

# The Promise and Peril of Hyperconnectivity for Organizations and Societies

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Within living memory, telephone service has cut its link to the wires overhead. Computers have moved from the climate-controlled environments of enterprises to devices in our pockets. Video has moved to the same devices from our living rooms. Social media have trumped traditional media. Most recently, the cloud has appeared virtually overhead, making massive amounts of data and applications available anywhere there is a broadband connection.

## THE ATTRIBUTES OF HYPERCONNECTIVITY

The result of this increasingly accelerated communications evolution is that today we are faced with the phenomenon of *hyperconnectivity*. The term refers not only to the myriad means of communication and interaction, but also to its impact on both personal and organizational behavior.

Hyperconnectivity has several key attributes. It is:

- **Always on:** Broadband and ubiquitous mobile devices enable people to be connected to family, work, friends, avocations, obsessions, and more 24/7.
- **Readily accessible:** A universe of mobile devices and personal computers links people and organizations together; these connections are increasingly available at any time and in any location.
- **Information rich:** Websites, search engines, social media, and 24-hour news and entertainment channels ensure that information—from the strategic to the banal—is always on hand, beyond anyone's capacity to consume.
- **Interactive:** Hyperconnectivity ensures that everyone can offer input on just about everything.
- **Not just about people:** Hyperconnectivity includes people-to-machine and machine-to-machine communications, supporting the development of what has been termed the *Internet of Things*.
- **Always recording:** Service records, virtually unlimited storage capacities, miniaturized video cameras, global positioning systems, sensors, and more—combined with people's desire to document their own activities—ensure that a large portion of everyone's daily activities and communications are part of a semi-permanent record.

The cumulative effect of hyperconnectivity is that the limitations of time and space have largely been overcome. Experience is virtualized. You no longer need to be in the same room, or even the same country, as your colleague, your teacher, or your doctor to accomplish what used to require face-to-face contact.

Hyperconnectivity confronts us with both benefits and challenges. It can be a powerful tool for collaboration that drives global alignment, increased efficiency, and material development. At the same time it has very rapidly changed the way many tasks are performed, and people are expected to accommodate those changes.

All of that information and all of that access also present risks of misuse.

Those who have not yet felt the impact of hyperconnectivity probably soon will. Statistics indicate that it is a burgeoning phenomenon:

- Worldwide fixed broadband subscribers totaled 503 million at the end of 2010, with 48 million subscribers added in the fourth quarter of 2010 alone;<sup>1</sup> this figure is expected to reach 674 million in 2014.<sup>2</sup>
- In 2010 there were estimated to be 7.8 billion global mobile connections.<sup>3</sup>
- The number of cellular mobile broadband subscribers jumped almost 60 percent in 2010 to reach 558 million worldwide; this number should top 2 billion by 2015.<sup>4</sup>

### HOW HYPERCONNECTIVITY IS CHANGING THE LANDSCAPE OF SOCIAL AND PROFESSIONAL ORGANIZATIONS

For institutions and organizations (i.e., corporations, industries, governments, and academic and research institutions in a variety of fields), hyperconnectivity is driving monumental shifts in terms of impact on their work styles, functions, and missions in a variety of realms.

#### Neo-urbanization

As a concept, *neo-urbanization* encompasses several different types of development that are taking place simultaneously. It refers both to the reclaiming of post-industrial spaces in existing cities for new uses as environments in which to live, work, and play and to the rapidly urbanizing development in emerging economies. The term takes in the blurring of the boundaries between traditional definitions of urban, suburban, rural, and even regional, introducing new concepts such as *corridors* and *megacities*, and refers to the rapid growth of smaller cities, which will increasingly be able to deliver many of the amenities and services that characterize larger metropolitan regions.<sup>5</sup>

Hyperconnectivity offers some obvious benefits in this realm, such as improved standards of living in remote areas—the result of increased availability of technology (e.g., in healthcare, education, and entertainment). This is expected to encourage migration back to the rural areas and slow the movement of the populace to cities. Similarly, the growing connectedness of rural areas will lead to more jobs outside existing urban centers, thus delivering substantial economic growth to neo-urbanized rural areas.<sup>6</sup>

Although hyperconnectivity provides the opportunity to live a connected life in remote areas, demographic studies clearly demonstrate that large numbers of people are continuing to migrate to cities. Some communities are being built from scratch and are conceived as true cities of the future, with sustainability engineered into all

aspects of life. Hyperconnectivity is an engine for much of that planned sustainability. But in the 21st century, most urban dwellers will live in traditional cities and the phenomenon of the megacity is expanding, particularly in Asia and Africa. As millions and millions of people gather together in environments of dense cohabitation, hyperconnectivity could be added to the list of quality-of-life attributes like adequate shelter, electricity, and plumbing that separate the relatively few haves from the multitudinous have-nots.

However, it is possible that—as access to communication technologies becomes ever cheaper and more available—hyperconnectivity could become a primary tool for governments and other institutions to address the shifting needs of city residents. Better access to government services, education, and healthcare could substantially improve the quality of life for many. We will discuss those possibilities below.

#### Government

On the political front, governments and other political institutions are coming under pressure to review their role and function because the availability of connectivity anywhere and at any time makes government's actions as well as the consequences of those actions more visible. Hyperconnectivity enables governments to improve communication with their constituents by sharing information more quickly and transparently. Simultaneously, it makes it easier for constituents to contact their government representatives and to access government services, regardless of where they live or work. In this way, hyperconnectivity has the potential to restructure the relationship between governments and those they govern.

At a minimum, hyperconnectivity can make various government services more readily available. We are already seeing a rapid move toward open-format publication of government information on websites, along with constituent engagement in processes and services through the use of social media, particularly in more developed democratic societies. The past decade has seen a shift from services delivered by employees at the counter toward greater self-service or interactive voice response—a consequence of the increased connectedness of government officials and government employees. Smart governance<sup>7</sup>—that is, an administration that applies and integrates information, communication, and operational technologies to address the challenge of planning and managing operations across multiple domains—is becoming a key architectural component in most governmental operational models. Governments of all shapes and sizes, just like their corporate counterparts, rely increasingly on technology to monitor, store, and analyze different kinds of information, with the goal

of delivering more sustainable services and operations as well as a faster response to constituents' concerns.

As a key element of smart governance, mobile government (or *m-government*)<sup>8</sup> allows developing countries a relatively quick and simple means of connecting with their populace, since mobile broadband services can be cheaper and somewhat simpler to deploy than full-scale wired communications networks. Interactive services provided by governments to constituents (i.e., mobile government-to-constituent interactive services) focus on citizen convenience and increase citizen participation in government-related activities and inquiries. In many countries, m-government is becoming a new method of communication between government and constituents based on applications in which constituents are encouraged to report in real time about their experiences and the events happening around them.

That immediacy of response also carries with it potential ramifications of participation in government activity by people who are not physically located in the geographical domain of the government. Expatriates now have the ability to readily follow the issues of their former locales as well as comment upon and potentially influence developments in a place far from where they currently live.

### Education

There has been a proliferation of online learning opportunities in recent years, driven in part by individual professional and personal development or enrichment needs. This trend, which has been described as “ed-YOU-cation,” reflects the ability of technology to support anytime and anywhere connections, as well as individualized learning plans.<sup>9</sup> As importantly, virtual education creates an environment where learning is more and more liberated from location- and time-specific constraints. It is also de-coupled from age, life stage, and means—people are pursuing learning opportunities throughout their lives, and technology is supporting this development. People can receive degrees from schools located many miles from their homes. Institutions of higher education that were created to serve the populations of specific and limited geographic locales now have alumnae who could be located anywhere and who never have to set foot on a physical campus to earn a degree. Online lessons and discussions held through message board postings mean that people can be anywhere and can participate in classes at any time from any location.

As broadband connectivity becomes more ubiquitous, the use of virtual education tools to reach populations in remote areas becomes much more feasible. The limitations imposed by the logistics of having to travel great distances to attend a classroom are being eliminated.

### Healthcare

In the realm of healthcare, hyperconnectivity is already proving to have huge potential.<sup>10</sup> Machine-to-machine-to-human (M2M2H) communications solutions—which are becoming a reality today—can improve patient care, support mobile and virtual care, and reduce travel requirements for both patients and physicians. With a hyperconnected healthcare sector, doctors and nurses can remotely monitor and diagnose patients continuously via medical applications that work with sensors discretely attached to the body.

The availability of remote care has the potential to dramatically reduce overall healthcare costs because more healthcare services can be offered at home instead of in a dedicated healthcare facility. It also allows people to live at much greater distances from healthcare facilities without worrying that they are putting themselves at increased risk. Hyperconnectivity can be a tether to a healthcare system that allows people to pursue life when and where they want, and bring them into a healthcare provider facility if necessary for a physical exam or procedure.

### Business

Hyperconnectivity is affecting enterprises of all sizes and types. In the retail sector, hyperconnectivity is already a pervasive force in the interactions between buyers and sellers. The next stage in this transformation is in the area of logistics—where the Internet of Things and related hyperconnectivity will transform the supply chain and connect customers, suppliers, manufacturers, and retailers with each other in a more efficient process.<sup>11</sup> With M2M2H communications, retailers, manufacturers, and suppliers are able to monitor supply and demand, manage inventory, and get products shipped when and where they are needed. This is accomplished by using tags and sensors, which reduce human intervention to a minimum and make supply chains faster and more efficient. Such efficiency can also increase the reach of supply chains. More precise tracking of usage—the movement of goods, inventory management, and so on—can allow for more remote distribution points aligned with more clearly defined requirements or expectations of customer demand. The more efficient distribution networks are, the less need there is to stockpile inventory because products can more easily be delivered on an “as needed” basis. Less risk to the manufacturer/distributor means, potentially, both increased profitability and reduced costs to consumers.

Another key concern of the 21st-century enterprise going forward will be its interactions with customers and its customer relations management. Today, the process of interacting with customers has the potential of spiraling out of control because of the migration to the digital world, hyperconnectivity, and the emergence of online

social networking communities where every customer's criticism comes with the expectation of a direct response from the enterprise. Customers now have more avenues than ever to express their complaints and kudos, and to request new features and capabilities. Savvy executives already know that the customer lifecycle spans multiple channels; today a contemporary approach to customer care includes becoming a part of online social networking communities. Corporate executives must be able to hear what customers are saying to each other, respond in a proactive manner, and communicate with customers through a myriad of channels.<sup>12</sup> To be truly customer-focused today, companies must learn how to better manage relationships with their customers in the hyper-connected world. In other words, the today's paradigm of customer relations and customer care demands 24/7 interaction with customers across multiple channels, especially the web.

Because of the increase in hyperconnectivity, the economic environment is changing drastically as the world becomes more balanced in terms of commercial activities and employment opportunities. Commercial centers will be increasingly spread all over the world, while economic growth is likely to be witnessed in areas that are currently marginalized.

Finally, the reliability of technologies and networks is increasingly an outgrowth of hyperconnectivity. This is because increases in technology adoption, the growing connectedness of cities and towns, and the creation of networked cities are creating a new concept of what is considered to be essential infrastructure. This infrastructure will require better-performing and more reliable technologies. The expectation for a growing variety of services is for 99.999 percent availability, at a minimum. Certain aspects of hyperconnectivity require technology and platforms that never fail.

### Workforces

Given the major shifts that have taken place in the world outside corporate organizations, it is no surprise that hyperconnectivity has and will continue to have a deep impact on the workplace: it affects the way we work and connect with colleagues, customers, and suppliers. Hyperconnectivity creates new business model opportunities and new ways of working: because of the proliferation of new mobile devices—from smartphones to tablet computers—and increasing broadband speeds, connecting people has never been easier. Web 2.0 social tools and the hyperconnected workforce are eroding many old work paradigms, ranging from work location requirements to work hours.<sup>13</sup>

Workforces are becoming more virtual, and the 21st-century workforce will need to utilize various technologies to stay connected to one or several business networks. In addition, the workforce will need to utilize

Web 2.0–like, people-centric collaboration tools and techniques to increase productivity and engagement. As more companies bring together integrated collaboration experiences for customers (e.g., email, instant messaging or IM, chat, web conferencing), benefits such as enhanced productivity and improved decision making can be realized. The growth of so-called immersive communications offers the potential of moving beyond video conferencing as a way of establishing a virtual presence with colleagues in other locations.

A hyperconnected workforce with always-on communication capabilities will result in material benefits for the 21st-century enterprise. These include lower travel costs, easier and faster data and information access, consistent understanding, and contextual awareness.

Hyperconnectivity will also impact the organization of the labor force. Major structural changes will include shifting patterns and proportions of workers who are part-time, share jobs, and are self-employed; they will also include changes in the ease and cost-effectiveness of telecommuting from any location. There will be new ways of designing how work can be accomplished (e.g., crowd sourcing) to ensure continuous international operations as well as other workforce management challenges. There will be an increase in the phenomenon of non-linear career paths, with people having multi-career and multi-occupational working lives along with the recognition of a greater need to integrate formal educational periods throughout the working life and an increase, as well, in the number of self-managed careers.<sup>14</sup>

Web 2.0 and the emergence of the Millennial Generation in the workforce are already shaping the workplace of the future.<sup>15</sup> The Millennial Generation is made up of people born between 1977 and 1997 who have come to rely on Web 2.0 technologies and services in both their personal and their professional lives. Having effectively been raised in a hyperconnected environment, this generation of workers will increasingly exert pressure on employers to overhaul their approach to talent management. Businesses that can attract and keep these talented young people could find their organizations transformed via increased innovation and improved customer connectedness, and even the ability to compete more effectively in the global marketplace.

Research into the workplace of the future has identified the following 10 forces that will define the working world in 2020:

1. **Demographics:** The demographics of the workforce is shifting; by 2020, there will be five generations working side by side.
2. **The knowledge economy:** Being conversant and skilled in the knowledge economy will become more essential to obtaining and retaining work, with a growing number of jobs requiring a significantly more complex set of interdisciplinary skills.

3. **Globalization:** By 2020, the globalized world will mean that companies will rely on the global marketplace, rather than a domestic or even international marketplace, to fuel growth.
4. **The digital workplace:** The digitalized workplace will result in an easier way for employees to create and access content while securing its accuracy and appropriateness, especially with the growth of cloud computing.
5. **Mobile technology:** The ubiquity of mobile technology will mean that companies (e.g., Bank of America and Wells Fargo) will deliver corporate training via mobile smart phones.
6. **Culture of connectivity:** Hyperconnectivity will grow as a business tool, resulting in a connectivity culture in business as well as personal aspects of life.
7. **Participation:** Improved collaboration and knowledge sharing will usher in a participation society, where it is essential to engage in societal endeavors.
8. **Social learning:** “Learning 3.0,” or social learning, will incorporate social media, gaming, real-time feedback, and simulations.
9. **Corporate social responsibility:** Corporations will act out of social responsibility because of an increased cultural intelligence and a deeper appreciation of the relationship between business and society.
10. **The Millennial Generation:** The workforce will include the Millennial Generation, who have grown up with hyperconnectivity and embrace it as an inalienable part of their work culture.

### Sustainability

Although it might seem counterintuitive, hyperconnectivity could be a boon to sustainability. The Internet of Things presents an opportunity to eliminate human intervention in many types of business and civil operations. As importantly, robust virtual environments can drive reductions in carbon emissions because major activities (e.g., education, medical care, government-related activities, and retail sales) can take place without requiring physical travel for the subjects involved.<sup>16</sup>

A surplus of resources in one region can be identified in advance and delivered where the need exists in a proactive and efficient way. Cities in the developed world that have lost significant percentages of their population because of shifts in manufacturing and demographics could be revitalized by members of the hyperconnected workforce, who can work from anywhere and are able to take advantage of existing housing stock and urban infrastructure at prices far, far below those in other regions. As more and more talented workers spread themselves around the world in search of attractive, reasonably priced sustainable locales in which to live and

work, the dominance of traditional centers of commerce is likely to diminish.

Hyperconnectivity can be used as a tool to help shape and manage the environmental impact of increased consumption of goods and services, which is reaching crisis proportions. This becomes progressively more important, because 800 million new consumers are expected to enter the market over the next 10 years. Designing an eco-friendly consumption pattern for consumers will rely heavily on information and communications technologies (ICT) and related aspects of hyperconnectivity. The Climate Group, a global sustainability initiative, estimates that appropriate applications of ICT can lead to the reduction of the carbon footprint of other sectors by nearly five times the consumption of the ICT sectors themselves.<sup>17</sup> The advent of hyperconnectivity therefore has the potential to exert a substantial positive impact on climate change.

For instance, one of the biggest challenges facing most urban centers is vehicular traffic and transportation. Opportunities to re-envision the traveling experience through the use of hyperconnected transport systems are plentiful. Intelligent transportation systems—which include synchronized traffic and notification systems, onboard tele-metrics, and dynamic signaling—have the potential to encourage eco-driving, reduce congestion, assist with routing and journey management optimization, and enable pay-as-you-go pricing for road usage.<sup>18</sup> Moreover, smart logistics solutions can enable fleet tracking and passenger tracking, which makes it easier to calibrate food and lodging needs with expected real-time demand.

### HOW CAN WE SHAPE AND TAKE ADVANTAGE OF HYPERCONNECTIVITY?

Hyperconnectivity is arguably the single most important trend in today’s world, as communication technologies are changing so many facets of life and opening so many new possibilities across individual, social, and business spectra.<sup>19</sup>

Thus far, the global communications service providers and their networks—supported by an ecosystem of researchers, developers, and consumer electronics and equipment manufacturers and service people—have been the primary builders and maintainers of the infrastructure that has enabled hyperconnectivity to flourish. For these organizations, hyperconnectivity is likely to be a key component of their business now and will almost certainly be central to the products and services they offer in the future.

Although the free enterprise model must be at the core of the evolution of hyperconnectivity, the service providers and their commercial partners alone cannot be expected to bring it to fruition. A consortium of

public-private partnerships, as well as the involvement of nongovernmental organizations, will be needed to ensure that, as a global community, we are taking the broadest possible view of hyperconnectivity so that it can deliver on its promise of economic development, more efficient healthcare, greater sustainability, and increased educational benefits. This broad view is necessary to craft and execute the coordinated plans necessary to take full advantage of these opportunities.

The technologies that enable hyperconnectivity can be harnessed, ignored, employed on an ad-hoc basis, or incorporated thoughtfully into a government's strategy to carry out a mission. The hyperconnectivity of our world has generated global wealth, but it has also made it possible for shocks on one side of the planet to affect communities on another with frightening speed. In other words, these technologies can be at the same time either beneficial or harmful, empowering or dangerous, depending on the context in which they are used. Recent events in North Africa and the United Kingdom have shown how communications technologies of various kinds and hyperconnectivity have become core to social movements of all types. The only thing that government leaders and enterprise managers cannot do with these technologies is make them go away.

Since these technologies and the related hyperconnected tools are here to stay, government leaders and people managers must learn how to deploy them effectively to their organizations' advantage. Policymakers and business leaders must surmount significant challenges if they are to ensure that the workforce is adequately trained to be able to manage the increased pressure and stress levels of working in an ever-connected environment.<sup>20</sup> Careful use and tight management of these technologies has also become imperative to the responses of authorities on social events. The flash mobs that rioted across cities in the United Kingdom were coordinated—so to speak—by text messages and by Facebook, Twitter, and Blackberry Messenger services. There has been much outcry since the UK riots, yet these were the same technologies that helped fuel the assembling of opposition groups in Tahrir Square in Cairo in 2011. Allowing people and cultures to connect together more easily is a good thing to do and should be encouraged by authorities at all levels. Sharing and communicating is how progress is made, and shaping hyperconnectivity allows us to fuel trends that are beneficial to daily life.

We must recognize that we are in the very early stages of establishing appropriate ground rules regarding how we—as individuals, societies, companies, and government—will need to become accountable for managing our relationships and responsibilities in light of the availability of new technologies and capabilities. The increased levels of access to information, new possibilities for integrating and sharing formerly incompatible data sources, and the pervasive use of connected devices

introduce fresh trust and privacy concerns for consumers and businesses. Policymakers and business leaders therefore need to consider how they can best educate users about potential security vulnerabilities and practical solutions. Businesses will need to establish policies to protect their corporate assets and business-critical information as well as their corporate reputations.

Although hyperconnectivity is clearly a 21st-century phenomenon, the drive behind it—to share information and create a community with like-minded people—is as old as humankind. But the tools to fulfill that drive have never been so broad in scope or so widely available to so many people; therein lies both the promise and the challenge.

## NOTES

- 1 Blackwell and Lynn 2011.
- 2 TIA 2011.
- 3 Obiodu 2011.
- 4 Teral 2011.
- 5 See Followwill et al. 2010 for some insights into the phenomenon.
- 6 OECD 2007.
- 7 Bittinger 2011.
- 8 Eskandar et al. 2011.
- 9 See the weblog <http://edyeducation.wordpress.com>.
- 10 For an overview of the impact of ICT on healthcare, see Media Lab Asia 2005.
- 11 European Commission 2008.
- 12 Cole and Brillhart 2011.
- 13 Fauscette et al. 2011.
- 14 Verdon 2010.
- 15 Miller 2011; Berg 2010.
- 16 OECD 2009; Roberts 2011.
- 17 The Climate Group 2008.
- 18 The European Community has defined a common strategic framework to overcome many of the challenges in the transportation fields; see Ferreira 2011.
- 19 For the importance of connectedness in crisis situations, see Collins 2011.
- 20 Pedley 2011.

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