Digital Information in the Public Domain

A turn paper for the seminar "Informatics and Society"

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Abstract

As we are rapidly heading to the so-called "information society" or "knowledge society", one question becomes increasingly important: Should some or any information be freely[†] available to the public, and to what extent?

There is a profound conflict of interests between authors/producers of information and the consumers of "intellectual property", because the former expect to be paid for their work (which is of course legitimate) but the latter would rather read books, listen to music and watch movies without having to pay for them. In fact "pirating", as it is labelled by major industries, is very common among consumers, because copying has now become easier and cheaper than ever in history. Thus the question arises whether it still makes sense to charge fees for providing information goods. The mechanisms of market economy can only be applied if very strong technical restrictions, such as digital watersigns, are used to prevent copying.

An information economy also has potential effects on the relation between the "first" and the "third" world, because the latter often cannot afford expensive research needed for their development. Scientific knowledge increasingly becomes private property with licenses sold at astronomic prices, so the developing countries will fall behind even further if these practices continue. On the other hand, natural information resources (e.g. genetic information) of third world countries are exploited by big companies without compensation.

I also present the idea that our concept of information (as well as knowledge) as a kind of object, a *good*, does not reach the point. Information can only exist in the process of communication. Of course this has implications on the economics of information exchange.

[†]In the sense of free access to information, not necessarily without cost—work has to be rewarded, of course!

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1 Introduction

> "Information wants to be free, and it wants to be valuable."

This statement from Stewart Brand will accompany us through most parts of this essay. But first let me define what I mean by the term 'information'. The mathematical definition from coding theory is somewhat technical:

> "The quantity which uniquely meets the natural requirements that one sets up for "information" turns out to be exactly that which is known in thermodynamics as *entropy*. It is expressed in terms of the various probabilities involved—those of getting to certain stages in the process of forming messages, and the probabilities that, when in those stages, certain symbols be chosen next." [SW69, p. 12]

Or, as Gregory Bateson puts it, "information is a difference which makes a difference". This means that information reduces uncertainty. Since we are talking about digital information, of which the *bit* is the basic unit, every bit can be viewed as answer to a question answerable by yes or no ('yes' for 1, 'no' for 0).

Helmut Willke concentrates on the distinction between *data*, *information* and *knowledge*: Data is the "raw" product of observation, whether by our senses or by technical instruments. Information arises from placing data in a system-dependent context, and knowledge derives from information when this information is put in a context of experience. [Wil98]

For the purpose of this paper it is legitimate to subsume all three categories under the term *information*, because all of them can be published in some way. Sometimes I shall use the word *content* as a substitute.

Why should an author, musician or any other kind of *information producer* avoid to publish her[1] work online in digital media? The reason is of technological nature: copying digital media is much easier and cheaper than copying traditional media where content is tightly bound to its "hardware". Thus the *information users'* inhibition threshold to *piracy*, as illegal copying is called, lies much lower when content is available in digital form.

Nevertheless I believe that the conflict of interests (information producer versus user) lies mainly in payment for information and not so much in its availability to the user. Most authors, writers etc. *want* as many people as possible to read their books or listen to their music, although some might only do it for the money. But they expect to be rewarded for their creative work, which is of course legitimate. Thus,

> "The question is not, Is it fair to charge someone for something which can be delivered at no incremental cost? It is rather, How should we allocate the cost of developing that value among the people who benefit from it?" [Dys96]

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[1]Throughout my paper I will use the female form

The industry's answer is the development of ever more sophisticated technical solutions to protect against unauthorised copying. The MP3 boom[2] has led to "digital watersigns" which mark digital pieces of music as belonging to a certain person; in combination with special player devices which read the watersigns it is possible to limit one particular copy of a song to its single owner—or rather, its licensee. Other persons with a different ID code won't be able to listen to the song on their player[3]. Similar techniques are used for digital images and video[4] and are being developed for texts[5]. The popularity of "Star Wars" bootleg copies on the Internet shows how urgent a solution for this problem has become.

2   Historical development of Copyright

It should be remarked that the German "Urheberrecht" is a more general legal concept than "copyright" in Anglo-Saxon countries. Copyright is—as the name implies—only concerned with copying information, while "Urheberrecht" is a usufruct as well as a right of personality (or moral right). But the term "intellectual property rights" shows that the differences are not that big.

I guess that the moral right on published works is the least controversial; crediting an information producer for her work does not cost anything. Whether an idea belongs to anyone or not is at first glance a philosophical question, but it has implications on copyright. Only if I own an idea can I claim the exclusive right to sell copies of it.

In modern jurisprudence copyright is no longer viewed as a property right, rather it confirms that an idea is the product of of a person's mind which the person can use in any way she likes (as long as she does not violate any other laws). In particular she has the right to publish it at her own conditions, and she may even keep it completely to herself. [HR95]

Copyright gives its owner a limited monopoly on her work. The first of these monopolies came up in the fifteenth century, when printing was (re-)invented[6] by Johannes Gutenberg and in the following decades spread over Europe. Printers who started their business in a town received the exclusive right to publish books in that town. This policy served as incentive for printers from other towns.

The idea of "author privileges" came up in the renaissance. At the same time publishers in England, who were organised in the "Company of Stationers", began to claim the exclusive right to make copies of the books they printed. They were granted this right by Queen Mary I in 1557.

Intellectual property rights (IPRs) arose from the concept of natural law. This

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[2]See `http://www.mp3.com/`

[3]See the Secure Digital Music Initiative: `http://www.sdmi.org/`

[4]DVD–Copy Protection Process: `http://www.macrovision.com/dvd.html`

[5]WebBuy Announcement: `http://cgi1.adobe.com/acrobat/webbuy/webbuybeta.html`

[6]it had been known for centuries in China

was the beginning of modern copyright. The first copyright law was enacted in 1710 in England under the reign of Queen Anne. The United States followed in 1790 with their Copyright Act. Both acts granted authors a copyright for fourteen years. In France, copyright was enacted in two acts in 1791 and 1793 during the Revolution. [HR95, Man98]

Since that time the world has changed a lot.

> "Furthermore, when Jefferson and his fellow creatures of The Enlightenment designed the system that became American copyright law, their primary objective was assuring the widespread distribution of thought, not profit. Profit was the fuel that would carry ideas into the libraries and minds of their new republic. Libraries would purchase books, thus rewarding the authors for their work in assembling ideas, which otherwise "incapable of confinement" would then become freely available to the public. But what is the role of libraries if there are no books? How does society now pay for the distribution of ideas if not by charging for the ideas themselves?" [Bar93]

As I pointed out before, the information providing industries (publishers, software companies, record companies and the like) push technological development in this direction. Their lobby has also influenced recent legislature[7] to create a legal basis for selling information as if it were a material good. The trend towards commercialisation of all kinds of information is clear.

But this trend threatens freedom of speech, which contains the right to access other people's opinion, the opportunity to exchange views with each other. Article 19 of the Universal Declaration of Human Rights states that

> "Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to *seek, receive and impart information and ideas* through any media and regardless of frontiers." [emphasis by me]

The German Federal Constitution Court views publishing of facts as necessary for freedom of speech, because facts are necessary as foundation for formation of opinion. [Sch98, p. 29]

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[7]*WIPO Copyright Treaty*: `http://www.wipo.org/eng/diplconf/distrib/94dc.htm`
WIPO Performances and Phonograms Treaty:
`http://www.wipo.org/eng/diplconf/distrib/95dc.htm`
HR 2281 Digital Millennium Copyright Act:
`http://thomas.loc.gov/cgi-bin/query/D?c105:6:./temp/~c105jVrWU5::`
HR 2652 Collections of Information Antipiracy Act:
`http://thomas.loc.gov/cgi-bin/query/z?c105:hr2652.rfs:`
HR 3048 Digital Era Copyright Enhancement Act:
`http://thomas.loc.gov/cgi-bin/query/z?c105:H.R.3048.IH:`
HR 3531 Database Investment and Intellectual Property Antipiracy Act:
`http://fairuse.stanford.edu/database/hr3531.html`
EU Database Directive: `http://www2.echo.lu/legal/en/ipr/database/database.html`

In the scientific community, almost every new idea or observation enters the public domain as soon as it is discovered, which is vital for peer review. For developing countries, scientific as well as business information is very important, but unfortunately these countries cannot afford license fees for patented processes or devices needed for their development. I will elaborate on these topics in the following two chapters.

3 Developing countries need information

3.1 Negative effects of intellectual property rights

Roberto Verzola of the Philippine Greens calls the worldwide information economy "the third wave of colonisation". What is described as colonisation in history books (European settlers founding colonies, imposing their culture and religion on native inhabitants, drawing out raw materials needed for the growing industry in Europe, taking African slaves to America and so forth) is only the first wave, according to Verzola. He describes the second wave as the process "where industrial countries and global corporations would range across the globe for investment areas, industrial markets, trading partners, and sources of cheap labor and raw materials." [Ver98] After having struggled successfully for their independence, global corporations lost their privileges in the former colonies, , because "this phase saw the adaption of economic protectionist measures meant to strengthen local capital vis-à-vis foreign capital." The Corporations tried and are still trying to regain these privileges, with considerable success, argues Verzola.

But he also points out that while "we are still in the midst of the second wave of globalization, yet a third one has already emerged. [. . .] This looming third wave is the global information economy." The products of this economy consist of information, which, Verzola remarks, is not very good suited for being at the heart of an economic system, because its non-material nature makes it possible to copy it at almost no cost.

> "The low marginal cost of information has two major implications: one for those who use it, and another for those who sell it.
>
> For users, it encourages sharing. Many cultures, in fact, see knowledge as social wealth—a collective asset that is meant to be shared. These cultures—including most Third World and indigenous cultures—are therefore in close harmony with the very nature of information. [. . .]
>
> But there are other cultures, where private property concepts have become more absolute and where almost everything may be commodified. In these cultures—often with capitalism at their core—information has become an object of commodification and privatization." [Ver98]

Economic interests of companies from industrial countries thus conflict with the practice of sharing information in developing countries. Intellectual property rights (which are statutory monopolies, as pointed out before) need to be enforced globally, otherwise there would be loopholes where these monopolies are not in effect and copying is legal. Organisations like WIPO, the World Intellectual Property Organisation, are on the head of this development.

Verzola shows that even in the U.S. piracy once was very common:

> "It is to the interest of developing countries, both the agricultural and the newly-industrializing economies, to dip freely into the world's storehouse of knowledge and adopt technologies where they might be useful for the country's development. When it was still a developing country, in the 18th and 19th centuries, the U.S. was one of the worst pirates of British books and publications. When it was trying to catch up with the U.S. and Europe, Japan also freely copied Western technologies. Taiwan did the same. So did Korea.
>
> Yet, the U.S. and Europe would lead us to believe that piracy is morally wrong. They do not want us to pirate their books, their software and their designs.
>
> They say we pirate their intellectual property rights. Yet, they continue pirating our intellectuals. Advanced countries think nothing of pirating our best scientists, engineers, technicians, and other professionals. They patent or copyright the works of these intellectuals and then sell them back to us at high prices. They also pirate our genetic resources. Their scientists roam the world pirating biodiversity resources like microorganisms, plants, animals and even human DNA. They then claim monopoly ownership over the genetic information they extract, patent them, and sell them back to us at high prices.
> [...]
> The U.S. sends its people worldwide to interview local healers and acquire their centuries-old healing knowledge, which had been passed from generation to generation. When we copy U.S. books to acquire their knowledge, we are accused of piracy. U.S. scientists freely take away all kinds of microorganisms, plants and other sources of medicinal substances from Third World countries like us. Yet, when we copy the drugs that have been developed from these substances, we are also accused of piracy." [Ver95]

Remember this is a Philippine talking. What these examples show is that an information economy in today's fashion seems to *depend* on pirating developing countries. There is no doubt industrialisation in Europe and the U.S. would have been much slower without constant inflow of raw materials from the colonies. The same is true with our information economy. *If our endeavours to help the Third*

World catch up with industrialised countries are honest, then we must make our scientific achievements available to them.

3.2   Prerequisites for participating in the information economy

It is not only necessary to lessen the grip of intellectual property rights, most developing countries also lack basic technical and social prerequisites. For example, "Africa has the lowest number of telephone lines per capita in the world. [. . .] The teledensity (the number of telephone lines per 100 people) in Sub-Saharan Africa is currently estimated at 0.5. This equates to approximately one phone line for every 200 people. By comparison, the teledensity in the United States is 65 (equivalent to one phone line for every two people), and 45 in Europe. *There are, in fact, more telephone lines in New York or Tokyo than in the whole of Africa.*" [But98, emphasis by me]

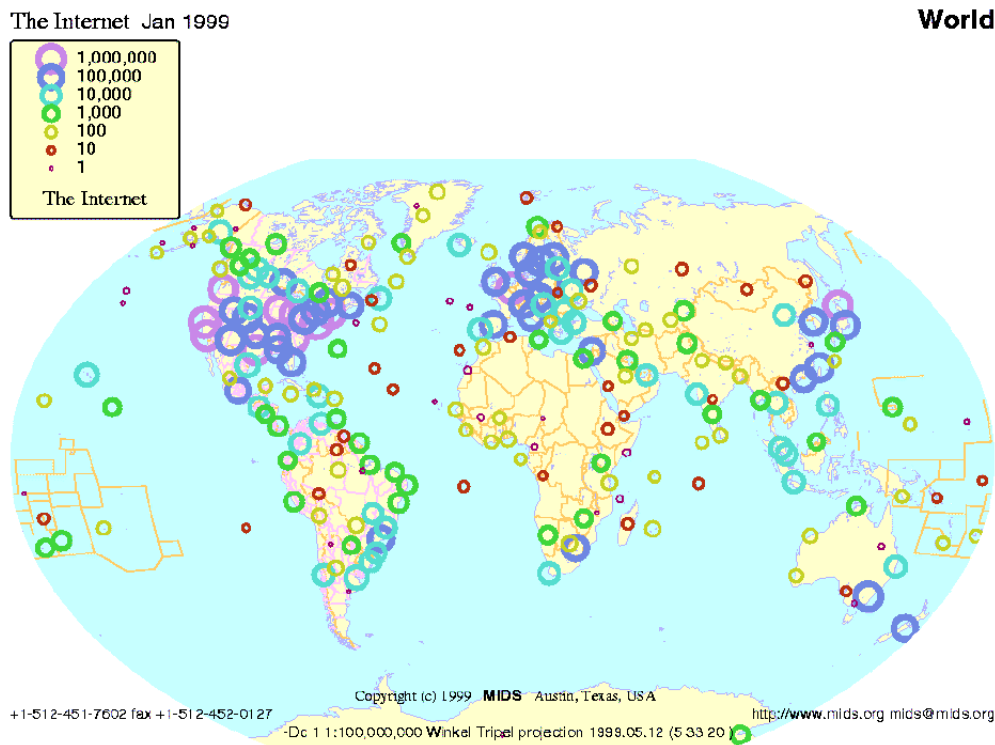Figure   1:   Internet   hosts   worldwide   (*Source:* http://www.mids.org/mapsale/world/index.html)

Third World countries also lie behind in the use of the Internet, as figure 1 shows. Poor power supply is one of the reasons. Of course electricity is needed

for electronic communication, but figure 2 shows that electricity generation (as well as electricity consumption) is very unevenly distributed on the Earth.
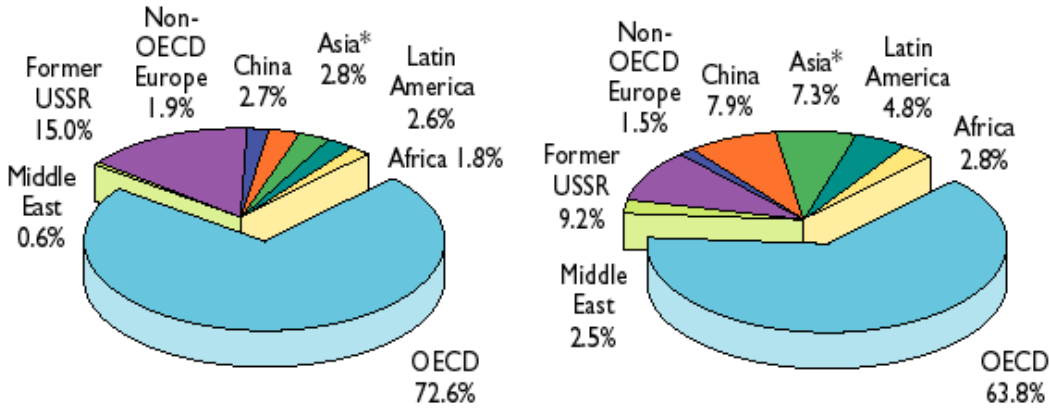
Figure 2: 1973 and 1996 Regional Shares of Electricity Generation (Excludes pumped storage) (*Source:* `http://www.iea.org/stats/files/keystats/stats_98.htm`)

Aside from technical issues, people need to be able to read if they want to access information from the Internet and other digital services. Currently there are 850 million illiterates on Earth, mostly in developing countries, as figure 3 shows. [Röt98]
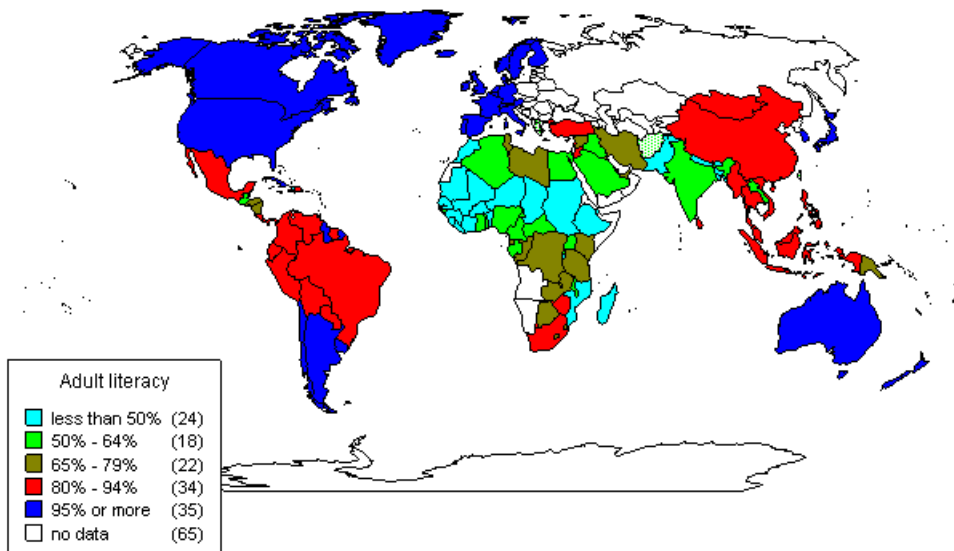
Figure 3: Literacy rates (*Source:* `http://www.oecd.org/dac/Indicators/htm/map_b.htm`)

Also, "the development of the wired economy in Africa is seriously constrained by the shortage of skilled human resources. Most IT and related companies in the continent face huge shortages of skilled personnel. Universities and technical colleges in Africa are often ill equipped to provide training on current technological developments and consequently provide training unsuited to the needs of the market." [But98]

The statistics in figure 4 illustrates the result.
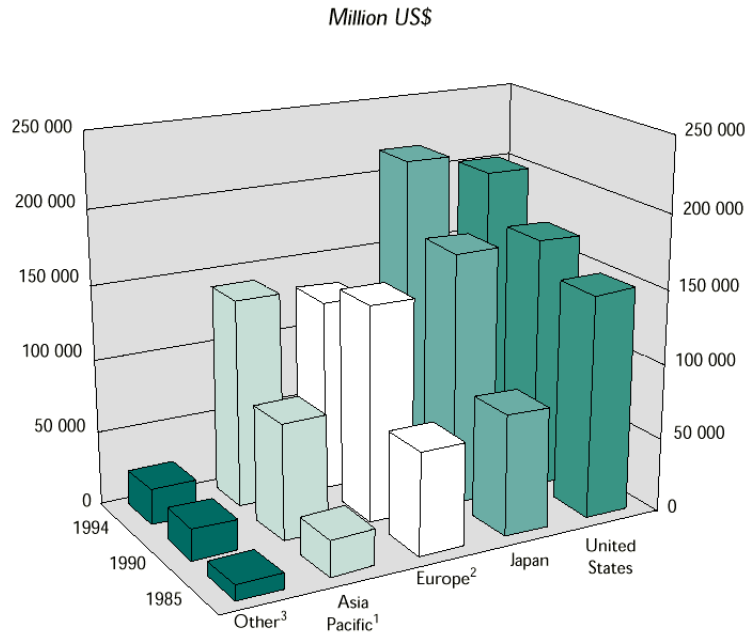
1. Asia Pacific: Australia, DAEs, India, Indonesia, Philippines.
2. Europe does not include Greece, Iceland, Luxembourg, Portugal, Turkey.
3. Other: Brazil, Canada, Israel, South Africa.
Source: OECD Secretariat calculations, based on data from Elsevier Advanced Technology, *Yearbook of World Electronics Data*, various issues.

Figure 4: World Information and Communications Technology (ICT) production (*Source:* http://www.oecd.org//dsti/sti/it/stats/itout-1.pdf, Figure 1.30)

Third World countries currently play only a very small role in the global information and communications technology market. But we can also see that some Asian states, the so-called "tiger states", have adapted rather fast to the economic change.

Further information is provided in the appendix, a statistics from the World Development Report 1998/99 dealing with "Communications, information, and science and technology".

Tom Butterly shares Verzola's view that "countries that do not facilitate this information revolution will likely fall further behind". But in contrast to Verzola

he believes that countries which privatise and deregulate the telecommunications market "will reap huge benefits in terms of economic development and growth". He mentions as examples "Latin America and Ireland, where telecommunication deregulation and privatization have produced enormous economic benefits".

Nicholas Negroponte, co-founder and director of the MIT (Massachusetts Institute of Technology), also believes that developing countries might be able to "leapfrog" into 21st century's information society utilising the Internet. Bearing in mind the facts about telephone lines and Internet usage in Africa, this seems very optimistic. Nevertheless he shows a possibility how such a leap might be accomplished:

> "Yet, telephone rates are the most expensive precisely where they should be the cheapest - in the developing world. It is time to take celestial intervention quite literally. A combination of geostationary and low-Earth orbiting satellites—GEOs and LEOs—can and will change Internet usage in the ROW [rest of the world], especially for the more than 2.5 billion people who live in poor, rural areas." [Neg98]

Tom Butterly mentions satellites, too: "Africa may actually be at an advantage in implementing these new technologies as it does not have an extensive investment in existing infrastructure." [But98]

Future will show who of them is right.

4   Science, libraries and community networks

4.1   Scientific research

Scientific research relies on unrestricted communication of research results between scientists. The principle of *peer review* is vital to the formulation and verifying of new ideas and theories. Scientists have to reveal results of experiments to the scientific community, so that others are able to repeat the experiment and verify the results.

As I stated before, an increasing number of scientific developments become patented or copyrighted, which means that they will not be available to peer review anymore, because that would result in loss of revenue.

Richard Stallman points out in his essay on free software that "in any intellectual field, one can reach greater heights by standing on the shoulders of others. But that is no longer generally allowed in the software field—you can only stand on the shoulders of the other people *in your own company*." [Sta98, emphasis from original] This can be applied to a wider range of scientific fields, mainly when potentially profitable technological achievements are concerned. Stallman continues, "the associated psychological harm affects the spirit of scientific cooperation, which used to be so strong that scientists would cooperate even when

their countries were at war. [. . .] Conflict for profit has destroyed what international conflict spared. Nowadays scientists in many fields don't publish enough in their papers to enable others to replicate the experiment. They publish only enough to let readers marvel at how much they were able to do."

4.2   Libraries as providers of free information

Closely connected with science is the case of libraries. The policy of *fair use*, which means that copyrighted works can nevertheless be accessed by the public without direct compensation for authors and publishers, was accepted for a long time until recently. The loss due to books in libraries is small compared to the number of books sold—many people go to libraries to try out lots of books without having to buy them, and eventually they do buy those books which they liked best. And in most other cases one would not buy a book one reads in a library (I know this from my own practise), which means that—at least for publishers—there is no loss at all in such cases.

Librarians view themselves as "guardians of the world's storehouse of knowledge, which they want to be freely accessible to the public. Librarians and educators have fought long battles and firmly held their ground on the issue of fair-use, which allows students and researchers access to copyrighted or patented materials without paying IPR rents." [Ver98]

Now that information has become the main business factor, intellectual property companies try to put an end to fair use because it threatens their profit. Libraries have recognised the digital age as well and are building electronic archives, from which users can lend books online. This is a thorn in the flesh of companies selling information goods. For example they argue that reading an electronic text on a computer screen already is an act of copying (from hard disk to RAM), saying in effect that even *reading* requires a license. [Lit96]

Applied to books, this would mean that every time I read a book I would have to pay my license fee. That is obvious nonsense in the book case, so why should it make sense with digital documents?

Harald Müller suggests that libraries could even charge publishers and authors for the services they provide: [Mül98]

- Cataloguing works, thereby putting them in a context where potential readers (the target audience) are likely to find them;

- advertising works in public accessible catalogues, bibliographies and databases;

- archiving and conserving works;

- providing works as basis for new works.

There exists even an online journal of physics[8] which charges the authors (!) of articles for publishing them. We will run across this model again later in chapter five.

4.3 Community networks

Libraries do not only have books in store but they also provide public Internet terminals; at least some of them do. Especially in Third World countries they are often the only place for poor people to access the Net. So-called *community networks* also provide access to electronic media for those who cannot afford a PC with online connection. Roberto Verzola writes that "information infrastructures are very expensive. [...] In the same way that the problem of Third World transport is solved by public transport and not by a "one-family/one-car" policy, the problem of universal access in the information sector can be solved by public work/access stations and not by a "one-family/one-computer" policy." [Ver98]

Community networks exist in industrialised countries, too. Douglas Schuler, member of the Seattle Community Network (SCN) board, reminds us "of the fact that the poor have been generally left out of the network arena". [Sch95] He stresses that "community networks are not designed to be on-ramps to the Internet, however, as this metaphor implies that the purpose of the system is to help people escape from their local community". This community lies at the heart of community networks.

"The world's first community network system, Community Memory in Berkeley, California, was started in the early 1970's by Efrem Lipkin, Lee Felsenstein, and Ken Colstad to serve as a model for facilitating the free exchange of information to communities around the world. From a variety of public locations [...] participants could read forums for free, contribute their thoughts for a quarter or start a new forum for a dollar." Again we have the notion that people pay for publishing while getting information for free.

Bielefeld's FoeBuD e.V. (Verein zur Förderung des bewegten und unbewegten Datenverkehrs)[9] is another example for a—very small scale—community network; at least it runs a small Internet café and a BBS system (BIONIC), and it hosts speeches on information technologies and their impacts about once a month.

5 New economic models

It was mentioned several times that the nature of information is not compatible with market mechanisms, because it is in no way scarce. Costs for producing content cannot be allocated by the market, unless artificial restrictions are applied. Either producers charge for content, then less users will acquire it, or the

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[8]http://www.njp.org/
[9]http://www.foebud.org/

costs are allocated via taxes (or similar collective financing mechanisms), then in general the individual contribution does not correspond with the individual usage. In terms of economics this is called *market failure* or *suboptimal*. [Hei94]

Selling information encounters another difficulty, Arrow's information paradox: Before knowing an information one cannot judge its value, and if one knows an information it is no longer necessary to buy it.

5.1   Attention economy

All these observations suggest looking for different economic models to be applied to the information economy. A good point to start is the question: *What is the scarce resource in an information economy?* Clearly it is not the information itself, but the time and the *attention* needed to retrieve it. Michael H. Goldhaber consequently says that the new model will be an *attention economy*.

He argues that capitalism, the industrial economy, has reached its limit in industrialised countries (not yet in the Third World). Mass production made it possible to fulfil every material demand. This is even more true with information— today many people feel they could drown in the flood of available information. What drives the enormous growth of digital media is not primarily a need for information. Rather the *content providers desire attention*, and therefore they publish information on the Net or similar media:

> "If the desire for information of any kind is hardly so strong as to justify the vast growth of what is known as information technology, then why did it grow, and why does that growth continue at an accelerating pace? Material goods don't flow through things like the net. Information does, but what else?
>
> There is only one basic answer, and that is what has to be present somewhere along the line if information is to have any value at all. It something that is scarce, as well as desirable, so that there is a clear motivation for putting out effort to obtain it. Namely attention."
> [Gol97]

Here we have an explanation why people would pay for posting to an online forum (p. 13): "Rather than pay to receive the content of an online service, users may read it for free, but pay to post to it: I. e., they pay for others' attention, but even then only if it passes a reviewer's filter." [Dys96]

She later points out that "in a world full of content, I still want to know what your friends and mine are thinking, but I want only what they think is so good that they'll pay to have me read it—because they honestly believe it will raise their stature in my eyes."

Being rich in an attention economy means being a *star*. Stars have become such an integral part of our culture that is is almost unthinkable not to have any stars. That they also earn very large amounts of money shows that we are living

in a transition period from monetary economy to attention economy, says Gold-haber. For him "intellectual property requires that no one pay attention unless they pay money. Even if they have the money, that complication, especially on the Internet, will often be too much for them, and they will focus their attention instead on what is uncomplicated and easy. [...] In the long term intellectual property is thus a foolish and losing proposition. This helps why the old and new economies won't continue to coexist forever; they are diametrically opposed around this central question, as well as some others, and one can only grow at the ultimate expense of the other." [Gol97]

John Perry Barlow, a star himself (he writes songs for the "Grateful Dead"), is a good example for this transition: "We have been letting people tape our concerts since the early seventies, but instead of reducing the demand for our product, we are now the largest concert draw in America, a fact that is at least in part attributable to the popularity generated by those tapes."

5.2   Earning money by creating content

One question still remains: One cannot buy food for attention, so how can one make a living publishing information? Stars don't have to worry about this, but the great majority of us will never be a star. As Barlow suggests,

> "One existing model for the future conveyance of intellectual property is real time performance, a medium currently used only in theater, music, lectures, stand-up comedy and pedagogy. I believe the concept of performance will expand to include most of the information economy from multi-casted soap operas to stock analysis. In these instances, commercial exchange will be more like ticket sales to a continuous show than the purchase of discrete bundles of that which is being shown.
>
> The other model, of course, is service. The entire professional class—doctors, lawyers, consultants, architects, etc.—are already being paid directly for their intellectual property." [Bar93]

Esther Dyson agrees that "content (including software) will serve as advertising for services such as support, aggregation, filtering, assembly and integration of content modules, or training—or it will be a by-product of paid-for relationships." [Dys96]

She also suggests that advertisers will sponsor artists, if they promote the company's products in their works and performances. I don't like this idea, because it could result in loss of artistic quality (not the best works will be sponsored but the ones with the most obvious advertising). "Product placement" is already common practise in the film industry. Another, slightly more favourable example is advertising on web sites. By the way, today in most cases it still is a deal of heavy losses.

The "Street Performer Protocol" is in my view better suited for funding content production, especially "alternative or "marginal" works". Using this protocol, "the artist offers to continue producing their freely-available creations so long as they keep getting enough money in donations to make it worth their while to do so". [KS98]

A creator sets a goal of, say, $20,000, and when she has received this amount of donations she makes her novel (or any other kind of work) available to the public. The authors suggest having a trusted third party to handle the transactions, because otherwise the author could simply take her money without having published anything. She couldn't repeat this scheme very often, of course. Actual transactions would be handled via electronic *micropayment*.

What makes this model most interesting is that it avoids any third parties like publishers, record companies, sponsors and the like. Consumers pay creators directly, thus all of the money paid helps the creators create new works. This applies to the following model, too.

Micropayment can also be used for "pay-per-view" transactions: I put some encrypted content on my web site which is downloadable for free. But, because it is encrypted, it is of no use to the consumer yet. If she agrees to send me a (usually small) amount of money electronically, she receives the decryption key to view or listen to my content.

Theodor Holm Nelson of Project Xanadu, the first hypermedia network, extends this procedure to hypermedia links: "A republisher only distributes pointers showing how to obtain the material, and in what new context(s) to place the material; each recipient buys these materials independently." [Nel95] He calls this "transcopyright". With this model we treat information as if it were a material good; every new instance of it must be paid for, though it does not have to be produced again. That is the reason why I refuse this solution.

Helmut Willke points out that information infrastructure as a "collateral good" needs political intervention, because a single, even global corporation does not have the capacity to build and maintain such an enormous project. He mentions development and construction of air planes, such as the "Airbus", which was made possible only by collaboration of several companies under supervision of the European Community. [Wil96] Such a political economy of information is suggested by Roberto Verzola, too. [Ver95]

One kind of political intervention is the principle of *compulsory licenses*. These are licenses which the *government* grants instead of the company which has developed a product, but government charges every licensee a fixed fee. Most of this fee goes to the company owning the patent. This policy makes it possible for small firms as well as poor countries to access expensive technologies without loss of compensation for the developer.

Tom Nadeau gives a very extreme example:

> "Imagine if a cure for AIDS was discovered, but the company that

developed it needed to charge $75,000 for a course of treatment just to break even. What a tragedy that would be, that perhaps millions of people would be denied the cure simply because of the cost! Would it not be more beneficial to have the formula purchased outright by a federal agency, placed in the public domain for any organization wishing to produce it for its members or customers, and published worldwide for the benefit of humanity? Meanwhile, the innovative activity of the pharmaceutical company could be amply rewarded, perhaps with an annual stipend." [Nad98]

5.3   Pure information economy

If we leave aside the question of earning money by creating information goods, it is possible to imagine an economy completely based on information, as John Perry Barlow states: "However, as we increasingly buy information with money, we begin to see that buying information with other information is simple economic exchange without the necessity of converting the product into and out of currency." [Bar93]

Rishab Ayer Ghosh remarks that "even when you don't charge for what you create, you're selling it, because you're using your work to buy the work of others—in a discussion group—or to buy the satisfaction of popularity—through your Web site. [...] Life on the Internet is like a perpetual auction with ideas instead of money." [Gho98]

He also proposes the notion of an attention or *reputation economy*, but in addition to the previously mentioned authors he emphasises the fact that "whatever resources there are on the Net for you to take out, without payment, were all put in by others without payment; the Net's resources that you consume were produced by others for similar reasons—in exchange for what they consumed, and so on". People feel obliged to put something back to the Internet "because they realise that they "take out" from it." He calls this a "cooking-pot market".

Ghosh continues:

"You are not giving away something for nothing. You are giving away a million copies of something, for at least a copy of at least one other thing. [...]

What a miracle, then, that you receive not one thing of value in exchange—indeed there is no explicit act of exchange at all—but millions of unique goods made by others! Of course, you only receive "worthless" copies; but since you only need have one copy of each original product, every one of them can have value for you. It is this asymmetry unique to the infinitely reproducing Internet that makes the cooking-pot a viable economic model, which it would not be in the long run in any brickspace tribal commune. [...]

The key here is the value placed on diversity, so that multiple copies of a single product add little value—marginal utility is near zero—but single copies of multiple products are, to a single user, of immense value. If a sufficient number of people put in free goods, the cooking pot clones them for everyone, so that everyone gets far more value than was put in."

If a way to provide information producers and users with enough material goods can be found, then this model seems to me the most desirable one.

5.4 Why economy?

As a conclusion I ask if it is desirable to build an information society on the basis of economy. I agree with Richard Stallman of the *Free Software Foundation* that society cannot prosper if people behave according to the "homo oeconomicus" principle and act only if the action gives them an advantage over their fellow citizens:

"We like to think that our society encourages helping your neighbour; but each time we reward someone for obstructionism, or admire them for the wealth they have gained in this way, we are sending the opposite message.

Software hoarding is one form of our general willingness to *disregard the welfare of society for personal gain.* [. . .] The antisocial spirit feeds on itself, because the more we see that other people will not help us, the more it seems futile to help them. Thus society decays into a jungle.

If we don't want to live in a jungle, we must change our attitudes. We must start sending the message that a good citizen is one who cooperates when appropriate, not one who is successful at taking from others." [Sta98, emphasis by me]

6 Information as a life form

This chapter can merely be an outlook, otherwise this paper would truly become too extensive.

Barlow describes information as an *activity*, a *life form*, and a *relationship*. He elaborates rather extensively on these three statements, but he also mentions Richard Dawkins' proposal of "memes", which Dawkins himself calls "viruses of the mind". He is widely credited for creating the word "meme", but in his article he quotes Daniel Dennett, so maybe Dennett had this idea first, and Dawkins was "infected" by him. Viruses of any kind need a host with certain qualities. "These qualities are, firstly, a readiness to replicate information accurately, perhaps with

some mistakes that are subsequently reproduced accurately; and, secondly, a readiness to obey instructions encoded in the information so replicated." [Daw91]

Cells and computers are very virus-friendly in these qualities, and the human mind is only slightly worse suited for viruses. As examples for memes he mentions crazes among school children like Yo-yos or, more recently, Tamagotchi's. Fashion trends also qualify for being memes.

Infected persons "typically find themselves impelled by some deep, inner conviction that something is true, or right, or virtuous [or "cool", one might add]: a conviction that doesn't seem to owe anything to evidence or reason, but which, nevertheless, they feel as totally compelling and convincing. [They] typically make a positive virtue of faith's being strong and and unshakable, *in spite of* not being based upon evidence." [emphasis original] Based on these observations Dawkins claims that all religions are memes, while scientific theories are something different. I don't share his view, instead I agree with the well-known saying "every lie contains a bit of truth". Of course I would not call religions lies, but what I want to express is that, although they are not based on *scientifically provable* evidence, there might well be some truth behind every religion.

In addition, my notion of a meme is broader than Dawkins', in my opinion scientific ideas also fall under this category. *Every* idea wants to enter as many minds as possible, and one could say that evidence for an idea can be a selection advantage for this idea, depending on who is going to be infected.

Extending the theory of memetics, the way is not very far to the idea of a global brain inhabited by these memes. Of course this global brain is identified with the Internet, though it still has to evolve, according to the "Global Brain Project" located at the Free University of Brussels. This project is working on a learning model for the WWW, based on *associative learning.* The idea is to implement this model into the hyperlinks in a way that "each time a new document is introduced, the links to and from it would immediately start to adapt to the patterns of its usage, and new links would appear which the author of the document never could have forseen. Since this mechanism in a way assimilates the collective wisdom of all people consulting the Web, we can expect the result to be much more useful, extended and reliable than any indexing system generated by single individuals or groups." [HB96]

Another useful mechanism is *spreading activation*: "activating one concept in memory activates its adjacent concepts which in turn activate their adjacent concepts." This is a perfect environment for memes to spread. The authors go on saying that in the next steps the global network could develop the ability to think and even generate new concepts, rules and models. They also present the possibility to connect directly to the net using neural interfaces, which reminds of popular science fiction, e. g. the "Borg" from Star Trek.

Although these are projections from a still far future, they still show how profoundly different a completely developed knowledge society might be from today's "information economy".

It seems clear to me that human society needs to change towards a more cooperative way of living, and I am also convinced that such a change *will* occur in the near future. In this light I have written this paper, emphasising the social nature of information.

References

[Bar93] JOHN PERRY BARLOW. The economy of ideas – selling wine without bottles on the global Net. `http://www.eff.org/~barlow/EconomyOfIdeas.html` (1993).

[But98] TOM BUTTERLY. Constraints for the development of the "wired" economy in Africa. `http://www.nua.ie/surveys/analysis/african_analysis.html` (February 1998).

[Daw91] RICHARD DAWKINS. Viruses of the mind. `http://www.spacelab.net/~catalj/virus.htm` (1991).

[Dys96] ESTHER DYSON. Intellectual property on the Net. *Release 1.0* (January 1996). Also available online at `http://www.edventure.com/release1/0196.html`.

[Gho98] RISHAB AIYER GHOSH. Cooking pot markets: an economic model for the trade in free goods and services on the Internet. `http://dxm.org/tcok/cookingpot/` (1998).

[Gol97] MICHAEL GOLDHABER. The Attention Economy and the Net. `http://www.well.com/user/mgoldh/AtEcandNet.html` (1997).

[HB96] FRANCIS HEYLIGHEN AND JOHAN BOLLEN. The World-Wide Web as a Super-Brain: from metaphor to model. `http://pespmc1.vub.ac.be/papers/WWWSuperBRAIN.html` (1996).

[Hei94] JÜRGEN HEINRICH. "Medienökonomie, Band 1". Westdeutscher Verlag (1994).

[HR95] HEINRICH HUBMANN AND MANFRED REHBINDER. "Urheber- und Verlagsrecht". Beck, Eighth edition (1995).

[KS98] JOHN KELSEY AND BRUCE SCHNEIER. Electronic Commerce and the Street Performer Protocol. In "The Third USENIX Workshop on Electronic Commerce Proceedings". USENIX, USENIX Press (September 1998). Also available online at `http://www.counterpane.com/street_performer.html`.

[Lit96]   JESSICA LITMAN.   Copyright law and electronic access to informa-
          tion. *First Monday* **1**(4) (October 1996). Also available online at
          `http://www.firstmonday.dk/issues/issue4/litman/`.

[Man98]   CHARLES C. MANN.   Who will own your next good idea?
          The Atlantic **282**(3) (September 1998).   Also available online at
          `http://www.theatlantic.com/issues/98sep/copy.htm`.

[Mül98]   HARALD MÜLLER. Digitales Urheberrecht – eine Gefahr für die Bib-
          liotheken?   *Bibliotheksdienst* **8** (1998).   Also available online at
          `http://www.dbi-berlin.de/dbi_pub/bd_art/98_08_14.htm`.

[Nad98]   TOM NADEAU.   The case for eminent domain.
          `http://www.vcnet.com/bms/features/domain.html` (January 1998).

[Neg98]   NICHOLAS NEGROPONTE.   The third shall be first.
          Wired **6.01** (January 1998).   Also available online at
          `http://www.media.mit.edu/~nicholas/Wired/WIRED6-01.html`.

[Nel95]   THEODOR HOLM NELSON.   Transcopy-
          right: Pre-permission for virtual republishing.
          `http://www.xanadu.com.au/ted/TPUB/transcopy.html` (April
          1995).

[Röt98]   FLORIAN RÖTZER.   Bildung in der globalen Wissensgesellschaft.
          `http://www.heise.de/tp/deutsch/inhalt/co/2558/1.html` (De-
          cember 1998).

[Sch95]   DOUGLAS SCHULER.   Creating public space in Cyberspace.
          Internet World (December 1995).   Also available online at
          `http://www.scn.org/ip/commnet/iwdec.html`.

[Sch98]   WOLFGANG SCHULZ. "Gewährleistung kommunikativer Chancengle-
          ichheit als Freiheitsverwirklichung". Nomos-Verlagsgesellschaft (1998).

[Sta98]   RICHARD STALLMAN.   Why software should be free.
          `http://www.gnu.org/philosophy/shouldbefree.html` (1998).

[SW69]   CLAUDE ELWOOD SHANNON AND WARREN WEAVER. "The Mathe-
          matical Theory of Communication". University of Illinois Press, Fourth
          edition (1969).

[Ver95]   ROBERTO VERZOLA.   Towards a political economy of information.
          `http://www.solinet.org/THIRDWORLD/obet1.htm` (November 1995).

[Ver98] ROBERTO VERZOLA. Globalization: The third wave. `http://x3.dejanews.com/getdoc.xp?AN=321398692&CONTEXT=&hitnum=0` (February 1998).

[Wil96] HELMUT WILLKE. "Systemtheorie, Band 2". G. Fischer, Second edition (1996).

[Wil98] HELMUT WILLKE. "Systemisches Wissensmanagement". Lucius und Lucius (1998).