Chapter 3

Information and Communication Technology for Human Development

An Intercultural Perspective

The past century has seen a veritable explosion of Western-style science, technology and engineering, spawning a number of crossdisciplinary and overlapping *technosciences*, such as cybernetics, computing technology, microprocessing and nanotechnology, robotics, artificial intelligence (AI) technology, biotechnology, genetic engineering, molecular electronics, bioinformatics, and so forth. These technosciences, collectively also referred to as *information and communication technology* (ICT), are said to engender a revolution in human history, inaugurating the so-called Information Age, which will in turn give rise to an "information" or "knowledge" society. In this chapter, I shall explore the validity of these claims, will examine some of the intercultural consequences for introducing current ICT worldwide, and shall stress the necessity of creating different forms of ICT, oriented toward global intelligence. I shall also highlight the important role that the humanities can play in assessing and in helping develop such ICT forms.

1. The Information or Knowledge Society: A New Global Paradigm?

The case that a number of scholars (Bell 1976; Weiser 1991; Castells 1996; Archibugi and Michie 1997; Moravec 2000; Kurzweil 1999) have been making for the emergence of a radically new, postmodern, "network" society, based on information or knowledge and ushered in by the new information and communication technologies (ICTs), appears, at first sight, to be compelling. But it is compelling mostly to those who assume that technology is the determining factor in the development of a certain society, driving its economy and,

Notes for this section begin on page 00.

through the latter, all other social and cultural arrangements. Let us test this assumption against the broader, cultural historical background of the new ICTs and then explore their most likely impact on the future of human development, including the emergence of a global "information" or "knowledge" society. Then we might be in a position to decide whether we are indeed moving toward a genuinely new global paradigm or are simply extending the currently dominant one.

Some scholars (Castells 1996; Dertouzos 1997; Naughton 1999, among many others) note that the new information and communication technologies are not all that new after all, being extensions of such modern communication media as the telegraph, telephone, radio, and television, or of even older ones, such as writing and printing. Most of the activities related to processing information, such as data collection, analysis, organization, transmission, and utilization have been around ever since the advent of humans on this planet. But, the same scholars point out that what is now different is the speed, accuracy, range, and reliability of processing and utilizing information, which have increased exponentially in the past few decades and seem to continue to increase at a faster and faster pace.

In contradistinction to older forms, the new ICTs enable a large number of individuals and organizations throughout the world to send and exchange a huge volume and wide variety of messages, transactions, and services almost instantaneously, at an ever-lower cost. This development is made possible by the mass production and utilization of computers. The so-called "Information Age," therefore, is computer-based, resting on "five pillars" (Dertouzos 1997): 1) All information is represented by numbers; 2) These numbers are sequences of 1s and 0s that are basic information units, called bits; 3) Computers translate information into bit sequences by arithmetic; 4) Communications systems move information around in this numerical or "digital" form; 5) Computers and communications systems combine to form computer networks. In turn, computer networks will eventually create a global information infrastructure (still in its very early building stages), which will then constitute the basis for a global Information Market Place. (Dertouzos 1997: 54)

The rapid development of computer-based technologies is most dramatically highlighted by Moore's law, so called after Gordon Moore, the founder of Intel, who predicted more than a decade ago that the capabilities of computer microprocessors would double every two years or so. His prediction seems still to be holding, although some experts expect this fast pace to level off by the end of 2010. (Dertouzos 1997) But quantum mechanical computing, for example, should it indeed become technological reality, promises to bring even more prodigious gains in computation speeds and memory capabilities than digital computing. It will certainly open the avenue for the creation of new generations of software, including the self-organizing or autopoietic kind, based on DNA and human-emulated thought processes.

To quantum computing, one may add molecular electronics and other nanotechnologies; adaptive or reconfigurable computing, based on chips with flexible circuitry; as well as optical computers, using light pulses instead of electrical impulses, and thus approaching the speed of light. All such multiprocessor, parallel computers and neural net computers would allow simultaneous rather than sequential processing, speech and voice recognition, multilanguage translation, AI autonomous operations, and so on. By 2030 we might be able to mass-produce computers that would be a million times as powerful as the current PCs. So Moore's law might well remain in force, or even be exceeded, by the middle of the twenty-first century and beyond. (Miller et al. 1998)

Network technology looks equally promising, with ever-faster fiber optical systems and ever- wider coverage for satellite-mediated mobile communications. Personal networks (PNs) should soon become available for home installation at an affordable cost. Communication services as a whole are supposed to reach almost zero cost by the third decade of this century. One can also expect considerable progress in human-computer interfaces, involving human voice and gesture recognition and leading to instantaneous, real-time, translation. All text-based data sources, as well as audio and video data will become digital and most likely open to universal searches. At the same time, experts believe that most technical issues related to computer security, privacy and operational compatibility should be resolved by the end of the first quarter of this century. (Miller et al. 1998)

Of course, most of these predictions need to be taken with a grain of salt, as they come largely from computer and other ICT development "experts," who have a vested interest in the industry. To offer just one example, an article in *Business Week* (8 March, 1982), entitled "Artificial Intelligence. The Second Computer Age Begins," cites Nils J. Nilsson, at that time director of the Artificial Intelligence Center at SRI, to the effect that AI will soon "change civilization in a profound way." Thinking computers will "change the way we work, the way we learn, and even the way we think about ourselves." In turn, the author of the article estimates that by 2000, they "will be radically altering society." Twenty years later, this prophecy has yet to be fulfilled, with most experts now estimating that the mass commercialization of AI technology will not happen before the middle of the 21st century. By that point, barring any unforeseen global cataclysm, they also expect that ICT will have penetrated every aspect of human activity, with most parts of the world being fully wired, networked, and interactive. What is certain, however, is that we are nowhere near this goal at the time of this writing, in 2003.

Understandably, the prospects of such prodigious technological developments and their likely impact on our economical, political, cultural, and social arrangements as well as on our daily lives are perceived by various scholars, experts, and practitioners with various degrees of optimism or pessimism.

Optimistic attitudes range from guarded, all the way to euphoric. The euphoric analysts are mostly advocates of a neoliberal brand of global economies. They are also the most enthusiastic promoters of the concept of information- or knowledge-based societies, extolling the potentially "limitless" technological growth in terms of the old ideology of private entrepreneurship, capitalist competition, economic laissez-faire, and boundless economic development. They regard ICTs as the principal "instruments of knowledge" that have revolutionized our ways of doing business in both financial markets and the production and exchange of services and goods.

Many optimistic analysts point out that, like never before, technological advances are directly and rapidly linked not only to scientific research, but also to the economy. (Archibugi and Michie 1997) In the United States, for example, the 1980 Bayh-Dole Act (1980) has allowed the patenting of inventions resulting from federally-funded research projects in not-for-profit institutions such as the research university. It has thus significantly contributed to creating close research partnerships between universities and private industry, particularly in the domains of software, biotechnology, pharmaceuticals, and medical devices, spawning many of the crossdisciplinary technosciences that I have mentioned above. In fact, it is the health services industry, as well as the related agro-alimentary sector, that the ICTs are expected to revolutionize most, thereby leading the entire economy to new heights of growth, due to spectacular scientific advances in molecular electronics, genetic engineering, and bioinformatics.

Optimists also point out that there is an unprecedented speed at which information or "knowledge" that has commercial value is being created and accumulated. Thus, there is a rapid rise of so-called "intangible" capital (investment in the production and dissemination of knowledge, as well as in human resources, or so-called "human capital") over tangible capital, such as operating equipment, physical infrastructure, natural resources, etc. There is a great proliferation of new jobs in such booming sectors of the economy as pharmaceuticals and scientific instrumentation, information and communication technologies, aeronautics, new materials, and so on. (Foray and Lundvall 1996) There is also an increased emphasis on innovation, not only as research and development, but also as organizational learning and experimentation, development of ICT systems with a view to regenerating older fields of activity, better coordination between systems and subsystems of production and marketing, and so forth. Computer-assisted design (CAD), computer assisted manufacturing (CAM), and computer integrated manufacturing (CIM) have been introduced on a large scale in various industries, allegedly raising productivity and cutting costs, and thus making these industries highly competitive on the world markets. (Mansfield 1995)

But what most analysts—optimists and pessimists alike—agree on is that the ICTs have brought about and enabled a shift from a market economy to a

network economy, with cyberspace gradually replacing geographical space as the locus of commercial transactions. (Rifkin 1995) The traditional market is a physical encounter, in geographical space, between a seller and a buyer who negotiate the exchange of goods or services. The seller makes a profit based on the percentage obtained on the transaction, multiplied by the volume of exchange. The network economy, on the other hand, functions primarily in terms of an exchange between provider and consumer, rather than between seller and buyer. This exchange increasingly takes place in cyberspace, rather than in a physical location, with provider and consumer hardly ever meeting face to face.

In a network economy, private ownership does not disappear, but it is less and less exchanged, remaining increasingly in the hands of the producer. Thus, the production and exchange of goods and services becomes as it were "marginalized." Just as in classical capitalism agricultural production moved to the margins of an industrial economy even as it was incorporated by it, in network capitalism industrial production is gradually moving to the margins of a services economy. What the provider sells to the consumer are segments of temporary access to the commercial network, in the form of a subscription, leasing, or user's licence. A common example is automobile leasing versus buying, which is increasingly becoming the norm. As a result, industrial giants such as General Motors are no longer driving the economy.

Whereas General Motors remains the biggest and most powerful company in the world in terms of tangible capital, it is no longer the one that makes the biggest profits, nor is it ranked among the top forty companies on the New York Stock Exchange. Instead, a company such as Nike, which has no tangible capital and farms out the production of its footwear to Asian subcontractors, has become the commercial paragon. What Nike sells is its brand or its name, that is, a concept. Customers pay for the "privilege" of becoming part of the Nike legend. It is this legend that is Nike's most valuable, "intangible" or "intellectual" capital. In a network economy, therefore, advertising, marketing, and selling through the Internet and the other New Media have become indispensable commercial tools.

One positive outcome of the network economy, at least according to optimistic analysts, is the phasing out of Fordism and Taylorism as models of mass production and the gradual introduction of so-called Toyotism, where customers or "users" have more and more of a say in the designing and marketing of certain mass-produced goods. Interaction between producers and consumers is supposed to stimulate creativity and innovation at all economic levels and to contribute to the development of a new, more "democratic" economy, based on the principles of rapidly generated and widely distributed material wealth, as well as increased equity, transparency, and freedom of choice. (Foray and Lundvall 1996; Foray 2000)

According to optimistic forecasts, moreover, advanced energy and materials technology will soon allow humanity to embark upon global projects that

have so far been the province of science fiction. Among these emerging technologies, one may list lightwave technologies (fiber optics, optical scanners, lasers, and so on); solar technologies (passive solar heating and cooling, Trombe walls, ocean thermal, tidal and wave power, hydroponics, photovoltaics, space-based solar collectors, photochemical and bioenergy conversion); imaging technologies (TV images, liquid crystal screens, magnetic imaging diagnostics); biotechnologies (gene splicing, molecular engineering, immunology, tissue culture, cloning, plant hybridization and redesigning, bioremediation); and nanotechnologies, such as gene machines, assembling and/or repairing molecules. They are creating the possibility of economically beneficial, regional and global projects beyond our wildest dreams, such as iceberg-towing for arid zone irrigation, ocean mining, waste disposal into the earth's mantle, earthquake prevention, weather modification, fail-safe nuclear power plants, automated farming and animal husbandry, integrated water supply systems on a continental scale, robotic assists for people, nanoscale products and systems, planning for terraforming, and so forth. (Miller et al. 1998) Finally, they may soon enable contemporary geneticists, medical scientists, and brain technologists to decode and duplicate the processes of life itself, thereby helping humans live a longer, healthier, and physically more satisfying existence, if not changing the very definition of life on earth. Indeed, robotics scientists and other futurists estimate that humanity's agelong dream of immortality will soon be realized through a fusion of robot and human, resulting in near-immortal mutants. (Drexler 1985; Stock 1993; Kurzweil 1999)

In the social and political domains, some analysts see equally tremendous benefits from the ICTs, creating the possibility of more democratic, transparent, and equitable social arrangements on a national, regional, and global scale. The personal computer and the Internet have created a global communication medium through which each participant becomes a node in an easily accessible and readily affordable informational network. Thus, the Internet can facilitate not only commercial transactions, but also political and social action. (Castells 1996) National and international governments as well as political parties and individual politicians are fully aware of this enormous potential of interfacing with their constituents and are in the process of creating a wide array of electronic public services, from health, food, medicine, and other consumer information, to educational drives, to grant and subsidy programs, to national emergency hotlines, to political propaganda, electoral campaigns, and online voting, among many others. These services are known in Internet parlance as e-government, just as one now speaks of e-commerce, e-travel, e-learning, e-health, e-religion, and so forth.

In turn, nongovernmental and civil society organizations (NGOs and CSOs) have set up their own Web sites, offering a large number of alternative public services, from consumer information and education, to ecology and health watches, to monitoring corporate and governmental accountability, to

political action groups, to religious teaching and/or proselytizing, and so on. In addition to political action groups, private citizens have joined other online, common interest groups. These largely informal groups can be of a professional nature, based on specific fields of research, such as medicine, education, natural science, or based on crossdisciplinary topics. Recent examples of such informal professional groups are the so-called "bloggers" in North American academia. Blogging or Web logging has become fashionable among scholars from various disciplines who share an interest in a specific crossdisciplinary topic and contribute informal comments to it by logging on to a colleague's personal Web site or chatroom. Most recently, it has also been used effectively in the political process, for example in Howard Dean's campaign for the 2004 presidential election.

Online discussion groups, or "virtual newsrooms," or "bulletin boards" can also be recreational, based on hobbies such as chess, golf, baseball, soccer, car racing, horseback riding, mountain climbing, art and coin or stamp collecting, fishing, and so on. Forming "virtual" artistic ensembles whose members will come together in order to perform instrumental and vocal music, dancing, and drama in real time, for their own pleasure and for that of their families and friends, is an interactive electronic feature that should also become available through the Internet in the near future. Such common interest groups amount to "virtual communities" (Rheingold 1993) or "wired neighborhoods" (Doheny-Farina 1996), or "virtual neighborhoods" (Dertouzos 1997), which link together thousands of people, even if they live hundreds or thousands of miles apart, in different physical neighborhoods, countries, or cultures. They could obviously log in from anywhere in the world, thus transcending ethnic, racial, physical, intellectual, and other differences. The Internet has equally given a boost to interpersonal relationships across ethnic, racial, and religious lines, resulting in virtual and physical friendships, romantic involvements, and even long-term commitments, such as marriage. The Internet has thus created what one may call an "e-culture" of global dimensions that is enormously diverse and may lead one day, at least according to some optimistic analysts, to a common global society.

The new electronic media are equally seen as an important engine of sociocultural development. They are said to produce, together with mass migration, "a joint effect on the work of the imagination that has now become a collective, social fact and, therefore, the basis for unprecedented, if uneven, social changes throughout the world." (Appadurai 1996: 5) The global media and mass consumption are supposed to stimulate people into social action. Through the New Media, various transnational networks that have arisen as a result of globalization, such as the activist civil movements involved with the environment, women's issues, and human rights, are generating an important "virtual space" of transnational discourse and can be regarded as "the crucibles of a postnational political order." (Appadurai 1996: 23)

Other analysts stress the revolutionary, epistemological, and ontological impact of the new ICT. By employing computer-based technologies of information and communication, our ways of acquiring, transmitting, and using knowledge are said to undergo sweeping changes: cognitive paradigms appear to be shifting from linear, binary forms that promote disciplinary and compartmentalized modes of knowledge, to nonlinear, holistic forms that promote transdisciplinary, integrative modes. Because of the open-ended, networked nature of computer-based ICT and the Internet, the information or knowledge that flows through them is intended, at least in principle, to be accessible to and shared by all.

On the ontological level, the PC and the Internet are said to create a cybernetic space that is paradoxically devoid of spatial and temporal dimensions, because it instantaneously relays communications between users located at opposite corners of the earth, erasing the difference between here and there, then and now. Within cybernetic space, physical obstacles and temporal distances seem to disappear as if by magic. Analysts also speak of cybernetic space as "virtual space" or even "virtual space-time" where new realities can emerge, independent of the individual users' intentions or actions. Indeed, one science writer sees the Internet as a globally networked, electronic, sentient form of life that is beyond anyone's control, evolving in mysterious and unpredictable ways. (Dyson 1997) Some philosophers are working out what they call a "digital ontology" (Eldred 2001; Capurro 2002; 2003), seeing ICT as generating new forms of reality and/or alternative worlds.

Additionally, the interface between humans and computers is reaching ever-higher levels of sophistication, with microprocessors fast becoming not only exterior but also inside extensions or prostheses of human beings. Consequently, it is claimed that the new technologies will create a new type of sentient being or the "metaman" (Stock 1993), a combination of human, computer, and other high-tech ware that will vastly exceed the physical and mental capabilities of *Homo sapiens*. The cyborgs and the bionic men and women of science fiction seem to be on the brink of becoming an all too immediate (and, to some, threatening) reality.

While most optimists see the socioeconomic changes brought about by the new ICT as extensions of the same capitalist modes of production and social organization (whether in the old guise of a so-called "free market" or in the new guise of a network economy) that seem to have triumphed on a global scale after the fall of communism, some bold analysts attempt to go even farther. Thus Bard and Soderqvist (2002) speak of a postcapitalist, "netocratic age," in which the Internet will replace current social, economic, and cultural values with "attentionalism," a new mode of production and societal relations, if not a new mode of being in the world. The most important asset in this networked society will be not capital, or the private acquisition and accumulation of material wealth, but the ability to acquire exclusive information that com-

mands attention in the select circles of decision-makers and power brokers. Class differences will not disappear, but they will no longer be the traditional ones, such as the aristocracy, the bourgeoisie, and the working class or the proletariat. The question will be not who is in charge of production, but who is in charge of consumption. The new elite will be a "netocracy," displaying social intelligence, flexibility, and receptivity and, above all, an ability to network and to acquire and process valuable information. The underclass will be not the proletariat, but the "consumptariat," who lives only to consume, at the bidding of the netocrats.

According to Bard and Soderqvist, one consequence of an attentionalist society will be that traditional learning, education, and diplomas will be useless in attaining the status of a netocrat, because what you learn today will have become obsolete tomorrow. Far more important will be one's ability to chase after what will next command the attention of those who matter and to keep learning as one goes along. The idea of traditional employment will in turn become outdated, with companies becoming more and more "virtual," that is, mere instruments for gathering a certain expertise at a certain time around a certain project—an ever-shifting commercial partnership, based on pure opportunism, rather than on human solidarity or affinity.

Another consequence of attentionalism will be the "death of democracy." Bard and Soderqvist argue that this trend is already present in today's so-called "Western democracies," where people can't be bothered to vote any more, because they realize that voting has become a futile and hypocritical exercise. They sense that power is becoming increasingly diffuse, shifting away from traditional government to more or less opaque and elusive global networks, ruled by a continually shifting netocracy. Although *Netocracy* reads like a witty, sardonic combination of George Orwell, Evelyn Waugh, and *Empire*, the authors are apparently dead serious (or perfectly deadpan) about their arguments: they seem to share the netocratic values expounded in the book or, at least, a belief in the inevitability of the netocratic future of humankind.

But, there are also a large number of thinkers, artists, researchers, educators, and other practitioners who are deeply skeptical, or at least ambivalent, about the likely impact of the new ICT on our local and global communities, as well as on our private lives. Attitudes in this respect range from noncommittal ambivalence to fatalistic prophecies of doom to Luddite rage. Economists, usually of leftist leanings, compile long lists of adverse socio-economical effects that the introduction of the new ICT has had on the local and global economies. In addition to the devastating effects for the world economies that the technological "hype" or "bubble" of greedy financial speculators has created on the world markets, these scholars point out that some new forms of ICT are far from being universally cost-effective. Despite neoliberal arguments to the contrary, they do not necessarily give the competitive edge to many of the enterprises that adopt them, not least because they need

continual maintenance and updating, which can be very costly and can often cause "change fatigue." Anyone owning a PC is painfully aware of the fact that present-day computers and their "standard" software, to say nothing of their servers, are not as "smart," reliable, or user-friendly as their manufacturers tout them to be, and much remains to be done to make them less demanding on, and wasteful of, the user's time and energy.

ICT has also further widened the wealth gap between the so-called "developed" and "developing" economies, creating a "digital divide" between them. According to official UN statistics, with the advent of globalization, seen as being largely driven by ICT, the world's dispossessed have become even poorer, and the rich, even richer. Economists and sociologists now speak of "information-poor" and "information-rich" countries. Information-poor are those countries that do not possess the new ICTs and therefore cannot participate as equal partners in the global network economy, created and controlled by the information-rich countries. The result is that developing countries, which more often than not also turn out to be the information-poor ones, are again shortchanged in the world markets, continuing to be used by the developed countries both as a source of cheap labor and as a dumping place for obsolete technology. (Gray 1998)

Skeptical analysts further point out that the great advances that the pharmaceutical industry and other Western-style health care providers are said to accomplish with the assistance of bio- and nanotechnology are offset by serious and unprecedented global dangers. These include the appearance of new diseases caused by antibiotic-resistant bacteria with multi-drug resistant genes and by new viruses or mutants of older ones, which seem to have created their own global network, as masses of displaced migrants and of business and pleasure travelers move ceaselessly around the world. (Garrett 1994)

Furthermore, genetic clones, genetically modified foods, and other biotech products have largely unknown long-term effects on the health of humans, animals, and plants, despite scientific studies to the contrary, conducted as a rule by "experts" with vested financial interest in biotechnology. Human interference with very complex living systems, involving an infinite number of interactions and feedback loops among a large number of subsystems lead to genetic mutations and other changes that are very difficult to predict and may eventually have disastrous effects on the biosphere.[1] The potentially irreparable damage resulting from the rapid and indiscriminate introduction of biotechnology in the world economies, including the agro-alimentary and the health sector, may eventually offset and far exceed its immediate economic gains.

The most dangerous aspect of genetic engineering, nanotechnology, and robotics (GNR) is their frighteningly rapid, self-replicating power. Deadly genetic replicators can conceivably escape from a scientific laboratory's control into the biosphere or can, no less disastrously, fall into the hands of a

fanatic individual or terrorist group. As Bill Joy, cofounder and Chief Scientist of Sun Microsystems, points out, through GNRs we have now created "the possibility not just of weapons of mass destruction but of knowledge-enabled mass destruction (KMD), this destructiveness highly amplified by the power of self-replication." Joy, who is hardly an anticapitalist, radical discontent, estimates that, with the present indiscriminate commercial development of GNRs, there is "no exaggeration to say we are on the cusp of the further perfection of extreme evil, an evil whose possibility spreads well beyond that which weapons of mass destruction bequeathed to the nation-states, on to a surprising and terrible empowerment of extreme individuals."[2] Given all of these very clear and present dangers, we might do well to heed the warning contained in Goethe's poem about the sorcerer's apprentice who has enough knowledge to unleash powers that replicate themselves at a catastrophic rate, but not enough knowledge to stop them.

Skeptics also point out that we are still very far away from the global information infrastructure and the liberal Information Market Place that Michael Dertouzos pleads for. There are hopeful developments in this respect, for example, in the Open Source Movement on the Internet.[3] This movement consists of programmers (some of them at Dertouzos's home institution, MIT) who want computer software to be distributed free of charge. Independent teams of programmers publicly disclose and develop the codes behind open-source software. This allows companies who adopt such software to customize their programs and to pay only for services that will improve their performance. The open-source movement would thus like to create a so-called "gift economy" (Naughton 1999) where there is free exchange of information leading to the development of free of charge, universally compatible, software. But, despite this movement, protectionist, obstructionist, and antitrust practices remain the norm in the software industry.

For instance, Microsoft, the leading industry giant, keeps most of its source code secret. One is by now familiar with Microsoft's antitrust law violations and the fierce, often underhanded competition that it engages in with other software companies. According to a *New York Times* article (15 May, 2003), moreover, Microsoft top-level executives are constantly preoccupied with countering the open-source movement, particularly Linux, whose open-source operating systems for large data-serving computers are popular in Europe and other parts of the world. Thus Steven Balmer, CEO of Microsoft, once characterized Linux's licensing as "a cancer that attaches itself in an intellectual property sense to everything it touches."[4] Balmer's metaphor is appropriate, ironically, not for Linux's, but for his own company's aggressive, territorial, and self-destructive behaviors that create blockages in the free flow of information and will eventually lead to terminal illness, unless Microsoft mends its ways.

We are equally far away from solving security, reliability, and intellectual property issues. If the Internet has spawned e-commerce, it has also spawned

a huge wave of e-crime, perpetrated by "virtual" international crime rings, ranging from virtual bank heists to child pornography to virtual hate crime. The most serious global threat that, given the present global political climate, seems almost to have become inevitable, is cyberterrorism. In addition to getting hold of or building homemade bioweapons, terrorist hackers could fairly easily break into a country's network systems and disrupt the proper functioning of local and national governments, businesses, vital services such as electricity and drinking water, and so on.

Intellectual property issues also remain an enormous problem. International pirating and scarcity of global agreements and/or rules, as well as the absence of effective means of enforcing them are most frequently mentioned as urgent issues to be addressed. But less frequently mentioned are the primary reasons for such absence or infringements of rules: the double-standard attitudes and unfair practices of those who seek to institute and enforce intellectual property laws on a global scale. Current rules and regulations are often loaded in favor of the "information-rich" countries, which mistakenly believe that it is in their best interest to maintain and continually enhance their high-tech superiority over the "information-poor" ones.

Nor have the new ICTs been the great social equalizers and purveyors of democratic values that some analysts tout them to be. On the contrary, they have polarized our world even further. As Zygmunt Bauman, among many others, points out, ICT has created a new "elite of mobility" (if not exactly a netocracy), who seem to "possess an unprecedented freedom from physical obstacles and unheard of ability to move and act from a distance." (Bauman 1998: 18) But they have also created a new class of dispossessed, the immobile class, who are no longer at home even in the single locality they inhabit and see the socioeconomic ground shifting from under their feet. According to Bauman, ICT has also produced a new "absentee landlord" phenomenon, whereby the mobility acquired by those with capital leads to "an unprecedented disconnection of power from obligations: duties towards employees, but also towards the younger and weaker, towards yet unborn generations and towards the self-reproduction of the living conditions of all; in short, freedom from the duty to contribute to daily life and the perpetuation of the community." (Bauman 1998: 9)

Although democratic values may in principle be diffused through the Internet, the current uses of ICT point in the opposite direction. In a post-September 11, global political climate, certain Western governments increasingly use the new information technologies to curtail, rather than to expand civil liberties. Under the guise of patriotism and homeland security exigencies, national governments adopt "extraordinary" measures that infringe upon the individual's rights to privacy, freedom of speech, religious belief, and so forth. Most recent North American examples are the proposed Total Information Awareness Plan (TIAP), currently modified as Terrorist Information Aware-

ness Plan, and LifeLog. These two related projects are part of the "cognitive computing" research of the Defense Advanced Research Projects Agency (DARPA), which has contributed to the creation of the Internet itself (originally conceived as a nuclear-safe, military communications system) and of other defense projects such as the stealth bomber.

TIAP proposes to combine all commercial credit data and individual bank and academic records with F.B.I. and C.I.A. files. In turn, LifeLog involves the development of a personal digital super-assistant called PAL (the "perceptive assistant that learns") for which the user will collect, "store, retrieve and understand data about his or her past experiences." Users will supposedly "determine the types of data to collect and when to collect it." The data can include everything the user can see, smell, taste, touch and hear on a daily basis. Although users are, allegedly, "in complete control of their own data-collection efforts, decide when to turn the sensors on or off and decide who will share the data," the description of the LifeLog project says nothing about the persons that may be the targets of this super data-collection effort.[5]

One can plainly see the nefarious uses that such devices can be put to by criminal organizations or by an overzealous (or ideologically motivated), information-gathering, governmental agency. One can also easily imagine how PAL could lead to a nightmarish, paranoid world in which people would sneak around and snoop on each other, recording and sharing information of the most private and sensitive sort with their government, financial company, or the highest bidder. Even without PAL, advertisements for electronic snooping and anti-snooping devices are pouring daily through the Internet—a sign that such devices must already be doing a booming business.

Along similar lines, if with slightly less ominous implications, the new ICT has facilitated the development of new techniques of public space control, appropriate for a global age. Bauman (1998), for example, points out that classical capitalism controlled public space on the disciplinary model of the Panopticon—Jeremy Bentham's prison project (analyzed in detail by Michel Foucault among others), constructed in such a way that the prisoner (or the factory worker) felt he was always being watched. Today, at least for the time being and despite the DARPA projects just mentioned, the Internet is far from being a Superpanopticon or a perfected instrument of discipline and control, as some Marxist critics claim. This does not mean, however, that it cannot act as a much more subtle and insidious instrument of selection, separation, and exclusion, especially of those who are "information-poor" and lack advanced technological know-how. The Internet thus "keeps the globals in the sieve and washes out the locals. Certain people it admits to the exterritorial cyberspace, making them feel at home wherever they go and welcome wherever they arrive; certain others it deprives of passports and transit visas and stops from roaming the places reserved for the residents of cyberspace." (Bauman 1998: 51)

On the other hand, the New Media in general do have a voyeuristic dimension that they share with the Panopticon. For that reason, Thomas Mathiesen (1990; 2001) sees the multinational television networks as forming a global Synopticon. In the Panopticon model, the few (jailers, factory owners, etc.) watched the many. In the Synopticon model of today, the many watch the few, or the locals watch the globals, that is, billions of telespectators watch and aspire toward the lifestyles of celebrities from the world of politics, finance, sports, science, show business, and information. One might add that, through the Synopticon of the New Media, the few (who in this context may appropriately be called netocrats) also send direct, indirect, or subliminal messages to the many, telling them what to eat, wear, or buy, how and where to spend their moments of leisure, and generally what to think, feel, and do about their lives and the lives of others.

Although the New Media can in principle communicate diverse sets of values and to some extent they actually do, at present they nevertheless remain largely focused on promoting mass consumption and other staples of the network economy and popular culture. The so-called "mainstream" media seem to be the worst offenders in this respect. Our giant transnational television networks, film industries, and newspapers, based both in the United States and in other parts of the world, communicate and support mostly Western-style commercial values, trite democratic and religious pieties, as well as crime, sex, and senseless violence, in their profit-driven, "blockbuster" movies, mud-raking investigative journalism, "soft" news and entertainment programs, and so on.

Nor have the new ICTs brought us any closer to a global society, with a coherent set of values conducive to global intelligence. The e-culture created by ICT is not only diverse, but also highly heterogeneous and fragmented. Judging from the statistics that monitor the volume and types of activities flowing through the Internet, the current global e-culture is predominantly a utilitarian one, geared toward commerce, politics, religion, and entertainment. For example, until recently, by far the largest number of daily "hits" or Web site visits were paid to the global sites dedicated to so-called "adult" entertainment. It might appear encouraging that, of late, education and learning sites are beginning to exceed in popularity the "adult" ones. But statistics say little about the quality and content of the education offered through the Internet. A large number of learning organizations seem, in any case, to be geared toward training individuals in practical or applied fields, such as commerce or the ICT itself, so that they largely disseminate and perpetuate the utilitarian values of Western-style, global capitalism.

Indeed, by "knowledge" and "information" in the ICT context, most analysts mean utilitarian or instrumental knowledge, that is, information and/or know-how deemed to possess significant commercial value. This knowledge or information becomes obsolete almost as fast as it comes into being, sharing the throwaway quality of all the other products of a consumerist society. It is

this throwaway quality that allows Bard and Soderkvist to argue that a college education or a college diploma will soon become irrelevant in the netocratic age, where today's "knowledge" or information becomes yesterday's news and where ethics turns into mere pragmatics.

Many scholars do make a distinction between knowledge and information. They usually define "knowledge" as capability for intellectual or physical action, and "information" as formatted or unformatted, inchoate data, waiting to be processed, interpreted, and put to use through knowledge. (Foray 2000) But few of them realize that this distinction is equally based on an instrumentalization of the two terms. Defining knowledge as capacity for (any) action already presupposes an asymmetrical binary opposition, in which the term "action" is privileged over nonaction, contemplation, intuition, imagination, and so forth. Translated into moral terms, this opposition could easily be pressed into utilitarian service, by pitting the "virtues" of the so-called capitalist work ethic, such as competence, efficiency, industriousness, thriftiness, punctuality, and practicality, against such "vices" as incompetence, inefficiency, laziness, wastefulness, tardiness, improvidence, and irresponsibility.

When speaking of information- or knowledge-based economies, therefore, Western analysts implicitly refer only to a Western system of commercial values and practices and, within that system, only to a small, if currently privileged, fraction of it: the subsystem of utilitarian values. Thus, neoliberal analysts often operate with a tacit distinction between (commercially) profitable or relevant knowledge/information and unprofitable or irrelevant one, typical of the utilitarian value subsystem. This economic subsystem has taken shape during the last three centuries, with the rise and successive development of industrial, market, and network capitalism, paralleling the rise and development of rationalist, reductionist, and positivist kinds of science, with which it forms a complex network of feedback loops. Far from being universal instruments of knowledge, the new ICT and the new technosciences that support it are merely expressions of this economic subsystem that wishes to impose itself not only on Western culture as a whole, but on all other cultures, as well.

By the same token, for many neoliberal and other scholars, a "knowledge" or "information" society in effect means a society that embraces Western-style, instrumental values. These values include privileging the kind of knowledge that leads to the creation and accumulation of material wealth. (Berthoud 1992; Gare 1993a and b) Calculation in all senses of the term is at the basis of this society, where quantitative values and measurements largely replace qualitative ones.[6] It is no wonder, therefore, that in the current "knowledge" society, everything must be expressed in numerical terms and must have commercial value, with a price tag attached to it. What is incalculable has no value, i.e., no potential for commercial profit, and consequently is irrelevant. It is this assumption, moreover, that allows some Western economists and sociologists to speak of "information-poor" and "information-rich" societies,

substituting information that is commercially relevant or irrelevant for all other kinds of information or knowledge.

As we have seen, the great "discovery" of the network economy is that even intellect and abstract knowledge can be quantified and assigned a market value under the concept of "intellectual property." So, in the network economy, a practitioner of the human sciences must speak of intellectual, cultural, and human "capital," "symbolic-analytic services" (Reich 2001), and otherwise show how s/he remains (commercially) relevant. Even contemporary "ecologists of commerce," such as Paul Hawken (1993) and Amory and L. Hunter Lovins (1999), must speak of "natural capitalism" and the "next industrial revolution" in order to get a hearing from the current business and political elites.

These ecologists are fully aware of the utilitarian turn in most mainstream natural science, which has now largely become the handmaiden of ICT, in the guise of technoscience. In "A Tale of Two Botanies," for example, the Lovins point out that the "new botany," based on genetic engineering, "aligns the development of plants with their economic, not evolutionary success."[7] Notwithstanding, one of their major strategies is to make a case for ecological sanity on the neoliberal economists' own ground, showing that natural resources such as clean water and clean air, as well as natural and cultural diversity, are left out of the utilitarian computation. Consequently, the Lovins, as well as most other ecologists, demand that a price be put on them as well, thus, ironically, reinforcing the utilitarian value system that they otherwise decry.

In turn, humanities scholars are beginning to use similar strategies. For instance, Mikhail Epstein (1995) has coined a new term, "techno-humanities," in order to stress the importance of literature, the arts, and cultural diversity as a whole in the network society. In turn, Kurt Spellmeyer suggests that the humanities "must become 'service providers' in a free-market climate." (Spellmeyer 2003: 20) Although these strategies are undoubtedly useful, they do not touch the core of the issue, any more than the well-meaning efforts to bridge the "digital divide," undertaken by the UN and other global organizations. We need to turn away from the current trend toward a global instrumentalization of all knowledge, instead of regarding it as a *fait accompli* and jumping onto the utilitarian bandwagon with a vengeance. At the same time, we need to explore viable alternatives to it, without discounting the positive role that future forms of ICT can play in these explorations as well.

It is this kind of alternative thinking and action that should be undertaken by such global initiatives as the upcoming World Summit on the Information Society (WSIS) to be held in Geneva (2003) and Tunis (2005). Unfortunately, the organizers of the summit seem unaware of the pitfalls inherent in their well-meaning call to bridge the "digital divide." They assume that the information society is "an economic and social system where knowledge and information constitute the fundamental sources of well-being and progress." The

information society, the organizers continue, is "one in which highly developed ICT networks, equitable access to information, appropriate content in accessible formats and effective communication can help people to achieve their potential, promote sustainable economic and social development, and improve the quality of life of all." Finally, the information society is "one that reduces poverty and creates wealth to satisfy the basic needs and rights of all peoples. It offers great potential in promoting international peace, sustainable development, democracy, transparency, accountability and good governance."

In order to achieve these goals, the organizers propose such concrete measures as 1) developing "national e-strategies for all countries within three years, including the necessary human capacity building;" 2) the launching "of a 'Global Digital Compact' as a new pattern of partnership and interaction between governments and non-governmental stakeholders, based on division of labor and specialized responsibilities, as well as on identified specific and common interests"; 3) creating "an ICT development index and report, where the ranking of countries will be accompanied by analytical work on policies and implementation." They also suggest such benchmarks of development as: "1) All villages to be connected by 2010, with a community access point by 2015; 2) All universities to be connected by 2005 and all secondary schools by 2010 and all primary schools by 2015; 3) All hospitals to be connected by 2005 and health centers by 2010; 4) 90 per cent of the world's population to be within wireless coverage by 2010 and 100 per cent by 2015; 5) All central government departments to have a website and e-mail address by 2005 and all local government departments by 2010."[8]

Although these goals and benchmarks of ICT development may be attainable, they will certainly not lead to universal material wealth, democracy, transparency, accountability, and good governance, any more than the telephone, radio, television, or writing and printing did, before the advent of the new technologies and the network society. The likelihood is, on the contrary, that many of the current uses of ICT will further aggravate world problems, including poverty, insecurity, and violence. The worldwide campaign to reduce the "digital divide" will probably have the unintended consequence of even further disseminating a utilitarian, reductive, economic and scientific mentality over the entire globe. So, in speaking of an "information" or "knowledge" society, the first questions to be asked by the WSIS ought to be: what kind of information and what kind of knowledge? Whom does it serve and to what purpose? What are the sociocultural and ecological perils of introducing certain ICTs and what precautions should collectively be taken before introducing them? Can we develop alternative ICTs, more friendly to people and to the environment than what is commonly offered on the market today?

On the other hand, it would be counterproductive, if not completely useless, to advocate resistance against all forms of ICT development, as some radical antiglobalization and fundamentalist movements do; or, even worse, to

advocate the kind of extreme, violent or terrorist actions that are occasionally practiced by the very scientists who are thoroughly familiar with the computing world. Such a Luddite position is mentioned, for example, by Ray Kurzweiler in his book on *The Age of Spiritual Machines* (1999), which otherwise is a euphoric endorsement of a new, computer-based social utopia, brought about by the fusion of humans and robots. It would be instructive to look at the Luddite frame of mind in some detail, as it could bring us closer to the core issues that need to be resolved, if humanity is to develop further.

The high-tech Luddite position starts from the assumption, which it shares with mainstream, utilitarian, and reductive technoscience in general, that computer scientists can indeed develop super-intelligent machines that will easily outperform humans. If that is the case, then humans will be faced with two choices: 1) to allow machines to make their own decisions without human supervision; or 2) to retain human control over decision-making. In the first scenario, a point will eventually be reached "at which the decisions necessary to keep the system running will be so complex that human beings will be incapable of making them intelligently. At that stage the machines will be in effective control. People won't be able to just turn the machines off, because they will be so dependent on them that turning them off would amount to suicide."

In the second scenario, on the other hand, human control "over large systems of machines will be in the hands of a tiny elite—just as it is today," but with an important difference: the new technologies will effectively enable the elite to have the power of life or death over the masses. If the elite is ruthless, it may "simply decide to exterminate the mass of humanity," which will have become useless and too costly to maintain. Or, if the elite "consists of softhearted liberals, they may decide to play the role of good shepherds to the rest of the human race. They will see to it that everyone's physical needs are satisfied, that all children are raised under psychologically hygienic conditions, that everyone has a wholesome hobby to keep him busy, and that anyone who becomes dissatisfied undergoes 'treatment' to cure his 'problem'. Of course life will be so purposeless that people will have to be biologically or psychologically engineered either to remove their need for the power process or make them 'sublimate' their drive for power into some harmless hobby. These engineered human beings may be happy in such a society, but they will most certainly not be free. They will have been reduced to the status of domestic animals." (Kaczynski 1995)

The citations in the preceding two paragraphs come from the "Unabomber Manifesto," by Theodor Kaczynski, a frustrated mathematician turned Luddite-terrorist and convicted as a serial murderer. It would be easy to dismiss Kaczynski as a twisted version of the mad scientist who, having failed in his bid to rule the world, turns against his own machines and technocratic establishment. Yet, the disturbing fact remains that his reasoning and basic premises are very similar to those of the brilliant computer scientists he attempted to

stop by sending them booby-trapped packages through the US mail. Kaczynski and many of his colleagues believe that, for better or for worse, technology is the overriding factor in the development of humanity. More to the point, they believe that technology is nothing but an instrument of power. Indeed, the current Western infatuation with high-tech is an infatuation with (unlimited) power, whether it manifests itself in fantasies of immortality or of world conquest. This infatuation is most obvious (and most dangerous) in the "stealth" aircraft, "smart" bombs, self-guided missiles, and other deadly toys of the high-tech Western military establishment of today. But it is equally obvious, and perhaps no less dangerous, in their "virtual" counterparts, the electronic war games that permeate our popular culture, from Hollywood movies to children's cartoons to video game parlors.

For Kaczynski, as for many members of Western intellectual and other elites, life is "purposeless" if the "need for the power process" or the "drive for power" is "sublimated" or neutralized. For him, all values, including freedom, are grounded in the power principle. Utilitarian values themselves are subordinated to this principle: one judges what is useful or useless, relevant or irrelevant, exclusively in terms of what may enhance or may impede one's "drive for power."

Of course, power itself transcends any utilitarian value system, even as it grounds it. As George Orwell showed in *1984*, power is exercised purely for the sake of power. Kaczynski engages in terrorist actions not because he wants to rid the world of ICT. He knows very well that by detonating a few bombs he cannot arrest our triumphant march toward the technological brave new world we have set out to build. He does it simply for the sake of enhancing his own power drive. Better to exercise destructive power, than no power at all. Kaczynski cannot even imagine alternatives to the power principle and therefore obeys its logic to the bitter end.

If machines are our extensions, they will simply replicate and enhance our will to power or any other principle around which we choose to organize our lives. By the same token, fear of machines is fear of ourselves, of the kind of unspeakable monsters that our power-enthralled imaginations might awaken and drag to the surface. Unless we turn away from our mentality of power, and transvaluate all of our values in the process, including the utilitarian ones, our culture will continue to spawn and release into the world a plethora of "monsters" like Kaczynski, together with countless other dangerous self-replicators. Therefore, instead of further enhancing a power-oriented high-tech mentality by "bridging the digital divide," the World Summit on the Information Society should first debate and agree upon the kind of intercultural values that our ICT should promote throughout the world, as well as the kind of technologies that could subsequently be developed, in order to best support such values.

Finally, one may wish to question what by now has become accepted dogma in neoliberal and other Western intellectual circles: that the new ICTs have brought about a historical rupture, ushering in a new global paradigm.

Although shifts in modes of production/distribution and supporting technologies can certainly make a substantial difference in people's daily existence, they do not amount to paradigmatic shifts. Such shifts come from human mentality, involving radical changes in human modes of thinking, behavior, and interaction. For the time being, we do not seem any closer to such a paradigmatic shift than we were two thousand years ago, and remain within the same mentality of power that has produced our past and current modes of production and ways of relating to each other.

For example, a network economy might be a new type of economy, replacing former economic systems such as agrarianism, mercantilism, and industrial and free-market capitalism, but it certainly does not transcend the asymmetrical human relations embodied in the previous capitalist modes of production and distribution, nor does it supersede the power-oriented system of values and beliefs on which all of these economies have been based. Nor does a netocratic society or the New Empire (Hardt and Negri 2000) supersede capitalist societies: it simply reorganizes the class system and redistributes power according to differential principles other than material wealth or tangible capital. Information or knowledge might be the new, "intangible" capital of choice, but the restrictive, privative, and power-enhancing modes and ends of its use remain the same.

By the same token, a certain mentality or mindset creates a certain technology, which in turn promotes and amplifies this mentality, but cannot radically transform it. So, radical breaks do not come from changes in technology, but from changes in mentality, which will then generate other technologies, in keeping with its main values and goals. In this sense, the New Media and their electronic narratives, which Appadurai and many other analysts regard as triggering radical, worldwide changes, do no more than preaching to the choir, as it were. The local collective imagination has its own inner resources to renew itself and may use certain aspects of the electronic media to do so. The electronic media do not "cause" the change, but are themselves an effect of this change, at the same time that they may help speed it along. In other words, mentality and technology interact through constructive (or destructive) feedback loops, according to the nonlinear principle of mutual causality or causal reciprocity.

In conclusion, I hope it has by now become clear that my own position toward the new technologies and their likely socioeconomic and cultural impact on our world communities remains, overall, a skeptical one, at least in terms of the mentality that has so far created and driven them. In this respect, I very much doubt that the ICT wave we are currently riding is headed toward a radical paradigmatic shift in human history. Such claims of revolutionary change are typical of Western modernity, with its ideology of continuous growth and progress, and its other linear notions of time, space, and human or natural history.

On the other hand, there is always the exciting possibility that this technological wave might be redirected toward global intelligence and a genuine shift in human mentalities. But, such a reorientation would involve a sustained, unprecedented effort on the part of all of our world communities. It would also involve much preliminary and preparatory work on the part of all of us, consisting primarily of developing worldwide intercultural learning environments, oriented toward global intelligence.

2. Intercultural Learning and ICT Development

From the preceding remarks, it should be obvious, then, that speaking of a "knowledge" society obscures rather than clarifies the most important issues that humanity is confronted with and should be working on in the foreseeable future. Far from assisting us in resolving these urgent issues, the concept of a "knowledge" society appears, within a global framework, as smug, (self-) deceptive, and overreaching, perpetuating some of the exemptionalist Western attitudes that have arguably led us to our present global plight.[9] Instead of a "knowledge" society, one would be much more advised to speak of a "learning" or an "intensive learning" society. This would stress the fact that in the increasingly complex global environment in which we are now living, the notion of "developed" and "developing" countries has become obsolete. It belongs to a national, capitalist industrial subsystem of values that should be replaced with a value system that is more in line with an emergent ethics of global intelligence. From that standpoint, there is no country that is more "developed" than the rest, and all countries, geographical regions, and world cultures can bring their specific, invaluable contributions to human (self-) development.

Our most urgent task, then, would be to launch local-global, intercultural learning initiatives throughout the planet. What we need to learn or relearn in the first place is how to relate to each other and to our environment in mutually beneficial and enriching ways. There is a most urgent need to educate our world leaders and world populations in the spirit of global intelligence. This task can certainly be greatly facilitated by developing and using new ICT in the same spirit. It could also be greatly facilitated by a thorough exploration and understanding of the systems of values and beliefs that have produced the current socioeconomic, political, and cultural institutions in various parts of the world, the ways in which these systems and subsystems have been interacting with each other throughout human history, and the best ways in which we can negotiate and resolve apparent and real conflicts among them, or consolidate and amplify their mutually beneficial feedback loops.

The humanities could play a major role in this global learning process, at the same time that they need, in turn, to reorganize themselves within larger, intercultural frameworks and reorient themselves toward global intelligence,

as discussed in previous chapters. In the remaining section of the present chapter, I shall briefly look at some of the ways in which the humanities could be of great help in a worldwide educational drive, by spearheading reform of some of the technology-assisted educational programs currently in use and by helping develop alternative learning programs, including electronic ones, based on the principles of global intelligence.

One may begin by reintroducing and reflecting on the traditional distinction between education and training, as well as that between knowledge and wisdom. Education is the process by which certain systems and subsystems of values and beliefs are passed down from generation to generation, whereas training is the process of transmitting various professional skills or know-how. As I argue at some length in Part III of *Global Intelligence and Human Development*, most of our large research universities in North America have effectively given up their traditional educational goals and have become primarily places of training. Even worse, they have largely adopted the utilitarian equation of training with education. Of course, the distinction between the two terms is not essential but functional, because training and education are continuously involved in amplifying feedback loops, with one reinforcing and nurturing the other. The consequence for the research university is that utilitarian values are reinforced at both the level of training and that of education.

There are also complex amplifying feedback loops between education, training, and knowledge. A utilitarian education will largely base training on utilitarian values, including utilitarian knowledge or "know-how," with the main educational goal of attaining "professional competence" and "expertise." Furthermore, utilitarian knowledge, reinforced by utilitarian education and training, will masquerade as a universal, eternally valid category. It thus obscures the cultural, ethical, and relativist dimensions of any kind of knowledge, validating, in turn, utilitarian education and training. Finally, it equally recasts the distinction between knowledge and wisdom in a utilitarian form.

For example, what appears to be vital knowledge or information in some cultures, such as sailing at night by the position of the stars without the help of a sextant, or distinguishing among various animal and bird calls, taboo and non-taboo foods, acceptable and unacceptable social relations and behaviors, or composing and reciting oral poetry/ narratives as a means of codifying and transmitting the community's system of values and beliefs may, from a purely utilitarian standpoint, appear to members of other, "developed" societies as useless information, poverty of knowledge, illiteracy, or even misinformation. Consequently "developed" societies either discount or actively denigrate traditional knowledge, which in traditional cultures is often entrusted to old sages of both sexes. In these cultures, the difference between knowledge and wisdom is one of degree, rather than one of kind: knowledge is only the first step toward wisdom. In modern societies, by contrast, there is either a sharp separation between knowledge and wisdom, or an equation of wisdom with utilitarian knowledge. This has led in modern soci-

eties (but also in traditional ones) to a gradual loss of traditional wisdom/knowledge, including valuable socioeconomic and ecological practices that are increasingly replaced by reductionist scientific dogma and Western-style technological know-how, in the name of modernity and progress.

The first task of an intensive learning society, then, is to become aware of its complex links to traditional culture and fully fructify such links, instead of rejecting or repressing them. At the same time, it should move toward a larger, intercultural reference frame, away from myopic, reductionist, and utilitarian views. Adopting such a larger frame is more important than ever in the current global circumstance, unless we in the West wish to continue clinging to the cultural imperialistic practices of "free-market" capitalism, with the same unhealthy prospects for genuine human development. It would involve reforming our current educational institutions, as well as developing alternative ones, appropriate for local-global, intercultural frames. Alternative forms of ICT could greatly help in this process by participating in the development of both distance learning institutions and intercultural, learning and research technological platforms, oriented toward global intelligence.

Our current distance learning outfits are in need of extensive reform. So far we have two kinds of distance learning: one is organized by universities as extensions of their academic curricula, and the other is organized by specialized, distance learning providers, sometimes in partnership with an institution of higher learning or other organizations involved in "continuing education" and "on the job" training. The first type of distance learning, organized by universities, largely consists of disciplinary courses posted online and open to qualified students from all over the world, who can take them for credit, if they pay tuition fees. Most major American and British universities have developed such disciplinary academic programs online. These programs are electronic versions of the older, academic courses "by correspondence," delivered through "snail mail," and have about the same low rate of success as the latter.

There are a number of reasons why such e-academic programs have not drawn as many students as their developers hoped and why they have generally been financial flops. One reason is the lack of trained personnel, such as online teachers, new media professionals, programmer librarians, and programmer/system support specialists. Online teachers, for example, need to develop different skills from those of classroom teachers, such as how to format and present online course content, how to provide online student feedback, and so on. They also need real time, public relations and administrative skills, such as coaching, facilitating, and moderating, not least among the members of their own team. In short, online course developers need a variety of crossdisciplinary skills that can in turn be developed only through appropriate training or, more often than not, only by experiment or by "trial and error." Consequently, effective online courses are difficult and costly to develop and even more costly to maintain, revise, and update on a timely, ongoing basis.

The second type of distance learning services is delivered by specialized, academic providers, such as universities online, e.g., the Open University in the UK or Phoenix University in the US. There are also a large number of nonacademic e-learning organizations that offer their own online professional training in a wide variety of fields, or work with learning organizations to provide a comprehensive and flexible e-learning platform, which can be customized according to the specific training needs of the individual client. Such e-learning platforms typically offer 24/7 access to an extensive array of online academic and/or nonacademic courses and tutorials, assessment tools to evaluate current competencies and objectives of learners, search and problem solving tools, access to online consultants, administrative tools to monitor and to manage the learning process, and so forth.

All of these e-learning providers serve the purpose of disseminating and redistributing old and new knowledge throughout the world, yet their mission and objectives are not primarily educational, but professional, i.e., utilitarian: they train their clients in certain skills and competencies that can, at least in principle, be acquired without the physical contact and experiential dimension that are integral to the educational process. As such, current distance-learning organizations are carriers of utilitarian values, designed to reinforce a Western-style, utilitarian mentality. If reoriented toward a global framework, they could indeed become important disseminators of global and intercultural competencies and expertise. But, a thorough intercultural education, leading to global intelligence can hardly be acquired through electronic means or "virtual" reality. It could only be reached through the learners' real-time, intercultural experience and practice of living, working, and playing together over extended periods, in various cultures and learning environments.

Information and communication technology, then, can certainly be levered to achieve and sustain closely interwoven, local-global communities of students, teachers, scholars, and other practitioners who support each other's research and learning efforts toward acquiring global intelligence. It can also help disseminate the results of these learning efforts to the world community at large. But it can never replace the actual process of learning or acquiring intercultural knowledge, which emerges through daily physical contact and interaction among diverse human communities. Much less can it replace local-global wisdom, that is, intercultural knowledge that emerges only after years and years of crosscultural experience, based on sustained and patient intercultural research and practice.

Therefore, the humanities could help develop appropriate forms of ICT that would serve local-global systems and subsystems of values and beliefs, grounded in a mentality of peace and intercultural, responsive communication and understanding. One could think of two broad areas in which the humanities and the arts could prove particularly helpful: A) Initiating extensive historical-theoretical reflection, as well as sustained intercultural and transdis-

ciplinary dialogue on past, present, and future ICT within local-global reference frames; B) Participating in the creation and development of new Internet projects and software concepts, based on, and further amplifying, emerging intercultural knowledge/wisdom.

A) Sustained Historical-Theoretical Reflection and Intercultural Dialogue on ICT

The humanities are ideally positioned to initiate and mediate this kind of intercultural and transdisciplinary reflection and dialogue. They possess the analytical and theoretical tools, as well as the historical perspective, that are indispensable for such intercultural dialogue to be successfully translated into meaningful action at various local-global levels. In the previous chapter, I have exemplified this kind of humanistic approach through my discussion of canonic, disciplinary thinking within a global reference frame, as well as through my analysis of an early instance of globalitarianism in Elizabethan drama. In the present context, one could examine, for instance, the neoliberal claim that the new ICT creates an unprecedented effect of space-time compression on a global scale. Obviously, there is some validity to this claim, particularly with respect to the virtual spacetime created by the Internet and the ever-increasing speed of some of our physical communications and transportation. Yet, one could easily qualify and temper such claims, if one placed them in an intercultural reference frame.

As I show in Chapter 1 of *Global Intelligence and Human Development*, space-time compression is operative only within the global subculture generated by the utilitarian mentality of network capitalism, that is, within a clearly circumscribed sphere of cultural reality. Therefore, it can hardly be treated as a universal phenomenon. Cultural spacetime may vary greatly from civilization to civilization, indeed, even from human community to human community. Therefore, it is imperative for any theory of globalization to explore these variations, and for any proper globalizing effort to submit such concepts to the same process of sustained intercultural research, dialogue, and negotiation that is appropriate for other culture-specific notions and practices.

As to the temporal and spatial dimensions of the Internet, the humanities might wish to reflect on an alternative definition of cyberspace. Currently, cyberspace is looked upon as a specific spacetime with definite characteristics or qualities. Yet, upon close examination, it reveals itself to be a liminal space that enables the generation of a theoretically limitless number of spacetimes. This line of thinking has already been initiated by Timothy Leary in his book on *Chaos and Cyberculture* (1994) and, in his wake, by a number of performance theorists such as those included in Michael Benedikt's collective volume, *Cyberspace: First Steps* (1991), Phil Morle in his *Communitek: Performance at the Electronic Frontier* (1995), posted at http://www.cyberstage.org/archive/cstage12/intperf12.htm, and Toni Sant, in his "Liminality

and Altered States of Mind in Cyberspace" (2001), posted at http://limen.mi2.hr/limen1-2001/toni_sant.html. What all of these studies have in common is the assumption that cyberspace is a liminal state, reached through surfing the Internet, understood as an electronic rite of passage from everyday consciousness to a higher level of consciousness. At this heightened, altered state of consciousness (whether mouse click- or drug-induced), everything becomes virtually possible and alternative worlds begin to emerge.

One may, however, note that, not unlike Iser's concept of liminality as vortex or black hole that I discussed in Chapter 1 above, this "altered consciousness" approach mostly limits cyberspace's potentialities to enabling the emergence of power-oriented worlds and thereby obscures its limitless nature. It is this limitless or indefinite nature that cyberspace shares with other liminal spaces, making it a locus where any kind of reality might emerge, including alternative worlds that operate on organizing principles other than power. On the other hand, cyberspace, like other liminal spaces, receives its definite or specific spatial-temporal structures through what the human imagination can conceive at a given place and time. Consequently, despite the virtually infinite potentialities of the Internet as a liminal space, most of its current uses show a remarkable failure of imagination, reproducing the same communal structures and human relations that have been in force for the last two millennia.

The cultural-theoretical and historical reflection of the humanities can be, and has been, supplemented with artistic staging of what it would be like to live in a world permeated by the kinds of ICT that we are currently developing. In this regard, the contemporary technosciences have seized the imagination of our popular fiction writers and filmmakers, who have produced a large amount of artistic works, indeed an entirely new artistic genre, devoted to robots, cyborgs, and other human-machine hybrids. Among these, the science fiction of Isaac Asimov and William Gibson; Stanley Kubrik's film, *2001: A Space Odyssey*; and the ever-popular television series *Star Trek* can be considered as creative trendsetters. Yet, far from being new, most of these works take up and adapt traditional themes from world literature. In addition to Marlowe's and Goethe's *Faust* (as well as the latter's "Sorcerer's Apprentice"), one may cite the story of the Golem or that of Frankenstein, or that of Dr. Moreau's Island, as forerunners of the current futuristic dystopias that stage the fatal dangers of a technoscientific mentality, driven by the will to power.

Since these popular culture productions have received more than enough attention from Western-style, cultural studies, here I shall instead examine *Crabwalk* (2002), the most recent novel by Nobel-Prize winner Gunther Grass. I have chosen this particular novelistic example because it imaginatively uses e-culture and hypertextual techniques to comment on contemporary German society's infatuation with ICT. Grass reveals this infatuation to be an extension of an earlier, Nazi fascination with the will to power and its utilitarian war machine. But he also extensively explores the cultural effects of electronic

spacetime compression within the Western world, complementing the preceding theoretical remarks on this topic.

The narrator, journalist Paul Pokriefke, sets out to tell the story of the sinking of the *Wilhelm Gustloff* at the end of World War II. This German cruise ship was originally designed to promote the national socialist propaganda of a "classless society." But because, during the war, the *Gustloff* was turned into a military hospital and refugee carrier, it was eventually attacked and sunk by a Soviet submarine in the Baltic Sea in 1945. This event involved a human tragedy far exceeding that of the sinking of the *Titanic*, including the drowning of thousands of children, women, and wounded soldiers. Yet, it was largely swept under the historical carpet both by the "denazified," postwar German authorities and by the Stalinist Soviet regime. Pokriefke is apparently the only child who was born at the very moment of the sinking of the ship (and one of the very few to be saved), on the fatidic date of 30 January, which coincided with the Nazi accession to power twelve years earlier.

Until now, however, Pokriefke has been very reluctant to tell the story of the ship, despite his mother's continuous prodding. He first attributes this reluctance to qualms about his professional ethics as a journalist, whose "objective" reporting of the facts would presumably be colored by his personal involvement in the tragedy. Later on in the narrative, however, he admits the possibility that he has used his professional ethics simply as an excuse to avoid tackling a highly sensitive political issue—according to his own confession, he has hardly ever taken a risky political stand on anything and has not even voted for years, even though he considers himself a liberal. He finally gives in to the pressure of telling the story, which now comes not only from his mother, but also from his boss at the newspaper. The latter presumably wants to cash in on the reawakened public interest in Germany, after the reunification, in discussing the country's recent past that has effectively been repressed in both the West and the East for decades.

From the outset, then, the journalist appears as an unreliable narrator who is mostly in bad faith when it comes to explaining his own motives and actions, as well as those of others. One cannot take his judgments at face value, so that the reader learns much more about the fictional world of the novel *through* him, rather than from him. The gap between the narrative persona (Pokriefke) and the authorial persona (Grass) also accounts for the ironic structure of the novel, ranging from good-natured parody to devastating sarcasm.

As is his practice with other journalistic assignments, Pokriefke turns to the Internet for "background research" on the *Gustloff* tragedy. He is not sure, however, about how to tell his story: "should I do as I was taught and unpack one life at a time, in order, or do I have to sneak up on time in a crabwalk, seeming to go backward but actually scuttling sideways, and thereby working my way forward fairly rapidly?" (Grass 2002: 3) He chooses the second narrative technique, which also happens to be that of the hypertext—the synchronic, asso-

ciative principle on which the Internet is based and which gives the surfer the illusion of the annulment of time and space that I have previously mentioned.

Searching the Internet, Pokriefke soon comes upon a neo-Nazi Web site, devoted to the *Wilhelm Gustloff* tragedy. And according to the Internet logic of everything being connected to everything else, he soon discovers that on this particular Web site he has "a familial connection" (142): the site turns out to be designed and run by his teenager son, Konrad ("Konny") Pokriefke. Unlike his father, Konny has already obeyed the Siren call of his grandmother and has engaged in extensive, if biased, research on the sinking of the ship, which he uses as pro-Nazi and anti-Soviet propaganda.

Konny is a typical broken-marriage offspring who goes through his rebellious phase by challenging his parents' supposedly enlightened values, especially those of his mother, who considers herself a liberal and a "successful," secondary-school educator. He also challenges his teachers' reluctance to debate Germany's Nazi past openly or to entertain any views of it that are not officially endorsed. Although Konny adopts an extreme political view, he is too much of a "nerd" to remain involved with one of the local neo-Nazi skinhead gangs that have sprung up in East Germany in the wake of reunification. After a short brush with them, he decides to turn to the Internet in order to vent his anger and frustration with his parents and the so-called democratic, yet thoroughly repressed and hypocritical, society that they and their generation have created.

Because Konny cannot communicate with his parents and teachers any more than the latter seem to be able or willing to communicate with him, he chooses an anonymous persona in cyberspace to express his thoughts and interact with others. But he also chooses to place these thoughts and interaction within a historical reference frame that directly involves his family, particularly his father. Thus, Konny attempts, through the Internet, both to communicate with his father indirectly, at the subliminal level, and to understand his own place in relation to the family history, so closely interwoven with the larger, national, European, and world histories.

Konny's Internet persona is "Wilhelm," which is also the first name of Gustloff, a Nazi activist from Schwerin, the East German hometown of Konny's father and grandmother. During the mid-1930s Gustloff had settled in Switzerland, where he had recruited new Nazi party members from the German and Austrian communities. For that reason he had been shot to death, at his Swiss residence in Davos, by David Frankfurter, a Jewish medical student from Serbia. As a result of his assassination, this minor party henchman became a Nazi "martyr" who was buried with great pomp and circumstance in his hometown, in the presence of the Führer himself. Gustloff also had a monument erected in his honor, as well as a number of places and institutions named after him, including the Nazi cruise ship on which Paul Pokriefke was born. Konny has obviously decided, to the dismay and acute embarrassment of

his father, to adopt Wilhelm Gustloff as his role model and to revive and perpetuate his hero's memory on the Internet.

In the chat room of the same Web site, however, appropriately entitled www.blutzeuge.de ("www.stigmata.germany"), another Internet user, who identifies himself as "David," assumes the persona of David Frankfurter and presents the "Jewish perspective" on both the assassination of Gustloff and the sinking of the cruise ship by the Soviet submarine. At first, the narrator believes that this second persona might also belong to his son, who would split himself in dialogical fashion to present both sides of the issue, in the interest of historical fairness and objectivity.

However, this Web site user turns out to be another discontent teenager, with "good," liberal, middle-class parents who are reluctant to discuss the Holocaust with their son. As the narrator speculates, the heated debate between the two teenagers, who seem to share many interests and hobbies and seem to have learned a lot of German and European history in the process, could be regarded as harmless, perhaps even useful. After a period of mutual venting of virtual anger, they seem to have reached the cordial position of "agreeing to disagree" and even to have become friends of sorts.

Yet, the two teenagers attempt to turn this virtual friendship into a real one and agree to meet in Schwerin, at the site of the by now long dismantled memorial hall of the Nazi "martyr," Gustloff. The "Jew" David spits upon the erstwhile gravesite to express his disdain for what it represents. In turn, "Wilhelm" reacts by shooting him to death, in the name of the "German people." Thus he allegedly avenges the assassination of his hero—carried out, according to the assassin David Frankfurter, in the name of "all Jews"—more than half a century before.

Ironically, the murder weapon is a World War II Soviet pistol that Konny's grandmother has given him (in addition to the Mac computer), in order to defend himself against the neo-Nazi skinheads who had tried to rough him up. Even more ironically, at the trial, it turns out that the "Jew" David is not at all Jewish, but from "solid," German Protestant stock. Just like "Wilhelm," he has tried out a different virtual identity on the Internet, with fatal consequences in real life.

Konny's prison term seems to bring about the expected reformation and, perhaps, as in *Crime and Punishment*, the promise of the spiritual redemption of the murderer. It also seems to bring reconciliation and mutual acceptance between father and son. Yet, when Paul Pokriefke checks the Web sites devoted to the "accursed ship" for the last time, before closing this tragic chapter in his life and becoming reconciled with his own past, he comes upon a brand new development: "At the URL www.kameradschaft-konrad-pokriefke.de, a Web site introduced itself in German and English, campaigning for someone whose conduct and thinking it held up as exemplary, someone whom the hated system had for that very reason locked up. 'We believe in you, we will wait for

you, we will follow you….' And so on and so forth." (Grass 2002: 234) The journalist concludes his narrative on a fatalistic, despairing note: "It doesn't end. Never will it end." (234)

I have greatly simplified Grass's novel, which works on many fictional levels and reference frames, in order to highlight his skillful use of the Internet as a narrative device. But *Crabwalk* is also a devastating critique of what Paul Pokriefke calls, when referring to the World Wide Web, "our global playground" and "vaunted ultimate venue for communication". (Grass 2002: 142) Obviously, this critique does not concern the medium itself, but the unimaginative, trite, and destructive uses that it has all too often been put to. Grass explodes some of the common neoliberal myths about the socially and morally redeeming value of our new ICT, viewed as a super-powerful, magical instrument that will help us overcome all of our physical, human, and historical limitations. Particularly relevant to the present context is Grass's critique of two, closely interrelated, euphoric concepts of the Internet: 1) that it annuls physical time and space as if by magic and 2) that it generates new social and physical realities, including new personal identities and communal solidarities.

As we have seen, Internet analysts have argued that cyberspace replaces physical time and space with virtual spacetime that enables us to perform extraordinary physical, commercial, and even spiritual feats. While it is true that cyberspace is a form of liminality that could, in principle, facilitate the emergence of new ontological and epistemological reference frames or alternative realities, *Crabwalk* shows why such alternative realities have so far failed to emerge. The much-vaunted annulment of physical time and space has tended, on the contrary, to produce confusion and scrambling of existing ontoepistemological and historical reference frames. Because on the Internet all events appear as both independent of any specific locality and simultaneous, or virtually interconnected, surfers can easily lose their sense of place and circumstance and, therefore, of history. But what will replace this sense, in the absence of any alternative ontoepistemological frames of reference?

At first, Pokriefke is unaware of the far-reaching, potentially dangerous, implications of the virtual annulment of specific time and place, for he notes: "Only this much is certain: Nature, or to be more precise, the Baltic, said yea and amen more than half a century ago to everything that will have to be reported here." (Grass 2002: 3) As it turns out, however, this may be the case for a linear view of history, such as Pokriefke's, but not for a nonlinear view of it, such as is often produced by the Internet. Where there is no sense of history or, even worse, when this sense becomes repressed, the fatalist logic of the eternal return of the same will often take its place. To be more specific, the modernist concept of time as linear, continuous progression will as a rule be replaced by its symmetrical opposite, the Nietzschean, circular concept of time as the eternal return of the same, which, to Nietzsche, means the return of the same will to power.[10]

Pokriefke begins dimly to realize the adverse effect of physical time-space annulment when he complains, always from his linear, historical perspective, that "since the *Gustloff* was launched into cyberspace, making virtual waves, the right-wing scene has been vocal online. Jew bashing is in season again. As if the murder in Davos had taken place just yesterday, radicals are demanding on their Web site 'Revenge for Wilhelm Gustloff'!" (Grass 2002: 64) Or, again, when he notes that "Webmaster Wilhelm" celebrates the deployment of the *Gustloff* off the English coast with "such up-to-date enthusiasm that you would have thought this propaganda coup had been pulled off only recently, not almost sixty years earlier." (65) But the narrator slowly begins to realize that the Internet does nothing but obey the logic of its users, in this case, the logic of the eternal return of the same will to power.

One such return is that of fatidic dates (symbolic numerology was one of the well-known Nazi obsessions), specifically of what Pokriefke calls that "damned date," 30 January, which is his birthday, as well as the date of the Nazi takeover and the sinking of the *Gustloff*: "How it clings to me, marks me. What good has it done that I have always avoided celebrating my birthday—whether as a schoolboy or a university student, as a newspaper editor or husband, whether among friends, colleagues or family members? I was always afraid that at a party someone might pin the thrice-cursed significance of the thirtieth on me—in a toast, for example—even when it looked as though this date, once force-fed to the point of bursting, had slimmed down over the years, becoming innocuous, a day on the calendar like any other. By now, after all, we Germans have come up with expressions to help us deal with the past: we are to atone for it, come to terms with it, go through a grieving process." (Grass 2002: 122) Yet, the Internet has brought all of it back, as if it had happened yesterday: "flags had to be displayed—still, or again—on the thirtieth, the state holiday. At any rate, my son highlighted the day of the Nazi takeover as a red-letter day, for all the world to see." (122)

Of course, Pokriefke could have offered a different, positive interpretation of the "fatidic" 30 January. For example, he could have linked the sinking of the cruise ship in 1945 with the impending fall of the Third Reich later that year, and his birth and miraculous survival, with a fresh beginning for his family and for Germany. But, he remains caught up in the *amor fati* of power, the implacable logic of the eternal return of the same. The nonlinear metaphor that he applies to Germany's historical "fate," closely interwoven with his own and his son's, is less elegant than Nietzsche's Ouroboros (or the snake that bites its tail) in *Thus Spake Zarathustra*, but it is no less appropriate; it could easily be extended, moreover, to a lot of the historical (and commercial) flotsam and jetsam that pops up again and again on the Internet: "History, or, to be more precise, the history we Germans have repeatedly mucked up, is a clogged toilet. We flush and flush, but the shit keeps rising." (Grass 2002: 122)

To change metaphors (without necessarily making them more palatable), Pokriefke, by entering his story via the Internet, finds himself caught up in a

vast and intricate spider's web. In the end, he sees no escape out of this (worldwide?) web, neither for himself, nor for his nation. It would take another frame of reference, or another type of mentality altogether—the authorial persona, rather than the narrator seems to imply—to turn the Internet into a celebration of life in all its symbiotic diversity, instead of an eternal return of the same cycles of violence and suffering.

A second issue that *Crabwalk* throws considerable light on and that is closely interrelated with the first one is the Internet's vaunted ability to facilitate the creation of new personal identities, social role-playing, and communal solidarities. (Turkle 1984; 1996) While this ability cannot be denied, it has also produced many unfortunate, largely unintended consequences. Because of its easy accessibility, anonymity, and global reach, the Internet is an ideal, safe place to express *any* views and to project *any* identity, no matter how fancy, extreme, or self-aggrandizing they might be. There will always be another logger to share your special vision, interest, or obsession.[11]

Furthermore, the Internet is a medium of communication that does not necessitate direct physical contact or interaction and, therefore, no deep ontological commitment. In cyberspace, one could safely ignore conflictive difference, whether ethnic, racial, religious, or ideological, and focus on binding commonalities. But even in the case of conflict, individual differences cannot escalate beyond the level of verbal violence, and virtual communities can usually arrive at reasonable compromises, in the name of the special interest or hobby that has brought them together in the first place.

Yet, as we have seen in the case of "Wilhelm" and "David," their role-playing on the Internet turns deadly in real life, not least because they choose to become actors in the mimetic drama of the eternal return of the same. The narrator claims he cannot understand the behavior of the two teenagers: "Whatever had induced the virtual David to respond to a vague invitation and travel, in the flesh, by train all the way from Karlsruhe, where the eighteen-year-old schoolboy lived with his parents, the eldest of three sons? And what had got into Konny to make him seek an actual encounter that would convert into a reality a bosom-enemy relationship that had developed over the Internet and was essentially a fiction?" (Grass 2002: 184)

But the narrator himself provides an indirect clue to this "inexplicable" behavior when he comments on the murder scene: "In front of the youth hostel, closed at this time of year and seemingly lifeless, something happened that was not predestined yet played itself out on the mossy foundation of the former [Gustloff] memorial hall as if rehearsed." (184) Indeed, the two teenagers are compulsively reenacting an ancient script: the sacrificial, scapegoat ritual. This ritual is merely a special instrument of the "eye for an eye" or revenge mentality that is, in turn, merely one act in the worldwide drama of the will to power, where aggressors and victims constantly change places, in a never-ending *danse macabre*.

Yet, it is again the authorial persona rather than the narrator who points to the failure in imagination on the part of many Internet users. Instead of availing themselves of the Internet as a great opportunity to create individual identities, human solidarities, and local-global communities, based on alternative organizing principles and values, they rehearse the same interests and obsessions that have preoccupied the ruling classes of the world for the better part of its known history. Just like Konny and David, such users become mere actors in the mimetic drama of the eternal return of the same will to power, which is now also being played out on the Internet.

The narrator actually skirts the fundamental issue, by trying to present the conflict between the two teenagers as a special case of the ontological confusion between fiction and reality or illusion and truth that is a common theme in world literature. In this case, the Internet would be simply a virtual or fictional world, or a World Wide Book of immense proportions, where everything relates to everything else as in Baudelaire's "correspondences." Although in a certain sense it is also that, the Internet ultimately transcends any traditional ontological divisions or binary oppositions, engaging in subtle and complex feedback loops with the various realities or reference frames that traverse its cybernetic, liminal space. In other words, the Internet, like Nature, will return to us anything that we bring to it. So the issue is not that we should keep the Internet and "real life" separate, as the narrator implies (and as if we could), but that we should approach it with the same regard and sense of responsibility that we ought to have toward other human beings and all other living and nonliving things.

The foregoing theoretical reflections on the idea of electronic space-time compression, complemented by Grass's fictional exploration of this idea, have thus highlighted the need to take into consideration the (inter) cultural dimensions of technology when creating and developing new forms of ICT, appropriate for local-global learning environments. In terms of a concrete program of action, the humanities and the arts should, in close cooperation with the social and the natural sciences, as well as with prominent, nonacademic researchers and practitioners in various ICT fields, organize worldwide colloquia and workshops, collaborative projects, and other forms of intercultural and transdisciplinary activities. They could set the agenda of a worldwide, sustained dialogue on the ethical and social implications of current ICT and on the type of ICT that should be developed in consonance with the values and goals of global intelligence. Indeed, the most important task of such worldwide deliberations would be to reach a general consensus as to what these values and goals might be in the first place.

B) Internet Projects and Technology Platforms for Local-Global Learning Environments

A number of studies have already explored the role that humanistic fields such as rhetoric, linguistics, semiotics, reception theory, and aesthetics have played

in organizing and presenting, as well as controlling, the content of the electronic information that flows through the Internet or the other New Media. (Stockinger 2001) In addition to such auxiliary functions of designing and treating received content, largely of a commercial, political, or entertainment nature, the humanities could launch a large number of Internet projects that would have their own research and learning content. The purpose of such projects would be to remap intercultural knowledge and reorient it toward global intelligence. A few such projects are already afoot, even though their explicit goal may not necessarily be that of global intelligence.

For example, there is a research project of creating a world encyclopedia, entitled New Encyclopedia of Knowledge-New Archive of Knowledge, or NEP-ARK for short (complete details about the project can be found at nep@tcs.ac.uk). This encyclopedia of global knowledge will be available through the Internet and will be compiled according to hypertextual principles. It is being developed by an intercultural and interdisciplinary team of researchers from a number of countries, including China, Japan, Korea, India, Singapore and the UK, under the leadership of the *Theory, Culture, and Society* group (Mike Featherstone, Scott Lash, Bryan Turner, Roy Boyne, and Couze Venn), at Nottingham Trent University.

NEP-ARK proposes to rethink the framework of knowledge in the social sciences and the humanities from a global standpoint and has set itself two major tasks: to examine critically the dominant, Western-style paradigm of acquiring, classifying, and distributing knowledge; and to recover, as well as to generate, alternative cognitive methods, belonging to Western and other traditions that have been neglected or suppressed in the past. So far, the encyclopaedia has not advanced much beyond its critical task, which, at least to me, seems to be the easier part of the project. As I have pointed out in the previous chapters, we modern Westerners are very good at "critical thinking," but not so good at intercultural dialogic thinking, the development of which, I believe, is one of the principal objectives of NEP-ARK that will, in the end, define its success.

In turn, one can propose, as a complement and supplement to NEP-ARK, a World Encyclopedia of Cultural Terms, to be compiled by interdisciplinary and crosscultural research teams of linguists, semioticians, cultural anthropologists, sociologists, psychologists, philosophers, political scientists, economists, computer scientists, humanists, historians, artists, and the like. The encyclopedia would not be eclectic, as most such compilations are, but would present each major cultural term in its historical perspective and in the context of a comparative analysis and cross-referencing with another similar or related term in a different culture or system of values and beliefs. Just as in the case of NEP-ARK, the project would involve innovative use of high-performance data mining and management systems, based on advanced, AI computing methods. Once posted online, the encyclopedia will never reach a "definitive" form, but will be continuously updated and refined, with additional entries pro-

posed by users and evaluated and processed by the original teams and/or by the automatic management system.

There are other innovative projects in the humanities that use the Internet in a creative way. To give just one more example, the Russian-American thinker and educator Mikhail Epstein has founded the InteLnet, which stands for "Intellectual Network" and can be found on the Internet at http://www.emory.edu/INTELNET/ This is an interactive site and a "virtual community" devoted to generating and debating interdisciplinary ideas in the humanities. For Epstein, the Internet is "analogous to the human mind, with its conceptual links and associations." (Berry and Epstein 1999: 276) Since the World Wide Web arose primarily as a technical concept, however, InteLnet seeks "to bring the humanistic 'message' of the Internet in line with its electronic 'media', to elaborate the methodology of thinking adequate to the multidimensionality and interconnectedness of computer networks." (277)

The InteLnet has five objectives, presented as five separate projects: 1) The Bank of New Ideas, which promotes "new ideas that reconfigure the paradigms of humanistic knowledge and transcend the borders of existing disciplines"; 2) Thinklinks, which explore "meaningful connections of concepts and ideas among the diversity of disciplines"; 3) InteLnetics, which seeks to elaborate "the methodology of a new humanistic metadiscipline responsive to the demands and possibilities of an electronic environment"; 4) InteLnet Journals or specific electronic sites promoting the "crystallization of new humanistic disciplines and areas of research"; and 5) the Interactive Anthology of Alternative Ideas, devoted to the creation of "interactive textual bodies that might grow in time and involve the collaboration of many minds." (Berry and Epstein 1999: 277)

Although the five projects are presented as separate, they are obviously interrelated. All of them are intended to stimulate out-of-the-box or alternative thinking in the humanities, away from a disciplinary mentality that Epstein regards, just as I do, as the largest stumbling block in the further development of not only humanistic, but also all other knowledge. Of course, the point is to encourage not so much interdisciplinarity (which preserves disciplinary thinking intact) as transdisciplinarity or thinking that frequently emerges at the borders, or within the liminal spaces, between constituted disciplines. As Epstein aptly observes, in disciplinary academia (and in other domains of intellectual and practical activity as well), "the most innovative ideas are usually found on the borders between various fields, so that they have difficulty 'passing muster' with specialized scientific councils and committees and are subsequently lost to that larger science for which they were intended. A truly new idea seldom fits into ready-made spheres of knowledge; rather, it wrenches itself away from the established set of dissertation topics to create its own sphere." (Berry and Epstein 1999: 278)

The InteLnet projects are also intended to nurture constructive, rather than "critical" thinking, along the lines that I have suggested in Chapters 1

and 2 of the present study. For example, The Bank of New Ideas will not accept deposits of "purely critical or polemical ideas" (Berry and Epstein 1999: 280), which are judged to be counterproductive in a transdisciplinary and, one may add, intercultural context. Epstein also develops the term "positive deconstruction" to counter the critical type of deconstruction, inspired by the work of Michel Foucault and Jacques Derrida, which remains fashionable in certain academic circles. Positive deconstruction, Epstein writes, "deploys a series of constructive alternatives for a concept or theory; instead of focusing critically on the given discourse, it potentiates new ones, inscribes each concept into a broader framework where it can be posited as only one in a whole family or cluster of concepts. This is a logical potentiation of a term, multiplication of its possible meanings, the process of building it into a larger field of consciousness." (291)

Here Epstein displays the kind of reference-frame thinking that is at the foundation not only of systems theory, contemporary cybernetics, and "deep" ecology, but also of the Internet itself. As he himself points out, cybernetics and inteLnetics as a humanistic metadiscipline can be traced back to the same "spiritual father," the German philosopher and mathematician Leibniz, who proposed the project of a "universal science capable of characterizing not only quantities but qualities." (Berry and Epstein 1999: 285) Later on, this project split into technical and humanistic parts with adverse consequences for both areas of knowledge. According to Epstein, the World Wide Web is an excellent opportunity and ideal medium to reunite cybernetics and inteLnetics, although I would beware of calling this project a "universal science" just as yet, lest we unwittingly reinforce Western cultural globalitarianism. We would obviously need extensive intercultural research, dialogue, and negotiation before we could arrive at this kind of universal or global science, which, in any case, can be only an emergent phenomenon, or a World Wide Book, eternally in progress.

In addition to using the Internet creatively as Epstein does, the humanities could go even farther and contribute to the development of innovative intercultural software programs and advanced technology platforms. The humanities are well equipped to make this contribution at both the conceptual and the design level. The existing technology platforms for most applications are largely monolingual and monocultural and are not geared toward intercultural learning, communication, and understanding. The reasons for this inflexibility and inadaptability of our current ICT are many, ranging from insufficient computing capacity, to rigid rather than reconfigurable computing, to software incompatibility, to protectionist company policies, to cultural insensitivity, and so forth. Above all, however, most of the programs and platforms are produced by Western-style software companies and are based on reductionist, linear scientific notions that are typical of contemporary, mainstream technoscience. Even those software programs that are supposedly designed for automatic

translation are not flexible or complex enough to render anything but Anglo-American scientific and technical terms into other languages with any degree of accuracy.

The overwhelming majority of software programmers focuses entirely on utilitarian, financial goals and has neither the interest nor the necessary knowledge to write intercultural programs that would be even more complicated and expensive than the current, "standard" ones. The prevailing attitude in the ICT sector and our technocratic establishment in general is that other cultures should adopt Western (largely Anglo-American) business and technological methods, or else miss the great financial benefits that accrue to members who belong to the "information-rich" country club. Consequently, intercultural information becomes more and more "standardized," that is, ever poorer, while communication becomes more and more monological. Indeed, one may speak of an increasing loss of diversity not only at the global ecological, linguistic, and cultural level, but at the global information and communication level as well, with disastrous consequences for the further development of humanity.

The advent of quantum computing and quantum information technology might offer some viable solutions to these problems, at least at the conceptual and design level (but certainly not at the level of cultural behavior or human mentality). The idea of quantum computing has arisen in relation to Moore's law, which I mentioned in the previous section: if microprocessors continue to shrink in size, the individual elements of the circuitry packed on silicon chips will eventually become as tiny as a few atoms. This would mean that the behavior and properties of the circuit would become quantum mechanical in nature. Therefore, quantum physicists such as Richard Feynman (1982) have raised the question whether one could devise a computer based on the principles of quantum mechanics.

In a serial, digital computer, binary bits (represented numerically as either 0 or 1) are encoded so as to obtain a useful computational result. In a quantum computer, bits are called "qubits," because their structure is not binary, but quaternary. Following the principles of quantum physics, a qubit can exist not only in a state of 1 or 0, but also simultaneously as both 0 and 1, with a numerical coefficient representing the probability of each state. This superposition of states, known as quantum interference, would allow for enormous calculation power. Any quantum operation on that system could compute not just on one machine state, as serial computers do, but on 2 500 states at once. This quantum parallelism, achieved through superposition of states, is the equivalent of performing the same operation on a digital computer with ~10150 separate processors—of course, no such giant, digital supercomputer could ever be designed and manufactured.

Several difficulties need to be surmounted before actually building a quantum computer, including the interrelated problems of decoherence and error correction. "Decoherence" is the tendency of a quantum computer to decay

from a given quantum state, just as, in a controlled quantum mechanics experiment, two paths that a quantum particle travels simultaneously collapse into a single path upon measurement. Thus, if one directly measures the state of a qubit, one will destroy the superposition of states in which it exists, turning it into either 1 or 0. Decoherence leads to computing errors that must be corrected, if quantum computing is to become effective. Although some advances have been made in this respect, resulting in the construction of small-scale quantum computers, the immediate prospects of building large quantum computers, let alone mass-producing them, remain rather dim.

The idea of quantum computer hardware has also stimulated efforts to design applications and software programs that would use them. Such software programs would process enormous amounts of data and would need to reach a level of complexity much beyond that of any of the current standard software programs, which, despite promotional hype, remain rather primitive and unsophisticated in both concept and design. Feynman himself thought that quantum computers could actually model quantum physical events, thus becoming an important instrument of studying such events. A commercial (and military) application would be encrypting and cracking codes that are usually based on the limited capacity of digital computers of handling extremely large numbers, which, by contrast, quantum computers could handle with great ease. Much more interesting, from the standpoint of an emergent ethics of global intelligence, would be those AI applications that would be able to process extremely large amounts of data in order to model human thought in all its diversity, including its almost infinite number of sociocultural and intercultural contexts. I am familiar with at least one such advanced technology platform, based on what its creator, Hardy F. Schloer, appropriately calls Quantum Relations Theory.[12]

As its name indicates, Quantum Relations Theory, or Quantum Relations (QR) for short, starts from the basic insights of quantum physics. At the same time, however, it argues that these insights should apply not only to the physical world, but to the human world as well. In this sense, QR is both a critique and an extension of the principles of quantum mechanics and of the theory of relativity. Although these theories recognize that the presence of the observer modifies the nature of the phenomena observed, they do not act upon this recognition in a radical and consistent manner. Moreover, QR incorporates the insights of general systems theory, as well as those of Whitehead's philosophy of process. It also meets the criteria of a transdisciplinary, integrative science, "capable of characterizing not only quantities but qualities," to adopt Epstein's description of Leibniz's cognitive model.

Just like systems theory and Whitehead's process ontology, QR moves away from the Western classical ontological premise of the independent existence of a knowing subject and a knowable object. It postulates that nothing exists independently in our universe and that reality arises primarily not as

objects and entities, but as dynamic networks of relations among such objects and entities, which are in a state of continuous flux. Everything arises contingent on conditions or events (understood in both a physical and a mental sense). Things do not possess an unchanging, abiding essence. They arise codependently, so that reality can be described only in terms of relations among objects, entities, and self-organizing systems, nestled within each other and within our universe. In turn, our universe is nestled within larger universes or relational frameworks.

Schloer subscribes to the assumption of general systems theory that our universe is a web of interrelated systems that mutually affect each other when they interact. QR is a theoretical account of the ways in which such systems interact (and not of the way systems "are"). If different systems present different accounts of the same sequence of events, then each description of reality can be understood only as relative to a particular system. A system can have a reciprocal relationship with another system, but any description of reality by one system is "interaction-dependent" and can only be viewed through the relationships that arise between the "observer" system and the "observed" system at any given moment. If this relational process applies equally to all systems in our universe, then it should also apply to any possible description of the human mind. We can thus describe mind or "consciousness" by the same relational processes that we use to describe physical and other systems.

According to Schloer, whereas quantum mechanics and general relativity provide reasonably accurate descriptions of how nature works, they leave out a crucial component that is the basis of any scientific observation and insight: the human mind. Although some physicists have suggested that consciousness or awareness is a quantum process (Bohm 1990; Nanopoulos 1995; Stapp 1995), no successful attempt has so far been made in the physical sciences to incorporate the mind in our description of nature.[13] QR seeks to fill this gap.

QR further departs from Cartesian dualism by postulating a relationship of mutual causality between subject and object, or mind and matter. Modern science has mostly seen itself as an objective and impersonal search into the nature of reality. QR emphasizes the need to shift scientific thinking away from the quest for objective Truth towards the recognition that all scientific data are observer-dependent and that all approaches to reality, including scientific ones, are influenced by subjective experience. QR, then, acknowledges the inherent unity of the body and mind through the complex networks of relations that emerge among its components.

This holistic viewpoint is essential in describing consciousness in its full subtlety and in exploring its complementary relationship with the physical world. At the same time, QR acknowledges that the conventional notion of causality, defined as a linear, local, and physical relation, is inadequate for describing the complementarity of mind and body. QR replaces this conventional notion with the nonlinear and nonlocal concept of mutual causality, thus

providing a much more complex, qualitative account of the reciprocal relations among the systemic networks that our minds and bodies constitute.

According to Schloer, a human mind forms quantum relations with other systems and builds an internalized universe (state-space) composed by these relationships. QR defines a "quantum relation" as the relationship or interaction that arises between an observing system (*System S*) and the observed system (*System O*), involving a mutual exchange, transfer, or conversion of small, discrete units of energy, or any other quantum between the two. QR further assumes that a human mind is a network of associations between "quantum instances." A quantum instance is a discrete unit of reality as perceived or imagined by a human mind. It also refers to a family of properties that describe one or more mental states. Quantum instances may include individual thoughts, ideas, emotions, sensations, perceptions, dreams, images, or any other category that pertains to a mind's conception or description of physical/mental phenomena. One should, however, not attribute absolute reality to any single mental quantum instance, because, according to QR, the only reality constitutive of a human mind resides in the relations that arise between quantum instances, and not in the quantum instances themselves.

In QR, as in quantum mechanics, all information about the internal relations among quanta is embodied in the mathematical relations between the vectors and operators that represent them, just as the information about the relations between locations in a city is contained in the spatial relations between the points that represent them on a map. The only difference between QR and quantum mechanics in this respect is that states and quanta in quantum relations represent mental/physical systems or subsystems, instead of merely physical systems or subsystems, and that the network of relations among their members reveals an individual mind's perception of reality.

Quantum instances are structured within the mind in spaces according to their "observer-dependent" properties. At any given moment, the state of a human mind consists of a complete specification of its quantum instances or "state-dependent" properties, which change with time. In quantum mechanics, relations in physical systems can determine the structure of its properties. By the same token, in QR the values given to mental quantum instances reveal the relations that exist among its properties, and therefore, the state of a human mind. A bivalent mental unit, for example, forms a set with two valences. In QR, a "valence" is a value that could denote, say, the degree of attraction or aversion of a quantum instance toward another specific quantum instance, the degree of truth or falsehood attributed to a given experience, and so forth. Thus, humans can mentally associate an instance of physical reality by determining its "observable" properties. The mathematical objects that represent the elements in some mental set of valences tell us about the quantum relations among them.

To model conscious experience, QR represents the state of a human mind by vectors within normalized state-spaces. In quantum mechanics, the state-

space of a system is the space formed by the set of its possible states. A state-space also refers to the mathematical model that represents that space, or one that provides a map of the set of possible states. In turn, QR employs state-spaces to describe the internal processes of a human mind and the behavior of its mental quanta, or the quantum instances that comprise it. State-spaces in QR, as in quantum mechanics, are different from those of classical physical models, being special kinds of vector spaces, called "Hilbert spaces." Thus, in QR a mental system is associated with a Hilbert Space, with every unit vector in the space corresponding to a possible state of the system, and vice versa. QR assumes that the internal structure of mental vector spaces and the dynamical rules that specify the paths through which those vectors travel provide an adequate description of a mental/physical system.

Furthermore, since quantum mechanics attempts to model subatomic reality as dynamic flux, it graphs the occurrence of physical quantum events in terms of probability, dealing with continuously variable probabilities, such as the x-coordinate. Because there are an infinite number of possible points on a line, the probability of determining the exact value of x is infinitely small. Instead, one works out the probability of x lying within a small interval on the axis and gives it a range of possible numbers. In turn, QR interprets the dynamic of mental quantum instances exclusively in terms of probability. Since human minds tend to describe reality in a subjective and fluid way, resulting in widely different descriptions of the same physical/mental event, a mental quantum instance will assume different values. Like quantum mechanics, QR uses an x-coordinate space and works out the probability of a value x lying within a small interval on the axis. When placed on a multi-dimensional, coordinate space, this value reveals the position of the mental quantum instance and the types of relationship it has with other quantum instances.

QR revolves around two fundamental concepts that can equally be translated into the mathematical language of quantum mechanics and constitute the cornerstones of any technology platform based on QR principles. These concepts are "frames of reference" (FORs) and "data fusion objects" (DFOs). They are described in some detail in Schloer and Gagner's "Quantum Relations: A Brief Overview" in the Appendix of the present book. Here I would like to add only a few technical points. In QR, FORs are special vectors in a normalized state-space, representing mental states at a given moment. FORs also form coordinate spaces, where each possible state of the mental system corresponds to a point in the space, and each point in the space corresponds to a possible state of the system. The associations between the mathematical objects that represent FOR spaces reveal the quantum relations that arise between them. For example, a given FOR with x quantum relations between quantum instances can show the way in which an individual perceives a certain object or observes its properties. Vectors can graph such quantum relations, while the distances between points in a coordinate space can reveal informa-

tion like degrees of attraction and repulsion, of truth and falsehood, of real and imaginary, or any other metric that defines relational behavior.

In turn, data fusion objects or DFOs can be defined, metaphorically, as mental elementary particles. These particles interact according to well-defined rules, and the result of their interaction can equally become a computed function. DFO particles arise within multiple FORs. Each FOR can be represented as a metric space, i.e., as a set of DFO elements, with one or more functions. Furthermore, any FOR can also be a DFO and vice versa, depending on their respective positions in the hierarchic space structure. Thus, a DFO can be an elementary particle in a higher-level FOR. In turn, this FOR can be a DFO of another, higher-level FOR structure, and so forth.

What are the technical advantages of implementing the DFO/FOR model? To begin with, this model is self-adaptable and will automatically search for the best method and the shortest path to accomplish its goal. Since the metric distance between a DFO and an FOR is stored as a property of the FOR, one can easily change metrics. A metric change is the equivalent of asking for a different interpretation of the underlying data. Because metric distances between DFOs/ FORs are implemented in a hierarchic fashion, one can easily change perspective on an entire data set. Because DFOs implement class inheritance, such changes might ripple down through various levels of sub-DFOs, triggering recomputation of intermediate results in a controlled and natural fashion.

Even more importantly, the DFO/FOR model is capable of self-organization, because data and functions are implemented as sets of hierarchic objects. For example, if the metric of an FOR is differentiable over the set, data in that set can be concentrated by finding the minimum of the differential, just as in the case of physical models. An FOR containing many DFO structures can also contain rules for, among other things, the creation of new DFOs; the interaction between its DFOs; and the calculation of functions between smaller DFOs, including the creation of new objects that embody certain relationships between these smaller DFOs.

DFOs and FORs are based on a complex network of parallel relationships. These relationships can be expressed as positive (attraction) or negative (repulsion). The interaction between two DFOs can include changing properties of the mental particles themselves, much as, in a physical system, an attraction is a function of space that operates to change the position of objects. A reasonable FOR can implement certain rules of symmetry and conservation among its DFO objects. In this way, the model uses mathematical and physical methods to create a framework within which large-scale computations can be performed.

Thus, DFOs and FORs provide a natural model for general parallel computation. Since DFOs and FORs are discrete objects, they can be implemented on multiple processor systems, and calculations can be performed in parallel.

The DFO/FOR model is not bound to the theoretical requirement that either the metric or other functions provided by a frame of reference be Turing computable functions. Any function that can take one or more data structures as arguments can be implemented within the DFO/FOR model. Therefore, this model can also provide conceptual methods for implementing quantum computing, as soon as hardware becomes available for such applications. On the other hand, it can equally simulate non-local functions, such as are found in quantum mechanics, and implement them on a Turing-Church type of processor (digital computer).

Furthermore, the DFO/FOR model is both modular and extensible. This means that a set of computations on one data set can be transformed into another data set and used by the second data set to define a set of new functions, translating the preceding FOR into the new one. In addition, an FOR can contain rules for logical inference and deduction that operate on its component DFO objects. The fact that FORs are also considered DFOs for higher-level frames allows lower-level frames to define data properties. DFOs could equally be used to pose queries on other DFO frames. This means that both the query DFO and the answer DFO would exist within the same FOR structure until a computation would achieve the goal of relating them. In this manner, the DFO/FOR model can implement AI functional and rule-based languages such as Prolog in order to solve real-world and hypothetical problems. It can also translate and incorporate any software program or computer language into its database, thus solving the currently intractable problem of systemic compatibility and interchangeability in computer programming.

Finally, the DFO/FOR model is compact and adaptable, expressly designed to handle extremely large quantities of data, on the scale of gigabit and terabit sets, and to provide methods for manipulating them through parallel processing systems. DFO/FOR structures can be compiled, i.e., translated from a symbolic form into a compact set of machine instructions and can also run continuous restrictions on data in order to prevent database errors. The DFO/FOR model can handle data storage, recuperation, and processing with great flexibility and practically no data loss. It assumes that no piece of information or knowledge from its database can ever become obsolete, because it may always turn out to be relevant in a different DFO/FOR configuration, or coherence, or correlation between data sets.

QR could provide an excellent theoretical basis for developing advanced technological platforms for local-global learning and research. In *Global Intelligence and Human Development*, I discuss at length the theoretical advantages of general systems theory and its offshoots, the theories of complexity and self-organization, over their scientific, reductionist counterparts, especially within a global reference frame. I have also pointed out the close similarity between the nonlinear view of reciprocal or mutual causality in these theories and that of early Buddhism and Taoism.[14] QR obviously shares the

same theoretical advantages. The DFO/FOR model is based on the "web of life" (Capra 1997) in its most diverse and complex aspects, including human relations and interactions. Unlike most reductionist scientific theories, QR implicitly acknowledges diversity and alterity as the very conditions of existence. Whereas the reductionist theoretical models perpetuate the globalitarian pretensions of mainstream Western science, attempting to impose its dualistic, Cartesian perspective on all cultures in the guise of objective, universal knowledge, QR can take into account and process widely different cognitive perspectives, including linguistic, philosophical, cultural, sexual, and other observer-dependent variables. Like other contemporary strands of systems theory, QR acknowledges that hierarchies as modes of organization are best understood not as "centers of command and control," but as reference frames or levels of complexity embedded or nestled within each other and engaged in constant communication and mutual interaction. QR thus supports and enhances a cooperative, symbiotic view of our universe, in which all living and nonliving components of the global system and subsystems depend on each other for their well-being and in which each perspective needs to be acknowledged and respected as potentially valuable for the common good.

The quality and nature of the QR applications in a global learning and research framework will obviously depend on the quality and nature of the intercultural databases that they will draw on and, above all, on the mentality and principles that will inform the collection and processing of such databases. It is here that the humanities can bring their most decisive contribution. Intercultural and crossdisciplinary groups of researchers such as philosophers, cultural historians, anthropologists, environmentalists, sociologists, psychologists, educators, historians of science, linguists, literary scholars, and many others, could compile intercultural data from a comparative perspective, delving into the systems of values and beliefs of various cultures, their philosophical, scientific, religious, and literary traditions, their specific economic, sociocultural, environmental, and legal practices, institutional arrangements, and so on. Such intercultural data, placed in a comparative perspective, but generated from the local viewpoint of each culture or subculture, whether large or small, and not from the so-called "objective" and "universally valid" perspective of mainstream Western science, would go a long way toward creating the local-global learning conditions that would lead to the adoption of the values and practices of global intelligence. It is precisely the spirit of global intelligence that should infuse any DFO/FOR-based learning and research technological platform, programmed for the benefit of all (not just some) of our world communities.

To give just one concrete example, there is a proposed QR application in the domain of global health services, called AlphaMedic Systems. This project would develop a global management and data processing system, designed to automate, manage, and record the day-to-day healthcare efforts of medical

practitioners worldwide, through a centralized, supercomputer system with real-time global network access. It would employ QR-based, artificial intelligence technology to provide a 24/7 accessible online medical diagnostic center, as well as innovative genetics research systems for medical scientists and practitioners from all over the world. Any participating doctor, medical office, or hospital, as well as any participating genetics research institute, would have real-time access to sophisticated diagnostic and reasoning functionalities.

The system would be kept up to date with the most current medical knowledge and would utilize fully automated, "cause-and-effect" tracking technologies. It would enable any participating medical provider or researcher to suggest a causal relationship between data and test its validity against the system's enormous medical database, or to ask the system itself to suggest relationships and correlations between data sets. In addition, the system would use its own automated, advanced AI technologies to find important cohesions that determine "cause-and-effect" micro patterns and amplify them to macro information. The system would then automatically message such information to the medical practitioners and researchers who seem to be working on problems most closely related to the patterns discovered.

Whether this medical technological platform will be successful or not (and here, obviously, I do not mean primarily technological or financial success, but, rather, success in furthering the goals of global intelligence) will depend, again, on the quality and nature of its databases and the principles that inform their collection and processing. A project of this kind could go either of two ways: it could content itself with creating a healthcare and medical research technological platform based solely on the principles and practices of mainstream, Western, "allopathic" medicine; or attempt to integrate the perspectives and methods of all other traditional and nontraditional forms of medicine, such as Chinese, Ayurvedic, homeopathic, and so on. In the latter case, the project would become considerably more complex (and more expensive), but also much more worthwhile, having the potential of entirely remapping global medical knowledge.

In either case, however, one would have to take into consideration local medical research and cultural practices, which differ vastly even within the reference frame of what to some might appear as a unified body of medical knowledge, whether allopathic or not. For example, simple medical facts such as a patient's temperature, diet, blood pressure, pulse taking, blood work, and the like are attributed different values in different allopathic subcultures. Other nonmedical, cultural problems will involve synchronization of different methods of collecting, storing, and interpreting data, synchronization of national and/or local administrative and legal systems related to healthcare, and so forth.

The proper resolution of such issues will, again, necessitate intercultural and crossdisciplinary teams, composed not only of healthcare providers and administrators, medical and biological researchers, and computer scientists,

but also legal researchers, cultural anthropologists, historians of science, cognitive psychologists, linguists, sociologists, ecologists, politicians, conflict resolution specialists, and other negotiators. But, the steepest obstacles that a project of this kind will face will certainly not be of a technical, or even of a cultural nature. Rather, they will concern a certain human mentality that is far from being restricted to the West. The project will, above all, involve skillful negotiation and harmonization among various powerful special interests and will need to address in a creative way the current, worldwide exemptionalist, protectionist, and territorial practices, not least those of the big multinational pharmaceutical companies, without whose cooperation this project has very little chance of success.

Although QR is implicitly and naturally sympathetic to a symbiotic, cooperative approach to the web of life and to global intelligence and could lead to the creation of exciting technological applications in that spirit, it could also lead, like any other technology, to less desirable applications that will have unintended, distressful consequences for future human development. For example, QR technological platforms can also be easily employed to implement some of the DARPA projects in cognitive computing that I have mentioned in the previous section. The DFO/FOR model provides for large-scale computation of observer-dependent properties, whether they belong to observing and observed systems that are configured within power-oriented frames of reference or those of any other organizing principle. Again, it is a particular human mentality that will determine the uses of QR technology, and not the technology itself that determines this mentality.

Whether we move from the digital age to the quantum age and beyond, the future of human development will depend less on advanced technological platforms and much more on our collective ability and, above all, willingness to shift to a mentality and practices that are oriented toward global intelligence. As I have stressed again and again throughout the present book, this is an arduous task, involving much preparatory work on the part of all of our world communities, consisting primarily, and most importantly, in developing local-global, intensive learning environments, whether supported by advanced technological platforms or not. The humanities, once they shed their own disciplinarian mentality and practices, can obviously have a crucial role in initiating and stimulating the development of such environments, as well as in remapping past and present intercultural knowledge within the framework of global intelligence.

Notes

1. For the perils of antibiotics and other Western-style drugs, see Laurie Garrett, *The Coming Plague: Newly Emerging Diseases in a World Out of Balance* (New York: Penguin, 1994). For the worrisome effects of pesticides and genetical engineering on plants and animals, see, among many others, Amory B. Lovins and L. Hunter Lovins, "A Tale of Two Botanies," at www.rmi.org/biotechnology/ twobotanies.html.
2. See William Joy, "Why the Future Doesn't Need Us: Our Most Powerful 21st-Century Technologies—Robotics, Genetic Engineering, and Nanotech—Are Threatening to Make Humans an Endangered Species," in *Wired* (April 2000).
3. For full information on the Open Source Movement, see their Web site at www.open-source.org/
4. See "How Microsoft Warded Off Rival," *The New York Times*, May 15, 2003.
5. See LifeLog, at www.darpa.mil/ipto.
6. For an early history of this calculating, utilitarian mentality, see Alfred W. Crosby, *The Measure of Reality. Quantification and Western Society, 1250-1600* (Cambridge: Cambridge University Press, 1997).
7. See Amory and L. Hunter Lovins, at htt://www.rmi.org/biotechnology/twobotanies.html
8. See http//www.worldsummit2003org, under Summit Documents: "WSIS Declaration of Principles" and "WSIS Plan of Action."
9. For exemptionalism and its connection to the will to power, see especially *Global Intelligence and Human Development*, Chapter 3, "Sociobiology in a Global Framework: An Intercultural Evaluation."
10. For a full discussion of the logic of the Will to Power as eternal return of the same, see *The Wreath of Wild Olive*, especially Chapter 1, "Nietzsche or Schopenhauer?" and Chapter 5, "Allegory, Power, and Postmodernism."
11. To give just one extreme, but not unrelated example (which would have undoubtedly interested Grass), there is the recent legal case of a German ritualistic cannibal, who advertised for a sacrificial victim on the Internet and, sure enough, found someone willing to be sacrificed and eaten. The two Internet users met, and the cannibal killed and ate his victim, but not before the two shared a meal consisting of the victim's cooked penis. The trial posed serious problems for the prosecution, because German law does not provide for bizarre cases such as cannibalism.
12. I would like to thank Hardy Schloer, Director of OSAQA Institute in Spain and CTO of RavenPack AG of Munich, for giving me access to his unpublished papers on QRT, as well as to privileged and confidential information regarding his advanced technology platform, RavenSpace II. In this chapter, I shall comment only on QR theory (which serves as a theoretical basis for RavenSpace II) and its possible ramifications for intercultural learning and research. Needless to say, I do not possess sufficient expertise to offer any technical evaluation of the platform itself, even if I were not bound by a confidentiality agreement. I have also included, in the Appendix of the present book, a brief overview of QR, as presented by Schloer and his close collaborator, Philip Gagner, who worked, during the early stages of his career, under Marvin Minsky, in his AI laboratory at MIT. This overview should give the reader firsthand information on QR and complement my understanding of the theory, which I first gained from the sources I have cited in this endnote.
13. For an exciting attempt to incorporate the mind in the theory and practice of modern medical science, see Deepak Chopra's *Quantum Healing*. Chopra creatively combines concepts from ancient Ayurvedic medicine and from quantum physics to develop a body/mind medical practice. There is also the very seminal research of Ken Wilber, from *Quantum Questions* (1984) to *Integral Psychology* (2000). The latter book is a monumental treatise, attempting to integrate the various theories of mind and consciousness that have arisen

through the ages in both the East and the West. The works of Chopra and Wilber are excellent examples of the kind of intercultural research projects that I have been pleading for in the present book.

14. In addition to Einstein and Whitehead, a large number of contemporary scientific and philosophical works have emphasized the dynamic and weblike nature of reality that also constitutes the QR basic philosophical premise. See, among many others, Ervin Laszlo, *Introduction to Systems Philosophy* (New York: Harper, 1973), Fritjof Capra, *The Web of Life: A New Synthesis of Mind and Matter* (London: Harper-Collins, 1997), as well as his earlier *The Tao of Physics: An Exploration of the Parallels between Modern Physics and Eastern Mysticism* (London: HarperCollins, 1975); and Arran Gare, *Beyond European Civilization. Marxism, Process Philosophy and the Environment* (BungaSdore, Australia: Eco-Logical Press, 1993). For an excellent comparative study of the nonlinear thinking of systems theory and that of early Buddhism, see Joanna Macy, *Mutual Causality in Buddhism and General Systems Theory: The Dharma of Natural Systems* (Albany, NY: State University of New York Press, 1991). For early Buddhism, Taoism and systems theory, see also Chapter 4 of *Global Intelligence and Human Development.*