

E-Publishing in Science and Healthcare: Alternative Models for Development

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ABSTRACT

The focus of this critical commentary is the role of e-commerce and the publishing industry in science and healthcare with emphasis on business models and initiatives originating in the developing as well as the developed countries. The commentary is illustrated with the following regional and national examples: (1) the Virtual Health Library created by the Latin American and Caribbean Center on Health Services Information (BIREME), (2) the Scientific Electronic Library Online (SciELO) led by Brazil, Chile and Cuba, and (3) the Cuban Medical Information Portal, INFOMED (Red Telemática de Salud en Cuba).

The *E-Commerce and Development Report 2002* makes an important contribution to the growing literature on commercial activity on the Internet and international development. The broad definition of e-commerce as online trade in products and services is appropriate to the objectives of the report, as stated in the Foreword by the Secretary-General of the United Nations, Kofi Annan, namely to provide information and analysis covering topics that will influence the expansion of e-commerce in developing countries, and to identify policy and business options available to these countries. However, evaluation of the economic value of such trade remains elusive, particularly under the assumption of consumer-driven markets based on financial transactions. The validity of this assumption in understanding ideologically diverse developing economies should be carefully examined and the appropriateness of monetary estimates of the value of e-commerce in these economies should be reconsidered.

In Chapter 7, *E-Commerce and the Publishing Industry*, electronic publishing is defined as delivery of information in electronic format implemented by creating, maintaining, archiving and distributing documents using computers and networks. Such materials may be scanned or converted from another physical format or created specifically for an electronic medium. Categories of e-publications considered in the chapter are newspapers, scholarly journals, and books, while other cultural goods including music, visual arts, cinema, photography, radio, television, and games, are excluded from the analysis.

The chapter should further take into consideration how text publications and other cultural goods are redefined in terms of time and space through the electronic medium. It is important to emphasize that other forms of expression such as music and visual arts are increasingly embedded in electronic text publications. Publication is no longer limited to a particular physical format or the logistical chain serving its production. Regional and local newspapers may become available globally, while scholarly publications and books may reach a much broader readership on demand. Hypertext linkage also makes possible cross referencing among very diverse information sources. For example, e-publication facilitates

integration of formerly differentiated products, such as newsletters, scientific studies, and policy research with hypertext links to pertinent references and data sources. These trends favor the emergence of the global village or “small world”¹, and the democratization of information access.

The medium of e-publication has an important potential to contribute to international development through cost-effective dissemination of information and creation of new opportunities to publish cultural products, literature and scholarly research produced in the developing countries. However the chapter does not address e-publishing innovations pertinent to international development except briefly in Annex 3, and generally the examples discussed are drawn from experience in the industrialized nations of North America and Europe, including Stephen King’s book, *Riding the Bullet*, the French newspaper, *Le Monde*, and scholarly journals on finance and economics. Unfortunately, the report does not consider emerging e-publishing business models such as ‘open access’ now transforming science publication, particularly in the fields of medicine and public health, where the need for freely accessible scientific research results has long been recognized (Godlee et al., 2000; Urra, 2001; Tan-Torres Edejer, 2000). The Budapest Open Access Initiative² supported by the Open Society Institute³ was signed in Budapest, Hungary, on February 14, 2002, by a group of publishers and researchers to promote open access to peer-reviewed journal literature without cost to readers. Alternative sources of funding for peer-reviewed publication include research institutions and universities as well as research funding agencies and philanthropic foundations. Other open access initiatives include the Scholarly Publishing and Academic Resources Coalition (SPARC)⁴, and the Public Library of Science (PLoS).⁵ Related efforts such as the Open Archives Initiative⁶, the Self-Archiving Initiative⁷, E-Prints.org⁸, and OpCit, the Open Citation Project,⁹ further promote free access to research literature (Suber, 2003).

Related to the debate surrounding the open access model of e-publication is the issue of intellectual property (Solomon, 2002; Willinsky, 2002). Chapter 7 of the UNCTAD Report considers conventional copyright ownership and deplors widespread violations of the World Trade Organization Agreement on Trade-Related Aspects of Intellectual Property (1994) and the World Intellectual Property Organization Copyright Treaty (1996). These violations are estimated to occur primarily, although certainly not exclusively, in the developing countries. According to the chapter: “The United States trade losses from piracy are increasing and are expected to grow even more with the development and expansion of new technologies” (p. 173). This perspective emphasizing law enforcement to prevent loss of revenues to US interests ignores the need to develop new business models for international development.

E-publication in the fields of medicine and public health offer case examples of business models pertinent to knowledge creation and dissemination with equitable cost sharing for free access to research literature (Kling et al. 2002; Varmus, 1999). For example, the open access model is embraced by the publishing house BioMed Central¹⁰, and

¹ See Watts (1999) for a study of network dynamics and the small-world phenomenon.

² Budapest Open Access Initiative: <http://www.soros.org/openaccess/read.shtml>

³ <http://www.soros.org/>

⁴ <http://www.arl.org/sparc/home/index.asp?page=0>

⁵ <http://www.publiclibraryofscience.org/>

⁶ <http://www.openarchives.org/>

⁷ <http://www.ecs.soton.ac.uk/~harnad/Tp/nature4.htm>

⁸ <http://www.eprints.org/>

⁹ <http://opcit.eprints.org/>

¹⁰ <http://www.biomedcentral.com/>

independent publications such as the Electronic Journal of Medical Internet Research¹¹. These journal publishers attribute article processing fees to authors' funding agencies with special waivers accorded as a function of ability to pay or institutional affiliation. Authors from the developing countries are exempted from such fees. The British Medical Journal¹², and The Lancet¹³ (McConnell and Horton, 1999) have created freely accessible archives for unreviewed eprints, although usage of these sites seems limited. Standards such as CONSORT¹⁴ and related initiatives including QUORUM¹⁵, MOOSE¹⁶, STARD¹⁷, and ASSERT¹⁸ contribute to quality assurance for research reporting and evidence-based clinical and public health decision making.

Some of the most significant initiatives for e-publication in science and healthcare are those designed in the developing countries. These countries have an urgent need for such information, while their inadequate financial resources often limit their access to the more traditional distribution channels. Several such initiatives serve the Latin American region. Among them are the Virtual Health Library¹⁹ created by the Latin American and Caribbean Center on Health Services Information (BIREME)²⁰, the Scientific Electronic Library Online (SciELO)²¹ led by Brazil, Chile and Cuba, and INFOMED²², the Cuban Medical Information Portal. These programs show how international, regional and national e-publications and databases can be integrated and made freely available for regional development with diverse funding support. The INFOMED Portal further shows the critical importance of resource integration for data-driven medical and public health decision-making and education. The e-publication models adopted in these three cases are designed to support healthcare system structure and outcomes, rather than commercial transactions and business values.

The Virtual Health Library (VHL) (BIREME et al., 2001) consists of a collection or network of health information resources in the Latin American region accessible to users regardless of their physical location. This initiative was created by the Latin American and Caribbean Center on Health Services Information based in Brazil (BIREME) already mentioned²³, and receives support from the Brazilian Ministry of Health,²⁴ the Health and Human Development Program (HDP)²⁵, the Pan American Health Organization (PAHO)²⁶,

¹¹ <http://www.jmir.org>

¹² Launched in December 1999, the *Clinical Medicine and Health Research Netprints* website provides a place for authors to archive their completed studies - before, during, or after peer review by other agencies :

<http://clinmed.netprints.org/home.dtl>

¹³ *The Lancet Electronic Research Archive (ERA)* in international health is a free searchable service for electronic publication of unreviewed and expanded published papers, and for open comment on these papers:

<http://thelancet.com/era/home>

¹⁴ *Recommendations for improving the quality of reports of parallel group randomized trials:*

<http://www.consort-statement.org/>

¹⁵ *Standard for systematic reviews and meta-analyses :* <http://www.consort-statement.org/QUOROM.pdf>

¹⁶ *Standard for meta-analysis of observational studies:* <http://www.consort-statement.org/MOOSE.pdf>

¹⁷ *Standard for reporting studies of diagnostic accuracy:* http://www.consort-statement.org/statement_test.pdf

¹⁸ *Standard for the Scientific and Ethical Review of Trials-* It proposes a structured approach whereby research ethics committees review proposals and monitor the conduct of randomized controlled clinical trials:

<http://www.assert-statement.org/statement.html>

¹⁹ <http://www.bireme.br/bvs/I/ihome.htm>

²⁰ <http://www.bireme.br>

²¹ There is only brief mention of SciELO in Annex 3 of Chapter 7. <http://www.scielo.org/>

²² <http://www.sld.cu/indice.php>

²³ <http://www.bireme.br/bvs/bireme/I/homepage.htm>

²⁴ <http://portal.saude.gov.br/saude/>

²⁵ <http://www.paho.org/project.asp?SEL=OR&LNG=ENG&U=HDP>

²⁶ <http://www.paho.org/default.htm>

and the World Health Organization (WHO)²⁷. Available information resources are created, updated, stored, and manipulated on the Internet by producers, integrators, and intermediaries, in a decentralized manner using common methodologies for their integration into the VHL under the national coordinating centers of participating countries. Collections include electronic and traditional library media in six categories:²⁸

- Traditional information resources.
- Electronic publications of scientific and technical literature organized in online hypertext databases.
- Multimedia and methodological tools to support education and distance learning.
- Push/Selective health information services, aimed at responding to the information needs of specific user communities.
- Newsgroups and discussion forums on national and international health topics, including implementation of the VHL throughout the region.

The VHL offers links to SCAD²⁹, the Cooperative Service for Accessing Documents, to provide access to documents in the health sciences exclusively for scholarly or research purposes. Documents may be delivered by regular mail, fax, email, or Ariel software,³⁰ with nominal payment depending on user category. The National Coordinating Center of Cuba and BIREME are responsible for managing cooperative development of the Health Information Locator (HIL)³¹ tool. Argentina, Brazil, Columbia, Costa Rica, Cuba, Honduras, and Mexico maintain national VHL sites while a large number of initiatives are in the development phase.

SciELO is a model for cooperative electronic publication of scientific journals on the Internet. It uses the VHL infrastructure, and is supported by the State of São Paulo Science Foundation³², BIREME, and most recently the National Council for Scientific and Technological Development,³³ as well as other national and international institutions. A portal provides integrated access to the network of SciELO organizations.³⁴ The SciELO methodology supports electronic publication of scientific journals, creation and maintenance of searchable bibliographic and text databases, preservation of electronic archives and statistical analysis of publication usage as well as impact. Quality control is assured by journal evaluation criteria based on international scientific communication standards. Electronic publication also facilitates hypertext links integrating other national and international databases such as Medline.³⁵ The important principles of SciELO management include reliance on national infrastructures for dissemination of locally generated scientific information to support evidence-based decision making throughout the network (Kling, et al., 2002).

The Cuban Medical Information Portal (INFOMED) illustrates the critical importance of national infrastructures for integration of the VML and SciELO in the context of the Cuban National Healthcare System (Séror, 2003). This national case also shows the potential

²⁷ <http://www.who.int/en/>

²⁸ See Foundations of VHL: VI Meeting of Latin American and Caribbean System on Health Sciences Information San José - Costa Rica - March 23th - 24th 1998 : <http://www.bireme.br/bvs/l/idoc.htm>

²⁹ <http://www.bireme.br/bvs/l/iscad.htm>

³⁰ Ariel is a software package for delivery of document images to the user's IP address.

³¹ This tool is available on the Cuban Virtual Health Library site at: <http://bvs.sld.cu/indice.php>

³² <http://www.fapesp.br/>

³³ <http://www.cnpq.br>

³⁴ <http://www.scielo.org>

³⁵ <http://www.ncbi.nlm.nih.gov/entrez/query.fcgi>

effectiveness of alternative models of e-publication for sustainable development. INFOMED is designed to offer convenient and timely information access required for optimal work performance without regard for physical location or the technical characteristics of work stations. Strategic objectives of the network are to:³⁶

- Facilitate electronic information access through the Cuban Virtual Healthcare Library (Biblioteca Virtual de Salud)³⁷ and SciELO.³⁸
- Facilitate continuing education for healthcare professionals through the Virtual University (Universidad Virtual).³⁹
- Maintain a continuous health information observatory through the National Office for Analysis of Healthcare Trends.⁴⁰
- Develop telemedicine services consistent with levels of telecommunications infrastructure throughout the country.⁴¹
- Facilitate communication and coordination among healthcare institutions within Cuba and outside the country.⁴²

The collaboration of international organizations has been fundamental to the development of INFOMED since its creation in 1992. The United Nations Development Program as well as the Pan-American Health Organization made significant contributions to this effort (Rodríguez Pérez and Urra González, 1996; Urra González, 1995). INFOMED has also developed collaborative projects with BIREME and offered training and assistance to other countries of the Caribbean and Latin American regions such as Ecuador, México, and Venezuela, where the Cuban model of healthcare serves as a reference for development.

The INFOMED Portal makes possible electronic access to diverse publications through the Cuban Virtual Medical Library. These include the U.S. National Library of Medicine, Medline, the Cuban National Library of Medicine, and the growing collection of specialized Cuban medical journals such as ACIMED, the first Spanish language journal of medical informatics (López Espinosa and Marqués García, 2001). Cuban journals have long been offered freely in electronic format on the Internet (Urra, 2001). Foreign authors are also invited to contribute articles to be translated into Spanish, thus creating a controlled electronic information market in healthcare. The Cuban SciELO⁴³ offers a national collection of medical and public health journals in electronic format based on quality standards discussed above. Thus the Cuban VML integrates resources from the developed and developing world with a view to integrate the most advanced scientific research, accounts of medical experience in developing countries, and documentation of natural and traditional approaches to medicine.

The Virtual University project was inaugurated by the Ministry of Public Health in 1999 to improve continuing post graduate medical training and to create an international center for postgraduate education in medicine and related disciplines (Ramirez Muchado et

³⁶ See Acerca de INFOMED- ¿Cuáles son los objetivos estratégicos?:

<http://www.sld.cu/acerca/acercade.html#CUÁLES>

³⁷ See the Virtual Library at <http://bvs.sld.cu/indice.php>

³⁸ <http://scielo.sld.cu/scielo.php>

³⁹ See the Virtual University at <http://uvirtual.sld.cu/index.html>

⁴⁰ See the Office for Analysis of Healthcare Trends: <http://www.sld.cu/instituciones/uats/index.htm>

⁴¹ See a description of the telemedicine network at <http://www.sld.cu/telemedicina/>

⁴² See a list of Cuban organizations and institutions affiliated with INFOMED at

<http://www.sld.cu/websalud.html>

⁴³ <http://scielo.sld.cu/scielo.php>

al., 2002). The Virtual University links the Cuban healthcare information and publication infrastructure to Cuban university resources, and it offers links to Cuban⁴⁴ as well as international content such as the supercourse, *Epidemiology, the Internet, and Global Health*⁴⁵. As part of the Virtual University, a Virtual Clinic offers expert consultation among the physicians and healthcare professionals associated with the University.⁴⁶ When authorized, consultations of particular pedagogical value are published for the benefit of other users of the clinic. The interactive design of the Virtual University promotes a market for reciprocal sharing of expertise and learning. The Virtual University now integrates all of the institutions of the Cuban National Healthcare System, thus extending its institutional scope throughout the country (Lalas Perea et al., 2000). Thus INFOMED, the Cuban VMS, and the Virtual University form the primary elements of the Cuban virtual healthcare infrastructure to ensure horizontal integration of the Cuban National Healthcare System and support for a data-driven national healthcare strategy. Scholarly e-publication in medicine and public health is the foundation for development of educational products and services as well as other revenue generating activities in a tightly integrated system.

The foregoing examples of e-publishing initiatives in Latin America show the value of models designed in the developing countries to serve the objectives of affordable access to the best scientific evidence in medicine and public health. These models rely on institutional sources of funding including international organizations, philanthropic foundations, regional associations and national governments to promote free electronic access to scientific publications for healthcare professionals and consumers, shifting the focus from e-commerce financial transactions to the dynamics of information markets. Information markets in turn support the development of international e-commerce in healthcare products and services including education (Chanda, 2001).

Converging international open access initiatives, regional programs such as the Virtual Medical Library and the Scientific Electronic Library Online, and national efforts such as the Cuban INFOMED Portal, promote equitable cost sharing for free access to science for sustainable development. Chapter 7 of the UNCTAD Report, however, considers e-publishing primarily from the perspective of the developed countries with emphasis on the assumptions of a consumer-driven capitalist economy. Rather than reviewing new approaches to e-publishing to promote sustainable development, the chapter defends the prevailing business model based on intellectual property treaties and legislation, and emphasizes international law enforcement to protect the economic interests of the developed countries, especially the United States. In our view, more innovative thinking and a perspective better suited to the needs and conditions specific to developing countries are required to address the challenging agenda set forth by Kofi Annan, the Secretary-General of the United Nations, in the Foreword to the UNCTAD Report.

⁴⁴ See a listing of courses offered according to medical specialty at <http://uvirtual.sld.cu/docencia/Especialidad.htm>

⁴⁵ See the *Supercourse- Epidemiology, the Internet, and Global Health*, University of Pittsburgh: <http://www.pitt.edu/~super1/>

⁴⁶ See the presentation of the Virtual Clinic at <http://uvirtual.sld.cu/clinica/index.php3>

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