# Work-Life Innovation
## The Role of Networked Technologies

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*This Point of View is the fourth in a series of perspectives by the Cisco® Internet Business Solutions Group (IBSG) on the future of geographically distributed networked work and how this approach is enabling profound changes among organizations, communities, and individuals. It explores the nature of how technology interweaves our personal and work lives, enabling innovation within and across communities.*

## Introduction

A number of forces are changing how we work, live, and innovate: pervasive technologies, distributed ways of working, "space rather than place" as a work ethos, new methods and modes of work, access to shared services, open versus closed innovation, a new generation of workers, environmental concerns, and macro socioeconomic shifts.

Given a choice, people will demand freedom to work, live, and innovate in ways that meet their individual lifestyles, unfettered by place. Meanwhile, pressures to reduce costs and seek new approaches to innovation are causing many private and public organizations to rethink how work gets done.

Furthermore, networked digital technologies and the Internet in particular are creating choice, and enabling open and peer-driven approaches to innovation. The application of such technologies is creating a new paradigm we call Smart Work,[1] an act of production performed independent of time and place. In its ultimate form, the "office"—and traditional work conventions such as the eight-hour workday—no longer exists. Smart Work is results-oriented: it is often social and collaborative, and the result of a networked way of operating, with exchange, collaboration, and co-creation processes optimizing work and its output.

In his book, *The Future of Work,* Richard Donkin writes that such forces have the potential to "…shrink, flatten, and democratize organizations."[2] Moreover, emerging technologies are also changing the nature of work and shifting society's attitudes. This shift, however, is not universal across industries, geographies, or cultures—society's ability to adapt to new technologies must be acknowledged. While we may be a long way from realizing the full potential of Smart Work, we are applying technology in our work and home environments like never before.

This Point of View is in two parts. Part I looks at technologies currently in use and how they are impacting our work and personal lives, and the processes of innovation. Part II discusses the most influential technologies currently enabling smarter ways of working and living, and those that will become pervasive in the next few years—cloud computing, connected devices, smart applications, collaboration platforms, flexible security-policy applications, and high-bandwidth networks. Such technologies are also driving innovation processes—empowering organizations and communities, and contributing to new premises and ethics that result in social, economic, and environmental outcomes otherwise unachievable.

## PART 1
## Technology and Work

*"The Internet changes everything. We see it all around us today in the increasing choices people have in how and where they work."*[3]
—Thomas W. Malone, Patrick J. McGovern, Professor of Management,
MIT Sloan School of Management

Technologies impacting work, personal life, and innovation are becoming more connected, and their usage more ubiquitous. Finding the right balance among devices, network infrastructures, applications/services, and business processes, however, remains a challenge, and business leaders and IT professionals often struggle to make their workforces more mobile and distributed within organizational constraints. For example, working from home is not a new concept and enabling technology is available, but few organizations support it well, despite advantages such as increased cost savings and reduced carbon footprints.

There has been some progress, though, in understanding how to combine technologies for personal, organizational, and societal gains. Smart Work Centers[4] (SWCs), private virtual offices,[5] and mobile social media applications are examples of workplace innovations that combine technologies in new ways, enabling broader, seamless, and efficient connections.

Technology-enabled spaces such as Active Collaboration Rooms (ACRs)[6], deployed by General Electric[7] and Cisco, for example, are one way organizations can improve business performance across geographically distributed teams. ACRs combine Cisco's TelePresence® and WebEx® technologies, interactive whiteboards, and other collaboration components to improve team productivity and reduce project cycles for key business processes. Remote users can participate using other telepresence-enabled rooms, desktop webcams, or high-definition video-conferencing systems.

Organizations from all sectors can embrace this new paradigm by adopting new policies for remote working and for using multiple devices in the workplace—a critical step to ensuring employee effectiveness and retention. Like many organizations, governments are also evaluating how to meet employees' demands for increased flexibility in their work tools. The government of British Columbia, Canada, is one example.

> **"Citizens @ the Centre—A Cultural Initiative**
> British Columbia's Citizens @ the Centre[8] public service initiative enables employees to work more effectively, recognizing that the lines between home and work are blurring—employees must be able to work remotely and choose the device(s) that enables the most productivity. The government's vision for cultural change is addressed in its corporate human resources plan, *Being the Best*. Technical, security, and policy challenges must also be addressed, such as ensuring that employees can access the programs they need, information is protected, and freedom of information requirements are met.

## Technology and Life

To understand technology's impact on our personal lives, we look at it from the individual and community perspectives.

### Individual

Smart Work's impact on individuals is multifaceted. Smart Work increases social connections, entrepreneurialism, and participation in peer networks (external and within organizations). Professional expertise and reputations can be maintained and developed through a wide range of peer networks and lifelong learning mediums, both online and in traditional or new educational modes.

Individuals must be cognizant of trust and of intrinsic/extrinsic motivations, however, when working across disparate peer communities. Conscious actions are required to ensure that the opportunities presented through smart working—such as improved skills, capabilities, and work-life balance—are realized. The difficult task for individuals will be to navigate a more complex but ultimately richer ecosystem, and to ensure that personal expertise, talents, and passions are actively explored and advocated to a wider audience.

Networked information and communications technology (ICT) gives people the freedom and flexibility to pursue personal interests, while also enabling work productivity and efficiency. Networked ICT can potentially improve our personal lives in many ways: from having access to advanced and affordable healthcare and high-definition movies on demand, to collaborating in virtual environments with work colleagues or university classmates around the world, to accessing real-time data about home energy use or travel plans—all from the comfort of their living room, home-based work environment, or community space.

Individuals increasingly value flexibility and freedom in regard to work location. According to the Cisco Connected World Technology Report,[9] two-thirds of participants surveyed* stated that they would choose work-location flexibility over a higher salary (see Figure 1).

**Figure 1.** Employees Rate the Value of Mobility.
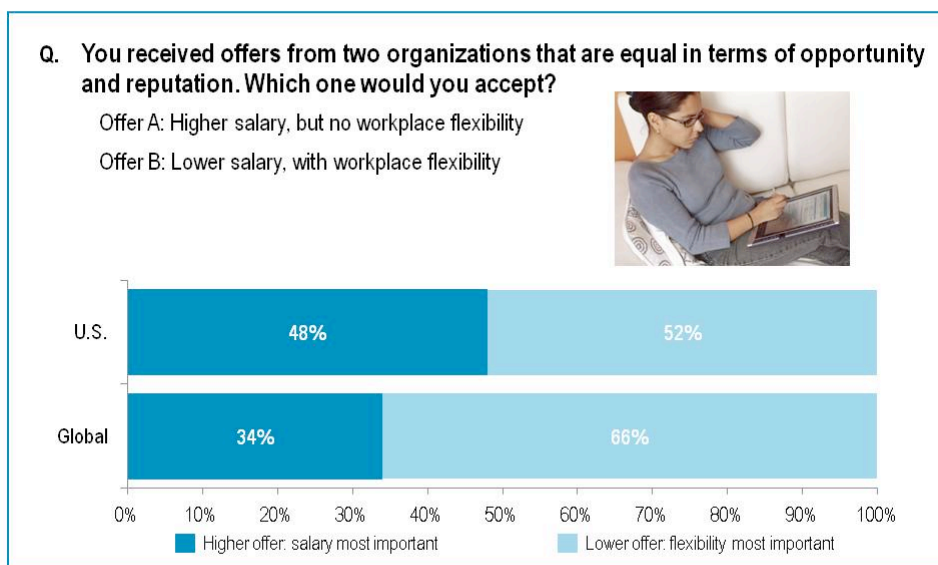


*Note: Total participants surveyed were 2,612 end users and key decision makers in 13 countries.
Source: Cisco Connected World Technology Report, 2010

Given the emphasis on flexibility, organizations must respond with better, secure solutions—particularly mobile ones—to attract the best talent and ensure an efficient, high-performance work community.

Dedicated home-based workspaces are one solution for partitioning work and personal lives, while providing the proximity and flexibility to manage work and personal priorities. Technology smoothes the transitions between the roles we play and the demands placed upon us in work and life.

Indeed, individual productivity and creativity may sometimes be better served in connected yet isolated spaces for some part of the work week. This is a point discussed by Susan Cain in her book *Quiet: The Power of Introverts in a World That Can't Stop Talking.*[10] Hence, the trend of working from home is important, as part of a mix of varied yet connected work patterns and locations.

Shedworking is one alternative workplace solution in response to a wider trend in home-based spaces (see Figure 2). Shedworking provides a greener way of working, improves work-life balance, and accelerates productivity.

**Figure 2.** Shedworking: "Manhut" Backyard Studio.



Source: http://kevindeeveyarchitect.com/. Visit www.shedworking.co.uk for other shedworking use cases.

## Communities

Technology is constantly changing the balance between work and life. It is important for organizations and public service providers to maintain a broad, spatial perspective on the impact of such changes. A more mobile, virtual community affects human movement patterns, impacting requirements for transportation, urban planning, building design, and spatial land management. For example, the changing nature of "place" in terms of where work is conducted influences overall requirements for office space, creating opportunities to make better use of different spaces over time.

New developments such as Greenhouse Leeds, a new model for multiuse real estate in the United Kingdom, explore the potential of multifunction living, working, and community social spaces. Greenhouse Leeds is a collection of distinctive homes and offices, "hotel apartments," and conference facilities. The development in Beeston, an inner-city area of South Leeds, is an excellent example of technology-enabled, sustainable urban regeneration (see Figure 3).

Figure 3. Greenhouse Leeds Enables Smart Living, Working, and Socializing.



Source: www.greenhouseleeds.co.uk

If office work can be carried out virtually anywhere, traffic congestion, accident rates, and transportation infrastructure wear and tear could decrease; public transportation usage could increase; and community carbon footprints could improve, impacting related issues such as insurance costs. New ways of working are emerging as alternative technologies, associated costs, and user experiences change. In his book *Work and the City,* Frank Duffy observes: "The increasing use of telepresence and other similar devices—which are becoming closer and closer in quality to real face-to-face meetings—could also substantially reduce the demand for long-distance travel".[11]

Communities can be connected to enable real-time information exchange, facilitate interaction, and provide access to resources that spur economic, social, and environmental sustainability. The "participative web,"[12] facilitated by cloud-based applications, plays a significant role in technology's impact on communities. Participative technologies include rich multimedia web applications, wikis, social media, blogs, video sharing, site-searching tools, mash-ups, tagging, and mobile applications. These technologies affect how we interact, learn, and participate within and across communities.

## Hyperconnected Communities
Gig.U,[13] the University Community Next Generation Innovation Project, is comprised of more than 30 leading U.S.-based research universities aimed at accelerating deployment of next-generation networks and providing opportunities in ultra-high-speed network services and applications. Another initiative—OneCommunity[14] in Cleveland and parts of northern Ohio—connects more than 1,000 public and nonprofit sites via its regional fiber-optic broadband network and works with public- and private-sector partners to lead innovative programs in healthcare, education, workforce, government, and economic development.

## Technology and Innovation

Networked ICT is a mechanism for innovation and an important factor in the way we work. In *The Public Innovator's Playbook: Nurturing Bold Ideas in Government report,*[15] the authors write: "To excel at innovation, organizations must use the appropriate mix of strategies based on the specific challenges they face and then manage innovations from idea generation through selection, implementation, and diffusion. In addition, proper execution of innovation requires that organizations move away from hierarchy and ownership models to inclusion and collaboration models. This is one way that networked digital technologies and the Internet impact innovation by improving collaboration."

Technology is also fueling innovation by accelerating discovery, experimentation, and scaling processes. Innovation benefits from new technology applications and work patterns. Initiatives such as Kaggle,[16] a predictive modeling competition platform, and Foldit,[17] a Tetris-like online game created by the Folding@home[18] project to crowdsource scientific discoveries, illustrate modularity and task divisibility, which are enabling heterogeneous participation and new models for innovation. Merck's "virtual lab"[19] is an example of early-stage research collaboration in the biotech industry, blending the best scientific programs developed from research conducted internally by both large corporations and external participants. Also, the emergence of social software platforms such as Spigit[20] (used by Cisco's I-Prize[21] competition) apply advanced mathematical algorithms and data analytics to map innovative ideas to identify likely sources of ideas and entrepreneurship.

Geographic proximity is still vital to the development of a community of interest. The ability to merge physical and digital experiences into hyperconnected collaboration environments that span private- and public-sector partnerships marks successful models for networked innovation.

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### From Hacker Spaces to FabLabs and Much More

Open Design City (ODC)[22] in Berlin, Germany, is a community production space where people gather to share ideas, skills, tools, and knowledge. As part of a wider hacker movement, ODC is a self-generating community providing resources for knowledge and skill sharing, and tools for creating new peer-driven production models and co-building things. ODC is also part of the FabLab[23] trend pioneered at MIT, and is emerging in communities such as the FabLab developed by the Waag Society in Amsterdam, the Netherlands.[24]

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### Digital Swarming

Digital swarming—the swarm of people, data, objects, and machines—is becoming a new open model for how organizations work to address their challenges and meet their goals.[25] The need for agility in the face of rapid and pervasive change demands new organizational models that deliver information and support decision making across—and at the edge of—the network or collective. At first glance, this notion seems chaotic, as organizations historically have operated in "information silos." It is not. Facebook and Twitter are examples of simple social networks that, while they appear to operate without regulations, follow clear parameters and rules.

The same chaotic organizational models can apply to work-based social networks where people apply digital swarming to projects or tasks in a temporary manner. Gartner, Inc.

identified this trend as one of its key predictions for the 2020 workplace.[26] "People will swarm more often and work solo-less. They'll work with others with whom they have few links, and teams will include people outside the control of the organization," said Tom Austin, a Gartner fellow, in a media announcement.

## Hubs and Clusters

The repurposing of real estate due to changing work patterns is causing a profound shift in communities—resulting in new physical and virtual collaboration spaces, which can be defined as hubs and clusters. From our perspective, hubs generally focus on community-of-interest networking and entrepreneurship; clusters, on the other hand, are based on specific industries, where economic activity occurs in a locale. These spaces in turn foster collaboration. We propose a new vision for stimulating innovation, targeting both locally based clusters and new types of global innovation hubs.[27] Co-working and innovation clusters are emerging in many cities and communities as a response to changing work and life patterns. More important is that such clusters are resulting from changes in economic production and innovation processes.

Locally focused social spaces are one way to ignite innovation; other spaces are multisector incubation centers and those enabling local peer networks. The Hub, shown in Figure 4, is one example of a global community of people from every profession, background, and culture seeking to tackle the world's most pressing social, cultural, and environmental challenges. The Hub provides locations for social innovation across five continents and 26 cities, taking the best from a member's club, innovation agency, serviced-office solution, and think-tank to create a unique innovation environment. The Hub provides tools for growing and developing new ventures; places for accessing experience, knowledge, finance, and markets; and environments filled with diverse people doing amazing things.

**Figure 4.**     The Hub in Prague.



Source: www.the-hub.net

The trend toward co-working and community collaboration spaces for like-minded people—those engaged in technology, media, culture, and other interests—is becoming pervasive. Examples include TechHub,[28] Hub Culture,[29] and Netil House[30] in London, United Kingdom; Centre for Social Innovation[31] in Toronto, Canada; and iHub[32] in Nairobi, Kenya. The highly successful iHub is an open community workspace for local technologists, investors, tech companies, and hackers. iHub focuses on young entrepreneurs, web and mobile device programmers, designers, and researchers.

## Virtual Innovation: Technology and Next-Generation Clusters

Clusters of economic activity are one of the most interesting innovation strategies. Michael Porter, a Harvard professor of business and a leading business strategist, defines clusters as "...geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions that compete but also collaborate."[33]

Traditionally, clusters have been defined by such geographic concentrations. Consider, however, how networked ICT is impacting physical clusters. While they are important to both economic growth and innovation, in times of economic volatility, organizations at all levels seek new, cost-effective ways to stimulate growth and job creation. With new communication and collaboration technologies, clusters of economic activity are thriving across disparate geographies. Bringing together stakeholders from clusters around the world provides opportunities to create new partnerships, accelerating success through enrichment of the idea-creation process and an increase in implicit exchanges. Idea and information exchange would not necessarily occur for the purpose of creating explicit transactions, but simply for the purpose of supporting the greater community.

### Physical and Virtual Entrepreneurship

Sandbox[34] is a global network of young innovators and leaders under 30. The organization has a rapidly expanding community in more than 60 countries, with events and initiatives in more than 20 cities in the United States, Europe, Africa, and Asia. "Sandboxers" can connect physically in locations such as The Hub in London or virtually to share ideas, collaborate, and innovate. A nomination-based network model enables a level of trusted collaboration and sharing across the community.

If geographic proximity continues to be a direct factor in the development of traditional clusters in the 21st century, then new global and virtual innovative partnerships are key indirect factors for the next generation of clusters that optimize resources such as capital, labor, and brainpower to foster economic development and job creation. Technology is playing a fundamental role in the evolution of clusters. By globalizing and changing the culture of networking, clusters can expand internationally and create relationships that directly impact the pace, scale, and scope of community actions and innovation cycles.

## PART 2
## Technologies that Will Transform the Way We Work, Live, and Innovate

In addition to the real-world examples described in Part 1, there are a number of technologies that will transform our work and personal lives, and encourage new innovation models: cloud computing, connected devices, smart applications, collaboration platforms, flexible security policy applications, and high-bandwidth networks.

### Cloud Computing: Services and Infrastructures

Cloud computing—delivering infrastructure, services, and software on demand via the network—offers organizations and individuals attractive advantages for accessing business systems from anywhere. Cloud provides a number of benefits, including the potential to lower total cost of ownership and improve productivity, with better asset utilization and automated service provisioning. It can also fuel growth by enabling wider participation and organizational agility, and by improving infrastructure, resulting in faster service delivery and quicker time to market.

Cloud computing presents the public sector with a particularly significant opportunity: the ability to share ICT resources among multiple agencies. While governments have tried to create frameworks geared toward shared services, these frameworks have not always been successful. Cloud computing offers an easier and less burdensome route to more efficient and effective information management.[35]

Cloud computing capabilities are also highly relevant to developing countries that may not have the technology, skilled personnel, or resources to create world-class ICT infra-structures.[36]

Examples of mainstream cloud-based services include Cisco WebEx and Salesforce.com; emerging enterprise software platforms such as Workday.com and Cisco Quad™; and infrastructures such as Amazon Web Services and Microsoft Windows Azure. New cloud-based services/products and the entrepreneurial industry fueling them are emerging rapidly. Huddle, Evernote, Dropbox, Basecamp, and HootSuite are just some applications that illustrate this trend.[37]

The 2010 Cisco Connected World Technology Report found that 52 percent of respondents have deployed or plan to deploy cloud services and infrastructures. Given this, we still have a ways to go in realizing the vision of "true cloud"—an environment that will enable enterprises and individuals to establish and pervasively use information systems, business resources, and applications independent of location, technology, and provider.[38]
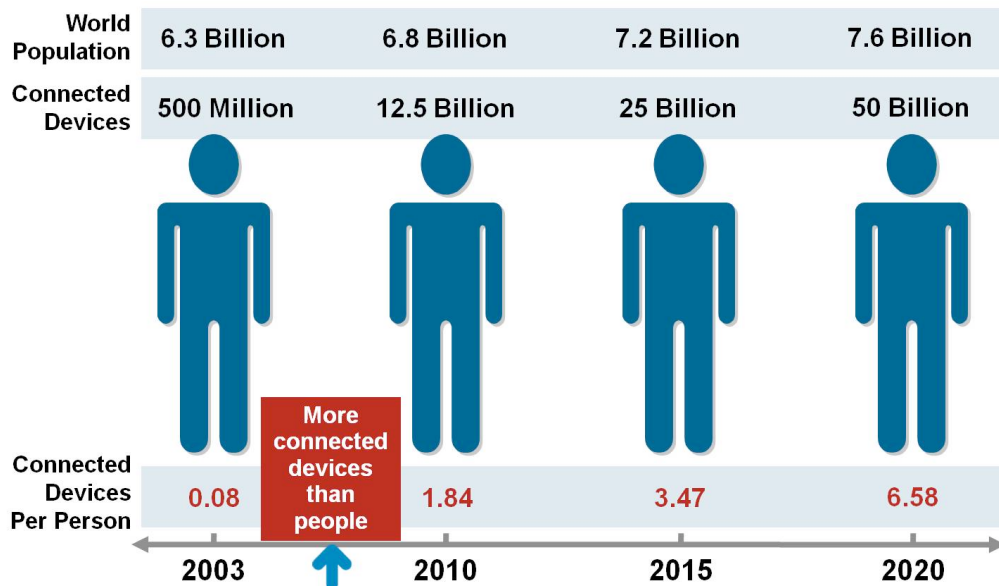
Although widespread adoption of cloud services will take time, we *are* on the path to true cloud. Cloud computing is already having an impact on organizations, the way we work, how we integrate technologies with our personal lives, and how we innovate and discover new business models. It should be noted, however, that there are concerns over reliability, security, control, and regulations. Nonetheless, examples of forward-thinking Smart Work strategies do exist in both the private and public sector. Current asymmetrical adoption rates should balance out in the next few years once these concerns are addressed. Public bodies such as the Canadian Public Policy Forum make a similar case for the role of technology in the future of work.[39]

## Connected Devices

There has been a dramatic increase in connected devices in recent years. In our homes, offices, and public spaces, devices that enable us to access information and interact are liberating us from fixed locations and are having a profound effect on the way we live, work, and innovate. In a 2003 interview with *InfoWorld,* George Colony, Forrester Research chairman and CEO, stated that there were approximately 500 million connected devices worldwide.[40] Based on the human population at that time (6.3 billion), there was approximately one-eighth of a connected device for every person.[41] Explosive growth in smartphones and tablet PCs increased the number of devices connected to the Internet to 12.5 billion, or slightly less than two devices per person, in 2010.[42]

Device connectivity, sometimes referred to as "The Internet of Things," not only includes personal devices such as smartphones, but also machine-to-machine communications devices, sensors, and infrastructures such as building systems and Smart Grids. Device proliferation/connectivity will continue. Cisco IBSG estimates that there will be 25 billion connected devices by 2015 and 50 billion by 2020[43] (see Figure 5).

Figure 5. The Internet of Things Was "Born" Sometime Between 2008 and 2009, When the Number of Devices Connected to the Internet Surpassed the World's Human Population.



| | | | |
|---|---|---|---|
| **World Population** | 6.3 Billion | 6.8 Billion | 7.2 Billion | 7.6 Billion |
| **Connected Devices** | 500 Million | 12.5 Billion | 25 Billion | 50 Billion |
| **Connected Devices Per Person** | 0.08 | 1.84 | 3.47 | 6.58 |
| | 2003 | 2010 | 2015 | 2020 |

**More connected devices than people**

Source: Cisco IBSG, 2011

In the traditional work model, devices such as smartphones, laptops, and desktop computers are selected, configured, owned, and maintained by employers. In reality, most employees carry multiple devices and use them for both personal and work-related tasks. Given this, employers are recognizing that having separate devices for work and personal use is neither practical nor sustainable. As a result, they are reviewing other options such as letting employees purchase their own devices, which may be funded entirely, partly, or not at all by the employer. It would be the employee's responsibility, however, to adhere to corporate standards.

*Consumerization*

Consumerization of personal devices and applications in the workplace is exploding.[44] International Data Corporation coined 2011 the year of "bring your own device" (BYOD),[45] noting, "Consumer apps and consumer devices will move from ambiguous tolerance in most organizations to being either embraced or their prohibition enforced." Indeed, employees want to use their devices in a number of ways, not just for work or for personal use alone.[46]

How can the dichotomies among work and life—as well as access to corporate services and connections from anywhere—be navigated optimally? Organizations can develop policies that sponsor, embrace, or ignore these dichotomies,[47] but there are ramifications to consider such as security, work performance, system access, and user satisfaction. Key challenges center on ensuring user experience, security, and manageability.

There is no doubt that the desire among employees for flexibility and mobility is growing, while device interoperability, open access, simplicity of use, and the ability to limit the number of separate devices are becoming fundamental to our ability to find balance between our personal and work lives. The Cisco Connected World Technology Report found that 32 percent of employees rely on more than one mobile data device during their typical workday. Furthermore, 66 percent of respondents answered "yes" when asked, "Do you believe company-issued devices should be available for both work and play?" Given that, 90 percent of respondents (organizations) said they will support corporate applications on personal devices by 2014.

*Tablets and Smartphones*

In 2011, tablet adoption exceeded that of smartphones.[48] Adoption of the Apple iPad continues to grow, and the list of competing devices is increasing.[49] This landscape illustrates the demand for multiple devices in our daily lives, and perhaps the need to compartmentalize our lives into "work" and "personal."

Counter to the BYOD trend, users may want devices and applications that enable them to perform work or personal tasks optimally. While this is seldom achieved, there are attempts to provide a better work-life user experience, such as the Cisco Cius™ business tablet. The Cisco AppHQ™ developer API and Android operating system are pragmatic and open innovation responses to the changing paradigm of Smart Work.

*Certification*

The requirement for official certification in various jurisdictions is one mitigating factor to device consumerization in the public sector. Agencies such as the National Institute of Standards and Technology (NIST)[52] in the United States and the British Standards Institution (BSI)[53] provide official certification for device use in government. Inevitably, there will be similar growth in the public sector to that in the private sector as new devices gain accreditation.

## Smart Applications: How Data Is Used

In urban communities, a number of real-time travel-assistant applications are now available that use open and proprietary data, tools, and services to let people work, study, and shop from either home or another location. Applications play a key role in mining data sources, linking locations, and connecting organizations and individuals. Such applications will

enhance our connected lives and work-life experiences by enabling us to make informed, efficient, and cost-effective decisions.

### Personal Travel Assistant[54]

Personal Travel Assistant (PTA) is an example of a technology that enables citizens in urban areas to balance their work and personal lives. An early prototype developed in 2009 by Cisco IBSG and the cities of Seoul and Amsterdam, PTA gives citizens more alternatives for making informed decisions about their daily travel, whether commuting, attending offsite meetings, and/or engaging in personal endeavors. Beyond travel, PTA offers citizens and employers more flexibility in their daily work environments by providing smart working options throughout urban areas.

Connections expand exponentially when we connect and interpret other data sets from businesses, individuals, and crowds. This approach is called "big data" and includes the rising importance of connected objects. The city of Busan, South Korea, is developing applications and a Smart City services infrastructure that accelerate delivery of information to improve quality of life, achieve environmental sustainability, and increase economic efficiency and social inclusion.[55] As part of the Busan "u-City" plan,[56] the Busan Mobile Application Center[57] initiative is a step toward a holistic and integrated system of connected devices, services, and applications enabled by a cloud infrastructure. Figure 6 illustrates how citizens can use u-City services at different times for different requirements.

Figure 6.     A Day in the Life of a Green U-City Citizen.



Source: Cisco IBSG, 2011

Due to the growing number of devices, there is an increasing need to link our workplaces, whether coffee shops, trains, public buildings, or co-working spaces. Sixty-one percent of

participants in the Cisco Connected World Technology Report indicated that they do not need to be in the office to be productive. A stream of location-aware, real-time applications that applies data to useful formats is emerging. W-WORK (www.w-work.nl) and WorkSnug (http://www.worksnug.com/) service platforms are two examples that illustrate the positive impact of Smart Work spaces in a connected world.

W-WORK is a booking platform for reserving meeting rooms or workspaces in the Netherlands. WorkSnug, on the other hand, is an augmented-reality application that applies location-based services to connect mobile workers to the nearest and best places to work in major cities worldwide. Information about a location's Wi-Fi access, workspace noise levels, power provision, community feel, and even the quality of the coffee is available.

Connected applications help improve worker productivity, encourage open innovation among communities, and enable businesses to compete, attract, and engage employees.

## Collaboration Platforms

New communications technologies, online collaboration spaces, project tools, and file sharing/storage media are emerging to enable distributed working.[58] Trends in multifunctional enterprise collaboration platforms include:

- Enterprise social software (ESS) to aggregate content and applications for individual work profiles
- Service delivery to enable the socialization of other apps
- Collaboration to federate with consumer sites via policy-based frameworks, enabling consumer-type services with ESS platforms to be used by employees
- Integrated collaboration, communications, and video

In recognizing the multidisciplinary nature of work, enabling ESS technologies such as the Cisco Quad platform provide new ways of engaging colleagues, external partners, and customers (see Figure 7). ESS platforms enable better knowledge management, the development of professional relationships, and peer interactions.

**Figure 7.**   Cisco Quad Enables a New Platform for Workforce Collaboration.



Source: http://www.cisco.com/go/quad

Law firm Minter Ellison uses the Cisco Quad platform to connect its global operations[59] by integrating various communications, collaboration, knowledge management, search, personal productivity, and directory functions via one interface—offering users a personalized experience that combines tools and applications people use throughout their workday.

Integrating video communication devices and platforms is a fundamental component of future enterprise collaboration platforms. High-end telepresence systems and devices that can be used in the home, on the move, or from temporary locations to connect with peers across a common platform are transforming our work lives. Modular video and high-definition video systems for personal use such as Cisco TelePresence Movi[60] can connect with other enterprise systems, becoming catalysts for new work-life-innovation patterns.

## Security Solutions

Cloud services, device proliferation, social networking, video applications, virtualization, and consumerization are transforming businesses and shifting how security solutions are developed and deployed. There is a need not only to protect physical infrastructure end-points, but also to rethink the way that modular services operate securely across borders. Data integrity and users' ability to connect seamlessly become a major issue central to any technological solution. Therefore, security policies, tools, and applications must be integrated consistently across the enterprise, while ensuring that IT policies support external personal devices, applications, and platforms across locations.

*The Need for Engagement*
Liberating people from fixed locations/devices requires changes to IT policies and practices. Dialogue among employees and IT departments must take place to ensure that the importance of security for all types of devices and peripherals is understood. A social contract is emerging that emphasizes the responsibility of both the user and the organization for ensuring the effectiveness of security policies.

Enterprise security architectures can help organizations create and enforce effective, high-level policies. An array of parameters enables effective security and situational awareness. Instead of using complex firewall rules, security policy can be based on context: an "any device" policy that allows users to choose mobile phones, desktops/laptops, or operating systems. Cisco's internal any-device IT policies have resulted in increased end-user satisfaction and reduced support costs. The Cisco SecureX Architecture™[61] provides such application/location awareness and simplifies policy language.

## High-Bandwidth Networks

Urban and rural communities are increasingly linked by global information and communications infrastructures that facilitate interaction, collaboration, and mobility. As a result, communities are evolving into places where overlapping networks of companies, institutions, and civil societies are supported by ICT.

A Smart Work environment requires a high-bandwidth infrastructure that enables reliable and secure symmetrical communications for high-end collaboration, video, and cloud-based services and operations (see Figure 8).

Figure 8.    Network Speed Requirements and Capabilities.
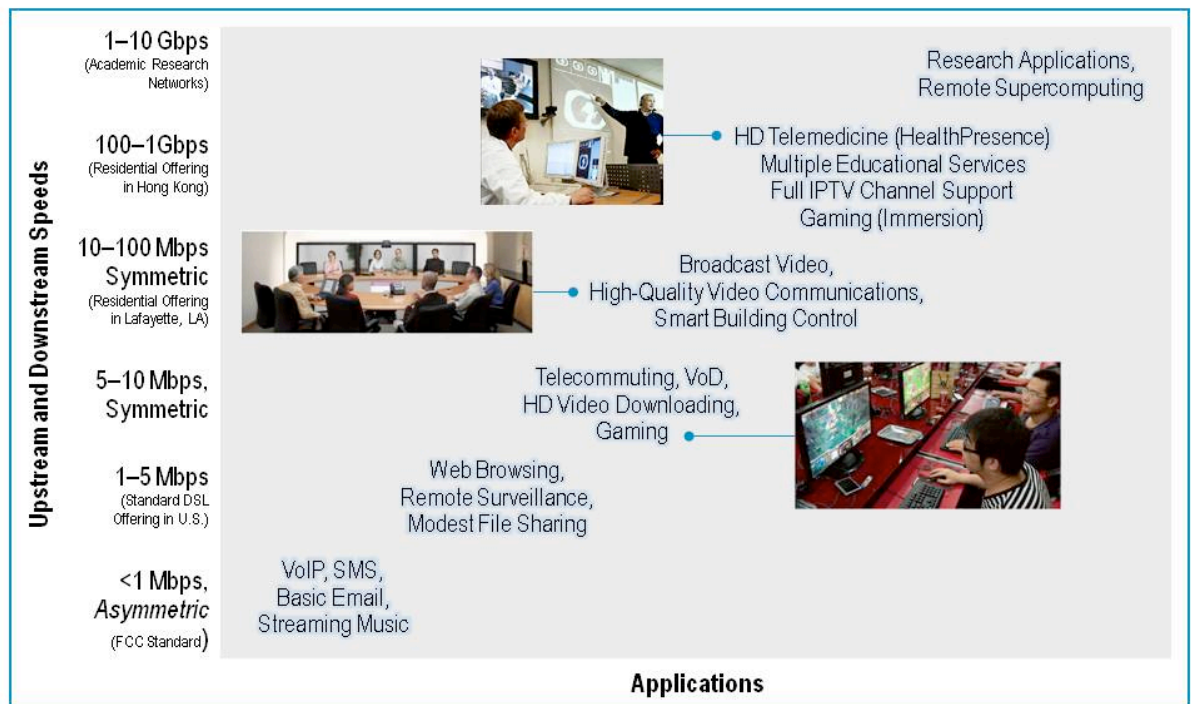


Source: Cisco IBSG, 2011

High-speed broadband is not pervasive, however, among residential users worldwide. While some people enjoy gigabit symmetrical access, others in many developed and developing countries do not have the pervasive, consistent access speeds that Smart Work demands. Leading countries in Smart Work practices have invested in high-speed broadband and new broadband models to replace legacy networks.[62]

In terms of mobile broadband, advances in 3G and LTE technologies, for example, are enabling people to interact through video and consume rich content while on the move. The transition from fixed networks to high-speed mobile broadband is enabling online experiences in peri-urban and rural locations to equal those enjoyed in urban communities.

Wireless frequencies such as WiMAX and satellite will continue to fill the gaps in connectivity, providing fast Internet access for all. Demand for access to online public services, work applications, collaboration tools, and cloud-based delivery infrastructures is growing regardless of location. According to a study on broadband quality,[63] we are in the second phase of broadband-quality requirements, which will accelerate through 2015.

## Network-Enabled Applications in Emerging Economies

Digital technologies—coupled with appropriate training, services, and content—offer urban and rural areas an increasing range of innovative solutions. While some individuals can afford broadband services to the home, Internet access is prohibitively expensive for the vast majority of people in developing countries. There are, however, innovative ways to use ICT to support development in these communities.[64]

One example is Pasha Centres,[65] a digital villages program launched in January 2009 by the Kenya ICT Board (KICTB), with consulting support from Cisco IBSG. Named after the Swahili

term for "to inform,", Pasha Centres are created using Cisco IBSG's Digital Community Development Toolkit, which enables a Pasha Centre to explore business model and break-even options for delivering ICT services. Social technologies, along with network and video services, are used in five entrepreneurial cyber cafés that were identified across peri-urban and rural communities to foster a sense of community and enable participation and access to digital services. The initiative was developed as part of an effort to become a "connected nation."

In developing countries and communities, mobile phone access and innovative applications and services are emerging rapidly. Companies such as Safaricom (M-PESA SMS-based money transfer system),[66] Ushahidi[67] (free open-source data-collection software), and mobile technology company Jana (formerly txteagle)[68] indicate an active innovation culture enabling new ways of working and models for work. Indeed, such models are redefining the nature of work.

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**Jana: A New Definition and Mode of Work**

Based on the concepts of crowdsourcing, Jana is a data-collection platform that aggregates consumer data about people in emerging markets and then provides phone carriers direct access to these consumers via their mobile phones. Using text messages or audio clips, people in developing countries such as Kenya can earn small amounts of money by completing simple tasks such as translating words from one language to another or transcribing audio recordings.

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## Call to Action

This Point of View is intended to encourage each stakeholder group—governments, organizations, individuals, community leaders, and technology developers—to think about how they can use existing and emerging technologies in their work and personal lives. Cisco IBSG recommends that each stakeholder take the following steps to determine the impact of adopting new technologies, applications, and business models:

- **Understand enabling technology:** Explore which technologies can provide better ways of working to engage customers, partners, and existing/future employees
- **Review policies and processes:** Determine how established norms in your work environment correspond with the ability to adopt new technologies, applications, and business models
- **Question location:** Where and how does location determine your work patterns? Explore how technologies can enable balance in work and life.
- **Recognize social norms:** Determine whether your organization's culture is receptive to distributed ways of working in virtual teams, and then identify what is currently enabling or inhibiting this
- **Explore the benefits of existing and new technology applications:** Determine in which area a technology platform, distributed way of working, or device can realize economic, social, and environmental benefit, as well as cost savings
- **Challenge productivity levels:** Question whether innovation can occur elsewhere, with other participants, and in new ways

Networked ICT is impacting work, life, and innovation simultaneously. The border between our professional and private lives is now intertwined. We can now work anywhere, using multiple devices. The ability for us to define our workday patterns, moments of creativity, study habits, socialization, productivity, and reach can be changed for better work-life and innovation outcomes.[69] In other words: work is what we do, not where it is done.

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Further perspectives on Work-Life Innovation are provided at:
www.cisco.com/go/worklifeinnovation

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**More Information**

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