth in the future. According to a study conducted by the McKinsey Global Institute, the Internet alone could reach a potential economic impact between \$3.7 trillion and \$10.8 trillion by 2025. While the opportunities are obvious, the challenges are often hidden. Privacy and information security will challenge us like never before.

## 12 TRENDS CHANGING THE WORLD

A decade has passed since we first conducted the Global Tectonics' study that identified 12 trends that would dramatically shape the future international business environment. Though many of our predictions are coming true, certain forces — such as the growth of social media — have had a much greater impact than expected. Given the rapid change the global business climate continually experiences, we have decided to update our initial study to better equip future leaders and to revisit the trends we identified that surprisingly remain the trends that thought leaders are most concerned about today.

1. Biotechnology
2. Nanotechnology
3. **Information technology**
4. Population
5. Urbanization
6. Disease and globalization
7. Resource management
8. Environmental degradation
9. Economic integration
10. Knowledge dissemination
11. Conflict
12. Governance



In less than half a century, the field of information technology (IT) has developed from one housed on huge stationary computers called IBM 360s, kept in air-conditioned rooms and monitored by computer experts, to small mobile devices like an iPhone that can be used easily by virtually everyone in almost any location. This unprecedented growth is not expected to stop, as this technological tectonic force will continue to see major changes in the near future. These advancements will shape the world's future global business climate.

In recent decades, IT has deeply altered how people live, work, learn and interact with one another. While people used to have to wait for an available phone line to call each other to communicate on home telephones, no longer are they confined by the whims of others. They can text each other's mobile devices and even discover their friends' locations thanks to the advent of technologies like Foursquare.

As Samuel Greengard wrote for *CIO Insight*, a "tsunami of change is [currently] washing over IT organizations. The introduction of iPads and iPhones, social media, big data and cloud computing have unleashed profound changes that far exceed the impact of each of these devices or systems alone."

### Information breeds competition

Technology has allowed for a more competitive market simply because it gives greater access to information to more people. In the old days, for example, a cocoa farmer in West Africa would be forced to accept prices offered by European traders. Now, on his phone, he can look up how much chocolate sells for in London and demand a higher wage.

Through the use of wireless technology, more people, especially those in rural areas, are gaining access to the Internet. As of

2012, nearly 35 percent of people worldwide used the Internet, representing a 566.4 percent growth since 2000. And as the industry continues to expand, this number will only increase, thus furthering opportunities for businesses worldwide.

But knowledge provided by the Internet extends beyond the cocoa farmer. On a broader scale, it has allowed companies to access new markets armed with information about demographics, cultures, tastes, preferences and disposable incomes – ultimately allowing them to tailor their services and products to consumers. Where it hasn't already taken hold, customization will become the buzzword of industries. As Greengard wrote, "Over the next few years, the role of IT will change further as the consumerization of IT marches forward and cloud computing provides more powerful ways to manage everything from infrastructure to enterprise application."

Already, IT has provided the capability for businesses to conduct market niche analysis. With it, businesses can track consumers' preferences, needs, habits and desires. Through consumers' own engagement with IT, companies like Groupon can appeal to their target markets better.

Say, for example, you're visiting a new city on a business trip; not only will Groupon be able to recommend hotels, but it also might supply a coupon to a nearby Indian restaurant because the algorithm knows you like Indian food. Or, take for example, your Facebook page. Ever notice how advertisements featuring pictures of clothes you clicked on days earlier appear on the side of your screen, reminding you how much you loved that blouse?

### Untapped commercial potential

But, in general, where is this industry heading, especially because it already has seen such tremendous growth?

Will it continue to have a major impact on the worldwide economy and global business environment?

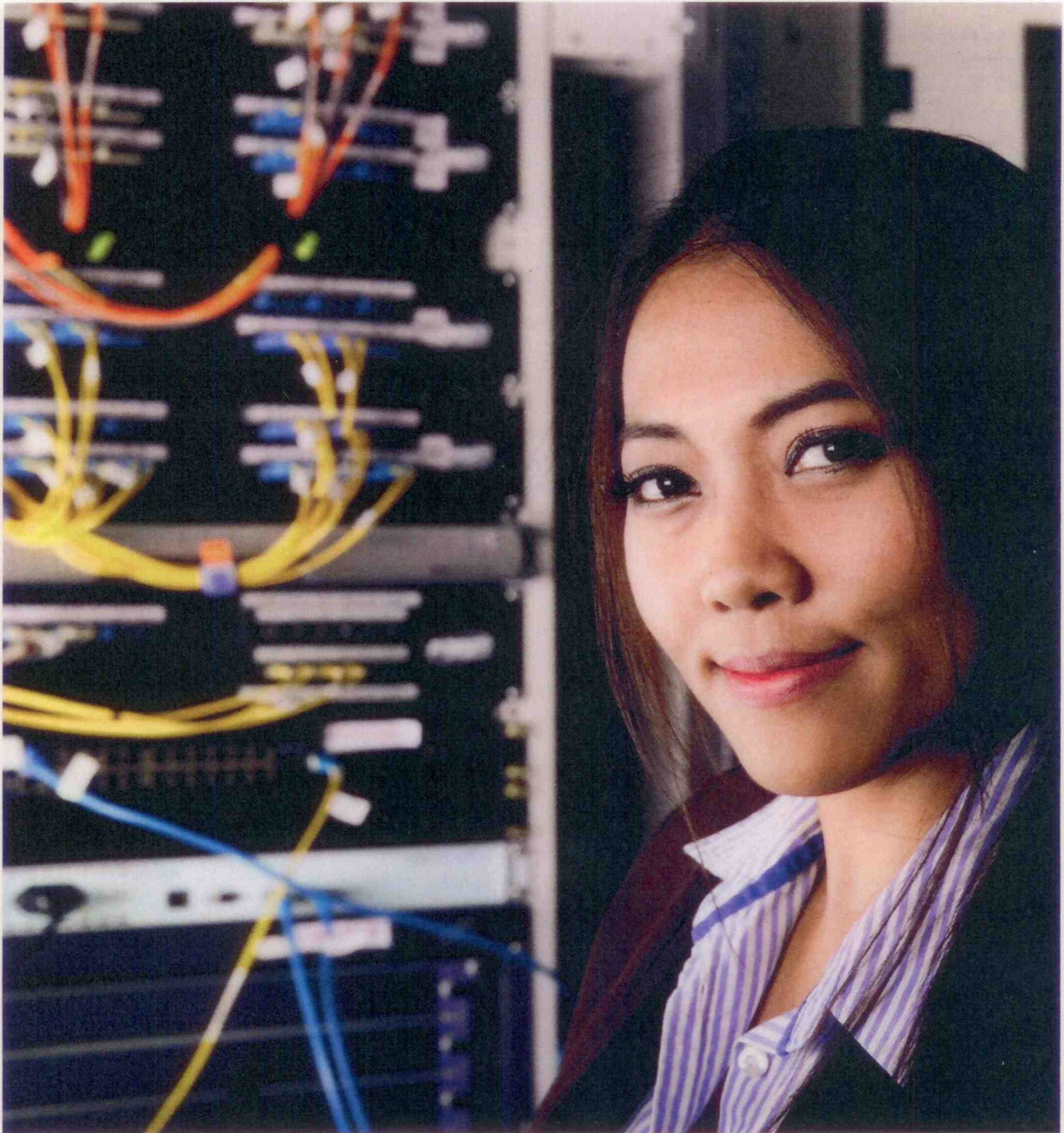
Simply put, the answer is yes. Because the commercial capabilities of the IT industry have been tapped only recently, many argue that we are still in the young stages of this revolution. As early as 2020, Forrester Research expects the industry to look almost entirely different. Not only will our devices be communicating with us, like the Groupon app does on phones by offering coupons at local businesses, but they will also operate self-sufficiently.

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Take, for example, a car. Already, GPS systems have been installed in many, and some cars even have the capability of being able to parallel park with minimal effort from the hand of the driver. Thus, the future will see cars that no longer require the presence of a driver. In turn, what will that mean for the taxi industry, if people can simply call upon a robotic car? Additionally, there will no longer be a need for downtown parking lots if cars can drive themselves, so what will this mean for city planning?

As the IT and robotics industries advance, both will continue to merge, and futuristic cars won't be the only end result. In the near future, we can expect to see the creation of robots that can deliver packages through a simple GPS system. As a result of this invention, how will companies like FedEx and UPS be affected, and what will they do to adapt to this changing landscape?

Overall, according to a study produced by McKinsey Global Institute, as the mobile Internet expands into emerging markets it – along with "the automation of knowledge, things such as computerized voices... and the 'Internet of things,' such as embedding sensors in physical objects to monitor the flow of products through a factory" – is expected to be worth at least \$1 trillion each. Therefore, devices with



the ability to communicate with other gadgets, such as a refrigerator alerting a computerized system in grocery stores that you're short on yogurt, no longer are confined to the pages of science fiction novels.

Thanks to projected advancements in technological tools that are easy to acquire and to use, Forrester expects businesses to become even more self-sufficient, resulting in smaller,

more strategic IT departments. Technology can help companies in a number of ways, but it can also hurt those who do not take the time to assess which technologies will fit best with their mission. There are fundamental rules of business that cannot be ignored for flashier products. Employees need to be trained to use a new technology and understand how to employ the vast

**Technology can help companies in a number of ways.**

array of programs available to them.

This changing dynamic will have an effect on many businesses' individual IT departments.

Because it will be necessary for most employees to have general IT knowledge, the individual departments most likely will be streamlined, but they also will need to be more innovative. Greengard's article further explains, "To be sure,

those that cling to the command and control model of the past are destined to face severe turbulence. Today, success hinges on a lean, agile, flexible and intrapreneurial IT model that's inextricably linked to business needs. ... In this upside-down post-PC world, risk must be viewed as a friend and change as a potential competitive advantage."

### The revolution of education

The IT revolution, however, won't just lead to companies educating their employees better, it will spark greater worldwide access to education. In fact, IT has the potential to completely revolutionize the current paradigm of education.

With newfound organizations such as Coursera, no longer will people need to attend universities to receive an education. Though courses like these are currently free and don't offer a degree, they eliminate the barrier to entry by providing nearly anyone access to some of the world's best educators. And in the future as these courses become increasingly popular, we can expect to see a shift to this structure of education. All of this means that education is going to globalize and be much more readily available, providing a real opportunity to the developing world.

In fact, by 2020, Rwanda hopes to transition into a knowledge-based economy, presenting future opportunities for investors and businesses. Thanks to this newfound knowledge and other capabilities provided by IT, this revolution will continue to influence economic development. Economies such as Hong Kong, Singapore and Taiwan have benefited tremendously from the manufacture and sale of IT products. According to the World Economic Forum's Global Information Technology 2013 Report, "digitization has a measurable effect on economic growth and job creation. In emerging markets, a

comprehensive digital boost could help lift over half a billion people out of poverty."

More explicitly, the report found that in the past two years alone more than \$190 billion has been generated because of digitization. Future growth could happen in Latin American countries that place an emphasis on education and innovation. Latin America's Internet market could grow exponentially as countries deregulate their telecom industries, pursue developing IT markets and adopt new technologies.

In fact, e-government recently has improved the lives of many people living in Latin America. For example, as stated in World Economic Forum's report, "In Panama, entrepreneurs used to need five days to set up a company. Now, thanks to PanamaEmprende, they can do it in 15 minutes." Countries such as Argentina, Mexico and Brazil also will present investors with vast opportunities.

### Privacy concerns

Even though IT developments can stimulate economic growth, they do lessen individuals' and companies' access to privacy. Though we might find it cool that Google Earth can pinpoint and draw up a map of where we live, consider what that means for our security if technology is publicly available for people to diagram unknown locations.

Therefore, as public services adopt IT, they must protect individual privacy and ensure national security. For example, as more countries implement electronic voting, they will need to meet a host of security, privacy and equity requirements. Internet hacking is now a federal offense in the United States, and it is likely that over time federal regulations and laws will develop to meet the demands imposed by advancements in and the adoption of new information technologies.

Privacy issues are not only

important because of Internet hacking, but also because they will be the growing focus of attention as an increasing amount of data on individual behavior is collected. Consider a common trip to the doctor's office wherein all your medical history is recorded electronically. A technologically savvy individual could hack into your files and acquire all of your information.

Though this would amount to a violation of the Health Insurance Portability and Accountability Act and a million-dollar lawsuit, in the end, what would that really do? In the future, how are people going to protect that information? And who is going to take on that responsibility – the individual, the doctor's office, the government? Currently, most American companies regulate themselves. If companies make the choice to stop self-regulation, they most likely will face government imposed regulation as a concerned and worried public tries to prevent identity and information theft.

As consumers, we ultimately will become more aware than ever about who has our information and how it is being used. Are we prepared to live in a world where, because of the Patriot Act, security cameras, point-of-sale data collection, ATMs, and state-controlled cameras in public places literally track our movements hour by hour?

As we adopt IT into all aspects of our daily life, there are sacrifices to personal privacy to be made. Nonetheless, where IT goes in the future will continue to shape the way society interacts, the way education reaches people, the way governments operate, and the processes businesses use to function. It is now and will continue to be a crucial global tectonic. ❖

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