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## **Joint ICSU Press/UNESCO Expert Conference on ELECTRONIC PUBLISHING IN SCIENCE**

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Electronic publishing: Will it reach the whole world?**

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Electronic publishing is a reality today from the technical point of view, and the rate at which new developments in this field take place is impressive. For those instances already involved in electronic publishing, the challenge is to solve specific problems relating to authorship, copyright, editorial procedures, storage and archiving, protection and control of data, payment of services and financing of publishers, assessment of the impact of publications, etc. It is clear that once the disadvantages and problems raised by this emerging technology are appropriately met, the benefits that result from it both for service suppliers and users can be considerable.

However, for those countries that are not -or not yet- part of this system of globalization of electronic telecommunications and information management, the issues raised are of a different nature, and have to do rather with infrastructure requirements, and strategies and policies of development. The purpose of this presentation is to offer a reflection, based on data pertaining to different regions of the world, on the need to define development policies and measures to be taken in order to achieve a more active participation of these regions, so that they are more equitably represented in the world of electronic publishing and information management.

The motivation for such a reflection is not simply the claim for a niche for

the weaker members of the international community in the global electronic publishing market, but rather the conviction that only if scientific publishing is viewed as an endeavour of all scientists of all nations, a genuinely global development of science can be achieved. This entails creating conditions that would enable all nations to enter as active partners, and not merely consumers, into the electronic publishing and information management system.

We don't think that at this stage it is really necessary to discuss about the advantages and comfort of electronic publishing. Nowadays it is commonplace for most scientists of the first world of communications to be able to access through the multiple services and connections available, an ever-growing amount of electronic material: tables of contents, full texts, journals, dissertations, photos, etc. The fact is there, and it is growing like a snowball sliding downhill. Anyone who takes a look at the statistics of the phenomenon and performs a browsing through the networks can realize that there is no use in highlighting electronic publishing: It is a reality.

For this kind of world, the question today is not: Electronic publishing, is it possible?, because the immediate answer is: yes, indeed. The incoming development of a new technology, as always, introduces new questions once it is there. For electronic publishing, these questions could be: How to handle authorship; how to define copyrights; how to implement editorial procedures; how to attain standard storage and archiving; how to protect and control data; how to pay services and/or royalties; how to get publishing financed; how to assess the impact of publications and, further, the impact of the impact ?, etc. It is clear that once the disadvantages and problems raised by the emerging technology are appropriately met, the resulting benefits derived from it can be considerable both for service suppliers and for users.

This is, more or less, the present general perspective for the users and suppliers of the first world of communications. Let us stress: The first world of communications. What does it mean? It means to us, that there are users who inhabit different worlds of computer services and networking, different levels of information technology, or, as it is known in some parts of Europe, different *telematique* levels. This does not have to do with the country where the user lives or works; it rather has to do with the

power and quality of the network's plug that he has behind his computer. We mention the network's plug because it represents the amount of national, institutional and personal infrastructure and technology backing up this user. Let us remark that we do not mean the total capacity of the nation or the institutions to support this effort for most of the people, but just for this user. In third-world countries there can exist some first-world users, and viceversa.

So, as we can see, there are different tinges when considering different users in certain countries. This is important when talking about users of scientific information. Certainly in several countries of Latin America, and probably in other countries of the developing world, scientific communities have been privileged with good, and even excellent, links with the international world of electronic information. These elite groups are using with full power, capabilities and enthusiasm most of what is available in this world of electronic networking: mail, BBS's, telnets, FTP's; access to free or even payable data bases, journals, pictures, references and documentation, data downloading, sailing through the Web, etc. Everything that has been published in electronic media.

These communities are facing the same problems faced by their colleagues in other parts of the developed world of communications, and they are prepared to discuss the questions that have been introduced earlier; the technological environments are alike. We feel that this is part of our commitment as members of the international networked scientific society.

It seems at this point that to achieve such a working level is a matter of both a national policy to provide with the telecommunications infrastructure and the required human qualified resources, and of institutional research policies that complete the scenario for the scientific communities. This has been done with certain success in countries like Mexico, Venezuela, Brazil, Argentina and Chile, among others, where core communities of researchers in the top level institutions have been supported with such efforts. With these experiences, it would seem that simply keeping on that track those groups that are already on it, while recommending the others to follow the same lines, could be the solution for the countries that initially have no access to electronic publishing, since it is a fact that it provides plenty of timely information for the research purposes of these communities. The main problem here is that for

these countries to take such a decision they must afford the high expenses of getting to this point, since they are not suppliers or owners of the technology involved. In many cases it is difficult for these countries to face such investments, in addition to bearing the burden of an increased technological dependence.

But this is only one side of the coin. We have another set of questions besides the initial one. As we said above, it is a matter of tinges; there are also many countries where scientific communities have medium level infrastructure and capabilities (medium level network's plugs), and many more with practically none of this infrastructure (no plugs at all).

For the bulk of the developing countries, electronic publishing is obviously not –yet– a reality, and the issues of concern are therefore of a very different nature from those that concern our colleagues from the industrialized countries. We should again stress that this part of the world, so-called developing, which represents around 80 % of the entire planet, is in fact so heterogeneous that it can be hardly be put under the same name. A glance at the statistics shows that in many respects the differences between countries of the South are much more significant than between some countries of the South and some of the North. These large contrasts are present in most of the standard indicators of development, and also in more specific ones as number of scientists per capita, scientific productivity, investment in R& D, or communications infrastructure.

Facing such a heterogeneous landscape, and in trying to avoid the consequent risks of over-generalizations, in this text we have restricted most of our analysis to the Latin American Sub-continent, although probably many of the statements can be applied to some extent to other regions of the South.

The other side of the coin becomes more evident when we look at the situation of electronic publishing as producers or suppliers; then many more issues are at stake. From this point of view an initial set of questions that arise are of the following kind: What scientific literature is produced in Latin America, and who produces it; where do our scientists publish; how are our publications distributed; who are our readers? And then: How would the answers to these questions change by going from printed paper over to electronic publishing?

It is a well-known fact that Latin American science is poorly situated on the world stage. The number of scientists per capita, averaged over the region, is about one tenth of the corresponding figure in industrialized countries. Our share of the total world expenditure in R& D is of the order of 1 %. It is not surprising, then, that our scientists produce not more than 1.8 % of the scientific articles published in the world's registered journals. As much as 80 % of this production comes from only 5 of the 29 countries, the same countries already mentioned above, namely: Brazil, Argentina, Mexico, Chile and Venezuela, which means that the remaining 24 countries contribute with less than 0.4 % to the registered world production. Further, more than half of these articles are published in the mainstream journals produced in the North.

As to the scientific literature produced and published in the region, then, it is clear that the figures are very low in comparison with the present world production. In fact, all sciences taken together, there are 5,141 active Latin American journal titles registered in the major information services, out of a world total of 143,068 (see figure 1). Most of these journals are produced by scientific societies and academic institutions: universities and research centres. Usually, a small team of scientists voluntarily take care of the entire editorial work, with much sacrifice, assisted by an equally small team of technical and secretarial personnel. It is characteristic of these journals that they depend to a major extent on government or public institutional funding and must struggle year by year for their survival. Although many of the most established journals have thus succeeded to come out regularly for more than four decades, recent financial crises throughout the Sub-continent have presented serious risks to their survival.

The local or regional publications referred to above, are mainly distributed within the region itself, a few hundred copies per journal on the average. Except for very few titles, the distribution outside the region represents a low percentage, sometimes insignificant. This is evident for anyone who looks at the shelves or browses through the catalogues of academic libraries throughout the world: the scientific literature produced in the developing world is hardly present.

In fact, it is interesting to note that the library catalogues of universities and research institutions normally contain a small subset of journal titles, including even of those journals produced in more developed countries. In

other words, there are in all countries, in all regions of the world, many titles contributing to small rivers that never flow into the mainstream of scientific literature. And whenever there is a shortage of budget –which is currently the case in many institutions, it is the flow of the small rivers that is cut off more readily, owing to the importance of keeping updated with the mainstream literature. This policy has had its negative effect on the worldwide distribution of journals from developing countries, even though their subscription prices are considerably lower than those of the journals produced in the North.

This leads us to responding to the next question: Who are our readers? It is clear that if our literature is not duly distributed, it is not read either. Another factor that contributes to the scarce use of our literature is of course the poor presence of it in the indices. The number of Latin American journal titles included in the major indexing and abstracting services is very small: for example, in 1994 the ISI indexed only 49 of our journals (see also figure 2). The inclusion of a publication in such indexing and abstracting services can have nowadays a substantial effect on the impact of the publication, and on the importance attributed both by individual scientists and by institutions to this publication. In addition to setting a ‘value’ to it for institutional purposes – which means adding a value by including it, but also diminishing its value by excluding it from the index or list of abstracts–, it influences the readership, to the extent that the colleagues tend to read and cite what is more easily accessible to them and to other colleagues.

Yet one should observe that our local and regional publications are not aimed exclusively at the international readership who have access to a host of scientific literature and have many options to choose from. There are other strong reasons for publishing and distributing our journals, of which we mention only two: On one hand, most of the scientists in the region, except perhaps for those who work at the larger or most established institutions, have very poor access –mainly for economical reasons– to the literature produced abroad, and depend therefore to a large extent on the scientific information they receive from the region itself. It is not uncommon that the first scientific journals with which a young scientist has some experience, both as reader and as author, are the locally produced journals. Further, the local or regional journals provide natural spaces for the publication of discoveries or results that are of particular

interest for the colleagues of the same region; this is the case in important branches of the social sciences, medicine, biological sciences, earth sciences, etc.

Now we come to the point where we ask ourselves: Under these conditions, what are the prospects of electronic publishing, for our publishers? Who would benefit from it, and how can the benefits be extended?

Certainly, if all publishers had the means and the capacity to distribute their produce in electronic format, there would be no problem, other than those problems that were mentioned at the beginning, which concern the first world of communications. But the truth is that at present, in Latin America only a few journals have in principle this capacity, those few that are registered even in the most selective international indices and constitute the most conspicuous part of the regional mainstream of printed scientific literature. Sooner or later, and probably very soon, we will see some of these journals circulating in the international electronic network. For these journals, scientific publishing certainly represents a powerful tool, as it helps them enhance their international presence and can even be useful to reduce publishing and distribution costs.

For the rest, things are not so easy. Those journals that hardly have the means to struggle for survival in the present world of printed paper – notwithstanding their intrinsic value–, will with more difficulty find their way in the rapidly evolving world of electronic publishing. The risk that these journals remain marginal or even drown forever in the deep ocean of present-day publications, is high. Unless, of course, efforts are made to avert this situation. This is, we think, a task that has to be approached. Which means the need to find measures that can be taken to enhance these journals, so that they are more equitably represented in the world of electronic publishing and information management.

The strategy to reach the high international levels of electronic publishing in Latin America, is to start by taking advantage of the current globalization of telecommunications and computing facilities. The first step could consist of compiling, storing and distributing by electronic media, in the form of indices, the basic information about the scientific publications produced today in our countries. This is highly important because at the present stage no one in the world –not even we ourselves–

has a comprehensive knowledge of what is published in Latin America. This first step would pave the way for the tasks that follow naturally, such as providing tables of contents, abstracts, and, eventually, the full contents of the journals, through the same electronic media.

This idea is not exclusively ours. Many colleagues in Latin America share our concerns and have similar expectations. An initiative in this direction has started to gather people from the different sectors involved: publishers, scientists and information specialists, from various Latin American countries, with the intention to create and set up the electronic mechanisms for compiling, storing and distributing the information related with the scientific publications of the entire region. The strategy is to work in a coordinated way with several established focal points that are already developed and have accumulated a valuable experience, and jointly define standards and policies for constructing the indices, with each one of the points taking the responsibility for their respective zones of influence, in order to collect the information from the weaker neighbours and thus catalyze their own development. (That there already exist a number of information centres with an experience in the construction of databases can be seen from [Table 1](#).) The goal for the near future is to obtain thus the whole Latin American scientific publications index, as the first step towards the objective of arriving eventually at a comprehensive and well-distributed Latin American electronic publishing capacity.

This project has been shaped by the conviction, widely shared by the respective communities, that only if scientific publishing is viewed as an endeavour of all scientists of all nations, each one to the best of their capacities, a genuine global development of science can be achieved. We do not claim a niche for the weaker members of the international community in the global electronic publishing market; we expect that all nations can enter as active partners, and not merely consumers, into the electronic publishing and information management system.

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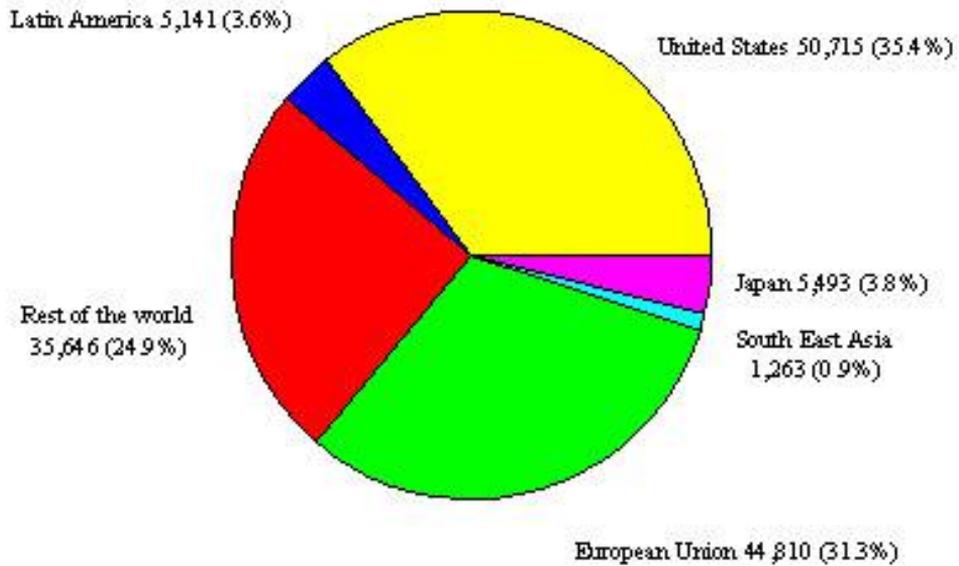
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**Table 1: Data bases produced in Latin America and the Caribbean** (bibliographical and statistical). Source: DIBALC 1992.

<b>Argentina</b>	<b>50</b>
<b>Bolivia</b>	<b>1</b>
<b>Brazil</b>	<b>73</b>
<b>Chile</b>	<b>32</b>
<b>Colombia</b>	<b>29</b>
<b>Costa Rica</b>	<b>153</b>
<b>Cuba</b>	<b>138</b>
<b>Dominican Republic</b>	<b>7</b>
<b>Ecuador</b>	<b>4</b>
<b>Guatemala</b>	<b>2</b>
<b>Guayana</b>	<b>1</b>
<b>Jamaica</b>	<b>3</b>
<b>Mexico</b>	<b>104</b>
<b>Nicaragua</b>	<b>1</b>
<b>Panama</b>	<b>1</b>
<b>Paraguay</b>	<b>2</b>
<b>Peru</b>	<b>16</b>
<b>Puerto Rico</b>	<b>2</b>
<b>T. and Tobago</b>	<b>3</b>
<b>Uruguay</b>	<b>11</b>
<b>Venezuela</b>	<b>15</b>



*Image 1: Currently registered journals from different regions of the world*

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*Image 2: Latin American journals indexed in Clase and Periodica and in other information services, Clase Index*

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