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**THE INFORMATION REVOLUTION BOTH SHAPES AND  
IS SHAPED BY SOCIAL AND CULTURAL VALUES IN  
SIGNIFICANT WAYS**

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**THE INFORMATION REVOLUTION IS BEING ENABLED  
BY TECHNOLOGY BUT DRIVEN PRIMARILY BY  
NONTECHNICAL FACTORS, INCLUDING SOCIAL  
AND CULTURAL FACTORS**

Outcomes of the information revolution are sometimes viewed as a product of how market forces on the one hand and government regulatory constraints on the other shape the deployment of technology-driven advance. But social and cultural values should be woven into the equation as well because they influence the course of the information revolution directly, as well as through their effects on both government policy and market activity.<sup>1</sup>

As evidence, note that many advanced democratic societies have access to the same information technologies. Yet they vary substantially in the extent of IT adoption, the nature of its use, and the apparent consequences. But the other direction of causation is also manifest. Globally networked information and communication media are already having profound effects on almost every aspect of society, and it is as yet unclear whether these will in general be forces for good (e.g., greater prosperity for all) or ill (e.g., unbridgeable social divides).<sup>2</sup>

In any case, social and cultural change will have to take place if individuals, organizations, and nations are to fully exploit the capabilities of IT—Schumpeter’s concept of “creative destruction” was frequently invoked.<sup>3</sup> Yet human practices and the technologies on

which they depend are situated in institutional realms (e.g., work, education, leisure) with embedded social norms, legal codes, shared histories, and the like. Institutional factors, however, are not easily changed and will limit the pace and scope of the information revolution. As one conference speaker put it, “Institutions change slowly. Internet time is fast. This disparity breeds tensions.”<sup>4</sup>

Finally, the deployment of IT will inevitably produce unintended consequences. Such consequences, like the use of the Internet for communication among humans rather than for sharing remote machine resources,<sup>5</sup> are well known in the history of technological advance. These surprises result not from the technologies per se but rather from how humans use them. Moreover, the unintended consequences that arise when social and technical influences combine may well dominate the intended ones.<sup>6</sup> The bottom line, then, is that generalizations about the social and cultural dimensions of the information revolution are exceedingly difficult to formulate.

#### **DIGITAL DIVIDES WITHIN AND BETWEEN NATIONS WILL PERSIST, BUT THEIR FUTURE SCOPE, DURATION, AND SIGNIFICANCE ARE SUBJECT TO DEBATE**

Within countries, IT diffusion generally exacerbates disparities and reinforces social cleavages, at least until saturation has been achieved. For example, returns to education are increasing because of the growth of information work, widening the social gap between more- and less-educated workers. As another example, those who have connectivity can expand their social networks and can do so in location-independent ways, enabling them to take advantage of both strong and weak social ties.<sup>7</sup> Further, connectivity also may also enhance factionalism; that is, individuals with very narrowly defined interests can find like-minded others somewhere in the wired world. Moreover, the polarization between the advantaged and the poor is made more acute because of its visibility in the information society.<sup>8</sup>

By and large, the same sorts of growing and visible inequalities as a cause and a consequence of differential access to and use of IT are even sharper at the level of national states, as the discussion of regional variations below suggests. While there is reasonable consensus about the present existence of these digital divides, there is con-

siderable debate over how their implications should be assessed. The European view, for example, is that digital inclusiveness is both a societal good and an economic asset; thus, a great many European Commission initiatives aim at producing equality of outcomes at the individual level and convergence at the national level. The prevailing American view is generally that policy should focus on establishing equality of opportunities, letting outcomes fall where they may.<sup>9</sup>

Whether or not these digital divides are regarded as problematic, and how severely so, is generally seen as a function of how much inequality can be managed and over what time periods. The prevailing American position is to downplay the consequences of the digital divide in the United States, taking the view that policy should focus on establishing equality of opportunities and let outcomes fall where they may. Further, Americans generally believe that the United States should aim at staying ahead of all other nations in the information revolution, rather than at converging on the same plane.<sup>10</sup>

**ABILITY TO ACQUIRE AND USE KNOWLEDGE WILL BE  
CRITICAL FOR SUCCESS IN THE INFORMATION SOCIETY:  
DEVELOPING HUMAN CAPITAL APPROPRIATELY IS KEY**

Knowledge work will constitute an increasing proportion of all work in the long-term future. This trend is already evident in the developed world; it will continue there and will emerge as well in less-developed parts of the world over time.<sup>11</sup> As a result, engendering, retaining, and nurturing intellectual resources—in particular, the sets of competencies related to production and use of knowledge—will be critical to global economic competitiveness. So “a quality education for all” will be one of the keys to a nation’s success in the information age.<sup>12</sup>

Meeting the human capital challenge created by the information revolution presents different problems in different parts of the world. In the world’s poorest countries, needs for basic literacy and numeracy skills stand alongside other basic societal needs (e.g., for adequate food, housing, and health services). Some developing areas and transitional economies, in addition to expanding basic skills in their labor pools, need to find ways to retain those with advanced competencies. Parts of Latin America, Eastern Europe, and South

Asia face the prospect of losing a significant proportion of their intellectual assets to Western Europe and North America, where knowledge work opportunities are growing and where the quality of life is higher.<sup>13</sup>

Nations in the vanguard of the information revolution face quite different sorts of challenges to human capital development for knowledge-based work. Most notably, the United States and parts of Western Europe are not producing an adequate supply of workforce entrants with high-level IT-relevant competencies in science, mathematics, engineering, and technology.<sup>14</sup> Presently these shortfalls are being remedied by in-migration from other parts of the world.<sup>15</sup> Another challenge has to do with providing for life-long learning. Education today in the developed world is based on the assumption that what is learned in the first part of life will satisfy long-term knowledge needs. But the information revolution has made for much shorter knowledge life cycles than in the past, resulting in the need for continuous learning just to keep pace with the moving state of the art in most professional domains.<sup>16</sup>

Advances in IT can play a role in resolving some, but not all, of these problems. For instance, globally networked information and communication systems may support “virtual migration,” enabling workers with high-level IT-related competencies to fill labor force needs in the United States and Western Europe without having to leave their home countries.<sup>17</sup>

Similarly, distance learning technologies and programs can provide on-demand training and development to help employed professionals keep up with their changing knowledge requirements. However, many knowledgeable American and Western European observers believe the deepest problems have to do with the nature and content of their educational systems—problems that technology leaves untouched. One expert, for instance, called for revolutionizing education—refocusing learning institutions to support the continuous gathering and use of new knowledge in place of onetime acquisition and retention of stored knowledge.<sup>18</sup> But prospects for timely reform of long-established educational systems in advanced countries are not viewed as promising.

**GLOBALIZATION, BOOSTED BY THE INFORMATION  
REVOLUTION, WILL CONTINUE TO HAVE  
MULTIVALENCED SOCIAL AND CULTURAL EFFECTS**

Globalization is generally understood as referring to the expansion of networks of interdependence spanning national boundaries that follows the increasingly rapid movement of ideas, money, goods, services, and people across these borders.<sup>19</sup> While its economic effects are widely recognized, knowledgeable observers also gave considerable weight to its societal implications—both positive and negative. Among the main outgrowths of globalization, for instance, one expert recently cited the following:<sup>20</sup>

- erosion of censorship
- information overload
- democratization of information
- empowerment of individuals with information access.

That English is the prevailing language in all these phenomena tends further to widen the gap between political/intellectual/economic elites and others. And even among nations on the positive side of the digital divide, U.S. domination of the Internet in general and the Internet Corporation for Assigned Names and Numbers (ICANN) in particular is seen as a threat to shared and fair governance of an internationalized and interdependent information society.<sup>21</sup>

Further, the porosity of national borders to the flow of entertainment—especially from the United States—has additional impact. First, it fosters the globalization of styles (or at least fads), which leads those in some countries to feel that their own national cultures are being vitiated. Second, it makes the contrast between the rich and the poor all the more salient, potentially leading to polarization, unrest, hostility, and possibly a “clash of civilizations.” Experts are uncertain about the long-term social and cultural outcomes of these trends.<sup>22</sup>

**WILL IT-ENABLED GLOBALIZATION LEAD TO GREATER HOMOGENEITY OR GREATER HETEROGENEITY IN SOCIOCULTURAL TERMS? THE ANSWER IS “YES” TO BOTH**

Shared norms, rights, and rules will be required for successful inter-networking to conduct a range of political, economic, social, and cultural activities that span national boundaries. Developed countries will not be able to go their separate ways on major issues (e.g., intellectual property rights, privacy rights, freedom of expression) if they want fully to exploit the advantages of an internationalized information society.<sup>23</sup> Thus, the expectation is that a harmonized and stable infrastructure of laws and policies will emerge over time across national states.<sup>24</sup>

These shared frameworks are, however, expected to allow regional and local differences to flourish without becoming barriers to productive interaction. Moreover, individual creativity will be stimulated by the rich intellectual and cultural resources to which networked technologies give access. Further, protections for freedom of expression plus the capabilities afforded by interactive technologies allow individuals to produce, as well as consume, digital materials of their own choosing. Moreover, greater diversity is expected to be a benefit in a knowledge-based society, where there is little value added if everyone brings the same information and ability to the network.<sup>25</sup>

Thus, the information revolution will stimulate greater homogeneity in the institutional and legal infrastructures of networked societies while enhancing the heterogeneity of their constituent cultures.

**THE INFORMATION REVOLUTION RAISES SIGNIFICANT SOCIAL-CULTURAL QUESTIONS FOR WHICH WELL-GROUNDED RESEARCH ANSWERS ARE UNAVAILABLE**

**What Is Effective Proximity?**

Global networks are expected to facilitate location-independent choices of work, education, and leisure pursuits—choices that in the past would have required geographic proximity. However, it is not clear how well connectivity can support comparable levels of performance. For example, we do not know enough about the role of

shared tacit knowledge and shared physical products in colocated interdependent work to understand how to create equally viable shared contexts via networked interactions—if this is possible at all (expert opinion is divided on this issue).<sup>26</sup> Similarly, the rise of high-tech clusters calls implicit attention to the potential role of geographic proximity in innovation and research and development creativity even when cluster members are at the forefront of the information revolution.<sup>27</sup> Finally, it is entirely possible that, in the absence of compelling positive experiences, localism may reassert itself over action at a distance.

### **What Are Viable Models for Leadership and Management in a Networked Global Society?**

As social organizations, networks have distinctive properties. For example, group membership is partial, overlapping, permeable, and unstable; subgroups are not clearly delineated. Further, shared values rather than formal roles and structures are what link people. Finally, even at the global level, there is not a hierarchical system for action and decisionmaking; rather, leadership is negotiated among varied actors including national states, transnational corporations, and international nongovernmental bodies (e.g., World Trade Organization, International Monetary Fund, World Bank, World Intellectual Property Organization). While the Internet is sometimes offered as an example of distributed self-organizing collaboration, it is not clear how well its governance will hold up and in any case whether that model could be replicated.<sup>28</sup>

### **Can the Information Revolution Contribute Meaningfully and Measurably to Environmental Sustainability?**

In Europe, in contrast to the United States, sustainability plays a big part in discussions of the future of the information revolution. It is hypothesized that the use of IT to reduce material consumption could make substantial contributions to environmental sustainability in the long run. Proponents of this view acknowledge that it would require structural changes in both lifestyles and business practices throughout the world; realization of these changes would demand the commitment of both civil society and the business community.

Others argue that opportunities to visit places virtually, to collaborate at a distance, and the like may well have the effect of increasing people's desires to travel and to communicate in person. Knowledgeable observers generally believe that at present there are very few data to support any inferences about relationships between the information revolution and sustainability.<sup>29</sup>

### **How Should Risk-Tolerance and Long-Term Planning Be Balanced over the Course of the Information Revolution to Yield Positive Social and Cultural Outcomes?**

Societies and cultures differ considerably in their attitudes toward risk and social change. As noted earlier in this chapter, taking advantage of opportunities presented by advancing IT requires risk-taking and change. According to knowledgeable observers from both sides of the Atlantic, Europeans are more distrustful and risk-averse than Americans when facing social change; on the other hand, Europeans have a penchant for long-term planning that Americans do not share. But coping successfully on a societal level with the information revolution—whose end is nowhere in sight—will surely require a balanced mix of both. A major question, then, is how to engage flexibly in creative destruction. As one expert recently put it, “how can society continue coupling, decoupling and recoupling to generate innovative activity?”<sup>30</sup>

## **NOTES**

<sup>1</sup>This conclusion from a plenary session in the first RAND information revolution conference (Hundley et al., 2000, p. 10) was echoed throughout the remaining conferences.

<sup>2</sup>See, for instance, Hundley et al. (2001), pp. 18, 25.

<sup>3</sup>See endnote 17 in Chapter Three and endnotes 29 and 30 in Chapter Six, as well as the discussions in Anderson et al. (2000) and Hundley et al. (2001).

<sup>4</sup>Anderson et al. (2000), p. 57. (See also Hundley et al., 2001, pp. xi, 19–20, 90.)

<sup>5</sup>This was the original purpose of the ARPANET, the predecessor to the Internet.

<sup>6</sup>Anderson et al. (2000), p. 57. For more discussion of the inevitability of intended consequences from reciprocal influences of social and technological factors, see Bikson and Everland (1998).

<sup>7</sup>Hundley et al. (2000), pp. 7–8; Anderson et al. (2000), p. 64; Hundley et al. (2001), p. 43; Treverton and Mizell (2001), p. 44. See also Fukuyama (1995); Anderson et al. (1995); and Bikson and Panis (1999).

<sup>8</sup>Hundley et al. (2000), p. 59; Hundley et al. (2001), p. 43.

<sup>9</sup>Hundley et al. (2000), p. 69; Hundley et al. (2001), pp. x, 5, 22.

<sup>10</sup>Hundley et al. (2000), pp. xii, 37–38; Treverton and Mizell (2001), pp. 44–45.

<sup>11</sup>Hundley et al. (2000), p. 9; Anderson et al. (2000), pp. 59–60. Levels of educational attainment are implicated, along with income levels, in the digital divides discussed above.

<sup>12</sup>Treverton and Mizell (2001), pp. xi, xvii–xix, 39–40; Hundley et al. (2001), pp. xv, 5. See also Enriquez (2001).

<sup>13</sup>Hundley et al. (2000), pp. 51–53, 71–72, 82–86; Treverton and Mizell (2001), pp. 40, 45–46. It should be noted, however, that improved conditions in the home country (e.g., economic growth, stable governance) would likely reduce the “brain drain” and might even induce a reverse diaspora, providing these regions with a wealth of human resources that could put them on a fast track to the information society. There is evidence of such trends in parts of India.

<sup>14</sup>Hundley et al. (2001), p. 68.

<sup>15</sup>A recent RAND report notes that both private- and public-sector organizations in the United States expect an even greater shortage of highly skilled entry-level IT professionals with degrees in science, mathematics, engineering, and technology if it becomes harder to employ foreign nationals (e.g., because of homeland security concerns). At present, a substantial proportion of U.S. academic degrees in these fields are earned by noncitizens (see Bikson et al., 2003).

<sup>16</sup>Hundley et al. (2001), pp. 5, 43.

<sup>17</sup>Anderson et al. (2000), pp. 63–64; Hundley et al., 2001, pp. 67–68. Some conference participants noted that virtual mobility permits employees to engage in rewarding knowledge work without the linguistic, familial, and cultural disruption that physical migration often entails. At the same time, it allows the employing country to avoid some of the strains associated with hosting immigrant populations.

<sup>18</sup>Anderson et al. (2000), pp. 68–70; Hundley et al. (2001), pp. 43, 89.

<sup>19</sup>See Bikson et al. (2003).

<sup>20</sup>See Hundley et al. (2000).

<sup>21</sup>Hundley et al. (2000), pp. 18–19, 35–37.

<sup>22</sup>Hundley et al. (2000), pp. xiii, 20–21, 36–39, 96; Hundley et al. (2001), pp. xvi, 96.

<sup>23</sup>As one participant in RAND's November 1999 information revolution conference remarked, "national-level laws do not make sense" in a global network. (See Hundley et al., 2000.)

<sup>24</sup>Hundley et al. (2000), pp. 67, 97; Hundley et al. (2001), pp. 22, 33.

<sup>25</sup>Anderson et al. (2000); Hundley et al. (2001), pp. 60–61, 86–87.

<sup>26</sup>Hundley et al. (2000), pp. 66, 98; Anderson et al. (2000), pp. 61–64; Hundley et al. (2001), pp. 20, 72. See also Bikson (2002).

<sup>27</sup>Hundley et al. (2000), p. 66; Hundley et al. (2001), p. 72.

<sup>28</sup>Hundley et al. (2001), pp. 32, 38.

<sup>29</sup>Hundley et al. (2001), pp. 29–33, 38–39, 69.

<sup>30</sup>Hundley et al. (2001), pp. 68–69, 90.