Information Technology, Globalization and Social Development

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Introduction

The world is in the midst of an historical transformation at the turn of the millennium. Like all major transformations in history, it is multidimensional: technological, economic, social, cultural, political, geopolitical. Yet, in the end, what is the real meaning of this extraordinary mutation for social development, for people's lives and well being? And is there a shared meaning for everyone, or must we differentiate people in terms of their specific relationship to the process of social change? If so, what are the criteria for such a differentiation?

There is a raging debate in the world on the mixed record of the information technology revolution, and of globalization -- especially when we consider their social dimensions on a planetary scale. As is always the case with a fundamental debate, it is most often framed ideologically and cast in simplistic terms. For the prophets of technology, for the true believers in the magic of the market, everything will be just fine, as long as ingenuity and competition are set free. All we need are a few regulatory fixes, to prevent corruption and to remove bureaucratic impediments in the path of our flight to hyper-modernity. For those around the world who are not ecstatic about surfing on the Internet, but who are affected by layoffs, lack of basic social services, crime, poverty and disruption of their lives, globalization is nothing more than a warmed up version of traditional capitalist ideology. In their view, information technology is a tool for renewed exploitation, destruction of jobs, environmental degradation and the invasion of privacy. Techno-elites versus neo-luddites.

Of course, the real issues are not in-between, but elsewhere. Social development today is determined by the ability to establish a synergistic interaction between technological innovation and human values, leading to a new set of organizations and institutions that create positive feedback loops between productivity, flexibility, solidarity, safety, participation and accountability, in a new model of development that could be socially and environmentally sustainable.

It is easy to agree on these goals, but difficult to develop the policies and strategies that could lead to them. Some of the disagreement comes, certainly, from conflicting interests, values and priorities. But a considerable source of current disarry in social and economic policies stems from the lack of a common understanding of the processes of transformation under way, of their origins and their implications. This paper aims at clarifying the meaning of this transformation, particularly focusing on the processes that are usually considered to be its triggers: the information technology revolution and the process of globalization. As we shall see, in fact, these two processes interact with others, in a very complex set of actions and reactions. But they

offer a fruitful entry point to discuss the connection between the new socio-economic system and the generation of inequality and social exclusion on an unprecedented, planetary scale.

Thus, after having characterized technological innovation, organizational change and globalization, I will analyze the various dimensions of inequality and social exclusion, showing the depth of our social crisis, and I will provide some hypotheses on the reasons for its accentuation in the last decade. I will conclude by proposing a redefinition of the field of social development, appropriate to tackle the issues that condition our capacity to live together in the new context of the Information Age. In proceeding along the lines of this argument, I have in mind a variety of data, from reliable sources, that make somewhat plausible the analysis presented here. However, since I have just published a book that brings together many of these data, I take the liberty of referring the reader to it, in order to concentrate here on the schematic presentation (and expanded elaboration) of my argument without repeating the presentation of data sources (see Castells, 1996, 1997, 1998; see also the synthesis of data on world poverty presented in the 1997 Human Development Report, published by UNDP).

The new socio-economic system: Information technology, networking, globalization

In the last quarter of this century, a new form of socio-economic organization has emerged. After the collapse of statism, in the Soviet Union and throughout the world, it is certainly a capitalist system. Indeed, for the first time in history the entire planet is capitalist, since even the few remaining command economies are surviving or developing through their linkages to global, capitalist markets. Yet this is a brand of capitalism that is at the same time very old and fundamentally new. It is old because it appeals to relentless competition in the pursuit of profit, and individual satisfaction (deferred or immediate) is its driving engine. But it is fundamentally new because it is tooled by new information and communication technologies that are at the roots of new productivity sources, of new organizational forms,and of the formation of a global economy. Let us briefly examine the profile of this new world we are living in, which in fact is shared by all countries despite the diversity of their cultures and institutions.

Information and communication technology as a strategic tool.

Information technology is not the cause of the changes we are living through. But without new information and communication technologies none of what is changing our lives would be possible. In the 1990s the entire planet is organized around telecommunicated networks of computers at the heart of information systems and communication processes. The entire realm of human actitivity depends on the power of information, in a sequence of technological innovation that accelerates its pace by month. Genetic engineering, benefitting from this wealth of information processing capacity, is progressing by leaps and bounds, and is enabling us, for the first time, to unveil the secrets of living matter and to manipulate life, with extraordinary potential consequences. Software development is making possible user friendly computing, so that millions of children, when provided with adequate education, can progress in their knowledge, and in their ability to create wealth and enjoy it wisely, much faster

than any previous generation. Internet – today used by about 100 million people, and doubling this number every year – is a channel of universal communication where interests and values of all sorts coexist, in a creative cacophony. Certainly, the diffusion of information and communication technology is extremely uneven. Most of Africa is being left in a technological apartheid, and the same could be said of many other regions of the world. The situation is difficult to remedy when one third of the world's population still has to survive on the equivalent of one dollar per day.

Technology per se does not solve social problems. But the availability and use of information and communication technologies are a pre-requisite for economic and social development in our world. They are the functional equivalent of electricity in the industrial era. Econometric studies show the close statistical relationship between diffusion of information technology, productivity and competitiveness for countries, regions, industries and firms (Dosi et al., 1988). They also show that an adequate level of education in general, and of technical education in particular, is essential for the design and productive use of new technologies (Foray and Freeman, 1992). But neither the sheer number of scientists and engineers nor the acquisition of advanced technology can be a factor of development by itself (neither was enough for the Soviet Union – see Castells and Kiselyvova, 1995), without an appropriate organizational environment.

The crucial role of information and communication technologies in stimulating development is a two-edged sword. On the one hand, it allows countries to leapfrog stages of economic growth by being able to modernize their production systems and increase their competitiveness faster than in the past. The most critical example is that of the Asian Pacific economies, and particularly the cases of Hong Kong, Taiwan, Singapore, Malaysia and South Korea. This is so despite the current financial crisis, which is unrelated to competitive performance and may be related, in fact, to the attractiveness of booming Asian economies to global capital flows. On the other hand, for those economies that are unable to adapt to the new technological system, their retardation becomes cumulative. Furthermore, the ability to move into the Information Age depends on the capacity of the whole society to be educated, and to be able to assimilate and process complex information. This starts with the education system, from the bottom up, from the primary school to the university. And it relates, as well, to the overall process of cultural development, including the level of functional literacy, the content of the media, and the diffusion of information within the population as a whole.

In this regard, what is happening is that regions and firms that concentrate the most advanced production and management systems are increasingly attracting talent from around the world, while leaving aside a significant fraction of their own population whose educational level and cultural/technical skills do not fit the requirements of the new production system. A case in point is Silicon Valley, the most advanced information technology producing region in the world, which can only maintain the pace of innovation by recruiting every year thousands of engineers and scientists from India, China, Taiwan, Singapore, Korea, Israel, Russia and Western Europe, to jobs that cannot be filled by Americans because they do not have proper skills (Benner, in progress). Similarly, in Bangalore, Bombay, Seoul or Campinas, engineers and scientists concentrate in high technology hubs, connected to the "Silicon Valleys" of the world, while a large share of the population in all countries remains in low-end,

low-skill jobs, when they are lucky enough to be employed at all. (Carnoy, 1999). Thus there is little chance for a country, or region, to develop in the new economy without its incorporation into the technological system of the information age. Although this does not necessarily imply the need to produce information technology hardware locally, it does imply the ability to use advanced information and communication technologies, which in turn requires an entire reorganization of society (Castells and Tyson, 1988, 1989).

A similar process affects the life chances of individuals. Not everybody should be a computer programmer or a financial analyst, but only people with enough education to reprogramme themselves throughout the changing trajectory of their professional lives will be able to reap the benefits of the new productivity. What about "the others"? It depends on social organization, the strategies of firms, and public policies. But left to market forces, there is an undeniable tendency toward a polarized social structure, between countries and within countries, as I will show below.

In sum, information and communication technology is the essential tool for economic development and material well being in our age; it conditions power, knowledge and creativity; it is, for the time being, unevenly distributed within countries and between countries; and it requires, for the full realization of its developmental value, an inter-related system of flexible organizations and information-oriented institutions. In a nutshell, cultural and educational development conditions technological development, which conditions economic development, which conditions social development, and this stimulates cultural and educational development once more. This can a be a virtuous circle of development or a downward spiral of underdevelopment. And the direction of the process will not be decided by technology but by society, through its conflictive dynamics.

Globalization.

There is so much ideology surrounding this notion, and its implications, that it is essential to characterize globalization precisely, and then determine its extent and evolution in empirical terms (see Hirst and Thompson, 1996). Although globalization is multidimensional, it can be better understood starting with its economic dimension. A global economy is an economy whose core activities work as a unit in real time on a planetary scale. Thus capital markets are interconnected world wide, so that savings and investment in all countries, even if most of them are not globally invested, depend for their perfomance on the evolution and behavior of global financial markets.

In the early 1990s multinational corporations employed directly "only" about 70 million workers, but these workers produced one-third of the world's total private output, and the global value of their sales in 192 was US$ 5,500 billion, which is 25 per cent more than the total value of world trade in that year (Bailey et al., 1993). Therefore multinational corporations, in manufacturing, services, and finance, with their ancillary networks of small and medium businesses, constitute the core of the world economy.

Furthermore, the highest tier of science and technology, the one that shapes and commands overall technological development, is concentrated in a few dozen research centers and milieus of innovation around the globe, overwhelmingly in the

United States, Western Europe and Japan. Russian, Indian and Chinese engineers, usually of very high quality, when they reach a certain level of scientific development, can only pursue their research by linking up with these centers. Thus highly skilled labor is also increasingly globalized, with talent being hired around the globe when firms and governments really need the talent, and are ready to pay for it.

At the same time, the overwhelming proportion of jobs, and thus of people, are not global. In fact, they are local and regional. But their fate, their jobs, their living standards ultimately depend on the globalized sector of the national economy, or on the direct connection of their economic units to global networks of capital, production and trade. This global economy is historically new, for the simple reason that only in the last two decades have we produced the technological infrastructure required for it to function as a unit on a planetary scale: telecommunications, information systems, microelectronic-based manufacturing and processing, information-based air transportation, container cargo transport, high speed trains, and international business services located around the world.

However, if the new global economy reaches out to encompass the entire planet -- if all people and all territories are affected by its workings -- not every place, or every person, is directly included in it. In fact, most people and most lands are excluded, switched off, either as producers, or consumers, or both. The flexibility of this global economy allows the overall system to link up everything that is valuable according to dominant values and interests, while disconnecting everything that is not valuable, or becomes devalued. It is this simultaneous capacity to include and exclude people, territories and activities, that characterizes the new global economy as constituted in the information age.

Similar processes of selective, segmented globalization characterize other critical instrumental dimensions of our society, including the media, science, culture and information at large.

Globalization and liberalization do not eliminate the nation state, but they fundamentally redefine its role and affect its operation. Central banks (including the new European Central Bank) cannot really control the trends of global flows in financial markets. And these markets are not always shaped by economic rules, but by information turbulences of various origins. National governments, in order to maintain some capacity to manage global flows of capital and information, band together, creating or adapting supranational institutions (such as the International Monetary Fund, the European Union, NAFTA, or other regional cooperation agencies), to which they surrender much of their sovereignty. So they survive, but under a new form of state that links supranational institutions, national states, regional and local governments, and even NGOs, in a network of interaction and shared decision making that becomes the prevalent political form of the information age: the network state.

In sum, globalization is a new historical reality -- not simply the one invented by neo-liberal idelogy to convince citizens to surrender to markets, but also the one inscribed in processes of capitalist restructuring, innovation and competition, and enacted through the powerful medium of new information and communication technologies.

Networking.

No major historical transformation has taken place in technology, or in the economy, without an inter-related organizational transformation. The large factory, dedicated to mass production, was as critical to the constitution of the industrial age as the development and diffusion of new sources of energy. In the information age, the critical organizational form is networking. A network is simply a set of inter-connected nodes. It may have a hierarchy, but it has no center. Relationships between nodes are asymmetrical, but they are all necessary for the functioning of the network -- for the circulation of money, information, technology, images, goods, services, or people throughout the network. The most critical distinction in this organizational logic is to be or not to be -- in the network. Be in the network, and you can share and, over time, increase your chances. Be out of the network, or become switched off, and your chances vanish since everything that counts is organized around a world wide web of interacting networks.

Networks are the appropriate organization for the relentless adaptation and the extreme flexibility that is required by an interconnected, global economy -- by changing economic demand and constantly innovating technology, and by the multiple strategies (individual, cultural, political) deployed by various actors, which create an unstable social system at an increasing level of complexity. To be sure, networks have always existed in human organization. But only now have they become the most powerful form for organizing instrumentality, rather than expressiveness. The reason is fundamentally technological. The strength of networks is their flexibility, their decentralizing capacity, their variable geometry, adapting to new tasks and demands without destroying their basic organizational rules or changing their overarching goals. Nevertheless their fundamental weakness, throughout history, has been the difficulty of coordination towards a common objective, towards a focused purpose, that requires concentration of resources in space and time within large organizations, like armies, bureaucracies, large factories, vertically organized corporations.

With new information and communication technology, the network is, at the same time, centralized and decentralized. It can be coordinated without a center. Instead of instructions, we have interactions. Much higher levels of complexity can be handled without major disruption. It does not follow, however, that large corporations are being replaced by small and medium businesses, or that multinationals are obsolete. We observe, in fact, the opposite: there is merger mania around the world. Bigger appears to be increasingly beautiful, as Citicorp marries Traveler Insurance, Bank of America leaves its heart in San Francisco but moves its money to North Carolina, Daimler Benz swallows Chrysler, Volkswagen upgrades itself to Rolls Royce status, and American banks digest Asian banks and financial corporations, in a historical revenge of the West against the high-growth areas of the Pacific.

But the concentration of capital goes hand in hand with the decentralization of organization. Large multinational corporations function internally as decentralized networks, whose elements are given considerable autonomy. Each element of these networks is usually a part of other networks, some of them formed by ancillary small and medium businesses; other networks link up with other large corporations, around specific projects and tasks, with specific time and spatial frames.

Yes, ultimately all this complexity boils down to the need to assure a profit. But how, and for whom? Once CEOs have served themselves, lavishly, there is still most of the capital to be distributed among increasing numbers of shareholders. Earnings do not remain in the firm (whether dedicated primarily to manufacturing, finance, or services): they are invested in the global casino of inter-related financial markets, whose fate is ultimately determined by a series of factors. Only some of those factors have to do with economic fundamentals. Because of this level of unpredictability and complexity, the networks in which all firms, large or small, are anchored, move along, readapt, form and reform, in an endless variation. Firms and organizations that do not follow the networking logic (be it in business, in media, or in politics) are wiped out by competition, since they are not equipped to handle the new model of management.

So, ultimately, networks -- all networks -- come out ahead by restructuring, even if they change their composition, their membership, and even their tasks. The problem is that people, and territories, whose livelihood and fate depend on their positioning in these networks, cannot adapt so easily. Capital disinvests, software engineers migrate, tourists find another fashionable spot, and global media close down in a downgraded region. Networks readapt, bypass the area (or some people), and reform elsewhere, or with someone else. But the human matter on which the network was living cannot so easily mutate. It becomes trapped, or downgraded, or wasted. And this leads to social underdevelopment, precisely at the threshold of the potentially most promising era of human fulfillment.

The other side of the Information Age: Inequality, poverty, misery and social exclusion

To analyze current trends of poverty and inequality in the world, we need to establish some conceptual clarity by distinguishing, first, between relationships of consumption and relationships of production; and then by differentiating four specific processes in both sets of relationships. Relationships of consumption refer to the appropriation by people of the product of their work. Here, we must differentiate between inequality, polarization, poverty and misery. Inequality refers to the unequal appropriation of wealth (income and assets) by individuals or social groups. Polarization is a specific process of inequality that occurs when both the top and the bottom of a scale of wealth distribution grow faster than the middle. Poverty is an institutionally defined norm establishing the level of income that a society considers necessary to live according to an accepted standard. Misery, or extreme poverty, is an institutionally defined level that establishes the lowest material standard of living, making survival problematic.

When we observe the evidence of social trends in the world -- within countries and between countries, and among people -- in the last two decades, the following trends can be detected. There is increasing inequality between countries in the world at large, while intra-country inequality offers a mixed record, with some countries improving their condition (e.g., India, the Asian Pacific, Spain), while others have fallen into greater inequality (U.S, UK. Mexico, Brazil). Polarization is on the rise everywhere. At a global level, the ratio of income for the top 20 per cent of the population to the income of the bottom 20 per cent jumped from 30 to 1 in 1960 to 78 to 1 in 1994. And the personal assets of 385 billionaires in the world are now higher than the annual income of countries representing 45 per cent of the population of the planet.

The evolution of poverty is complex. Modernization has contributed to reducing the proportion of poor people in some very large countries, including China, India and Brazil. Still, the proportion of the poor is growing in most countries. And the number of people living in poverty has significantly increased everywhere. Furthermore extreme poverty, or misery -- usually defined as the proportion of people who are below 50 per cent of the poverty line --is the lot of the fastest growing segment of the poor population in almost every country (see sources cited by Castells, 1998, pp. 75-82, and UNDP, 1997).

As for relationships of production, they refer to the ways and means through which people provide for their livelihood. Here I will not go into a full fledged analysis of all relationships of production existing in our society, but I will focus on the four conditions that seem to be decisive in affecting relationships of consumption. The first process, characterizing the information age as a result of its networking form of organization, is the growing individualization of labor: I refer to the process by which labor's contribution to production is defined specifically for each individual, with little reference to collective bargaining or regulated conditions. If the industrial era consisted, in terms of the labor process, of taking a population of peasants and craftsmen and bringing them into socialized conditions of labor, the information age is exactly the reversal. It is the de-socialization of labor and the increasing flexibility and individualization of labor performance.

This is not necessarily either good or bad. Flexibility of labor can allow people to organize their lives better, or not. But it does transform the social relationship between capital and labor, between management and workers, and among workers themselves. And it has fundamental implications for political action.

A second characteristic of current relationships of production is over-exploitation: I mean the imposition of unfavorable norms of compensation or labor conditions on certain categories of workers because of their vulnerability to discrimination (e.g., immigrants, women, youth, minorities). Women, in particular, have been massively incorporated into paid work, but in many cases at miserable wages (see data in Castells, 1996, chapter 4, and 1997, chapter 4).

A third characteristic is social exclusion, that is the process by which certain individuals or groups are barred from access to social positions that would entitle them to provide for themselves adequately, in an autonomous way, within the context of prevailing institutions and values. Usually, in informational capitalism, such a position is associated with the possibility of access to relatively regular, paid labor for at least one member of a stable household; or with the right to receive sufficient long term benefits from a non-stigmatizing welfare system. There is currently an extraordinary increase in numbers of people who find themselves in situations of social exclusion in practically all countries of the world, with the exception of the Scandinavian democracies (for sources, see Castells, 1998, chapter 2).

Finally, there is a fourth significant type of relationship of production that is relevant to current trends of social underdevelopment: what I call perverse integration. This refers to the labor process in the criminal economy -- in other words, to income-generating activities that are normatively declared to be a crime by the state. As a significant number of people are being excluded from access to regular jobs, they are

moving onto this shop floor of crime. One could say that some have little choice. People who are not needed in the information age do not vanish: they are there. And in fact, they are increasingly there, because -- with the exception of Russia -- many populations now have an increasing life expectancy. (For more on the explosion of the criminal economy throughout the world -- and, accordingly, a boom in its employment capacity -- see Castells, 1998, chapter 3).

Links between informational capitalism and the growing social crisis

These, however, are simply observations of a growing social crisis (and not exempt from controversy concerning the selection and interpretation of data). What does the analysis mean? What is the relation of these trends, if any, to the structure and dynamics of informational, global capitalism?

First, the extreme social unevenness of the process is linked to the flexilibity and global reach of informational capitalism. If everything, and everyone, who can be a source of value can be easily connected -- and as soon as he/she/it ceases to be so, can be easily disconnected (because of individualization and extreme mobility of resources) -- then the global system of production is populated simultaneously by extremely valuable and productive individuals and groups, and by people (or places) who are not, or are not any longer considered valuable, even if they are still physically there. Because of the dynamism and competitiveness of the dominant system, most previous forms of production become destructured, and ultimately phased out, or transformed into subdued tributaries of the highly integrated, dynamic, globalized system.

Second, education, information, science, and technology become critical as sources of value creation (and reward) in the informational economy. While formal education has increased throughout the world, the quality of education becomes essential. Most public schools, both in developing countries and in the United States, are simply not up to the task of producing the new, informational labor force. But even in countries with a decent educational system, the overall cultural and technological environment that is required to exercise informational skills does not mirror the dynamism of the system. So lack of education, and lack of informational infrastructure, lead most of the world to be dependent on the perfomance of a few globalized segments of their economies, increasingly vulnerable to the whirlwind of global financial flows.

Third, as new technologies, new production systems, and the organization of international trade eliminate traditional agriculture (still employing two-thirds of the people in the world in this end of millennium), a rural exodus of gigantic dimensions is being propelled – particularly in Asia. Rural people are destined to be painfully absorbed into the informal economy of overcrowded megacities on the edge of ecological catastrophe. Fourth, since states are bypassed by global flows, disciplined by the enforcers of these flows (such as the IMF), or limited by the supranational institutions they have initiated to survive somehow in the midst of globalization, welfare states come under attack, regulations break down, and the social contract, wherever it has existed, is fundamentally challenged.

New technologies do not induce unemployment, as has been repeatedly demonstrated by empirical research (Carnoy, 1999). Indeed, at the world level there is a massive

creation of jobs but, in most cases, under conditions of over-exploitation: the most telling development is the employment of about 250 million children at the time work is supposedly ending. But there is unemployment in Western Europe when firms facing tight labor rules, high wages, and generous social benefits refuse to create jobs. Those firms have the possibility of automating, subcontracting, and/or investing elsewhere, while still selling goods and services in the European market. Thus, under current conditions, markets overwhelm regulations and worker protection through relying on the increased mobility of resources made possible in the new technological environment. This is why, in the midst of the most extraordinary period of human ingenuity, people around the world are taken by panic. And this is why, together with affluence and prosperity for a significant minority (about 1/3 of the people in advanced countries, and probably about 1/5 in the world at large, who have substantially improved their living standards in the last 10 years), there is the formation of a fourth world, characterized by social exclusion.

The fourth world

This world is composed of people, and territories, that have lost value for the dominant interests in informational capitalism. Some of them because they offer little contribution as either producers or consumers. Others because they are uneducated or functionally illiterate. Others because they become sick or mentally unfit. Others because they could not afford the rent, became homeless, and were devoured by life in the streets. Others who, unable to cope with life, became drug addicts or drunks. Others because, in order to survive, they sold their bodies and their souls, and went on to be prostitutes of every possible desire. Others because they entered the criminal economy, were caught, and became inhabitants of the growing planet of the criminal justice system (almost 3% of adult males in the United States). Others because they had an incident with a cop, or a boss, or some authority, and got onto the wrong track. And places, entire places become stigmatized, confined by police, bypassed by networks of communication and investment. Thus, while valuable people and places have been globally connected, devalued locales become disconnected, and people from all countries and cultures are socially excluded by the tens of millions. This fourth world of social exclusion, beyond poverty, exists everywhere, albeit in different proportions -- from the South Bronx to Mantes-la-Jolie, from Kamagasaki to Meseta de Orcasitas, and from the favelas of Rio to the shanties of Jakarta. And there is, as I have tried to show, a systemic relationship between the rise of informational, global capitalism, under current historical conditions, and the extraordinary growth of social exclusion and human despair.

Redefining social development in the Information Age

For millennia, social development was tantamount to social survival: the daily goal of people, with the exception of a tiny ruling minority, was to get by, make a family, and steal a few moments of joy out of the harshness of the human condition. This is still the lot of many. Yet over the last two centuries, with the advent of the industrial age, social development came to involve the goal of improving people's livelihood. Capital accumulation and investment, technological development geared towards material production, and massive inputs of labor and natural resources were the generators of wealth, both under capitalism and under statism. Social struggles and political reform – or revolution – took care of diffusing the harvest of productivity

within society at large, albeit with the shortcomings of a world divided between North and South, and organized in class societies that tended to reproduce themselves.

There is something new in the Information Age. It can be empirically argued that at the source of productivity and competitiveness (that jointly determine the generation of wealth and its differential appropriation by economic units), there is the capacity to generate new knowledge and to process relevant information efficiently. To be sure, information and knowledge have always been essential factors in power and production. Yet it is only when new information and communication technologies empower humankind with the ability incessantly to feed knowledge back into knowledge, experience into experience, that there is, at the same time, unprecedented productivity potential, and an especially close link between the activity of the mind, on the one hand, and material production, be it of goods or services, on the other. The old school of thought centered around the notion of human capital is fully vindicated. To invest in education is a productive investment. An educated labor force is a source of productivity. But to be educated means nothing if labor does not enjoy good health, decent housing, psychological stability, cultural fulfillment -- in other words, a multidimensional improvement in the quality of life. Thus welfare states, minus their bureaucratic underpinnings, should be sources of productivity, and not simply burdens on the budget.

Yet the interaction between economic growth and social development in the information age is still more complex. It is the entire social organization that becomes productive or, on the contrary, an obstacle for innovation, and thus for productivity growth. Personal freedom (and therefore liberty in its fullest sense) is a pre-requisite for entrepreneurialism. Social solidarity is critical for stability and thus for predictability in investment. Family safety is essential for the willingness to take risks. Trust in one's fellow citizens, and in the institutions of governance, is the foundation for socializing ingenuity in a given space and time, thus making it possible for others to enjoy the fruits of such ingenuity. In a word (and continuing along the seamless circle of change to which reference was made at the outset of this paper), social development leads to cultural development, which leads to innovation, which leads to economic development, which fosters institutional stability and trust; and this underlies a new, synergistic model that integrates economic growth and the enhancement of quality of life.

Without social development, without institutional stability, there may still be a diffusion of economic development around the world, but it will be based upon a cost-lowering formula, rather than a productivity-enhancing model. Furthermore, both spirals (the high road to informational productivity, and the low road to economic competitiveness through cost cutting) are cumulative and contagious. If firms, and countries, compete on the basis of worsening the conditions of work, and concentrating as much as possible of the productivity bonanza in a few hands, they will kill incentives for most workers to invest their own mental capital in a collective undertaking, they will slow down the learning curve, and they will restrict both purchasing power and the drive towards innovation. Silicon Valley will still thrive on the basis of innovation, and it will still attract a substantial share of brain power in the field of information technology from around the world. But the proportion of Silicon Valley's techno-elite in relation to the population at large -- even the educated population -- will become so ridiculously small in comparison to its share of power

and wealth, that this will be socially unsustainable. Some people's dream of a shrinking planet, made up of a highly productive, very affluent, avid consumer minority, floating on a cloud over low-skilled generic labor and ignoring the black holes into which devalued people and locales are doomed to sink, is simply untenable. It is a nightmare, shaken by the rage of fundamentalism and by the fear of desperate terrorist threats. The disassociation between economic growth and social development in the information age is not only morally wrong, but also impossible to sustain.

The reintegration of social development and economic growth through technological innovation, informational management, and shared world development will not be accomplished by simply relying on unfettered market forces. Neither will it be born only out of the individual efforts of states, engaging in defensive strategies. It will require massive technological upgrading of countries, firms, and households around the world -- a strategy of the highest interest for everyone, including business, and particularly for high technology companies. (An appropriate use of the Internet is in fact the most important feature in such an upgrading.) It will take a dramatic investment in overhauling the educational system everywhere, through cooperation between national and local governments, international institutions and lending agencies, international and local business, and families ready to make sacrifices for a tangible improvement of their children's future. It will require the establishment of a world wide network of science and technology, in which the most advanced universities will be willing to share knowledge and expertise for the common good. It must aim at reversing, slowly but surely, the marginalization of entire countries, or cities or neighborhoods, so that the human potential that is being wasted -- and particularly that of children -- can be reinvested. All people must become valued producers and consumers, and they must be recognized as human beings in fora other than the thirty second commercials of international organizations.

All this is feasible. We have the technical know how, the technology to do it, and the economic and institutional strategies to implement it. The obstacles, of course, are political. In part, they are related to very narrow business strategies. But if we know what we want, why we want it, and how to do it, we have the basic groundwork from which to try to convince business and governments. I tend to think that it is in the interest of the most enlightened business groups to support the high road of informational development, linking up productivity, quality of life, and investment in technology and education, world wide. And if there is a strong pressure of public opinion in the world in favor of this shared development strategy, with its potentially positive payoff in environmental conservation, governments may join, ultimately, or, else be ousted by their citizens.

Solidarity in a globalized world means global solidarity. And it also means inter-generational solidarity. Our planet is our only home, and we would not like the grandchildren of our grandchildren to be homeless. These are basic, elementary principles of economics and policy-making "as if people matter". And they are in full coherence with the productive, creative logic embedded in our information-based society. If this sounds like wishful thinking, it is only a measure of how bewildered we have become at this critical moment of historical transition.