

The Internet, Global Healthcare Management Systems, and Sustainable Development: Future Scenarios

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ABSTRACT

Telecommunications technologies and the Internet offer a revolution in management of global healthcare systems and sustainable development. This paper explores emergent telecommunications infrastructures and their consequences for the future of healthcare management using a scenario methodology. A world systems view from evolutionary economics provides a unique perspective on sustainable development. System performance on the dimensions of universal access, equitable resource allocation and consumer participation are evaluated in light of ideological, political and cultural considerations of governance. Alternative scenarios vary according to market dynamics led by healthcare institutions (push) or by consumer demand (pull), and according to system control mechanisms that may be technologically embedded, institutional or behavioural. The scenario analysis suggests that telecommunications technologies and the Internet may contribute significantly to improve global healthcare system performance, to manage ideological diversity and to reduce the wide inequities that separate the industrialized nations from the developing world.

1. INTRODUCTION

World population now exceeds 6 billion people, of whom more than 4.7 billion reside in the developing countries (UNDP, 2000; US Census Bureau, 2001). The cumulative fortune of the 200 wealthiest individuals was estimated at more than 1000 billion dollars¹ in 1999 compared to 146 billion dollars, the combined revenues of the 43 least developed nations. It is also estimated by the United Nations Development Project (2000) that basic services including healthcare could be offered throughout the developing world with an additional annual investment of 80 billion dollars. Studies show that the inequalities that characterize the quality of life in the developing world in contrast to the industrialized nations are broadening, and this is particularly true in access to information and telecommunications technologies increasingly important to the performance of economic and social infrastructures for education, healthcare and social services (ITU, 1998, 1999). Costs associated with healthcare services continue to rise, but the origin of the problem in the developing world appears to be more closely associated with organizational and ideological considerations than with availability of financial resources alone. According to Sen (1999), economic analyses demonstrate that life expectancy, a commonly accepted indicator of national healthcare system performance, is only indirectly correlated with gross national product through variables related to equitable wealth distribution and investment in public health services. Sen also points out that healthcare services are generally labour intensive,

¹ All dollar amounts refer to US currency.

and this production factor is less expensive in developing countries. The Cuban case illustrates very effectively Sen's arguments. The World Health Organization (2000) ranks the general performance of the U.S. healthcare system 37th and the Cuban system 39th of 191 member countries; while total healthcare expenditure *per capita* is estimated at \$3724 and \$109 respectively.

It seems clear that information and telecommunications technologies, including the Internet, may change the configuration and modify the definition of healthcare system efficiency and effectiveness throughout the world. Certainly rapid access to medical information and expert consultation represents a very significant advantage, particularly in the developing countries. However, distribution of technological resources and the dynamics of information flows are not symmetrical, posing a particular challenge to the design of healthcare systems for sustainable development. For example, in 1998, the 48 least developed countries received less than .4 per cent of all foreign direct investment (UNDP, 2000). This context requires an integrated world-systems perspective (Goldfrank, 2000; Wallerstein, 2000) on the healthcare sector consistent with evolutionary economic theory (Nelson and Winter, 1982; Nelson and Sampat, 2001).

The objective of this paper is to construct a meta-scenario model of healthcare management and to develop a framework for analysing alternative future trajectories for global sustainable development in this sector:

- Telecommunications, the Internet, and global healthcare system performance
- The future of the global healthcare management system: scenarios
- A meta-scenario model
- Conclusions

2. TELECOMMUNICATIONS, THE INTERNET, AND GLOBAL HEALTHCARE SYSTEM PERFORMANCE

Applications of telecommunications technologies and the Internet to the management of healthcare include the practice of telehealth and telemedicine. *Telehealth* is very broadly defined to include health services, education and research supported by information technology, while *telemedicine* refers more specifically to medical care and procedures offered across a geographical distance and involving two or more actors in collaboration, often in interdisciplinary teams (Industry Canada, 2001). Through these diverse applications, information and telecommunications technologies affect the entire healthcare system, including consumers, physicians and professionals. However, use of these technologies in healthcare management raises numerous legal, ethical, and political considerations, particularly in a context of national development where such innovations have often been associated with deepening domestic inequalities between social elites and the poor in the developing countries as well as the disparity in quality of life separating the developing and the industrialized world.

Such deepening inequalities are sometimes even more pronounced in the industrialized countries where certain groups experience a quality of life inferior to that in the developing countries. Throughout the world it is estimated that one child in six lives in poverty defined as a household with less than 50 per cent of the median household income in their country of residence (Roach, 2000; UNICEF, 2000; Mehrotra, et al., 2000) One in three women has been subjected to physical or psychological abuse by her male companion or spouse (WHO, 2000). According to Sen (1999), a black man residing in New York, San Francisco, or Washington, D. C. has a shorter life expectancy than a man living in India or

Pakistan. Thus to understand the dynamics of the model it is appropriate to formulate a broader world systems perspective on sustainable development (Wallerstein, 2000) rather than to objectify medicine and development as dividing practices described by Foucault (Foucault, 1982; Cullen et al., 1997).

Future scenarios describing global healthcare management systems incorporate the objectives of sustainable development (Galopin et al., 1997, p.2):

- The elimination of poverty, malnutrition and famine throughout the world.
- Universal access to education and healthcare services.
- Improvement of material quality of life and reduction of disparities between the poorest and the wealthiest social strata.
- Protection of the natural environment and climate, renewal of critical biological resources, and pollution control.
- Prevention of international armed conflict.
- Protection of the family, local community and human values of global solidarity.
- Management and control of global population growth.

Consistent with evolutionary economic theory (Nelson and Winter, 1982; Nelson and Sampat, 2001), the transformation process of development is defined within its social and institutional context. This transformation emerges through the “co-evolution of physical and social technologies” (Nelson and Sampat, 2001), where social technologies include institutions and their network configurations. New venture capital markets are also critical (Verspagen, 2000), as are collaboration and partnership at the national and international levels for the creation of global healthcare management systems (Kickenbusch, 2000; Edeger, 2000; Godlee et al., 2000). In most developing countries, traditional technologies continue to be of strategic importance in satisfying the basic needs of the population (Bhalla et James, 1988; James, 1988), while technological innovations are integrated to the extent that they are coherent with the scale and culture of local economic activities. This process is extremely important to a process of development under rationalities differing from the Western techno-economic modernity (Avgerou, 2000; Corea, 2000; Kothari and Mehta, 1988).

The concept of technological blending recognizes the value of local culture in the translation of new technologies (Atkinson et al., 2000), and the diversity of paths leading to technological development or modernization. Decentralization of healthcare management to the local level serves as a vehicle for technology blending and for system responsiveness to local needs through specific social organization and political culture. Local context thus offers the framework for evaluation of responsiveness motivated by accountability for quality of care as well as efficiency of resource management. The processes of consumer participation and empowerment in healthcare planning and decision-making are also founded upon local definition of accountability and access to healthcare data for analysis of local priorities. Exercise of local authority is affected by behavioural aspects of managerial culture through coherence of formal and informal roles, extent of delegation and consultation, leadership style, and integration of individual and collective behavior patterns (Atkinson et al., 2000). Thus healthcare management performance is a complex construct integrating multiple levels of system analysis as well as technological and behavioural components (Donaldson, 1999; National Research Council, 2000).

A model of healthcare management system performance suggested by the World Health Organization (2000) suggests three performance objectives : (1) universal access to quality healthcare services, (2) equitable distribution and control of financial resources, (3) and system responsiveness through patient participation, ethical practice and sharing of responsibility. Achievement of these objectives is evaluated in light of the characteristics of information and telecommunications technologies including functional integration and interoperability, interactive interfaces and user orientation (Harris, 1995). This evaluation framework facilitates integration of future scenarios describing healthcare management system evolution.

3. THE FUTURE OF THE GLOBAL HEALTHCARE MANAGEMENT SYSTEM: SCENARIOS

Information and telecommunications technologies offer many clear opportunities for healthcare management in the developing world. It is estimated that 18 million people die each year of contagious diseases, and 30 million children die each day of preventable causes. A significant proportion of these deaths is due to inadequate preventive healthcare. These rates of mortality could be reduced through rapid availability of appropriate medical information and access to consultation with specialized healthcare professionals. The Internet could also contribute to healthcare management system infrastructures and the equitable allocation and control of human, financial and technological resources. Such infrastructures also play a critical role in public education concerning issues of health and hygiene as well as training of medical and other healthcare professionals (ITU, 1999). Medical and other healthcare research and public health monitoring also depend upon effective medical data collection and database management. Telecommunications technologies and the Internet could improve the accuracy and extent of data collection relative to public health around the world such as statistics concerning birthrates. It is estimated for example that as many as 40 million births go unreported each year (WHO, 2000). Such data are essential to understanding and managing public health.

Barriers to Internet access in developing countries vary according to their cultural and economic specificities but generally costs of computing equipment and software as well as institutional and technological infrastructures are higher *per capita* than in industrialized countries. The 23 most developed countries possess 62 per cent of telephone lines serving only 15 per cent of the world's population (McClelland, 1998). Culture and language also pose obstacles to the development of diverse local content accessible in languages other than English (Renaud and Torrès, 1996; ITU, 1999). Even though non-English speakers will soon represent the majority of Internet users, Internet domain name registrars have only recently begun to consider the use of non-English top-level domain names (Yamada, 2000).

According to many observers, the Internet remains an ethnocentric social construction whose governance is still essentially controlled by U.S. policies, models, and culture. For example, medical gateways such as Medline reflect American medical culture and are often available only in English, while Francophone gateways are designed following the American model and may compromise the cultural integrity of the doctor-patient relationship within the French healthcare management system (Eveillard, 2000). Thus the Internet creates a new context in which legal and ethical considerations modify the doctor-patient relationship and the definition of professional and medical responsibilities beyond national boundaries (Martin, 2000; Kuszler, 1999; Terry, 1999). Of particular significance is the specialized role of the medical information professional. For example, programming analysts and network administrators share a technological culture and they may have substantial influence on

construction and configuration of healthcare management systems (Gaunt and Roger-France, 1996).

The foregoing discussion of opportunities and risks associated with applications of telecommunications technologies and the Internet to healthcare system management suggests the usefulness of a scenario-building methodology for analysis of alternative future development trajectories. This methodology integrates inductive and deductive logics to identify dimensions of uncertainty affecting future development and to analyze their consequences (Morrison and Wilson, 1996; Gallopin et al., 1997; Van der Heijden, 1997; Mittman and Cain, 1999). The evolving world system perspective integrates multiple levels of analysis and interacting subsystems (Gallopin et al., 1997). The healthcare management system includes global, regional, national and local levels as well as network relations among system entities and analysis of structures and processes within entities. Criteria for evaluation of healthcare management scenarios include integration of all relevant system levels, comprehensive identification of major issues and trends, methodological rigour in theory development, and diversity in underlying ideologies, and worldviews represented. Although applications of scenario methods vary among academic disciplines, they generally offer tools for systematic construction of logical stories describing alternative futures (Gallopin et al., 1997). Scenario methods require definition of (1) the current system state, (2) dominant driving forces shaping evolution of the current state in the future, and (3) critical dimensions of uncertainty determining alternative paths to the future.

Future scenarios describing the global healthcare management system rely more broadly on models describing future development of telecommunications and Internet infrastructures (ITU, 1999; Kelley, 2000; Mittman and Cain, 1999; Stead et al., 2000; Howkins and Valantin, 1997). Growth of the telecommunications sector and the Internet affects healthcare management in significant ways. First, the extremely high rate of growth has surpassed any other technological innovations. While adoption of the telephone reached 50 million users over a period of 75 years, the Internet has reached that number of users in only 4 years. Exponential rates of network growth challenge institutional capacities for adaptation, particularly in coordinating and controlling complex medical services and in educating healthcare professionals. An important problem caused by high rates of technological change is the lack of qualified information professionals to manage telecommunications networks and information technologies in healthcare management in industrialized nations as well as the developing world. Integration of the global healthcare management system also depends on the degree of inclusiveness of the global community and strategies adopted by the developing countries to join the information society (Howkins and Valantin, 1997).

According to Kelley (2000), these tendencies in telecommunications and Internet growth will lead to development of Internet and telecommunications network infrastructures in three phases. In the first phase, convergence between enterprise intranets and Internet contributes to development of services such as content distribution and access infrastructures directly offered on the Internet. Examples include email services among healthcare professionals and patients, discussion and support groups, messaging and fax services, specialized information search and portal infrastructures, and Web hosting. Management of such services on the Internet reduces the need for specialized personnel such as Webmasters and network managers within traditional healthcare institutions. The second phase of Internet development is characterized by emergence of software applications also available directly on the Internet to reduce software licensing as well as human resources and other administrative costs associated with the traditional model. In the third phase database management is further outsourced to Internet infrastructures, reducing network complexity

and overload while increasing the speed, reliability and rigour of information search and processing. In healthcare management, institutional infrastructures emerging on the Internet are transforming the configuration of user-oriented services, clinical collaboration and decision making, financial and administrative transactions, public health services, medical and other professional education and training, and research in medicine and all related areas. These infrastructures also increase the potential for integration of the developing world in the global healthcare system.

While telecommunications and Internet infrastructures change the configuration of institutional networks serving healthcare, the information architectures of healthcare institutions are also evolving to facilitate integration and interoperability of increasingly diverse entities of the global healthcare system (Stead, 2000). At the local level, the design and development of medical data banks serve a variety of functions such as data entry when patients register at a hospital and activation of expert protocols for clinical and best practise decision making in narrowly defined domains. The next level of process integration is characterized by local area network (LAN) interconnection to facilitate access, communication and data exchange among healthcare entities governed by explicit norms. However, each entity possesses a distinct enterprise model and database structure such that significant incompatibility and system redundancy may result. At the third level of analysis programming languages such as SGML and XML as well a object oriented system architectures and data mining permit construction of ontological relations among very diverse information entities. This development contributes to the feasibility of a global information system with the capacity to integrate linguistically and culturally diverse subsystems. However, certain costs are associated with such synergies, in particular ambiguity of information translation among different entities and the abstraction of form from content pose difficulties for quality control of medical information and services throughout healthcare management systems.²

According to Fuller and Tolia (1998), user behaviour and Internet growth rate are the dimensions most critical to future scenarios of Internet development. Moderate Internet growth would give rise to expert power and control depending on patterns of user behaviour. Where users are active, the digerati (experts and professionals) exercise authority in hierarchical configurations while in a context of passive user behaviour, governments, national and international institutions enact 'big brother' surveillance. On the other hand, Internet hyper-growth creates a market dynamic where passive user behaviour would result in emergence of portal infrastructures for information distribution, while active user behaviour would be associated with greater information symmetry among individual, corporate and institutional users. Future healthcare management systems may be described by each of these four scenarios depending upon the specific clientele and the ideological context analyzed. Consumers of healthcare information and services may include doctors and other specialized professionals, managers and administrative personnel, patients, and the general public. Ideological context particularly affects the hierarchical relation between healthcare professionals and their patients as well as the emphasis on individual choice with respect to collective or institutional interests and priorities. Free healthcare market dynamics promote deprofessionalisation of healthcare and information symmetry among market actors while a more socialized model of healthcare delivery creates powerful centralized government institutions (National Health Service Information Authority, 2000, 2001).

² See Eysenbach et al. (2000) for a discussion of information quality control and certification using a metadata structure.

Enterprise reengineering, including redesign of traditional healthcare institutions, is a process parallel to Internet development and the emergence of telecommunications network institutions (Tapscott, 1996; Stead et al., 2000). Laubacher and Malone (1997) have elaborated two future enterprise scenarios as a function of network configuration. The first scenario proposes dynamic network structures connecting small enterprises and projects. Decentralized control based on emergent norms and standards resides at the level of project management, while resources and key competencies are allocated in external electronic markets. In the second scenario, economic activity is organized in large conglomerates described as virtual nations or *keiretsu*. These large and powerful enterprises are vertically and horizontally integrated and they allocate resources and competencies through extensive internal markets controlled by organizational structures as well as hierarchical authority. According to the Madingly scenarios and Ling (1999), future healthcare management systems will also evolve as a function of market forces balancing the dynamics of consumer choice and professional authority founded in the values of science and religion. The logic of these scenarios is consistent with that of Laubacher and Malone (1997).

Critical to future scenarios describing healthcare management systems are universal global access to healthcare services and the ubiquity of Internet in collective experience (Mittman and Cain, 1999). Personalized medical information services will respond to consumer demand on the Internet. The quality of information and services offered on these specialized Internet sites will be assured by professional criteria for Website construction such as those published by the American Medical Association (Winker et al., 2000) and certified by recognized healthcare authorities. Consumers seeking information will also be guided by criteria developed to assist them in evaluating the reliability and validity of such information on the Internet (Kim et al., 1999). Consumers will further be protected by codes of ethics governing professional conduct on the Internet at all levels of the healthcare system (Internet HealthCare Coalition, 2000; Rippen and Risk, 2000; Health on the Net Foundation (HON), 1997). The active participation of consumers in the system will be facilitated by user-oriented discussion fora and support groups for patients sharing common questions and problems. Other information services will support physician and professional roles through publication of scientific studies and meta analysis of such research results (Chartron and Salaün, 2000).³ Research results also contribute to the development of decision support models for clinical decision making and interdisciplinary collaboration in virtual teams (Patel et al., 1999; 2000). Several projects illustrate these initiatives to create clinical guideline repositories within transnational telematic infrastructures that support authoring, exchange, dissemination and application of research and consensus based guidelines for routine clinical care.⁴

Effective medical research planning at the global level requires better consideration of the needs and priorities of developing countries including the elaboration of research instruments and methodologies to promote equity in healthcare services such as costly medical treatments for HIV and AIDS and research on vaccines and infectious diseases such as tuberculosis and malaria primarily affecting populations in developing countries (Sitthiamorn and Somrongthong, 2000; Lee and Mills, 2000; Benatar and Singer, 2000). Electronic

³ See the NHS Centre for Reviews and Dissemination, Database of Abstracts of Reviews of Effectiveness, University of York: <http://agatha.york.ac.uk/darehp.htm>

⁴ See clinical decision support models such as GLIF (Greenes et al., 1999), Prestige (Gordon and Veloso, 1999), PROforma (Fox et al., 1998), and Prodigy (Sowerby Center, 1998). See also the development of integrated administrative decision-making models at the Websites of the NHS healthcare Modelling Programme: <http://www.standards.nhs.uk/hcm/Index.htm> and the American Medical Association Office of Electronic Medical Systems: <http://www.ama-assn.org/med-sci/cpt/oems.htm>

databases and public health monitoring systems using remote sensing technologies contribute to global research planning processes and governance (Freimuth et al., 2000; Beck et al., 2000; Howard, 2000; McGlynn et al., 1998), as these data are made available to medical researchers and healthcare policy-makers (Greiner and Rose, 1997; Burchill et al., 2000). The creation of structured databases promotes standardized nomenclatures and methodologies, codification of medical knowledge, and interdisciplinary and inter-institutional collaboration. Such databases also support project management and control, and publication of research results (Burchill et al., 2000).

Some scenarios address resource allocation mechanisms and social security in healthcare management systems (Rai, 1999). Saturation of healthcare markets in industrialized countries and lack of regulation of healthcare in developing countries contribute to the integration of an ideologically diverse global healthcare system. Diverse models of service distribution and payment promote entry of new institutional actors into the healthcare system, while development of advanced telecommunications infrastructures may support either centralized healthcare authority such as the British National Health Service or free market dynamics driven by consumer demand. Consumer participation is associated generally with system emphasis on preventive healthcare strategies (Jarudi, 2000).

These scenarios are not mutually exclusive and they illustrate the political economy of future social systems in which diverse ideologies may be integrated at the global level. Consumer participation plays an important role while at the same time managerial tools are designed to control healthcare costs. According to Rai (1999), constraints on budgets as well as other healthcare resources will lead to reflexive rationalisation of healthcare services taking into account individual and collective consumer preferences. These preferences may be integrated in formal contract terms describing not only the criteria for certain strategic healthcare choices, but the rationalization methodology. For example, the healthcare contract might specify the relative weights assigned to the criteria of life expectancy and quality of life, as well as the decision model for integration of these criteria in strategic healthcare decisions related to cardiac surgery. The efficiency of reflexive rationalization in healthcare markets depends upon the principle of universal access to information and services and the symmetry of information flows among consumers and healthcare professionals (Eysenbach, 2000; Brennan and Strombom, 1998). Some research has demonstrated that consumer information with participative decision making and risk sharing may reduce demand for expensive medical procedures such as surgery (Pencheon, 1998).

4. A META-SCENARIO MODEL

Recent evolution of the global healthcare management system has tended to validate scenarios predicting the important role to be played by consumers (Eysenbach, 2000; Jones, 2000; Ling, 1997). The critical dimensions of the scenarios identified in this review are shown in Figure 1.

Figure 1: A META-SCENARIO MODEL

Control Processes and Structures			
		Norms and Standards : Behavioral Control CLANS	Telecommunications Infrastructure : HIERARCHIES
MARKET DYNAMICS : HEALTHCARE PRODUCTS AND SERVICES	SUPPLY-PUSH : PROFESSIONALS	<p>Access controlled by healthcare professionals</p> <p>Professional authority.</p> <p>Professional hierarchies.</p> <p>Codes of ethics for professional cyberbehavior.</p> <p>Professional criteria for presentation of Web content and other electronic healthcare information.</p> <p>Professional certification of healthcare workers, services and institutions.</p> <p>PROFESSIONAL VALUES Example: American Medical Association -http://www.ama-assn.org/</p>	<p>Access controlled by telecommunications network technologies</p> <p>Institutional authority.</p> <p>Institutional hierarchies.</p> <p>Codes of ethics for institutional cyberbehavior.</p> <p>Institutional standards for presentation of Web content and other electronic healthcare information.</p> <p>Institutional certification by network affiliation.</p> <p>INSTITUTIONAL VALUES Example : British National Health Service -http://www.nhs.uk/</p>
	DEMAND-PULL : CONSUMERS	<p>Access controlled by individual consumer choices and availability of services in the market.</p> <p>Decentralized and deprofessionalized authority with individual consumer participation.</p> <p>Codes of ethics for individual cyberbehavior.</p> <p>Certification of products and services by independent evaluators.</p> <p>Criteria for individual consumer evaluation of Web content and other electronic information developed with consumer participation.</p> <p>CONSUMER VALUES Example : WebMD Health - http://my.webmd.com/index</p>	<p>Access controlled by collective choices and network protocols.</p> <p>Decentralized and deprofessionalized authority with local hierarchies governing institutions and consumer organizations.</p> <p>Codes of ethics for collective behavior and affiliation within the healthcare community.</p> <p>Certification of products and services by institutional evaluators and consumer organizations.</p> <p>Criteria for collective consumer evaluation of Web content and other electronic information</p> <p>MANAGERIAL VALUES Example: Kaiser Permanente - http://www.kaiserpermanente.org/</p>

Globalisation of Telecommunications Infrastructures and Control Processes Shaping Healthcare Management Systems

Telecommunications infrastructures and the Internet contribute to control mechanisms of healthcare management systems through network structures and transaction services offered directly on the Internet (Stead et al., 2000). Technological advances extend the classic concepts of markets or clans and hierarchies in economics and organizational theory (Williamson, 1975). Clan control is expressed through norms and standards emergent in behaviour on the Internet. Examples of clan or behavioural control include voluntary codes of ethics governing cyberbehaviour, norms for presentation of Web content, and criteria for consumer evaluation of electronic information. On the other hand, network technologies and the Internet give rise to institutional hierarchies of control embedded within the technologies themselves. Technological control mechanisms may effectively regulate access to healthcare services and information, and ensure system security, confidentiality and integrity. While these infrastructures may in some cases replace traditional institutional networks, they may also extend or complement existing structures. Intranets within such traditional institutions may also serve as vehicles for clan or behavioural control processes. Furthermore, professional or institutional intranets may function in parallel to the Internet to offer hierarchical control while at the same time making the system accessible to an extended community for consumer information and control. Availability of software applications and medical database management infrastructures on the Internet favour universal access and equity with respect to healthcare services beyond national boundaries. Global infrastructures also contribute to international research governance and public health monitoring with the participation of developing countries, and they serve as structural quality control mechanisms through network protocols and affiliation. At the same time they facilitate emergence and diffusion of behavioural controls at local levels of the institutional network.

Market Dynamics and Ideologies Governing Healthcare Service Distribution and Resource Allocation

Supply and demand in healthcare markets are governed by dynamics of interaction among market actors: information and service providers and consumers, healthcare professionals, patients, and the public at large. Information and service supply express medical expertise mediated through telecommunications infrastructures or interaction among autonomous network actors. While all of the scenarios emphasize consumer participation and demand, institutional ideology affects the form of this participation and how resources are distributed as a result. The emergence of telecommunications infrastructures serving healthcare product and service supply favours the centralized model of social medicine with universal access, equitable distribution of services, and structural control mechanisms ensured by telecommunications and other information technologies. As in the example of the British NHS, institutional network affiliation certifies information and service quality. On the other hand, free market dynamics among autonomous actors on the Internet governed by consumer demand strengthens the formation of discussion and support groups for peer-to-peer transmission of information and the consequent diversification and deprofessionalization of healthcare systems. While diversity and deprofessionalization challenge quality control, review can be ensured by independent evaluators certifying products, services and information without prejudice of conflict of interest. Healthcare free markets encourage active consumer participation and information symmetry among consumers, and professional and institutional actors. Such information symmetry in turn contributes to consumer empowerment and risk-sharing with professional service providers.

Analysis of the foregoing dimensions as shown in figure 1 gives rise to four alternative scenarios describing future healthcare system management and development governed by professional, institutional, consumer and managerial values. These alternative scenarios are not mutually exclusive but reflect cultural and ideological diversity in healthcare markets. Control mechanisms in healthcare markets driven by service and information supply (*push*) include the important consumer role of feedback to healthcare providers, either through institutional channels or independent quality assurance agencies. On the other hand, markets driven by collective or individual consumer demand (*pull*) involve consumers in active participation in healthcare research, service creation and evaluation. Thus forms of consumer participation are determined by market dynamics and ideologies.

5. CONCLUSIONS

The objective of this review was to present a critical framework for scenario description of the future global healthcare management system development considering global, national, and local levels of analysis. System performance is defined in terms of (1) universal access to quality healthcare services, (2) equitable distribution and control of financial resources, (3) and system responsiveness through patient participation, ethical practice and sharing of responsibility. The review has shown how telecommunications and the Internet with other information technologies contribute to interactive, integrated, and user-oriented services as well as equitable resource distribution depending upon forms of control and market ideologies. Information is the foundation of future healthcare management systems including data driven medical practice, global public health watch and research governance integrating priorities of the developing world.

The meta-scenario model suggests healthcare futures led by professional, institutional, consumer and managerial values. These alternative paths to global healthcare performance suggest the importance of diversity at the global level, and they raise important issues for consideration in ongoing research programs:

The processes of diversification and deprofessionalization of healthcare information, products and services in markets driven by consumers raise issues concerning the ethics of the system. The American experience has shown some of the consequences resulting from the predominance of managerial values over professional concerns. How can these difficulties be addressed while maintaining the objective of efficient system performance and healthcare rationalization?

Consumer participation and free healthcare market dynamics rely on the aggregate of individual choice in governance of healthcare systems with respect to development of healthcare models and efficiency of products and services offered by the system. How can individual consumer choices contribute to the ethic of equitable healthcare in a world-system perspective on sustainable development? How can individual and system requirements be reconciled?

The meta-scenario model suggests diverse paths to global healthcare performance. What are the best strategies to ensure integration of differing healthcare ideologies. How can information and telecommunications technologies continue to contribute to system integration?

The healthcare systems of the twentieth century were characterized by hierarchies of institutional and professional control (Cullen, 1998; Rosenau, 1993; Kothari and Mehta, 1988; Foucault, 1982) while the global village of the twenty-first century is evolving towards inversion of economic, political and social hierarchies. Traditional institutions are becoming more integrated in technological healthcare markets and network infrastructures where

professionals and consumers may be able to participate in a community model of healthcare,⁵ or where the digital divide may yet deepen the inequalities between the privileged and the poor in the new world economy.

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⁵ See Guevara (1960) for a discussion of a community model of medicine.

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