

An introduction to the critique of theoretical and practical challenges that the stakeholders of the repositories of public knowledge face in the Information Society (IS) phenomenon

[Spanish original version]

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Sheffield, United Kingdom

21 March 2004

This is a translation of the article published in the Chilean journal *Pez de Plata*:

Muela-Meza, Zapopan Martín (2004) Una introducción a la crítica de los desafíos teóricos y prácticos que enfrentan los integrantes de los repositorios públicos de conocimiento en el fenómeno de la sociedad de la información. *Pez de Plata : Bibliotecas Públicas a la Vanguardia* (Silver Fish: Public Libraries to the Vanguard) 1(2).

<<http://eprints.rclis.org/archive/00003577/>>

“The discovery of a complete unified theory, therefore, may not aid the survival of our species. It may not even affect our lifestyle. But ever since the dawn of civilization, people have not been content to see events as unconnected and inexplicable. They have craved an understanding of the underlying order in the world. Today we still yearn to know why we are here and where we came from. Humanity’s deepest desire for knowledge is justification enough for our continuing quest. And our goal is nothing less than a complete description of the universe we live in.”

Stephen Hawking (1988: 13)

A Brief History of Time:

From the Big Bang to Black Holes

Abstract

This essay intends to cover the most critical challenges the public repositories of knowledge face in the Information Society phenomenon. The study pretends to be a proposal for an integral theoretical framework to be used as a reference guide for public repositories of knowledge stakeholders: librarians, researchers, practitioners,

authorities, etc. The methodology used was on-desk qualitative research and hermeneutics analysis and using document methods. Throughout the study an exegetic revision of the documents discusses the rigour or lack of rigour of the sources used. The challenges analyzed were: the definition of Information society; philosophical and scientific; economic; social, psychological and cultural; political; and technological. Each section and each challenge are full of challenges pretending the public repositories of knowledge should understand and overcome. From the literature reviewed plenty of evidence was found on the dilemma if libraries should provide free or charged access to Information and Communication Technologies. A position was taken: there should be a legislation where the right for people as a free of charge access and use of ICTs become a statutory and human rights; there should not be any charge for ICTs access or use. This challenge and this position was sustained and underpinned by some scholars. At the end, the technological challenges illustrate with abundant evidences that the best alternative solutions to tackle the lack of funds were found on the use of open source software and thin client server networking technologies. Both issues became the central challenges and discussions related to them appear spread throughout the essay.

Keywords:

[B. Information use and sociology of information.](#) > **[BC. Information in society.](#)
[A. Theoretical and general aspects of libraries and information.](#)
[L. Information technology and library technology.](#) > **[LA. Telecommunications.](#)****

1. Introduction

The social phenomenon called the Information Society came about in the 1970s. Since then, substantive research has appeared in many fields, because the Information Society affects society as a whole. The field of Library and Information Science (LIS) is no exception. The political and economical leaders of the world--particularly those of the more highly developed countries-- have reached a point where they wish to regulate the Information Society. By doing so, they will establish new ways into which the Information Society will develop and advance. This might have been the purpose of the World Summit on the Information Society which took place in Geneva on December 10-12, 2003.

Therefore, this research essay will analyze the major challenges central to Information Society which influence the roles libraries should play in this phenomenon. Research and practice in this area has been carried out by professionals in the LIS field. This body of research begins with the idea that the research in the LIS field related to Information Society is technology-driven, atomized, fractionalized, scattered, narrow scoped and self-contained in the LIS field. Thus, while the same integral issues have been researched in various fields, the findings in the respective fields are not linked to each other. Consequently, even where the same issue is treated as a topic of research, there is no connection to some other crucial factors affecting that issue. Therefore, the central idea of this study is to describe as many integral challenges of this social phenomenon affecting the LIS field and the public repositories of knowledge as libraries, archives, and museums as possible and relate them all in an integrated analysis. Also another central purpose is

that this study serves as a theoretical framework for future research of the IS phenomenon in the LIS field. In addition, this proposal is to serve as a theoretical framework for the LIS practitioner or policy-maker and is to be used in libraries for decision making processes.

The methodology used in this study is the so-called “on-desk research approach” and hermeneutics methodology analysis. The method used in this study is documental research. Since the content of the theme is currently so polemic, a position is taken in this study. This position is that the libraries should promote legislations at local, national and international levels where consider statutory and human rights the rights for people to have access for Information and Communication Technologies (ICT) completely free of charge. This is tempered by the fact that ICTs are commodities and ruled by the market forces in our capitalist society. This study is limited, by scope, deliberately did not cover many more topics well covered by current research for being considered away from the core of this subject matter of finding the most challenging challenges and their possible alternative solutions to tackle down. Might have other crucial issues been avoided and they might have been pertinent to this essay, that limitation is acknowledged before hand: the time to do this analysis was so short and the access for the pertinent documents might have not been available. Another limitation is this study only used English and Spanish working languages for retrieving of information, thus the rest of the world’s literature is excluded.

2. What is the Information Society (IS) phenomenon?

As mentioned in the **Introduction** section, this study shows the results of the analysis and synthesis of this phenomenon by the inherent reference to its use of the qualitative hermeneutic research methodology. Thus, getting a definition for this phenomenon in question took –as throughout the study as a whole– a rigorous, and critical process of information gathering, analysis, and synthesis.

The most suitable introductory works to understand the social scientific theories behind the IS phenomenon were *Theories of the Information Society*, 2nd ed. by Frank Webster (2002) and *Informational Societies. Understanding the Third Industrial Revolution* edited by Erkki Karvone (2001). Webster provides a profound analysis of some of the most influential thinkers and their contributions to building the theoretical construct to rationalise and understand the phenomenon. Included in his analysis are Daniel Bell, Manuel Castells, Herbert Schiller, Jurgen Habermas, and Anthony Giddens. Thus, by doing a small bibliometric measure of the number of times each of these thinkers were cited in these two books can determine in a quantitative fashion which of these thinkers’ work might have been more pre-eminent. These were the results: Bell was cited 13 times, Castells 27 times, Schiller 24 times, Habermas 3 times, and Giddens 13 times. By reading the books, however, more qualitative insights came about which led this study to consider at this point the work of Castells the most illustrative as a theoretical framework to support this analysis.

The LIS field does not have a specific theory for the IS phenomenon. It is worth

mentioning that in the library literature there is one article which attempts to analyse the development of IS phenomenon from 1983 to 2000 by using quantitative bibliometric methodology – Li's article "Development in Information Society as reflected in the online abstracts of The Information Society (1983-2000)" (2002). However, this article was not methodologically rigorous because the study only amalgamated definitions of concepts from abstracts, and some of the references employed did not give any cross references or page numbers where the statements were actually cited. Moreover, from the few citations used, this study did not even develop a citation analysis from the myriad of authors publishing, citing or being cited in the 1983-2000 period. Li's (2002) analysis is questionable in the light of its methodology. It matters not that this study is published in a peer-reviewed journal, since as Carlin (2003:4) argues, the methodological potential of the LIS field lies precisely in the bibliometrics or citation analysis methodology, which is the pride of LIS field. and the only "exporting" methodology to other disciplines, from all the others it imports. Li's research failed because it did not utilise methods consistently with the assumptions of quantitative research. Even if this research were viewed through the lens of qualitative research, the methods were not methodological at all. The research was shoddy and ill-executed. For example, she might have correlated the topics she mentioned with the names of the authors and their respective articles' titles, so readers of her research could trace the actual articles and expand their understanding of the study she is proposing.

Therefore, following the exegetic and hermeneutic lines of analysis of the documents of this study, it is necessary to mention that it was only through a qualitative analysis of the document sources that was possible to determine which might have been the most influential thinkers. More challenging than providing definite answers to each of the questions arising in this study, demonstrating the soundness of the methodological approach is the most important and challenging undertaking. As the late Carl Sagan observed, "Methodology, as much indigestible and thick as it might be, it is much more important than the breakthroughs of science" (1997:39). Thus, this study seeks to be a rigorous approach using multidimensional and interdisciplinary theories and methodologies from the social sciences. Thus, the reader can evaluate them, and choose from them the best matches for his or her lines of research. There surely are other theories and methodologies from disciplines other than the social sciences, but they were beyond the scope of this study. Theoretical and methodological rigour from the social sciences in analysing the IS phenomenon should be the challenge to overcome for any LIS researcher or practitioner.

This study challenges LIS academics to model their research projects after the rigour of the theories and methodologies of the social sciences as there are some examples in this analysis which did not follow this rigour. The most questionable example is a European academic empirical LIS research study of the public libraries in the IS sponsored by the European Commission, *Public Libraries in the Information Society*. It seems to be the most comprehensive study of the phenomenon, covering many critical issues in eleven European countries addressed by several LIS researchers. Particular attention should be paid to the analysis of Thourhauge (1997: 8). The author shows a lack of understanding of the rigour of science in general and of the social sciences in particular when defines the concept of IS. The author quotes the futurological author Alvin Toffler's *The Third Way*

definition of IS. If the study were about the discussion of the futurological authors of the IS phenomenon then the quote would have barely been adequate, and the author should have included John Naisbitt, Yoneji Masuda, and others. But his or her analysis was to shed light to the introduction of the phenomenon in study which was IS, specially for the public librarians who are not expected to undertake empirical research as sophisticated as the research LIS researchers from the academia are expected to perform, as the British report *Developing Research in the Public Libraries* argues about. (Thebridge, S., Nankivell, C. & Matthews, G., 1999). An academic social scientist supports this idea in the following quote:

“We can thus conclude that the first round of analysis directed towards the information society were mainly produced by futurological and management writers, not by academic social scientists, and the contributions did not receive an enthusiastic response among the later. ... Most of the academic social scientists considered the information society literature to be a collection of intellectually rather loose popular writing without any real theoretical significance” (Kasvio ,2001:32-33).

In general social sciences are considered soft sciences in reference to the hard sciences as physics, mathematics, chemistry, etc. Library and Information Science (or any similar nomenclature used) may have been considered one of the softer among the social sciences precisely for its lack of general theories and methodologies. Thus, instead of at least recognizing the state of the rigorous social scientific theories as a framework, a general study on the IS phenomenon and the public libraries in eleven European countries gives a non-scientific view of the phenomenon. Underpinning non scientifically grounded opinions from futurologists only, discredits science in general and social sciences (LIS included) in particular. Unfortunately, such a practice could have a far reaching impact throughout Europe, and LIS researchers or public librarians may get confused or consider futurologists' ideas as the course of research and practice.

Therefore, the most plausible definition of the phenomenon is the definition of Manuel Castells:

“A new world is taking shape at this turn of the millenium. It originated in the historical coincidence, around the late 1960s and mid-1970s, of three *independent* processes: the information technology revolution; the economic crisis of both capitalism and statism, and their subsequent restructuring; and the blooming of cultural social movements, such as libertarianism, human rights, feminism, and environmentalism. The interaction of these three processes, and the reactions they triggered, brought into being a new dominant social structure, the network society; a new economy, the informational/global economy; and a new culture, the culture of real virtuality. The logic embedded in this economy, this society, and this culture underlies social action and institutions throughout and interdependent world.” Castells (2000:367).

This definition is rather indigestible and dense when compared with the vagaries of Thourhauge, but a LIS study that follows social sciences theories and methodologies should show the analysis where the data lead the outcomes rooted in reality (theories and

methodologies are real). Thus, it is better that the reader gets a difficult picture of the phenomenon as how it supposedly might be at a certain stage of its development or evolution, but with the certainty that this would lead her or him to an objective road towards its understanding, or transformation, or both. "To find a drizzle of occasional truth floating in big ocean of confusion and deceit takes attention, dedication and courageousness." (Sagan, 1997: 57).

Following Kasvio, he argues this about Castells work:

"...the attitudes have started to change gradually within the academic social sciences. Undoubtedly one of the most important turning points has been the publication of Manuel Castells' *Information Age* trilogy in 1996-97 and the reception this work has received within the social scientific community. Castells has made the mental societal transformation that we are approaching together with the advance of the digital revolution." (Kasvio, 2001:38).

Castells' work, of course has its critics, and that is healthy for the search of truth and objectivity in science, this is a sound one:

"Manuel Castells' trilogy of the 'Information Age' has been hailed as one of the major works of social science of the last century. The words of Tony Giddens, Alain Touraine, Peter Hall and Chris Freeman all grace the covers of the trilogy and compare Castells to such sociological greats as Marx or Weber. The 1200 combined pages of the trilogy represent one of the most important, and largely successful, attempts to understand how technology, the economy and society are changing.... The technological determinism and reductionism constrain the explanations on offer in the trilogy. ... The technological reductionism reveals itself in an over-emphasis on IT. IT networks are important, but they do not explain everything. ... By reducing everything to IT Castells is unable to appreciate the national and sectoral diversity inherent in all these changes. This is a serious problem with his analysis....*Research Policy* readers will find plenty to disagree with these books, but they will also be enlightened and challenged by the rich scholarship of this excellent trilogy." (Nightingale, 2003: 1144-5).

There might be more critics of Castells' work, but it is not the intention of this essay to focus on one author and his or her critics. Sufficient is to say that the reader interested in understanding the phenomenon of the public repositories of knowledge and their multiple relations with the IS, and its inherent challenges with aims to overcome them, his or her first critical step to take is to investigate on some of the theorists' work discussed above, or others if by that time the ones discussed her might not support his or her analysis. In other words, in order to avoid the confusion of defining Information Society or Knowledge Society, which are merely publicity neologisms, one should try to understand the theoretical underlying grounds of the phenomenon. From the evidence found in this study rooted in the social sciences theorists Information Society is not even called as such. Neither is called as any new non scientifically based or probed evidences of "megatrends" or "computopia" for the year 3003 at the very style of modern Nostradamus. What might be a sound definition for the Information Society according to our current reality's nomenclature -and not futuristic dreams-- might be a new mode of development of capitalism, "informational capitalism" in Castells' conception, where the driven force might be the network society from local to global scope and reach, precisely pushed by the

ever crescendo ICT revolution, with its corresponding consequences –which might be negative or positive – on society, culture and nature at large. Nevertheless, it is expected the reader understands the difference between a popular terminology (Information Society, or Knowledge Society) and the theoretical foundation which is actually rooted in reality and might have indeed diverse ways to name it.

3. Philosophical and scientific challenges

Ronald C. Benge, in the chapter “Philosophies of librarianship” of his theoretical book *Libraries and Cultural Change*, defines philosophy of the LIS field in this way: “[if it] ... involves the pursuit of true, or the setting up of principles as a guide to action, or the creation of theories which explain reality, then philosophy is necessary and inevitable, even if the word is not used.” (1970:244) Based mainly on the British LIS reality and the American by extension he criticizes those LIS librarians, researchers, and practitioners who reject the idea of having a solid theoretical background to engage in research or understanding of any LIS phenomena: “There is a philistine belief that theories are a frivolous luxury which practical men cannot afford. It seems not to occur to those who hold this view that in many areas if the theory cannot correspond with practice, then the theory is wrong, inadequate, incomplete or incorrect.” (1970:245).

Perhaps this phenomenon has to do with the traditional methodological debate between quantitative and the qualitative research methodologies in sociology and all the social sciences included LIS. Beginning a research with a theory in mind and setting a priori hypothesis is the traditional quantitative research methodology; a deductive methodology beginning with the general to the particular. But there is another way to come up with a theory, and that is all the other way around, a posteriori, with the qualitative research methodologies which in general begin from the particular to the general; inductive methodology. And perhaps the most notorious narrower qualitative research methodology is the Grounded Theory which came up 17 years later than Benge’s approach. “The Grounded Theory seeks to generate theoretical statements and, ultimately, complex theories based on empirical evidence, although it can be used in different ways and reach various degrees of complexity. (Strauss, 1987).

This debate may require a different ring to discuss about it and it is not intention in this essay. But enough is to say, that in this study is recommended that LIS researchers, librarians, practitioners, or workers should begin any research with general scoped theoretical backgrounds in mind. And to so they should self challenge their own particular beliefs on their perceptions of the origin, or evolution of the universe, their axiologies, and teleologies about the universe, the world, life... everything. LIS professionals should elevate their minds beyond their particular beliefs and grasp general theories related the conditions of the universe, the galaxies, Earth, the living material conditions of people from their country and countries far away or from their regions, states, provinces, cities, wards, communities; from the working and living conditions of librarians from their own place and from Africa, Latin America, Middle East, etc. “A central lesson of science is that to understand complex issues (or even simple ones), we must try to free our minds of

dogma and to guarantee the freedom to publish, to contradict, and to experiment. Arguments from authority are unacceptable." (Sagan, 1998:189).

For example, as for the theories behind IS, there are more theories from non LIS researchers. In the LIS field there is one which supports the importance of the traditional classification theory in order to support several LIS specializations like reference services, electronic information (text, images, and any unimaginable formats) retrieval, and indexing and surrogation, metadata classification, etc. (Mann, 1995; Benge, 1970). That is, if someone is doing research on high technology LIS specializations say, the evaluation or actual creation of electronic databases for text or image retrieval (i.e. chemo-informatics descriptors and thesaurus) and no attention is given to the standardized and solid theory of LIS classification there may have negative results in the library service provision, thus reference librarians will be frustrated to use such databases and to teach users how to use them, or even worse, if users use them by themselves the degree of frustration would be higher.

Thus, the main challenges LIS professionals and workers should overcome have to do with their rooted pragmatic views and their lack to use theoretical backgrounds to have a solid general understanding of any phenomena or LIS phenomena in particular.

4. Economic challenges

Should service provision in the public repositories of knowledge like public libraries, public school libraries, archives, and museums be free or charged? That is the central question. In the private special or work place, or academic libraries perhaps some services might have to be charged and still can be questionable. But charging for any service in the public repositories of knowledge like public libraries, public school libraries, archives, and museums should be taken as an assault to the statutory and basic human rights of all the real or potential users of such services. As mentioned early, publicly funded libraries, archives and museums should not charge for any service and the discussion of this issue should be risen locally, regionally, nationally and internationally to legislations, policy makers, NGOs, etc. as to create policies, laws, people's rights on the subject at all governing levels, and LIS professionals and practitioners whose profession is their life, passion and future crave should act in all milieus supporting this position. Kagan supports the same idea stating and help the reader to focus his or her attention to the most noticeable root of the "free or charged" dilemma: "As opposed to a "public good" transnational corporations view electronic information as a commodity. Microsoft dominates the personal computing and tries to control Internet content and commerce through the arrangement of selected icons on its desktop." (2002:39).

There is a an interesting study, *The Public Library as a Public Knowledge*, which brings the essence of the debate of these issues in the British reality and sheds light to the position of this study:

“The citizen’s right to information and ideas is now under attack. Charges for public library services are being advocated and, in the case of some on-line services, introduced, The Arts Minister’s recent pronouncements have been widely interpreted as meaning that public libraries should charge for all services except for the loan of books.” And he goes further: “The real question has always been to decide how such costs are to be met. That is a question that should concern not only the public librarians, and other professional information workers, but all who care about such unfashionable concepts as equality and democracy... we should be very wary of those who suggest that a resource as important as information should be distributed according to the laws of commerce.” Usherwood (1989:84).

A note should be added to Usherwood’s analysis: what is under attack is the right for all the people to information and ideas, not only citizen’s for this would exclude all real or potential users of repositories of knowledge which are not citizens by age or by law restrictions like immigrants, or another factors. Hence, for pragmatists these issues may result very simplistic. Many people may put it in these ways: “that’s the way capitalism works and nothing can be done about the market forces, that’s how market works” and therefore information and ICTs infrastructure installation and access in libraries are simple puppets of the market’s strings. This essay does not discuss about macroeconomic issues or does not advocate either in favour of socialism against capitalism, or vice versa. The point is clear: access to information and ICTs in the public repositories of knowledge like libraries, archives, museums or in any other sorts of facilities should be considered as all people’s statutory rights, as human rights by national and local legislations, international, national and regional government policy makers, LIS researchers, workers, and local, regional, national, and international associations like the International Federation of Library Associations and Institutions. And the way this study promotes the installation of ICT infrastructure and its service provision, based on scientifically based research (see **Technological challenges** on this study) should be completely free of charge for all the people. This is the challenge the study poses to the LIS professionals and workers.

As it is understood from this study, the “free or charged of ICTs infrastructure installation and access to service provision” issue seems an eternal dilemma due to the general lack of its understanding by the overwhelming majority of the LIS professionals and their deliberate refusal to even pointing out at the issue. Usherwood is right at pointing a red light for those advocating for the libraries be driven by the rules of commerce. And in fact that is what it comes from the literature. For example there is a study being made year after year by Batt in the UK. He is vague about the discussion as if public libraries should charge for ICT service provision or not in the public libraries. He claims: “Until now we have not been very good at using macro-economic models of costs and benefits to show how charging does or does not influence the nature of use; in the future we may have to.” (Batt 1998:35). But there is no such a thing like the future. In this present it has to be understood that providing for information resources and ICTs mainly in public libraries, public funded school libraries, museums, archives and other public facilities it is responsibility of the local, state or federal government to provide them free of charge. If in capitalist society information and ICTs are commodities, it is not because librarians or library users or non users or the government authorities transformed them as such. But the processes to build publicly funded libraries, archives, museums and the like, to acquire information and installation of ICTs and provide them free of charge to library users or

non users it is the responsibility of the government at all levels (by citizens' taxes alone or in cooperation with local, regional, national, or international corporations, NGOs, charities, or international capitalist organisms like International Monetary Fund, World Bank, etc.). And librarians and information workers and all related professionals, instead of being Nobel prizes in economy in the future, should advocate in the present to ensure that free installation of ICT installation of infrastructure and service provision be completely free of charge.

Usherwood supports completely this idea by criticizing:

“Others have argued that for the public library profession to become involved with what they perceive as non-library problems to challenge the neutrality of the librarian. It is our argument that if the library is to be a social force, it cannot afford to be neutral on some issues, for instance in institutionalized racism. Further we would argue that in fact the public library has never been neutral, and that as a concept it embodies some most important radical ideals –equality, provision for need rather than commercial profit, educational advancement, free access to, and free expression of, information and ideas. To stand for such issues is to take a very positive stance. It is certainly not a central one.” (1989:12-13) As a society we have to develop policies to ensure that the average citizen has access to information and ideas. As professionals we must ensure that the public library service is an integral part of these policies.” Usherwood (1989:89). As mentioned before, by citizen should be read all people in this study.

In the data collected there is an European research sponsored by the European Commission, *Public Libraries in the Information Society*, and it seems to be the most omni-covering study on public libraries and the IS in Europe addressed by several LIS researchers. But same as in information retrieval techniques: abundance is not equivalent to pertinence, this study fails discussing the critical “free or charged services” issue. The analysis shows that Thourhauge in his economic analysis does not address the critical free or charged services discussion (1997: 8). On the other hand, Overbeck, in the same study, does not address the issue either, but just recognizes it in the traditional way it is well known: “Financial problems are amongst the main barriers for public libraries wishing to introduce or improve IT-based services. Only a few libraries have enough funds to make the additional investment for this technology. On the one hand, libraries have to reduce staff and to concentrate their work. New investments have become more difficult to realise.” (1997:60). This may sound as this example: some marine species are nowadays endangered by human made poisonous substances drained to water habitats. This is supposedly a fact. Thus, the study on this phenomenon should address the assessment of the possible solutions to avoid the poisoning so marine fauna and flora can be saved, instead of repeating descriptively and tautologically the same unbalanced fact.

Thourrhauge's and Overbeck's findings are questionable precisely because this study pretended to be a role model for the 11 European countries surveyed and therefore for the rest of Europe. And the general preface of this study reads: “... by developing a visionary strategy as well as defining models and scenarios for the public library community on how to deal with the challenges of the Information Society.” (Segbert, 1997:III). There cannot be a visionary strategy in a traditional view which just repeats tautologically the well known facts and does not challenge them as to search for possible

short or long term solutions.

In the most incredible case that the people of the world change the balance towards the free of charge services to be offered at a service point in libraries, archives and museum, still some fees must be paid in order for LIS people to buy thin clients and some other gadgets. But this section cannot be finished if no comment is made about the poor countries' external debt they owe to the highly developed powers. LIS people should be aware, specially from the highly developed countries that if in their home countries they might have severe financial problems, even when their countries' governments are creditors of the poorest debtors like African countries, these debtor countries are extremely unlikely to tackle digital divide, because all debtor countries will never pay the external debt since the interest rates have risen exponentially the original basic amount first time lent from the ex-colonialist and contemporary powers. Thus this study supports the idea that the international leading library associations should address this issue at international police makers, i.e.: UN, UNESCO, ITU, UNIDO, etc. They should join forces for altogether lobby the creditor organisms (IMF, WB, etc.) and countries (USA, UK, France, Japan, Germany, Canada, Italy, Russia, etc.) to seek for the possibilities for the poorest debtors obtain a full and definite cancellation of their debt or renegotiated in such fashion that they receive special treatment when the time comes to issue the new international Information Society policies as for receive the best deals to introduce ICT infrastructure in their countries. The external debt for debtors is a non payable credit card, they will never pay it, but most of the poor and drowned countries pay in general more than the half of the Gross National Products. They will never get out of that situation if the debt or interests are cancelled.

5. Social, Political and Cultural challenges

The main social challenges for libraries lie on the digital divide or the social exclusion of a vast number of individuals around the globe. This study is watching the rise of a deepening social Darwinism where capitalism is moving towards a more specialized use of ICTs where the vast majorities of the world are excluded. Hence the ICT elites are the ones more suitable to have better educational opportunities, better jobs, better life opportunities. These are the main challenges. But as reviewed, the LIS stakeholders, as far as it is interpreted from the data, have not understood well the phenomenon, do now take a serious stanza in favor of free of charge access to ICTs and looking from the seven seas the possibilities of using alternative solutions as thoroughly explained in the **Technological challenges** section. This idea of social Darwinism where only more educational literate, the informational literate, and the ICT literate are most likely to have better life chances is pertinently discussed by Castells:

“The truly fundamental social clavages of the Information Age are: first, the internal fragmentation of labor between informational producers and replaceable generic labor. Secondly, the social exclusion of a significant segment of society made up of discarded individuals whose value as workers/consumers is used up, and whose relevance as people is ignored. And, thirdly, the separation between the market logic of global networks of capital flows and the human experience of workers' lives.” Castells (2000:377).

And Kranich, an American librarian who, as few others mentioned in this study, takes a clear position, stands up and speaks up in the same direction supported in this study. She sheds more light on this position criticizing the ominous power of political and economic forces dominating ICT invention, development, implementation and servicing free of charge in publicly funded repositories of knowledge:

“As the information revolution has changed the way we live, learn, work, and govern, we simply cannot assume that libraries and other cultural institutions are capable of ensuring equitable access to all resources and points of view that we desire. Access to abundance does not ensure access to diversity. Instead, we now have access to more and more of the same ideas, with alternatives marginalized more and more by such forces as corporate profiteering, political expedience, and the whimsy of market place. The promise of new technologies is imperiled by powerful political and economic forces.” Kranich 2004: 7

The Muddiman’s study is an obliged step to have an introductory understanding of the social exclusion process (or inequality, polarization, poverty, and misery as crudely Castells call it, 2000:69) and its relation to public libraries. Although as for our phenomenon in question has left out some of the critical issues mentioned, non the less it may help to foster further research.

6. Educational, Psychological, and Cultural challenges

When analyzing the IS phenomenon per se or related to LIS field many researchers and practitioners become encapsulated, or drowned inside the dynamics and mechanics of it that is, they become specialists of the topic, but with highly narrowed scope of the phenomenon. By doing so they forget that the most important thing about information or ICTs provision is the users. And understanding of these issues cannot be understood without the help of other sciences like educational and psychological sciences or cultural studies from anthropology or some other akin disciplines. IS phenomenon as mentioned earlier is a multidimensional phenomenon and therefore its scope should be interdisciplinary. Putting people in the center of the phenomenon this study takes a position different from other disciplines or professional who center objects at the heart of their research. IS is bringing in parallel many negative emotions like fears, frustrations, depressions, anxiety, and many others all of them mainly rooted in the changes society is experimenting as a whole as informational capitalism makes its way. This study is limited to examine profoundly the educational, psychological and cultural implications of the negative effects of informational capitalism. It basically poses a further study of these issues as a challenge for an integral theoretical understanding of the IS phenomenon as a whole. But at least can be said that LIS people are being deeply affected with the introduction of ICTs, another intruders are breaking in their peaceful world, but it is clear that there is no such thing like peace in an implicit chaotic whirlwind of capitalism; its rules are based on competence, therefore the only foreseeable alternative constructs for LIS people are to challenge their paradigms and move from a competitive behaviour towards a cooperative one, no matter this society is designed to be competitive and individualistic. Nevertheless there are few things that can be mentioned about educational issues which in turn will affect people’s behaviour and adapting them better for the inexorable cultural

change. Very long time ago before capitalism oral language was the first human way of communication, then came written languages with Sumers. And what underlies on the core of servicing users whether with technologies based of writing and encrypting materials made of clay, papyrus, wax, wood, palimpsestus, parchments, celluloid or electronics or in any existing or be discovered materials is not the technology per se, but assuring or guaranteeing they can read them, understand them, reflect about them, and be transformed by them. In music there is a saying when a musician performs with excellence: "it's not the violin, but the violinist." Thus, the most important thing in our phenomenon of study is people: the people servicing in the libraries, and the people accessing the libraries. And the fundamental process is the access for reading. A Mexican expert on reading, reader formation, and development explains magisterially this idea:

"The quality of education does not begin neither in the parabolic dishes, nor in the electronic equipment –ones and the others indispensable–, but in the ability of communication and expression of the individual, in his or her level of use of the language. An education of quality is not only that that accumulates information, but that that makes grow the awareness of students –that is another to refer to the ability to create criticism–, and over this sharp, expanded, and alert consciousness he or she creates the conditions to access information. In the same way that the treasure of opportunities of a huge library is worthless if he or she does not know how to use it, satellites and electronic networks would be a very expensive and colossal way to simulate quality if they cannot reach a population capable of communicating and expressing through language, that as how I have mentioned, nowadays is both oral and written. ... But, in reality, it is not forceful to separate literacy from readers' formation." Garrido (1999:122-123).

Thus, reading is the basis for an individual build its gothic temple of knowledge, therefore literacy is the adequate technique. For the understanding and use of library resources information technology is the most suitable lifelong learning technique. For the use of ICTs computer literacy is the way. Carl Sagan, an American scientist whose name has a star in the Milky Way upon his discovery, was a very famous proponent of science, education, literacy, readership and use of the libraries; he went further and proposed the scientific and sceptical thinking literacy. Thus the educational challenges for LIS people – and actually for all the world's people at large, no matter which language they speak – is literacy in all of its forms which lever the individuals to acquire the abilities needed for surviving the dramatic psychological and cultural changes: reading, basic literacy, information literacy, ICT literacy and science literacy. So far all LIS studies go short in promoting science literacy. Carl Sagan, who was maybe most famous for his TV series Cosmos where many TV viewers from around the globe, but mainly in the USA, had the chance to know more about the realms' of our cosmos in a very popular manner. He illustrates the issues that the mass media in the promotion of science, education, literacy, readership and use of libraries, could make a lot of good, but he criticize mass media like this: "I hope that no one considers me excessively cynical if I affirm that a good summary of how the commercial and public TV works is this: money is all about it." Sagan (1997:397). Thus, as explained in the **Economic challenges** section, capitalists do not know other language but the search for profits, money, but that is contrary to the central position of this study that despite that fact, information and ICTs must be considered by legislations as statutory and human rights for all the world's people. Usherwood agrees with Sagan criticizing that: "Information provided by the mass media is shaped by structural, economic, professional, ideological and technical factors." (1989:88). Therefore the most critical challenge mass media represent for public repositories of knowledge is the negative effect these media have on readers: "television in particular tends to seduce the mass population away from reading. In pursuit of the profit motive, it has dumbed

itself down to lowest-common-denominator programming – instead of rising up to teach and inspire.” (Sagan, 1998:248). A final word on this section, the mass media issues are brought about because if LIS practitioners once realizing of the negative effects of mass media they might be able to make partnerships with the mass media to push the correlation towards the positive side of promoting reading and literacy in all of its forms as to create awareness in people of the important value libraries could make to lever their educational, and cultural life chances.

On the cultural explanations affecting the educational and pedagogical traditional paradigms, the French philosopher Pierre Lévy emphasize on the new roles people (LIS included) would play as to face these new challenges: “The flux of knowledge, work as a transaction of knowledge, the new technologies of the individual and collective intelligence change profoundly our focus of education and training. ...The systems of education and formation must face two big reforms. In first place, the adaptation and integration of the devices and the philosophy of Open Distance Learning to the habitual practices of education.... The second reform refers to the acquired recognition. If people learn from their social and professional experiences, if the school and the university lose progressively their monopoly in the creation and transmission of knowledge, the education systems can at least assume a new mission: to orient the individual careers in the knowledge spaces and to contribute to the recognition of the set of capacities of individuals included non academic knowledge.” (Lévy, 1996)

7. Political challenges

An interesting political challenge for LIS stakeholders working, researching, funding or advocating for the repositories of public knowledge in relation with the Information Society could probably be that of hackers, having their innovative vision and thinking and their open and cooperative spirit to share their innovations in benefit for the world’s people.

“The hackers are not what the mass media or the governments say they are. They are, simply, people with technical computing knowledge whose passion is to invent programs and develop new ideas for processing electronic information and communication. ...The hacker culture it is organized in collaborative networks on the Internet, although there are some personal meetings. Several cooperative lines are grouped around cooperative groups, in which a technological hierarchy is established of who created a program, who are their supporters and their contributors. The community acknowledges the authority of the first innovators, like is the case of Linus Torvalds in the Linux community. But only is acknowledge the authority of those whose performs it with prudence and does not uses it for its personal benefit.” (Castells, 2001a) Castells mentions that the political hacker movement, in terms of technological freedom politics, was created by Richard Stallman in the 1980s at the Machussets Institute of Technology when he created the first open software operative system (GNU) based on another operative system named UNIX, but at the same time he created the Free Software Foundation. There, he replaced the copyright

for the copyleft: where everyone who created open software could register in his foundation and his rights would be respected under the umbrella of the copyright laws, but only as long they disclose the source code which their software was written on, so any other open software developers could contribute to the development of such and such software (i.e. Microsoft source code are closed, so no one could disclose its source, and if someone eventually succeeded could not by no means divulge it openly to the world like open software does, because is protected by the copyright laws and by breaking them would be liable for criminal prosecution). That is he established the copyleft protected legally by the Intellectual Property restrictive copyright laws which protect the right for profit. But as it has been over argued, all initiatives promoting the free installation of ICTs technologies and free of charge access to them in the public repositories of knowledge is precisely the position this study stands on, it is this study stanza. Therefore LIS researchers should understand the positive hacker culture (totally contrary and different from the negative crackers), learn from them, specially on their passionate defence for the unhampered exercise of the world people's rights to freedom of expression and information access.

As it has been demonstrated in this study, LIS people refuses to take a position on the development of the public repositories of knowledge where they work or where they do research or play any role, but ICTs are not flying on ether, they are conceived by humans. They are mainly created by political powers through the military as Escarpit argues: "...as for the information and communication technologies. Its functioning and development were first provoked by the political, economical, military, and even cultural apparatus, when these exigencies made profitable their investment, that is, nearly long time after their scientific or technical breakthroughs they are based on." Escarpit (1983: 141). Thus LIS people should realize about this facts and take a position towards the best course of action that lead to the search of the best solutions for the problems IS are creating in parallel as any other capitalist brings inherent contradictions.

In the **Technological challenges** section the reader can be geared with some ideas toward the search for alternative solutions for some of the problems IS is bringing aside. Hence, it has been the conducting thread of this study to guide the reader through the indigestive and dense, but at the same time sceptical, solid and objective pathway towards a sound understanding of the IS phenomenon. Thus, Castells supports this on the political challenges by arguing:

"The most fundamental political liberation is for the people to free themselves from uncritical adherence to theoretical or ideological schemes, to construct their practice on the basis of their experience, while using whatever information or analysis is available to them, from a variety of sources." Castells (2000:390).

Finally this study invites the reader to take a position in benefit of the central idea of this study to understand the IS phenomenon and to discover the best solutions which offer public knowledge repositories of knowledge with free access to information, ICT infrastructure installation and free access to ICT service provision. By doing so LIS people would be helping users to exercise their democratic rights.

Kranich criticizes:

“Without a technologically sophisticated information commons in every community, the gulf between the information rich and the information poor will widen. If we are to revive communities and to restore civic virtue and democratic participation, we must advocate for a public sphere with a rich, vibrant information commons –a commons where citizens are free to engage in civic life. Otherwise, we will endanger our most precious assets in a democratic society –our rights of free speech, inquiry, and self governance.” Kranich (2004:16).

As mentioned, this study challenges the LIS researchers, professionals and workers to take a position defending the all the people’s right to have free access of information and ICTs. Kranich is another librarian that promotes the same idea:

Librarians must pick up the gauntlet and join forces with computer professionals, educators, cultural organizations, journalists, public officials, public interest groups, and the general public to ensure that everyone has access to a free and open information commons. Neutrality will not work; the stakes are very high –namely, our democratic way of life that depends upon and informed electorate.” Kranich 2004: 15).

On the international political arena these are the major actors. On 28 May 2003, IFLA’s resolution “Libraries Help Bridge Digital Divide” made several challenging statements to be considered on the World Summit of the Information Society at Geneva 10-12 December:

IFLA is calling for the Summit to:

- commit member States to connect all their public libraries to the Internet by 2006
- support the skills development of librarians
- ensure that intellectual property laws for electronic publications do not prevent public access
- recommend public investment in information and telecommunication technologies
- ensure that libraries providing public access are eligible for affordable connection charges. (2003c).

There must be noticed that the most leading international library association position on the “free or charged” issue took a slightly challenging position. But at the IFLA’s Council meeting in Berlin on 8th August 2003 the issue was risen with more resoluteness and taking a more clearly free of charge position as it has been stated in this study as well:

And be it resolved that IFLA urges governments to eliminate fees for basic services broadly construed, assist in developing local content for electronic information services, and provide equitable access to the Internet (2003b).

IFLA came up with a stronger and outspoken resolution standing on the free of charge

position. But the leader of associations of world's library associations and institution failed even to acknowledge the central technological solutions found in this analysis to tackle a bit the digital divide: open software thin client technologies. Fortunately the International Telecommunications Union brought about the issue of the open source software solutions. (2003b). These were only resolutions and propositions for the WSIS, as for the date of this of this essay the general resolutions of the conferences or the official policies have not been yet issue.

But there is a concrete and outstanding success story of the most powerful international political practice so far on the ICTs history. The Hacker Movement won an unthinkable battle against the intellectual property defenders. Thanks to the Hacker Movement protests the European Parliament restricted authors to make patents of software. Therefore the open source software and the people's world will not have to pay millions of dollars of licences to monopolistic software vendors like Microsoft who would make patent of some software applications holding their rights of profiting with the excessively negatives effects explained along this study. (Navegante.com, 2003b).

8. Technological challenges

Some years previous to the end of the Cold War Carl Sagan was asked to write an article on the common enemy for both the USA and the ex USSR, and this was the essence of the common enemy: "An alien invasion is, of course, unlikely. But there is a common enemy – in fact, a range of common enemies, some of unprecedented menace, each unique to our time. They derive from our growing technological powers and from our reluctance to forgo perceived short-term advantages for the longer-term well-being of our species." (Sagan, 1999:181). That is, technology gives more positive than negative to mankind, but when people do not get involved in understanding what for technology is made up for, then the political powers can use it in a negative way like there a many examples, specially the killing effect of technologies. This is a challenge for everyone and all professions., perhaps one of the most difficult to bear or find a reasonably balanced way out because has to do with ethics, legal issues and the like. In general people do not want to get involve in things of general concern.

But that is another challenge LIS researchers and practitioners, specially from the public repositories of knowledge, should understand and overcome. As we mentioned above, LIS researchers have been more technology driven than theory or methodology driven. Thus, this section is the core of the phenomenon by its participants, but even in the essence of the phenomenon most of all participants lack of its understanding, and as mentioned before, this has to do mainly because professionals are processes, or matter, or mechanical, or technical driven and forget that the sense of any kind of human-related research people must be set at the heart of the research object. And also because of an implicit idiosyncrasy of lacking to understand the generalities of the universe, the planet, the continents, the oceans, the seas, the nations and an individualistic character.

At the heart of the battle field of the ICTs developments, as in any other processes in

capitalism, there are the main forces towards an insatiable thirst for greedy profit on one hand, and on the other hand there the alternative forces. Which position LIS practitioners should take? That is the question. That is the main challenge of this section.

In a network society, the central societal drive of the informational development mode of capitalism, networking technologies is the natural electronic web. In 2000 someone put this question on the alternative forces: Is thin-client becoming the new paradigm in networking? (Muela-Meza, 2000). The Internet, the Web or WWW or World Wide Web, the electronic mail, they all work with principle of a computer network. A small computer network in a computer lab works with a computer as a server and all other computers (clients) hooked to the server by cables. The current paradigm is the fat-client network. All clients are connected to the server and they all can share resources in the network with the server and with other clients, but, the fat but, all clients have hard discs installed and the last edition of closed application software, thus these clients can work as a stand alone computer or hooked to the server. But "a thin client is a computer with no hard drive or other moving parts that lead to machine failure. Thin clients operate on a mainframe paradigm. All instructions and sessions come directly from a central, secure server. Each thin client realizes its Network Termination session and operates independently from the other thin clients. Because thin clients have no hard drives, there is no loss of data if a local thin client gets damaged or has a local power failure." (ACP, 2000).

What has of special thin client computers? They cost less than the half of a fat client average computer, and there are thin clients that could cost as less as a quarter of the cost of a fat one. A thin client needs to connect to a server, the server is the real fat computer. But if the server costs as much as the difference one can save with a thin client, than prices will go even and there will be no savings. That is the missing analysis in the above study. A cheap platform for the servers as much as cheap for the clients is the missing piece. "Eureka" shouted Archimeds. In the Riverdale School District in Oregon, USA, they shout like this "It works. It's free. Duh." (Minkel, 2003). They talk about the alternative forces of computing and networking technologies, they talk about Linux, they talk about open software or open source, the opposite to closed software/source like all the line of commodities of the empire of Microsoft.

"Open source software is software whose source code is made freely for inspection, modification and incorporation in other software, as distinct from being a closely guarded trade secret of software companies" (Schlumpf 1999). "The licences typically specify that applications and source code are free to use, modify and distribute, so long as these modification, uses and redidistributions are similarly licenced." (Chudnov 1999).

This is the new mixture of a free of charge server platform (Linux) and the cheapest devices, thin client computers and there can be obtained the most economic ICT solution, with better computing technologies (the literature shows evidence Linux is a better, more robust, with better capabilities of deployment than Microsoft). This is here and now the alternative for the world in real theory, methodology, practice and action and not just palaver. The over mentioned study edited by Segbert (1997) did not discuss at all about

such a critical issue. That is, a research project standing with a strategic vision throughout Europe did not include the most feasible solutions of proposing the installation of thin client computers and free Linux (or other open source) platform servers to give free of charge access to ICTs. The issue is essentially critical and polemical because Bill Gates is not happy at all with these alternative free developments. But a scientist should pursue for the search of truth. Thus this study is the major proof LIS research are self contained, abstracted from the general global problems which alternative although globally developed can of course be applied locally. There is another study, perhaps one of the most polemical of all the LIS research in the UK or the capitalist academic centres: *Open to All? The Public Library and Social Exclusion* edited by Muddiman (2000). It covered all the possible issues dealing with social exclusion and how affect public libraries, communities, and users, and how these contribute to tackle it. And one of the issues dealt precisely with ICTs, public libraries and social exclusion. But none of the authors of such an interesting study discussed anything about the installation of ICTs through thin client computers and Linux or other open source servers. Even Pateman from this last study proposes the "introduction of a workers' state" as the panacea and cornucopia of all the social exclusion ills at the very revolutionary marxist style. (Pateman, 2000, 128). What it comes diaphanously clear from both studies is that it is not much of an ideological position where LIS researchers stand, but of their lack of understanding the integral parts of any phenomenon, to make an analysis and synthesis of each of them in order to bring propositions for a real solution of the concrete problems rooted in the concrete realities say of public libraries, archives or museums. On one hand Segbert's study has a mild position as how to tackle the digital divide, with authors like Thorhauge following idealistic futuristic non theoretical or scientific methodologies and on the other extreme, authors like Pateman with a marked anti capitalist –more ideologically led than by empirical research evidence. Thus the challenges for LIS professionals is rather use theoretical ideologies as social sciences theories and methodologies rooted in the realms of research of real phenomena with an open, objective, and critical analysis of data and with a universal, global, multidimensional, and inter disciplinary vision of the evolution or development of the phenomena –say from the big-bang through the black holes till the big-crunch and back and forth--, not just led towards the position they stand.

Having all the world connected –at the very idealistic and religious style of Masuda – may help indeed bridge somehow the digital divide. The current region leading the way in using thin client computers connected to Linux free platform servers is Andalucia, Spain. On December 10, 2003 they have saved 24 million of Euros thanks to the installation of ICT infrastructure based on Linux open software (Navegante.com, 2003).

In Mexico, in 2001, 140, 000 elementary and secondary schools installed Linux instead of Windows and thin client technology to start the implementation of a nation-wide school network. And the savings for the Mexican government were: 100 million US dollars that can be used to buy more thin clients devices. (Lencinas, 2001).

China is mounting to the thin-client / open source server networking technologies bandwagon too. On November 25, 2003 they signed a contract which allows Sun Microsystems to distribute up to 200 million of Java Desktop System thin client computers

running on open source using Linux open source platform as server. This is the strongest application of massive ICTs a stand alone national government does to tackle a huge chunk of the digital divide in its national boundaries. They will install these equipments in government offices, schools, libraries, archives, museums and other publicly funded repositories of knowledge. And they chose open source thin client computers and Linux software platform, not only because Linux is free and thin client devices the cheapest, but also for the robustness of the software, scalability, deployment, ubiquity, and best of all, they could use this technology to help them develop in-house applications for specific needs. (For any difficult with concepts see an extensive glossary in Muela-Meza 2000). This contract converts China the most gigantic open source thin client/server networking technology Microsoft and others never dreamt of (Noticias.com, 2003).

In California TiVo.com has developed a thin-client device as small as a VCR or DVD players to offer homes TV programs through the Internet connecting to Linux open source platform server, the data obtained does not show evidence of successful use as to be a serious competence to traditional TV or TV through cable, but it shows that can be cheaper than regular cable TV and with better resolution capabilities, flexibility, and variety, but still, no strong evidence was found. Thus if is cheaper, people could afford it, both in homes, and best of all in educational uses in public repositories of knowledge and everywhere else. (Barton, 2003).

There are many evidences the alternative market forces are moving to offer people the most efficient and effective thin-client/server networking computing solutions at the cheapest prices or free. Due to time constrains it was not possible to show all the evidence, but considering the case of China, a country with one fifth of the population of the world, signing an initial contract for a 200 million thin-client/server computers, one can imagine the magnitude of this trend as shown for these current facts. If Andalusia saved 24 million Euros in a region with a lot much less population, one can easily imply the big savings of the Chinese government. But thin client are not only computers, thin clients are any portable or wireless device as mobile telephones, laptops, palmtops, etc. And even in this sector open software is leading the way, i.e. Sun Microsystems is creating partnerships with open source Linux platform, and a Chinese mobile company to provide wireless data technology infrastructure for a 60 million mobile users at the cheapest prices due to the better robustness of open source technology, and they claim to be the biggest market. (Sun.com, 2003).

A MS-Windows and MS-Office user may ask: and the open source thin clients offer a similar graphical solution to Microsoft graphical environment? Miguel de Icaza, the 27 year old Mexican hacker answers yes. He created Gnome which is the equivalent graphic interface for a Windows accustomed user and several software of applications like: Gnumeric for spreadsheets like MS-Excel. Other open software applications currently available for any one around the world and that can be offered in full (openly tailored) packets from Genome (Helix Genome) are: Netscape or Mozilla (Web browser like MS-Explorer and Web based email managers) OpenCalc (another solution for spread sheets like MS-Excel), Linux Open Office Word (word processor like MS-Word) (Garcia, T. & Risi, M. 2003), Open Office Impress (presentations software like MS-Power Point). (Minkel,

2003).

A policy maker from a country where linguistic diversity might be a big issue might ask: can open source offer free alternatives to translate software in many languages? Carol Wright from South Africa says yes it can. In the City of Cape Town, South Africa, Bridges.org introduced open source software and thin client technology as proposed by Muela-Meza (2000) and as proposed in this study with the goal to network the whole city, and by using open source Mozilla Web browser and email client they translated to 6 local languages. "This is an example of how the open source philosophy has lent itself to serve a market that commercial software vendors failed to address. Information on programming is freely discussed and shared so that volunteer programmers anywhere in the world can rapidly enhance the software. By promoting a spirit of cooperation and collaboration, these programs gained multi-lingual input for software development. Wright (2002:33). And this is possible because one of the many inter linguistic capabilities created is the use of Unicode which is the Esperanto for computer programming, so called universal code on which all languages can be built upon no matter if is Russian, Chinese, Arabic, etc. (Ostrowsky, 2002).

An environmentalist from Greenpeace may ask: and what about all the junk fat client computers dumped in poor countries from Africa, or Latin America as donations from bare foot Samaritarians, they are junk and pollute the environment, what does open source and thin client technology about it? "Thin-client networking will lever the existing infrastructure of the organization, which means that new applications can be deployed in the existing desktop hardware/software environment." (Muela-Meza, 2000). From 286 generation of computers can be converted into thin clients, thus much of the world's existence of hardware which are disposal might be used in poor countries in efficient manner.

In an society where ICTs are shaping all kinds of aspects in people's lives of course there might have been many other questions of environmental or health related or of any other issues like people getting blinded caused by computer monitors; people suffering from agonic pains of arms, hands and backs and muscles due to computer use; wasting of non renovated natural resources like oil, carbon, ferrous oxides and many other composites of which ICTs and their hardware parts and electronic devices are build and the various modes of energy needed for transmission, and many others, but those may need a deeper research which is out the scope of this study. Nevertheless, the challenge for LIS researchers and practitioners is to acknowledge that any technology is not a magic or other non existing things and that the more they understand the broadly general issues of how ICTs are created and transmitted and all the implications in all possible aspects having always all the people in the center, then the more they will be geared with innovative, creative, and imaginative thinking to look for solutions right before their very eyes.

So far it has only been explained about the free and cheapest solutions to help decisively to tackle the digital divide by offering ICTs services in libraries or in any other milieus. But the ICT savvy reader of this study may certainly question about the Integrated Library

Systems (ILS) which offer standardized solutions for electronic catalogs (OPACs), acquisitions, cataloguing, and all sort of module these systems provide. If the world's people at large is in general at the mercy of the line of general closed software commodities from monopolistic corporations like Microsoft. Then the majority of the world's public –as well as private-- repositories of knowledge apart from already suffering the devastating costs of being at the mercy of general closed software commodities monopolistic vendors like Microsoft, they all are also caught up by the closed ILS vendors of all kinds. But same as open source application software, there are several ILS solutions: MARC.pm supports MARC cataloguing, iVa helps librarian to catalogue Internet resources, MyLibrary helps librarians to set up Web database portals, Prospero like Ariel exchange journal articles from library to library. (Ostrowsky, 2002). What is mentioned here is just a basic introduction to open source software and its applicability in libraries, for further reading the reader may consult the 240 records and 15 A4 page long "Open Source and Libraries Bibliography" created and maintained by Brenda Chawner, who teaches at the Victoria University of Wellington, New Zealand and who is actually preparing this bibliography as she advances in her PhD at the School of Information Management.

The essence of this study as over mentioned has been to challenge theoretically and methodologically the reader's way of thinking towards the IS phenomenon and its impact on public knowledge repositories and the way he or she should overcome these challenges. At the very heart of the open software movement against or parallel to the closed one comes a solid critique which should challenge the reader to inquire more about it: "Scientists and researchers are warning that the use of closed software is against of one the pillars of scientific method: its validity. To accept as valid all the calculations used to support certain scientific assumption, they must be available to public verification. This is only possible with open software." (Lencinas, 2001).

Therefore, if the benefits of open source software and thin client networking technologies are very evident, and they have been developing for several years, why the serious LIS researchers investigating the many relations of the IS with libraries, have not been interested in understanding these solutions and assessing their viability through deeper empirical research? Why most of them do not promote them politically from local to global publics? The main challenge for LIS people in this section might be precisely to answer these questions and if they are really serious about LIS profession they should begin changing their way of thinking towards the social problems at large and getting involved in searching for the most suitable solutions for the problems our world claims, and concretely: tackling educational, information, ICT, and scientific unliteracy; tackling information and ICT gaps; participating on the political debate geared with solid theoretical and methodological research, etc.

9. Conclusions

LIS stakeholders should be aware of the many issues a phenomenon like IS may have and they should be able to know as much as they can about them in order to be able to come up with an integral analysis that illuminates the problem on research.

For the IS phenomenon and public repositories of knowledge the main challenges are on the economic side. Thus LIS researchers should look for the solutions as open source software and thin client technologies as the most cheapest and feasible ways to tackle just a little bit the digital divide.

In order to tackle the digital divide and its correlative negative impacts on people like social exclusion, a multinational effort should be made to release the external debt debtor countries from such burden. Otherwise poverty, and misery will worsen like Castells criticizes.

As for other initiatives LIS people could do be better prepared to overcome the challenges analyzed here, LIS schools should consider introducing courses of open source software, thin client technologies, Integrated Library Systems using open source software. The Universitat Oberta de Catalunya apparently is the pioneer around the world offering the online, open, and distance Program of Masters Degree of Open Source Software because they say people in Spain are requiring professional with this profile since they are becoming in demand. Manuel Castell was a visiting professor in the time the program opened, but no evidence was obtained as if he probably influence the university authorities to create such program. (Criado, 2003). In the LIS field, apparently the leader school is the LIS program at the University of Tennessee where they begun building the University's catalog (OPAC) using Linux and thin client technology. Shawn Collins, the instructor of that project makes a stentorian declaration: "we don't want our students to just be customers. We want them to influence the direction of the technology they work with." (Ostrowsky, 2002).

Finally, if this humble and modest, as well as indigestible and dense essay influence its readers, then maybe alternative solutions might be at the reach of possibility to tackle so many multidimensional and multi disciplinary problems IS has per se and particularly with LIS and the public repositories of knowledge. Otherwise, the candle light of knowledge will dwindle and all will become dark... and demons will begin to shake... (Sagan, 1997:45).

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