**6. Information Technology**  
**How can the global convergence of information and communications technologies work for everyone?**

Nearly 25% of humanity is connected to the Internet. More people in China use the Internet than live in the U.S. There are four billion mobile phones. Mobile devices are becoming personal electronic companions, combining the functions of a Web-connected computer, telephone, camera, music player, TV, and library—all adapting to the individual user and aware of his or her location. The Internet is beginning to connect the built environment via low-cost nanotech sensors, cameras, and transceivers for traffic control, security, market research, climate-driven energy management for buildings, and other forms of environmental management. Humanity, the built environment, and ubiquitous computing seem destined to become so interconnected that collective intelligences with “just-in-time knowledge” will emerge for improving civilization.

In the meantime, Internet bases with wireless transmission are being constructed in remote villages, cell phones with Internet access are being designed for educational access by the lowest income groups, and new business models are being created to connect the poorest two billion people to the evolving nervous system of civilization. E-government systems can support justice, democratization, education, and economic development by delivering services, providing citizen feedback channels, and initiating public-private partnerships. The Internet could connect developing country professionals overseas with the development processes back home. Online social networks are new forms of transnational democracy for emergent international conscience and action.

Since cyberspace has become a new medium for civilization, the full range of human behavior from individual philanthropy to organized crime is growing on the Internet. Cyberspace is increasingly becoming a battle zone among adversaries, a training and recruitment tool for terrorists, and a medium for intellectual arms races between those who use the Internet for illegal activities and those who would counter them. Fundamental rethinking will be required to counter future forms of information warfare that otherwise could lead to the distrust of all forms of information in cyberspace.

Open source software’s non-ownership model may become a significant element in the next economic system. Issues of intellectual property, compensation for creators of artistic material, and equitable economic policies for competition among communications modes are yet to be resolved. The Internet has evolved from a passive information repository (Web 1.0) to a user-generated and participatory system (Web 2.0), and eventually to a more intelligent partner that will have knowledge about the meaning of the information it stores and the ability to reason with that knowledge (Web 3.0). The Internet is already the most powerful force for globalization, democratization, economic growth, and education in history.

Although the digital divide continues to close, special efforts are needed to lower cost, increase reliability, and improve educational and business usage in order to help close the economic divides. Businesses, governments, foundations, and UN organizations are collaborating to provide broadband access to all Net users. “One laptop per child” costs of $178 in large lots to developing countries are receiving competition from Intel’s second-generation Classmate $300 PCs and teacher training programs.

Internet users spend more time using social networks than e-mail, creating virtual communities from which new forms of culture may emerge. E-mail, phone texting, instant messaging, and collaborative software link groups of people in humanitarian, scientific, and business projects. Businesses are building offices and holding meetings in Second Life and other cyberworlds that compete with conventional reality. Gartner forecasts that 80% of the active Internet will be using virtual worlds by 2011. Wikipedia has become the world’s encyclopedia, albeit with information reliability problems and the opportunity for some to conduct disinformation campaigns. The greatest entrepreneurial success in history was the sale of YouTube for $1.65 billion just 21 months after it was founded.

“Cloud computing” that provides data storage and applications via the Web is becoming an alternative to keeping it all on your computer. This can solve updating software and security problems, but requires trust of outside managers with your vital information. Rapid multimedia growth on the Internet will force infrastructure upgrades. The OECD forecasts that Internet addresses that identify devices connected to the Net will be used up within two years.

**Regional Considerations**  
  
**Africa:** Internet penetration in Africa is 5.6%, growing about 20% a year. Some 80% of African Net access is via satellite, but new fiber-optic cables to cut cost and speed access are planned to link Africa to Europe, the Middle East, and Asia, at a cost of $6.4 billion. Only six African countries have penetration rates greater than 8%. About 31% of the African population has mobile telephones. Web 2.0 played an important role in anti-government protests in Egypt. South Africa will use mobile phone text messages to encourage people to get tested and treated for HIV/AIDS. Tele-education, tele-medicine, and e-government will become more important as African professionals die of AIDS in increasing numbers.  
  
**Asia and Oceania:** Asia has the largest share of the world’s Internet users (41%) but only 17% penetration. In 2008, 279 million of China’s 298 million Internet users had broadband; there are 17 million registered domains there, 2.9 million Web sites, and 162 million blogs, and users getting access to the Net via mobile phones doubled in 2008, reaching 117 million. The governments China, Vietnam, Turkey, and Iran have tightened controls on Internet access. Some 8,000 Chinese signed the China Charter 08, many after learning about it on the Net. Australia plans to bring speeds up to 100 Mb/s to 90% of homes and offices. Trials are being conducted in India has launched a nine-crop Agropedia. A $20 laptop (Sakshat) is being built as part of e-learning program for 18,000 Indian colleges. Indian political parties use the Internet to 100 million 18- to 24-year-olds in the recent election. Twitter via mobile phones kept Iranians informed of post-election controversies in 2009.  
  
**Europe:** It is the national policy of Finland to connect the poorest of the world to the information society. The EU’s Safer Internet Program is working in 26 European countries to counter child pornography, pedophilia, and digital bullying. Estonians will vote by mobile phones in 2011. During the crisis with Russia, Georgia was reported to be the target of cyberattacks similar to those experienced in 2007 by Estonia. Portugal has ordered 500,000 low-cost Classmate computers. NATO has opened a center in Estonia to enhance the country’s cyber defense capability. The number of Internet users increased 26% in Russia from 2007 to 2008.  
  
**Latin America:** By the end of 2009 Peru will have 600,000 “one laptop per child” laptops, while Uruguay will have one for all 301,143 students and 12,879 teachers. About 20% of the region has Internet access. Only Argentina, Brazil, Colombia, Uruguay, Costa Rica, and Chile have greater than 30% penetration. Fulfilling the promise of modern technologies for international collaboration and development in this region will require more serious attention to training. Educational curricula should address the underdeveloped use of development technologies such as leaning systems via ICT.  
  
**North America:** Broadband carriers are fighting “Net neutrality,” which would prevent them from charging on the basis of user or content type. The U.S. has dropped below twentieth place in broadband penetration in the world, and its top broadband speeds are several times slower than those of Japan and South Korea. President Obama has allotted much of the $7.2 billion in ICT stimulus funds to bring broadband to rural areas to help close America's "digital divide." The U.S. has established a National Military Strategy for Cyberspace Operations. The Web played a major role in the 2008 U.S. presidential election and continues as medium for public participation in the White House agenda. The U.S. Computer Emergency Readiness Team has revealed that cyber attacks against government computer networks increased by more than 40% in 2008.  
  
  
**Graph:** Regional Internet population growth, 2000-2009  
  
Source: internetworldstats.com

