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Free as in Education.

Significance of the Free/Libre and Open Source Software
for Developing Countries.

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Foreword

FLOSS, Information Society and the Verbs

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The possibilities that Free/Libre and Open Source Software (FLOSS) offers for development in information and communications technology (ICT), in general, and for the developing countries, in particular, have recently gained increasing attention and importance. The following report provides encouraging examples of the role FLOSS has already had or can have in the developing countries and developmental co-operation. The reason for the increased attention is simple: the philosophy, economy and software development model of FLOSS have in the past 20 years or so made an ineradicable impact on how information technology is conceptualised, used and developed. Since FLOSS does not rely on concepts like intellectual property or copyright but rather on concepts of voluntary co-operation and copyleft ("copyright turned around"), it has been seen as an ideal tool for bridging the so-called digital divides. What has made an even stronger impression on some researchers has been the fact that in the case of FLOSS fun and ethics seem to travel hand in hand, at least part of the way. The developers of FLOSS, the hackers, often "scratch their own itch", that is, do what is fun. It appears that in most cases this fun can be had only if the software the hackers are interested in having fun with is free and open. The background motivations that the hackers have for engaging in FLOSS development can, indeed, be quite varied, and still the result contributes to a freely distributable, modifiable and usable pool of good quality software. For instance, the philosophical and social motivations of the Free Software movement and the Open Source movement are quite different, even antithetical at places, but the movements can still share-and-share-alike when it comes to creating software that excels in its technical qualities. It seems that this kind of co-operation is precisely what bridging the digital divides on the software side needs. The question of whether ICT development is necessary or whether it should be prioritised when it comes to countries that have severe problems with providing for the basic needs of their citizens may be debated. It seems clear, however, that if and when ICT development is, for instance, a part of developmental co-operation, the basic concepts and day-to-day practises of using and developing FLOSS offer a footing that may be used with benefit.

Because the background motivations for creating and using FLOSS are varied, the arguments for

FLOSS are also diverse. They range from the purely technical (e.g. speed of development, security and privacy, technological independence, ease of use) to the deeply economic, social, political and philosophical (e.g. price, co-operation, equality, commitment to the right to know). This spectrum of arguments can be stratified by thinking about the different levels on which digital information has an impact. Underlying all the discussions on ICT and its effect on the emerging information societies is the fact that by its nature *information is different from material things.* Information is abstract in the sense that giving or sharing information does not diminish the amount of information that the giver or sharer has. Furthermore, the reproduction and copying of information can be done with much less cost than the reproduction and copying of material goods. These characterisations of the nature of information can be captured in the phrase "Information *can* be free". As a means of production and exchange, information is different from material things in that it can be free; as a resource, information is non-rivalrous. The different kind of "being" that information has compared to the "being" of material things means that the sharing of information is in its ontological nature unlike the sharing of material goods: this is the sense in which information "can" be free.

The next level of argumentation is crystallised in the rallying-cry of hackerdom: "Information *wants* to be free". Information wants to be free in the sense that information, e.g. computer software, as a tool is made better if it is free. This is the level of argument that the Open Source movement emphasises. The development of good quality software is faster and more efficient if the source code of the software is open and if everyone potentially interested in the code is free to contribute to the development. As a means to an end, software is best developed if it is free. The so-called Linus' Law, after the Linux-hacker Linus Torvalds, is often cited in this context: "Given enough eyeballs all bugs are shallow". The global society of hackers has through the internet harnessed its pool of skills and interests in a distributed working model that has produced software at a pace that has defied all economic theory and continues to baffle computer scientists. Software as a tool makes best progress when it is free. Therefore it wants to be free; its goal as a tool is to be free.

Information technology as a means is, of course, used towards some ends. The use and development of technology is embedded in practises and cultures. It is obvious that technology in general and information technology in particular are not culturally neutral: a given type of technology use and development always favours or disfavours different types of social arrangements. In the case of FLOSS, the position of the Free Software movement is formulated through considering the ends to which software contributes. From this viewpoint, the question to be asked about different models of

using and developing software is what kind of society does this or that model promote. Like Richard M. Stallman, the founder of the Free Software movement, has emphasised, the goal of the Free Software movement is to create a society based on co-operation, equality and sharing, therefore software is instrumental only if it is free. Software can be a means to the end of a co-operative and ethically sound society only if it is free in the sense of free speech; even openness of the source code is not enough. This third level of viewing software through its social and political goals can be expressed in the slogan "Information *ought to* be free". The social commitment to supporting and creating a society that is not a jungle but a co-operative whole implies an ethical commitment to the freedom of information.

This third level of argument can be augmented. Following Aristotle, we may see the goals towards which we are striving as finalities, as goals-in-themselves that do not require any further motivation. Finalities do not require motivation, they *are* the motivation that give shape to the tools, practises and social arrangements that embody the finalities. It is this level of commitment that often means taking extra effort. In this sense the (ethical) commitment to certain finalities can also be quite different from having fun, or from the technical considerations that have to do with the properties of software seen purely as a tool. For instance, democracy is often seen as a finality. Even though democracy might be inefficient and costly, the extra effort is worth taking, because of the ethical and social goods that democracy includes. Democracy is worth it for its own sake. This level of motivation applies also to FLOSS, even though it can not be easily captured in a phrase. Maybe the verb "x" describing this fourth level of finalities in the phrase "Information '*x*' be free" would have to combine the senses of the verbs "can", "wants to", "ought to" and "will".

It is also through this fourth level of argumentation that we reach one of the crucial questions that the so-called developed countries face when it comes to the use of FLOSS in developmental co-operation. The global trend towards an "information society" gives an increasing role to information, knowledge and other immaterial assets in production. Therefore the economy is also seeking ways of controlling, identifying and using immaterial assets. This happens largely through the concept of intellectual property. In economic terms, the notion of intellectual property and the connected immaterial property rights are a way of regulating free markets, setting up limited monopolies in the name of economic incentive for innovation and creativity. This mega-company-driven trend towards an increasingly tight "intellectual property" regime conflicts squarely with all the above verbs. If information is made into property, it can not, will not and should not be free.

Taken to its extreme, the notion that information or knowledge is owned and that its use should be controlled by the "owners" becomes absurd. An infant either has to be taught that information is owned or otherwise remains ignorant of the fact. In both cases information freely shared is the basis on which the ownership of information can be based. The absurdity can be seen in the following scenario: if all information is proprietary, then the information that information is proprietary is proprietary, too, and I can choose to stay ignorant of that information. As with material property, intellectual property relies on the goodwill of non-proprietary social functions and arrangements. Therefore its beneficiality is not a given.

Through this perspective it is obvious that a very strict regime of intellectual property will lead to increased fragmentation and the unbalanced division of wealth in the world. It would not be too extreme to claim that certain forms and applications of so-called intellectual property rights are a way of protecting the "firstness" of the "first" world against the interests of the other worlds. At its worst, the concept of intellectual property works in ways that are analogous to the colonialising effects that the concept of material property has had in the previous centuries. It has always been known that "intellectual property laws" can be a hindrance to economic development. This was the reason why the United States decided not to recognise European copyrights and patents in the 19th century. It is very likely that following a tight regime of intellectual property rights will be an obstacle to the economic development of the developing countries today, too. Therefore it is essential that the legislative system and the policies of the "first" world will allow for intellectual and software freedom.

When it comes to information technology, the task is to create a balanced environment for innovation, both social and technological. It is a well-known fact that things like software patents and the idea of "trusted computing" seriously threaten the possibility of FLOSS development. Therefore it is extremely troubling to see how a strong big-industry lobby is pushing the legislation and its interpretation in the "first" world towards an increasingly biased and restrictive direction. Software patents have already become a burden on FLOSS development and the innovation of small and medium-sized software companies in the US, and currently the EU is thinking about having a software patent legislation of its own. Software patents are a good example of "intellectual property rights" that are not only harmful to FLOSS in the "first" world but also to the use of FLOSS in developmental co-operation. A healthy global information society needs a political and legal environment that gives possibilities to both independent FLOSS type development and proprietary software development. Shutting one or the other out will only aggravate the existing

digital divides.

From the point of view of finalities the question is: "What is information technology *for*?" Answering this "why" question can give sustainable form to the "how" questions. For instance, economic and cultural "whys" may give different weights to different factors. Globalisation as a narrowly defined economic trend and the creation of *a particular type of* information society push towards a strict intellectual property regime. This, however, does not mean that intellectual property as a concept or as a practice systematically favours equality, democracy or development - quite the contrary. Intellectual property rights might, in principle, protect the livelihood of indigenous populations and local cultural endeavours, but in practice they next to never do. This is because established organisations, institutions and companies have an upper hand when it comes to interpreting the concept and enforcing the laws that codify it. "First" world countries like Finland can therefore advance the creation of a global sustainable information society by giving enough weight to social and ethical issues in the legislative framework that partly creates the international information environment. Especially so because there are also strong economic arguments that speak in favour of free markets and against the restrictions in terms of "intellectual property".

The use of FLOSS is motivated through concepts like freedom, independence and *swantantra*. These concepts have at the same time their economic, technical and cultural meanings. Freedom and independence in all of these senses are finalities, goals in themselves and in that sense very well in line with the ideals of a global sustainable information society. Making grand ideals like this happen is, of course, always a complicated thing. However, to be fair, FLOSS is not a dream, but a rapidly growing reality that has several success stories in its track record. As noted above, FLOSS is no one thing, either. There are different sets of philosophical underpinnings, different models of development, different technological options and so on. There is no reason to downplay the internal variation of FLOSS or the different options in building an information society. The proof of the pudding is in the eating, and the proof of the bridge is in the crossing. Let us attend to the details.

Introduction

During the last couple of years the use of Free/Libre Open Source Software (FLOSS) has gathered momentum, which has surprised its proponents and opponents alike. Looking at the figures, it would not be an exaggeration to say that the Internet is powered by FLOSS.[1] (See. David Wheeler - Why OSS/FS?)

Given such a huge spread in the use of FLOSS and its very significant economic impact, the questions arising from the perspective of development aid and sustainable development are: Does FLOSS offer developing countries any significant alternative in addressing crucial problems, such as the alleviation of poverty, the democratization of society, the reduction of illiteracy, conflict reduction, access to knowledge, dealing with natural calamities and other emergencies, etc.? Does FLOSS have the potential to help bridge the digital divide?

In our view, the answers to most of the above questions is a definite ***YES*****,** but without attributing some magic wand status to any technology, especially Information and Communications Technologies (ICT), including FLOSS.

The solutions to the problems facing developing countries are very complex, and ICT and FLOSS can at best provide a helping hand to humans determined to solve those problems. Lacking the political will and social forces necessary to solve problems, any technology is just another tool which may throw us into "techno-optimism", that is, the belief that "future economic prosperity is dependent upon the rapid development of national electronic infrastructures" without actually meaningfully s olving the burning problems facing the developing world.

Commenting on the role and impact of Bangalore, capital of the Indian state of Karnataka, and that country's foremost hi-tech centre, noted economist and Nobel laureate Dr. Amartya Sen[2] said: "New centres of excellence such as Bangalore can prosper and flourish. Yet even 100 Bangalores would not solve India's poverty and deep-seated inequality. For this to happen, many more people must participate in growth. This will be difficult to achieve across the barriers of illiteracy, ill health and inequalities in social and

economic opportunities." (from The Oxfam Education Report Chapter 1)[3]

Already at this stage, we should note that the present study is not an economics-based one. The team responsible for it lack expertise in economics, and is not making any significant claims regarding the impact of ICT on economies. Having said that, we can still refer to a number of studies and views which actually show that there is no direct link between computers and productivity. For instance, World Bank economist Charles Kenny, in his well argumented paper at a WIDER conference on New Economy in May 2002,[4] believes that the "'Solow paradox'[5] — widespread evidence of computer use, little evidence of (widespread) productivity growth — continues, at least in modified form."

Warning against techno-optimism and pinning too many hopes on the Internet and ICT, Kenny notes: "The Internet is a powerful technology that will have a long-term impact on the quality of life in developing countries" and "Having said that, our record in predicting the dynamic impact of technologies on development in the past has been very weak. To take three communications-related examples, the railway was predicted to spark the dictatorship of the proletariat, the telegraph was predicted to engender world peace and the television to revolutionize education. Broadly, it appears that even while the role of technology in economic growth cannot be questioned, the dynamic impact of a particular, invented technology is never very large. It looks increasingly as if the impact of the computer on US productivity will be a good example of this. The impact has been limited so far, and might not increase in the future." (Charles Kenny: The Internet and Economic Growth in Least Developed Countries. A Case of Managing Expectations?)[6].

At the same time, however, we can note that ICT, or rather the lack of it, does significantly impede access to information and knowledge for a vast majority of developing countries, especially their academic and educational institutions, students, government officials, economic and financial institutions, businesses, etc.

The main objective of this report has been to analyse the significance and relevance of FLOSS for developing countries.[i] In doing so, we have tried to take a brief look at the the

(i) The term "developing countries" used in this study is meant to describe a group of countries alternatively described as the Third World, or more recently Majority Countries. The former socialist countries, or the 'countries in transformation' are not included in this study.

overall use of ICT and FLOSS, especially at some of its most significant and popular software, such as GNU/Linux, Apache, Mozilla, Open Office etc, as well as its possible impact on the societies, lives, and economies of the people of those countries.

As noted earlier, our focus in this study is more on the wider impact of ICT and FLOSS on societies than on economics. That is why we have tried to look at a number of issues which hinder a more widespread use of ICT in general and FLOSS in particular in most of the developing world. Keeping in mind a host of social, political and economic factors, especially the overall huge cost of employing ICT (compounded in most cases by hard currency shortages), we contend that FLOSS offers an affordable and useful alternative to proprietary software for all the concerned parties in those countries: governments, public institutions, education, NGOs and the private sector.

Another objective has been to evaluate projects which utilise FLOSS technologies and to see whether they have any significant impact on the democratization of countries, increased access to knowledge, enhancing the quality of education, and aiding sustainable development. We have tried to achieve that objective by going beyond the purely technical merits and use of FLOSS and look instead at the very nature of FLOSS (its philosophy of freedom, openness, community activation and collaborative nature) as well as make a link between FLOSS and any developmental effort dependant upon humans determined to solve problems.

We let the reader determine if we have succeeded in achieving those objectives. We can only reiterate that FLOSS and developing countries make a great partnership.

Helsinki, 28th February 2003

Chapter 1

A Brief Overview of the Free Libre and Open Source Software Movements

- and relevant concepts

> "Open-source software has been called many things: a movement, a fad, a virus, a Communist conspiracy, even the heart and soul of the Internet. But one point is often overlooked: Open-source software is also a highly effective vehicle for the transfer of wealth from the industrialized world to developing countries".
> *Andrew Leonard*,[7] *In IHT on-line.*[8]

Free Software

The term Free Software[9] is a bit tricky for speakers of English and German. German Philosopher Theodor Adorno already around the end of WWII wrote "German and English reserve the word 'free' for things and services which cost nothing."[i] This problem with the word 'free' is something that Richard Stallman, the founder of Free Software Foundation, has had to tackle again and again, in order to distinguish between the *zero price* and *freedom* aspects of the word 'free'. In many languages, there are two separate words denoting 'freedom' and 'zero price': for instance, in Finnish 'vapaa' [free as in freedom] and 'ilmainen' [free as in zero price] are two separate words, making it simpler to accept the distinction and appreciate the importance of the *freedom* aspect.

But what's the point of this concern over the word 'free'? The point is to have the freedom to use, view, copy, redistribute and modify a piece of software, irrespective of the price aspect. The predominant proprietary software has its source code[ii] closed, so that one can not view or study it, let alone copy, modify and redistribute it. When one installs any proprietary software you are asked to agree to an EULA (End User License Agreement), prohibiting you from viewing, modifying or copying the source code, whether or not you have paid for the software.

(i) Theodor Adorno "Message in a Bottle" in *New Left Review* no.200 (July/August 1993) p. 7.
(ii) Source Code is a text, consisting of a set of instructions and statements that coders write in a language (such as BASIC, C, FORTRAN, or GPG), which is understood by computers and humans alike. However, in order to execute those instructions on a computer, the "set of instructions" need to be compiled, i.e, converted into a language which is understood only by the computer - a machine-language or **object code.** At this stage the compiled version of the "set of instructions" consists only of ones and zeroes, and become a computer program, hiding the original set of instructions -- **source code** -- from people. Some more definitions of source and object code can be found at: http://labs.google.com/glossary

It is of course true that most of the users around the world do not actually go on editing the software source code, but, on the other hand, an increasingly larger number of users, especially companies, governments and other similar entities, do find that they may need to modify the code in order to make the purchased software work for their specific needs. The number of such users is increasing constantly as ICT proliferates, and as computer literacy increases. This is where the freedom aspect comes into play, and the free software as formulated by the Free Software Foundation [FSF].

> ‶Free software is a matter of the users' freedom to run, copy, distribute, study, change and improve the software. More precisely, it refers to four kinds of freedom, for the users of the software:
>
> - ✔ The freedom to run the program, for any purpose (freedom 0).
> - ✔ The freedom to study how the program works, and adapt it to your needs (freedom 1). Access to the source code is a precondition for this.
> - ✔ The freedom to redistribute copies so you can help your neighbor (freedom 2).
> - ✔ The freedom to improve the program, and release your improvements to the public, so that the whole community benefits (freedom 3). Access to the source code is a precondition for this.
>
> A program is free software if users have all of these freedoms. Thus, you should be free to redistribute copies, either with or without modifications, either gratis or charging a fee for distribution, to anyone anywhere.[10] Being free to do these things means (among other things) that you do not have to ask or pay for permission.”[11]

In practical terms, the above philosophy is legally “embedded” in a software license called GPL (GNU General Public License) and dubbed Copyleft. The GPL explicitly grants all the above freedoms, and tops those off with a requirement which makes sure that the use of the code of a GPL software does not result in anybody redistributing the same and expanded code with a proprietary scheme.

Free Software is not the same as Freeware, Shareware, Adware, Spyware or Crippleware,

which are all types of Proprietary Software made available at no price, providing various degrees of freedom of use, but in most cases not other freedoms as described by FSF. Freeware, Shareware, Adware, Spyware and Crippleware are made available at no price as a part of some business strategy. Microsoft Internet Explorer, for example, is a web browser available at no price, produced and distributed as part of a business strategy to gain market share over its rival Netscape.

Open Source Initiative

The Open Source Initiative[12] (OSI) tends to differ with FSF philosophy, and instead emphasizes the practicality and technical superiority of a method of software development. It explicitly rejects the political and social philosophy of Richard Stallman. Instead it points to the open source model as a superior model of developing software, which is based on the availability of the source code, combined with rights to inspect, modify and distribute to everyone, resulting in a technically superior software, because any programmer can see and fix the problems and bugs, and improve functionality at a far faster pace than a proprietary model of developing software can ever do. The OSI[13] site puts their case as follows: “The basic idea behind open source is very simple: When programmers can read, redistribute, and modify the source code for a piece of software, the software evolves. People improve it, people adapt it, people fix bugs. And this can happen at a speed that, if one is used to the slow pace of conventional software development, seems astonishing.” The important features of this model are that a large number of programmers can in the age of Internet co-operate on producing software of a very complex nature, despite being physically far apart, and despite not working in a traditional ‘cathedral-building style’ setting.

Furthermore, the Open Source Initiative claims, in its own words “.. to make this case to the commercial world.” They seem to believe that FSF and Richard Stallman, despite their great initial contributions, failed to take the movement to the commercial world. Their view of him is that “…he's been one fifteen-year long continuous disaster” (See Eric Raymond in “shut-up-and-show-them-the-code”).[14]

In both cases software is developed by a community of hackers,[15] testers, users, etc., who

spend significant amounts of their time and energy contributing and participating in projects which they consider important. The participation is of different types and levels, ranging from writing code, finding bugs, fixing bugs, testing, suggesting features, translating to other languages, writing documentation, working in advocacy groups, etc. This can mean different levels of participation, ranging between an hour a week to full-time employment, occasionally getting paid but most of the time going unpaid. There are cases in which some coders work 40 hours a week at their normal work and then spend about 30-40 hours a week on a project they like or own. A recent study gives a more detailed picture of who these people are and how and why they do what they do. (FLOSS Report[16] especially chapter IV and IVa give a better idea of Nationality, Gender, Income, etc. of the developers. An article in news.com [17] also takes a look at these aspects).

Hackers and what motivates them

> "We do develop a lot of free software. If a theory says we can't, you have to look for the flaws in the theory" Richard Stallman[18]

> "Understanding the open source movement has been hard, in part because of the lack of good research done by people who understand the community (as opposed to those trying to force fit it into their convenient existing models). A second problem arises because the most well known studies from inside the community lack academic rigour and in at least one case come from an extreme political viewpoint which denies the existence of society as a concept. " Alan Cox [19]

As already noted, Hacker is the key word when one describes the Free and Open Source Software phenomena. So who are the hackers?[20] The mainstream view of a hacker is someone who tries to break in to computer systems. However, this view is a gross misunderstanding and results in demonizing people who are responsible for the development of some of the most sophisticated software in existence. In contrast to this rather recent and pejorative description, hackers understand themselves as "warriors, explorers, guerrillas, and joyous adventurers of the Digital Age."

The Hackers hall of fame at the learning channel discovery.com lists the 15 greatest hackers in the world, among them: Richard Stallman, Dennis Ritchie and Ken Thompson,

John Draper, Mark Abene, Robert Morris, Kevin Mitnick, Kevin Poulsen, Johan Helsingius, Vladimir Levin, Steve Wozniak, Tsutomu Shimomura, and Linus Torvalds.

What all of these individuals have in common is a passionate relation to computers, but a few of them, (for example the two Kevins and a Levin) are easily separated from the rest, and are in fact the reason why mainstream journalism equates hackers with criminals, since all three have been convicted for unauthorised intrusion into computer systems. Hacker Tsutomu Shimomura is the one who made it possible to apprehend Kevin Mitnick.

Incidentally, two of these most well-known hackers are Finns: Johan Helsingius and Linus Torvalds. Johan "Julf" Helsingius established and operated the world's most popular anonymous remailer called penet.fi, until he was forced to close it in September 1996 after being raided in 1995 by the Finnish police following a complaint by the Church of Scientology, who claimed that a penet.fi customer was posting the "church's" secrets on the internet. Helsingius closed the remailer after a Finnish court ruling made him reveal the customer's real e-mail address. His “run-of-the mill 486 with a 200-megabyte hard drive” was the machine which ran the world's busiest remailer, and took him just two days to set-up. (For a more detailed account of anon.penet.fi, see this CMC article).[21] Helsingius was awarded the EFF [22] Pioneer Award for his contribution to on-line freedom and privacy by establishing and maintaining the first practical anonymous e-mail server. “For many years his anonymous remailer, anon.penet.fi, allowed people who might otherwise be intimidated or even endangered to speak out and to express their views. From battered women to political refugees, Helsingius' system provided all users the ability to communicate freely and safely in cyberspace.”

In the case of Helsingius, the prime motivation behind his initiative was to prove to those in the Finnish universities who wanted to be able to trace each e-mail to its originator, that it was not possible to do so because “the Internet works according to different principles and it would always be possible to find a technical loophole to get around using one's real name”. Another motivation was his belief in free speech. But what about other hackers? Or to be more precise, what motivates current hackers to spend hours, months, and sometimes years of their time and effort contributing to making software 'free' in both senses of the word, while not getting any overwhelming or significant monetary returns.

Why would a perfectly sane person write software code and make it open, accessible and usable by everybody? The question itself emanates from a cultural mileau which finds it hard to understand the possibility of human co-operation without a significant involvement of money. So entrenched is the culture of "everything has a price" that human behaviour which does not follow the pattern of greed and monetary gain is deemed suspicious.

The answer(s), in the case of software developers, coders and programmers, is neither simple nor singular. The reasons hackers want to contribute code, are manifold. For the most part, the motivations are private:

- altruism and a sense of sharing knowledge.
- a challenging task.
- just for fun.
- something needed to be done for one's own work.
- developing new skills.
- expectation of indirect reward, such as improving job opportunities, etc.

However, as part 2 of the FLOSS Report [23] points out "..about a third of the surveyed developers are being paid directly for developing Open Source software". This points to a lot of firms employing programmers to work on Free and OpenSource Software projects. IBM [24] alone has several hundred full-time employees working on Linux. Others include HP,[25] Sun Microsystems,[26] Oracle,[27] etc.

The FLOSS report chapter on engagement,[28] looks at the Open Source engagement of 25 top Software companies in 2001, but this list of activities may already require an update since some of the firms categorised as "No OS activities visible" have since joined the bandwagon.

The motivation of any firm for engaging in Free Software development, apart from making profits on hardware or services sales, could be strategic positioning, rivalry to Microsoft, the fear of being left out, being prepared for any eventualities, etc.

However, one should note that the above description basically applies to programmers and developers, while the FLOSS movements consist of a pretty large number of people who contribute in other not-less important ways, like testing, bug finding and reporting,

documentation, translating, advocacy, helping others to use and learn, etc. All this makes FLOSS a very plausible and attractive alternative for developing countries.

Chapter 2

Free as in Education

> " *Two little boys exchanged toys, both went away with one toy each. Two wise men exchanged ideas, both went away with two ideas each."* African Saying.
>
> " He who receives an idea from me, receives instruction himself without lessening mine; as he who lights his taper at mine, receives light without darkening me."[29] Thomas Jefferson.

The FSF and OSI movements have repeatedly emphasised the distinction between free and gratis. "**Free as in speech**" contrasted to "**free as in beer**" is meant to de-emphasize the price aspect of software. Thus, for example, Microsoft Internet Explorer, Opera, Kazaa, and other software may be available at zero price, but these are not understood as free software since they do not allow their source code to be open and do not grant freedoms described by the FSF. On the other hand, any particular distribution of Linux might be available at zero price but also could be available for a price, yet remains a free software both in terms of FSF or the OSI.

The emphasis on freedom and the openness of the source code is intended to point out that the *price* (zero price) aspect of software is unimportant compared to the *freedom* aspect. Again, in the words of Richard Stallman, "The identifying characteristic is not the absence of price. Some free software is sold (Red Hat). Some proprietary software is given away (freeware)."

From the point of view of the developing countries, we would argue that though the freedom is of paramount importance in more than one way, the price aspect is also very important, without which developing nations would not be able to significantly meet the challenges of the computer age. In fact, the Freedom aspect can be seen in terms of "**free education**", which ought to be free in terms of *freedom* as well as *price*.

Some might find it difficult to come to terms with this idea, but in the Nordic countries, as well in many other European countries, free education is regarded as a fundamental fact of life. Education is free in Finland in terms of price as well as freedom. To emphasize the

contrast, one can note that education is provided free in terms of price in many countries like Saudi Arabia and other countries possessing abundant natural resources, but is not free in terms of freedom. It is rather obvious to see what is meant by free as in zero-price, but still it is a bit different from “free as beer”, since beer is not a necessity, while education is.

In terms of freedom, the democratically constituted state must make sure that the content, form and mode of education is free from, among other things, commercial interests, racism, sexism, etc., that it meets the agreed standards and remains open and available to citizens irrespective of their race, gender, colour, religious belief and financial standing or poverty/richness and even IQ level.

Intellectual Property

A large part of the debate around FLOSS, its implications and its significance for developing countries is focused on the phrase “Intellectual Property” (IP). Representatives of proprietary software companies are keen on portraying FLOSS, and especially the GPL license,[30] as being against “Intellectual Property”, and hence harmful.

But more importantly, should IP be seen in the context of development and social advancement, or should it only be seen as an abstract right and end in itself?

According to Professor Mark Lemley,[31] the earliest use of the term 'intellectual property' can be found in the title of the World Intellectual Property Organization (WIPO),[32] first assembled in 1967. According to WIPO,[33] “Intellectual property refers to creations of the mind: inventions, literary and artistic works, and symbols, names, images, and designs used in commerce.” It further states:

〝Intellectual property is divided into two categories: *Industrial property*, which includes inventions (patents), trademarks, industrial designs, and geographic indications of source; and *Copyright*, which includes literary and artistic works such as novels, poems and plays, films, musical works, artistic works such as drawings, paintings, photographs and sculptures, and architectural designs. Rights related to copyright include those of

performing artists in their performances, producers of phonograms in their recordings, and those of broadcasters in their radio and television programs."

However, one should note that about 90% of WIPO's funding comes not from UN member governments (as does the WTO or other UN agencies) but from the private sector by way of fees paid by patent applicants under the PCT — effectively from the community of patentees. Also WIPO is, according to its founding charter, solely concerned with the promotion of IPRs, in effect making it a well-organised lobbying group. Its objectives and functions do not include any development agenda.

The Free Software Foundation seems to believe that the term 'Intellectual Property' is confusing, and should be avoided, firstly, because it is "based on an analogy with physical objects, and our ideas of them as property", and secondly, because "it is a catch-all that lumps together several disparate legal systems, including copyright, patents, trademarks, and others, which have very little in common." Supporters of this set of ideas point out obvious differences between *copyrights, patents, and trademarks* – and the laws dealing with these categories differs in all countries.

The Open Source Initiative[34] ".....does not have a position on whether ideas can be owned, whether patents are good or bad, or any of the related controversies."

The CIPR (Commission on Intellectual Property Rights),[35] established in May 2001 by Clare Short, the UK Secretary of State for International Development, in the foreword of its report notes:

〝On the one side, the developed world side, there exists a powerful lobby of those who believe that all IPRs are good for business, benefit the public at large and act as catalysts for technical progress. They believe and argue that, if IPRs are good, more IPRs must be better. On the other side, the developing world side, there exists a vociferous lobby of those who believe that IPRs are likely to cripple the development of local industry and technology, will harm the local population and benefit none but the developed world. They believe and argue that, if IPRs are bad, the fewer the better. The process of implementing Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) [36] has not

resulted in a shrinking of the gap that divides these two sides, rather it has helped to reinforce the views already held. Those in favour of more IPRs and the creation of a "level playing field" hail TRIPS as a useful tool with which to achieve their objectives. On the other hand those who believe that IPRs are bad for developing countries believe that the economic playing field was uneven before TRIPS and that its introduction has reinforced the inequality." (From Report of the CIPR)[37]

Since the CIPR was initially asked to "consider, amongst other things, how national IPR rights could best be designed to benefit developing countries" its terms of reference are totally different from WIPO, which by contrast is a sort of pressure group of patentees. Thus the observations of CIPR reflect not just the defence of IP, but also its relationship to developing countries, and the development and diffusion of knowledge.

〝In particular, says the commission (Chapter 5 of the final report), developing countries should allow their citizens to circumvent copyright protection mechanisms and should not follow the example of the US and the EU by enacting laws that ban such practices."(Matt Loney in Zdnet.)[38]

〝Even weak levels of copyright enforcement have had a major impact on diffusion of knowledge and knowledge products throughout the developing world. "Stronger protection and enforcement of copyright rules may well reduce access to knowledge required by developing to support education and research, and access to copyrighted products such as software," notes the commission. "This would have damaging consequences for developing their human resources and technological capacity, and for poor people."" (Matt Loney in Zdnet.)[39]

Even though the main focus of the present study is on software and knowledge aspects of IPRs, it's instructive to look at other aspects as well. For example, Dr. Vandana Shiva,[40] author of several celebrated works including *Staying Alive*, *The Violence of the Green Revolution*, and *Monocultures of the Mind*, and other books, regards IPRs as an instrument of three level piracy: *resource piracy*, *intellectual and cultural piracy*, and *economic piracy*. Providing several examples,[41] she contends that:

〝IPRs systems evolved in industrialised countries reflected in the TRIPs agreement only recognise western knowledge systems as scientific and formal and non-western knowledge systems are regarded as unscientific and informal. The creation of monopoly rights to biodiversity utilisation through its claim to the creation of 'novelty' can have serious implications for erosion of national and community rights to biodiversity and devaluation of India's indigenous knowledge. TRIPs gives countries the option of formulating its own sui generis regime for plants as an alternative to patent protection. Collective rights can be a strong candidate for such sui generis systems for agricultural biodiversity and medicinal plant biodiversity. Therefore, it is crucial that community held and utilised biodiversity knowledge systems are accorded legal recognition as the 'common property' owned by the communities concerned. Building such an alternative is essential to prevent biodiversity and k nowledge monopolization by an unbalanced mechanistic and non-innovative implementation of TRIPs or in response to Special 301 threats from the US."

The impact of current IPRs in the context of development issues, and particularly software, is also adverse and not insignificant. According to Indian estimates, if India was to pay the cost of currently illegally-copied software in use in accordance with the TRIPS requirements, the result would be that India would lose a significant chunk of the billions it earned from its software industry during the past decade.

The story of IPRs actually is not limited to its current status. The CIPR report notes[42] the "trend for developed countries to seek commitments on IP standards from an increasing number of developing countries in bilateral or regional trade and investment agreements that go beyond TRIPS." In one such case reported by etaiwannews.com,[43] the Ministry of Economic Affairs of Taiwan has rejected the extension of local copyright protection to 70 years, as well as the expansion of the scope of prosecution for IPR violations even to personal or non-profit use.

The CIPR report also notes[44]"Increasingly there is concern that protection, under the influence of commercial pressures insufficiently circumscribed by considerations of public interest, is being extended more for the purpose of protecting the value of investments than to stimulate invention or creation."

Another interesting view on the issue of IP comes from the Vatican. In paragraph 11 of a document titled, IP and access to Basic Medicine,[45] Mons. Diarmuid Martin states:

〝The Holy See, consistent with the traditions of Catholic social thought, underlines that there is a 'social mortgage' on all private property, namely, that the reason for the very existence the institution of private property is to ensure that the basic needs of every man and woman are met and sustained. This "social mortgage" on private property must also be applied today to 'intellectual property' and to 'knowledge' (John Paul II, *Message to the "Jubilee 2000 Debt Campaign" Group*, September 23, 1999). The law of profit alone cannot be applied to that which is essential for the fight against hunger, disease and poverty. Hence, whenever there is a conflict between property rights, on the one hand, and fundamental human rights and concerns of the common good, on the other, property rights should be moderated by an appropriate authority, in order to achieve a just balance of rights."

The Vatican views are thus in direct opposition to the supporters of strong IPRs or the Fundamentalist school of copyright law, "according to which broad appeals to values beyond material concerns--culture, beauty, dignity, democracy--invite inefficiency into social, political, and economic systems. These extra-economic principles are not bad ideas per se, ... but proposals that appeal to them should be justified by tests of their utility. " (Siva Vaidhyanathan *Copyrights and Copywrongs,* page 157).

Another interesting set of viewpoints and proposals have been put forward recently in the form a question: Should the intellectual property be taxed? [46] Supporters of strong IPRs usually frown at this suggestion, implicitly admitting that IP is not a property in the normal sense of the word, and should be seen in a wider context of human progress and innovation.

Software Patents.

Another central aspect of IPRs, as related to software, is patents. As distinct from copyright, which is automatic, one has to apply for a patent subject to the normal tests of

novelty, *inventiveness* and *industrial applicability* (i.e. novel, non-obvious and useful). In addition to that, patents are limited, originally for a period of 4 years, which was later extended and is now close to a 20 year period.

Until 1980, it was generally believed in the USA that patent law did not cover software programs, because programs were considered algorithms, and thus mathematical things.

Professor Donald Knuth,[47] professor Emeritus of The Art of Computer Programming[48] at Stanford University,[49] says in a letter to the US Commissioner of Patents and Trademarks[50]: "Congress wisely decided long ago that mathematical things cannot be patented. Surely nobody could apply mathematics if it were necessary to pay a license fee whenever the theorem of Pythagoras is employed." and "When I think of the computer programs I require daily to get my own work done, I cannot help but realize that none of them would exist today if software patents had been prevalent in the 1960s and 1970s." At the end of the letter, Professor Knuth asks the Commissioner "Please do what you can to reverse this alarming trend" [of allowing software patents].

Using different words, Microsoft Chairman Bill Gates[51] noted the same problems when he said in a memo to Microsoft executives in 1991: "If people had understood how patents would be granted when most of today's ideas were invented and had taken out patents, the industry would be at a complete stand-still today."

However when it comes to a solution, Bill Gates has a rather different one than Professor Donald Knuth: "The solution . . . is patenting as much as we can. . . . A future start-up with no patents of its own will be forced to pay whatever price the giants choose to impose. That price might be high: Established companies have an interest in excluding future competitors." (Free Culture)[52]

Many in the Free and Open Source Software movements believe that the practice of granting software patents is extremely harmful for FLOSS, among other reasons because if the source code is open, the risk of being sued is multiplied. Suing would not be that easy in the case of proprietary software, since the source code is secret. Thus any interested party determined on attacking FLOSS could easily sue programmers for the

sole purpose of putting them out of action. Apart from these legal risks, US software patent laws have already played havoc with free s oftware development by delaying the development of GNU Privacy Guard.[53] It is interesting to note that GnuPG is going to be used in Germany to help government users secure their mails, even using email clients like Microsoft Outlook. In 1999 the German Ministry of Economics and Technology[54] approved a grant for further development of GnuPG. (More examples of how software patents have affected the FLOSS development can be found at GNU)[55]

`Should the Patent and Trademark Office be issuing 20,000+ new software patents every year? Is there that much novel and unobvious, unpublished, innovation in the software industry?" is a question posed by Bust Patents,[56] a US-based website which monitors the software patent scene in the US. One can find a huge number of invalid software patents; so much so that some of the companies who registered those patents later withdrew them realizing the triviality of their claims. For example, IBM has quietly eliminated a patent it received on a method for determining who gets to use the bathroom next (see this news. com story.[57] A BBC story describes[58] a number of "patently absurd" patents).

To take an example, few people know that the US patent #5443036 controls how you play with your pet. The abstract from "Method of exercising a cat" by Kevin T. Amiss and Martin H. Abbott, filed on 2nd November 1993 and issued on 22nd August 1995, says it all: "A method for inducing cats to exercise consists of directing a beam of invisible light produced by a hand-held laser apparatus onto the floor or wall or other opaque surface in the vicinity of the cat, then moving the laser so as to cause the bright pattern of light to move in an irregular way fascinating to cats, and to any other animal with a chase instinct."

Away from the software scene but related to development issues, one of the most bizarre patents ever granted by the US Patent Office[59] is number 6,098,905. This patent, according to an InfoChangeIndia.Org article[60] is granted to a Nebraska-based private company, ConAgra Inc,[61] for 'a method for producing "atta" flour — typically used to produce Asian breads such as chapatti and roti'. So "novel" is this invention that it is used by hundreds of thousands, if not millions of "atta chakkis" or flour mills in India, Pakistan, Bangladesh, Nepal, Sri Lanka and many other countries around the world. And the 'inventors' — Ali Salem, Sarath K Katta and Sambasiva R Chigurupati (all of Asian

descent) — of the method have a patent that covers the 'spirit and scope' of the invention, as well as any modification and variation to this 'invention'. Is it difficult to imagine the consequences of demanding royalties from everybody making flour in accordance with one of the variations of ConAgra Inc method? Another similar patent is Number 5,663,484 on basmati rice lines and grains, which according to Ben Lilliston, of the Institute for Agriculture and Trade Policy,[62] "is a clear example of biopiracy which the US government, perhaps unwittingly, supports."[63][http://www.greens.org/]

GNU Public License

[CopyLeft[64] (GPL, LGPL, GGPL etc) and other open source licenses]

Though Microsoft, and other opponents of FLOSS, are vehement in their rejection of both Free and Open Source movements, they are particular about targeting the GPL (General Public License) because of what they call its "viral" nature. One must note that GPL is not the only type of free and open source software license; currently there are more than 30 different types[65] of free and open source software licenses, which provide varying degrees of access and conditions, but a very large number of software, for example Linux, is under GPL version 2.0. What licenses which cover Mozilla,[66] Apache,[67] BSD Berkeley Software Distribution[68] etc., as well as GPL, have in common is that the source code is open and users are free to use, copy, duplicate, distribute, modify them; but GPL adds the condition that any modified version of the software, if distributed outside, has to be governed by the same conditions as the original. This clause is designed to make sure that anyone using the work of the community also contributes the improvements and additions back within the community.

The primary term in "Copyleft" is, according to Professor Yochai Benkler,[69] that "people have same rights with combined product that you had with the original code you modified."

Brendan Scott, an Australian lawyer specialising in IT and telecommunications law, describes the distinction between bare Open Source licenses and the GPL in the following words: "In the bare Open Source Initiative definition, the license must *allow* modifications to be distributed on the basis of the original license, but does not *require* it. Contrast this with the GNU GPL (the main free software license endorsed by the FSF) which *requires*

that if redistribution occurs, that redistribution must be on the terms of the GPL." (See Brendan Scott. 'Why Free Software's Long Run TCO must be lower' 15 July 2002).[70]

(A ZDNet,[71] article authored by Nikos Drakos and Alexa Bona for Gartner,[72] takes a look at different open source license types. This analysis is mainly targeted at businesses, to inform them about different aspects and legal ramifications of open source licenses).

One interesting addition to these license types, though not listed on OSI pages, is GGPL, or Greater Good Public License.[73] This license is designed to add a moral and environmental dimension to GPL. Many people have been faced with a situation in which the prospective use of one's creative work and effort may run counter to one's ethical beliefs. In these cases the authors of GGPL propose that two more conditions be added to the original GPL:

1. Use, copying, distribution, and modification does not violate the Universal Declaration of Human Rights.[74]
2. Use, copying, distribution, and modification does not violate Four TNS System conditions.[75]

Even though it is obvious that it would be impossible to implement such a license because of the simple fact that there is no authority to enact such a license, the point raised here is important from the point of view of civil society and NGOs engaged in the struggle for democracy and social justice. To illustrate the point, I can relate a personal example: I myself have suffered at the hands of a dictatorship in Pakistan, one of my best friends was tortured to death by the ISI (Inter Services Intelligence) of Pakistan[76] in 1980, and numerous others were tortured and spent tens of years in prison. Now as much as I would like FLOSS, I find it hard to live with the idea that the ISI[77] may be running Linux on their servers, and thus actually saving money to perhaps buy more surveillance and torture equipment. It is obvious that I can not stop them from using Linux, but one can make a point of disapproval, which is on the basis of generally accepted norms like the UN Charter of Human Rights.

It is interesting to note that among other Open Source Licenses, even a Nokia Open Source License [78] is listed.

One common misconception about the GPL license is that it is not suitable for companies and commercial entities. Many companies have discovered that releasing their code under the GPL protects it from being stolen and closed by rival companies. GPL doesn't stop anyone from using the code but since it requires the redistribution of the code, it makes sure that the code contributed by any company is open for all. For example, if HP, Sun or IBM contribute code to the Linux Kernel, they don't have to worry that any of them, or any rivals for that matter, will be able to steal it and incorporate that code in some other software (as Microsoft has done with BSD TCP/IP stack).

There is some speculation about GPL suggesting that it is not enforcible because “users haven't accepted the license”. This speculation, according to Professor Eben Moglen,[79] professor of law and legal history at Columbia University Law School,[80] is either a misunderstanding or part of Fear Uncertainty Doubt [FUD]. This is how he explains it:

〝The license does not require anyone to accept it in order to acquire, install, use, inspect, or even experimentally modify GPL'd software. All of those activities are either forbidden or controlled by proprietary software firms, so they require you to accept a license, including contractual provisions outside the reach of copyright, before you can use their works. The free software movement thinks all those activities are rights, which all users ought to have; we don't even want to cover those activities by license. Almost everyone who uses GPL'd software from day to day needs no license, and accepts none. The GPL only obliges you if you distribute software made from GPL'd code, and only needs to be accepted when redistribution occurs. And because no one can ever redistribute without a license, we can safely presume that anyone redistributing GPL'd software intended to accept the GPL. After all, the GPL requires each copy of covered software to include the license text, so everyone is fully informed.”

Many people regard GPL as a brilliant legal tool, which has made possible the success of FLOSS. But one must note that only once has GPL been tried in a court of Law, in the MySQL-NuSphere lawsuit. [81] Many companies are fearful of the outcome of challenges to GPL in the US and other courts.

As it stands, GPL, its many variations, and other Open Source licenses, provide a variety of approaches which programmers, companies and other concerned parties may take in accordance with their specific requirements.

Public Domain

〝Public domain" is a legal term which means "not copyrighted". Any work whose copyright has run out, or where there is no copyright, is in the public domain. More than 6000 such past works are available on-line in text format at Project Gutenberg,[82] through the efforts of Michael Hart, Professor of Electronic Text at Benedictine University (Illinois, USA).

〝In 1930, 10,027 books were published. Today, 174 of those books are still in print. What would it take to put the remaining 9,853 out-of-print books onto the Internet?. To most, this sounds like a question about technology: How could all those books be scanned? How many servers would it require? But to a lawyer, the question evokes a very different puzzle: who owns the rights to these out-of-print books? For though the copyright initially offered to the authors of these books should have expired in 1987, Congress has extended copyright terms again and again--from a maximum term for these works of 56 years, to 75 years, and now 95 years. On the current schedule, no work will pass into the public domain through copyright expiration until 2019--assuming Congress does not extend the existing terms again." (Lawrence Lessig in Red Herring)[83]

Shakespeare freed !

It is hardly possible to calculate the effects of taking Shakespeare out of public domain. Though Shakespeare is important for English culture, similar cases can be easily identified in all nations and cultures around the world, where locking out cultural heritage would be not so different from a murder attempt on those cultures.

In that context, it is very interesting to see how Shakespeare was freed. The story is told by Professor Lawrence Lessig.[84] Addressing the O'Reilly Open Source Convention, [85] he said:[86] "In 1774, free culture was born. In a case called *Donaldson v. Beckett* in the House of Lords in England, free culture was made because copyright was stopped. In 1710, the statute had said that copyright should be for a limited term of just 14 years. But in the

1740s, when Scottish publishers started reprinting classics (you gotta' love the Scots), the London publishers said "Stop!" They said, "Copyright is forever!" Sonny Bono said "Copyright should be forever minus a day," but the London publishers said "Copyright is forever." These publishers, people whom Milton referred to as old patentees and monopolisers in the trade of book selling, men who do not labor in an honest profession (except Tim here), to [them] learning is indebted. These publishers demanded a common-law copyright that would be forever. In 1769, in a case called Miller v. Taylor, they won their claim, but just five years later, in Donaldson, Miller was reversed, and for the first time in history, the works of Shakespeare were freed, freed from the control of a monopoly of publishers. Freed culture was the result of that case."

In his passionate attempt to stop the trend of extending the copyrights into perpetuity and shrinking the public domain, Professor Lessig challenged the right of US Congress to extend copyright terms. The petition, or the Eldred case,[87] was heard by the US supreme court in 2002, and in January 2003 the supreme court upheld the term extension.

The novel method employed by Professor Lessig in preparing this challenge is in itself a significant corollary of the FLOSS movements, and is described elsewhere in this paper. However, one interesting episode to note is that when Professor Lessig first approached Michael Hart of Project Gutenburg to be a plaintiff in the case, Hart wanted that the Berkman team's briefs integrate his manifestos against the greed[88] of copyright holders, without which, he would become a mere "figurehead". (See also the story at Wired.Com)[89]

The contraction of the Public Domain through the extension of copyright terms is not only a US phenomenon. It is spreading like fire among many European countries. Australia seems to be the only country which has officially stated that they will not extend the copyright term to more than 70 years. This has made possible books by many authors, such as Khalil Gibran, D. H. Lawrence and all of George Orwell's novels, to be made available from the Australian Project Gutenberg.[90] (A list of books[91] in the public domain across the world [but due to the latest Copyright Extension Act are still locked under US law] can be found at the The Online Books[92] of the University of Pennsylvania.[93])

Chapter 3

The Expansion of FLOSS ideas into other Walks of Life

> "*Alchemists turned into chemists when they stopped keeping secrets.*"[94]
> Eric Raymond.

The ideas behind Free and Open Source movements are being used far beyond the field of software technology. Initiatives like the MIT OpenCourseWare,[95] Open Law,[96] even Open Source Biology[97] and Open Source Mining,[98] Free Encyclopedia,[99] Open Music, etc., are well worth mentioning, in the context of their importance for developing countries.

A lot of these types of initiatives are just hype, trying to bank on the success of Open Source and the concept of openness, but a significantly large part of these are very important and socially useful projects which give a different face to the society we live in. These initiatives and attempts touch upon a set of more fundamental values and questions governing our life, and the future of the society we live in, as well as possibilities for developing countries.

Let us take a look at some of these initiatives:

Open Law

Open Law[100] is perhaps the most important initiative outside of FSF and OSI. This experimental project, hosted by the Berkman Center for Internet & Society[101] at the Harvard Law School, is an attempt to bring the model of open source software into legal practice. The basic idea is "crafting legal argument in an open forum" and harnessing "the distributed resources of the Internet community".

Under traditional legal practice, legal arguments are crafted in closed rooms by lawyers, and are kept secret until the court, where the opponent unprepared for a particular line of argument may fail to make a convincing counter-argument. The Open Law Project, on the other hand, constructs legal arguments out in the open, removing the surprise element from the arguments. This approach is what Heidi Kriz, in a wired.com article "Open Source

in Open Court"[102] calls "to turn the traditionally adversarial and secretive world of the legal system on its head." Of course this approach can not be applied to all legal practice.

Professor Lawrence Lessig[103] of Stanford Law School, who is the motivating force behind the project, is testing the approach of open legal argument, utilizing internet forums, and other collaboration tools.[104]

In first Open Law case *Eldred v. Reno* (now *Eldred*[i] *v. Ashcroft*) — a challenge to the Sonny Bono Copyright Term Extension Act — many believed that the Sonny Bono act could not be challenged, and that the US Supreme Court would not even agree to a hearing. Yet in October 2002, the U.S. Supreme Court heard arguments to challenge the practice of extending copyright terms. On January 15th 2003 the US Supreme Court upheld the term extension by a vote of 7-2, Justice Stevens and Justice Breyer dissented.

Open Source Biology

Out-innovating the corporate researchers !

Nicholas Thompson[105] of the New America Foundation and a contributing editor at the Washington Monthly[106] asks in a very interesting article "May the source be with you"[107]: "Can a band of biologists who share data freely out-innovate corporate researchers?" The answer seems to be in the making. In line with Albert Einstein's famous quote "The right to search for truth implies also a duty; one must not conceal any part of what one has recognized to be true", a number of scientists are conducting research, using the internet, in a way that would look like a "complete antithesis of corporatized research". The idea is not so different from the development model which produced Linux. Scientists use huge online-databases to unload their findings, instead of hoarding them behind iron walls, hoping to organize "a massive public brainstorm", which could, for example, bring the decades required to develop a new drug down to a few years, saving hundreds of millions. For sure, Noble Laureate Alfred Gilman,[108] who is behind one of those projects, will certainly not make any more money than he is paid through his grants, but the world and science will benefit immensely. Similar processes are taking place in the field of Scientific Journals publishing.

(i) Eric Eldred is founder of a company that publishes rare and out-of-print books on its web site http://www.eldritchpress.org/. See also: A Bookworm's Battle http://chronicle.com/free/v49/i09/09a03501.htm.

The Public Library of Science PLoS,[109] "is a non-profit organization of scientists committed to making the world's scientific and medical literature freely accessible to scientists and to the public around the world, for the benefit of scientific progress, education and the public good."

This initiative is supported by Nobel Laureate Richard J. Roberts,[110] who wrote an open letter to fellow scientists around the world to urge "publishers to allow the research reports that have appeared in their journals to be distributed freely by independent, on-line public libraries of science." As of February 2003, 32,772 people from 183 countries have signed the open letter, which states that "we pledge that, beginning in September, 2001, we will publish in, edit or review for, and personally subscribe to, only those scholarly and scientific journals that have agreed to grant unrestricted free distribution rights to any and all original research reports that they have published, through PubMed Central[111] and similar on-line public resources, within 6 months of their initial publication date."

〝PubMed Central and Medline may not seem that different. But scientists and publishers alike agree that it would be revolutionary to pass from searchable abstract to searchable texts. People in the Third World would suddenly have access to the planet's great libraries; lay people interested in specific diseases would have the best information at their fingertips; all current medical researchers would save countless hours and could investigate their work much more thoroughly." says Nicholas Thompson[112] in another article "Publisher Perish".[113] (See also a Guardian article[114] by James Meek).

PubMed and similar projects like GenBank[115] etc. are hosted by the US National Center for Biotechnology Information, at the national Library of Medicine.[116]

One more interesting site is The Library of Sciences and Medicine. (Stanford University's HighWire Press.[117]) HighWire is a leading not-for-profit aggregator of electronic-based academic journals, which started in early 1995 with the on-line production of the Journal of Biological Chemistry. The on-line production company, which is now the leading aggregator of scholarly life science publications, is currently responsible for the production and upkeep of 190 sites on-line and over half a million articles.

Sadly, one excellent resource, PubScience, was closed down. The original PubScience website http://www.osti.gov/disconps.html now says: PubSCIENCE Discontinued (November 4, 2002). It is a well known fact that the discontinuation of PubScience was the result of lobbying by SIIA, the Software and Information Industry Association,[118] including Dutch giant Elsevier Science,[119] which argued that PubScience amounted to improper government-funded competition with commercial information services. According to William Matthews,[120] SIIA has begun efforts to remove other public databases of on-line scientific and technical literature.

MIT OpenCourseWare

OpenCourseWare,[121] a free and open publication of Massachusetts Institute of Technology (MIT)[122] course materials available via the web, and Dspace,[123] a software which makes OpenCourseWare possible, are said to be some of the boldest projects by MIT in years. Dspace is a long-term "digital library" or a super archive of virtually the entire intellectual and research output of MIT scholars and researchers, estimated to be around 10,000 papers, data files, images, collections of field notes, and audio and video clips each year. Initially it will be managed by a federation of eight universities (Cambridge, Columbia, Cornell, Ohio State, Rochester, Toronto and Washington State) including MIT, and will be available on-line, allowing storage in text, audio, video and other file formats.

Since Dspace or MIT Durable Digital Depository[124] (available under a BSD-style license as version 1.0 at Sourceforge.Net)[i] has been in production use at MIT Libraries for a while, and was developed in conjunction with Hewlett Packard, anyone else can use or adapt the program to create digital libraries and repositories of their own that could easily be linked to Dspace. It would also include a Google-like search engine. The annual cost of about US $250,000 for maintaining and operating Dspace has been set by MIT.

Both OpenCourseWare and Dspace are going to be of immense use for education in all parts of the world in terms of availability of content as well as availability of a robust Open

(i) SourceForge.net is the world's largest Open Source software development website, with the largest repository of Open Source code and applications available on the Internet. SourceForge.net provides free services to Open Source developers. Dspace is developed at http://sourceforge.net/projects/dspace/

Source tool for other educational and research institutions to deploy and to make more content available.

Project Gutenberg and Books Online

Project Gutenberg (PG)[125] was founded in 1971 by Michael Hart, Professor of Electronic Text at Benedictine University (Illinois, U.S.A.), to create a library of books in the public domain.

〝When I chose the name, the major factor in mind was that publishing eBooks would change the map of literacy and education as much as did the Gutenberg Press which reduced the price of books to 1/400th their previous price tag. From the equivalent of the cost of an average family farm, books became so inexpensive that you could see a wagonload of them in the weekend marketplace in small villages at prices that even these people could afford. ....Another way our Project compares to Gutenberg's revolution is that copyright laws were created to stop both.” says Michael Hart (in an interview with Sam Vaknin.)[126]

The project does not have a head office and is run by volunteers or “Gutenbergers” (about 1700 in 2002). Anybody can find a book in the public domain, get copyright clearance, scan or type the book into a computer, proofread it and send it to PG, where it is posted on the PG website available for anybody to download. In order to effectivise this cumbersome task, Charles Franks has started an extremely exciting project called Distributed Proofreaders (DP),[127] which is a web-based method of easing the proofreading work associated with the creation of Project Gutenberg E-Texts. By breaking the work into individual pages many proofreaders work on the same book at the same time, speeding up the proofreading/E-Text creation process. The site includes a hourly and daily page count of pages completed by the site visitors. The project uses MySQL, PHP and Java Script.

A similar initiative Project Runeberg[128] has been publishing works of literature and art in Scandinavian languages (Swedish, Danish, Norwegian, Icelandic and Faroese) since 1992.

In addition to books on line in the public domain, such as Eldritch Press,[129] Bartleby.com: Great Books Online,[130] many authors and authors' collectives publish their own books on-line. Baen Free Library [131] is one such initiative.

These kinds of initiatives make an incalculable contribution to culture and get immense help not only from Free and Open Source Software as tools, but also from the larger community spirit of people, as can be seen by the growing number of Gutenbergers using Distributed Proofreaders(DP)[132] to contribute to proofreading. These are very likely to proliferate in the developing countries.

Free Dictionaries and Encyclopedias.

There are a number of initiatives to create and provide on-line dictionaries and encylopedias. The idea behind these projects is simple: harness the power, activity and creativity of internet citizens to create dictionaries and encyclopaedias available to all. Without doubt, this is not an unproblematic method, since if everyone can contribute to the making of a dictionary or encyclopedia, how does one distinguish between accurate and inaccurate information? The method employed by Nupedia[133] is to provide an easy method for people to join as an editor and/or peer reviewer. Nupedia has an open detailed policy guideline,[134] which describes, among other things, how to become an editor or peer reviewer. Other similar initiatives have their own open methods and policies on how to filter out inaccurate entries. As a rule, these initiatives are covered by some sort of free documentation,[135] or open content licenses.[136]

As the content of the internet is s lowly being internationalised, the chances and possibilities of dictionaries and encyclopedias appearing in other languages or translations of present ones in other languages are increasing by the day. I could already find a Bulgarian-English-Bulgarian Dictionary, but chances are that many more, especially from developing countries, will appear.

Among the dictionary and encyclopedia initiatives, Nupedia,[137] Wikipedia[138] and The Open Dictionary are well known. The Open Dictionary[139] project[140] is a dictionary of “definitions” typically links to web pages and unlike ordinary dictionaries, content is organized

hierarchically by context. Wikipedia,[141] being a multilingual project including Dansk, Deutsch, Esperanto, Español, Français, Italiano, Nederlands, Polski, Português and Svenska has already crossed 100,000 entries for its English language edition.

There are many on-going Free and Opens Source software projects for creating dictionaries in a number of east-European languages as well as from developing countries. In addition, a lot of open source tools for creating dictionaries are also available. Even the Oxford English Dictionary [OED][142] makes extensive use of Perl, which is open source and the most popular web programming language.

Even though OED is not a free or open source project, it is interesting to note that it has never been commercially profitable for Oxford University Press. Despite that, the Press "remains committed to sustaining research into the origins and development of the English language wherever it is spoken. This commitment to the cultural values embodied in the Dictionary is shown by the £34 million funding of the current revision programme and the associated programme for new words." (See Resource Unlimited)[143]

Open Music Movement.

Another pervasive expansion of FLOSS technologies and ideas is in the field of music distribution. Almost perfect copying and compression technologies, like mp3 and ogg, coupled with the peer-to-peer P2P technologies like Napster, Kazaa, Gnutella, have made it almost trivial to copy and share music, thus jeopardizing the enormous profits of the record companies; so much so that Charles C. Mann provocatively titled his February 2003 wired.com article as "The Year The Music Dies."[144] While music is hardly going to die this year, the business of music as a cash cow of conglomerates is no longer sustainable. The Recording Industry Association of America [RIAA][145] has been trying to blame on-line piracy as the main reason for the recent decline in record sales, yet many see a link to the fact that record companies have for years kept the prices of music records artificially high in different parts of the world. Instead of looking at the business model and price structure of the records they sell, the record industry has been spending billions on mechanisms and technical solutions to stop the digital copying of records. So far all of those attempts have failed, and will never succeed, if one takes heed from a white paper written by four

scientists, Peter Biddle, Paul England, Marcus Peinado and Bryan Willman, working for Microsoft. The paper "The darknet and the future of content distribution"[146] was presented at the "Ninth ACM Conference on Computer and Communications Security".[147] In conclusion, the paper states: "In short, if you are competing with the darknet, you must compete on the darknet's own terms: that is convenience and low cost rather than additional security." This is what most hackers have been saying all along; that is, take a second look at the business model and prices, rather that technologies. The point is that the proliferation of cheap computer equipment and software has greatly reduced the cost of investment in equipment, which earlier costed a fortune and needed a huge investment beyond the reach of the average musician. This fact shows that the record industry needs to bring prices down in relation to their investment.

Beyond the technological factors, one can also find other reasons behind the growing Open Music Movement which is not as widespread and powerful as the Open Source and Open Information movements, but it is getting there. Many of its proponents describe it as "an anarchistic grass-roots, but high-tech, system of spreading music: the idea that creating, copying, and distributing music must be as unrestricted as breathing air, plucking a blade of grass, or basking in the rays of the sun." It must be added that the philosophy of free and open music[148] is not limited to anarchists or libertarians, but even to religious people. For example Jack Decker in his article Christians and the Copyright Law[149] complains:

〝You may not have realized it, but most Christian songs are copyrighted. If you reproduce them without the permission of the copyright owner, you have broken the copyright law and are subject to a fine. One church in Chicago apparently was fined $5,000 for copyright violations. The most common copyright violation is in the area of music intended for use of the congregation. Many churches use mimeographed song sheets or use an overhead projector to project a handwritten transparency of the song, both of which are illegal (it's legal to use a projector but only if the transparencies you use are obtained from or approved by the copyright holder)."

(Another religious view point comes from John M. Frame in his article "The Other Shoe: Copyright and the Reasonable Use of Technology".)[150]

Just like in software and books, people have come up with a number of licenses as an alternative to the official copyright schemes: licenses such as CreativeLibertyLicense[151] and OpenAudioLicense[152] are making their way into the music scene.

The questions asked from the proponents of Open Music are not very different from the ones asked from the FLOSS supporters. For example, to the question “Why would an artist want to release music as Open Audio?” the answers are not very dissimilar to those which apply for authors or programmers: self-promotion, sharing art with the world without worrying about money issues, making a statement against commercial entertainment, an attempt to “free the music” from the control of the record companies, or giving something to fans in appreciation for their past support, etc. (A lot more information can be found, for example, at: FreeMusicRegistry,[153] The OpenSource Music,[154] or OpenMusicWiki.)[155]

FLOSS is helping free music in technical terms as well. Not so long ago Fraunhofer-Gesellshaft, the owners of the popular MP3 file format, began charging a minimum of $15,000 for MP3 technology licenses, but the FLOSS came up with an alternative, the Ogg Vorbis,[156] or just plain "Vorbis" music format, which is not only better in retaining the quality of music but takes less space. Oggs are now spreading and even the British Broadcasting Corporation [BBC] has started to use it for their on-line audio content. Once again FLOSS provides an alternative.

Chapter 4

Most Successful Examples of FLOSS Projects and Technologies

GNU/Linux, Apache, Mozilla, OpenOffice, Koha, Sendmail, Postfix, Bind, PHP, Perl, MySQL, Zope etc.

Though the FLOSS movement has produced hundreds of millions of lines of code, and thousands, if not tens of thousands, of Software Programs and Packages, which do immensely important work for modern society, it is important to describe some of the most known, useful and successful examples of the products and projects out there.

These projects and resultant technologies have a huge potential for improving the security levels, stability and quality of computing environments, and for cutting costs in developed countries, but they also provide a viable and affordable alternative for developing countries in their pursuit of developmental goals.

GNU/Linux

GNU/Linux,[157] or Linux[158] as it is more popularly known, is perhaps the most famous and significant achievement of the Free and Open Source movements. The Linux kernel, the core of a UNIX-like Computer Operating System, originally written by Linus Torvalds and developed by tens of thousands of programmers around the world, is estimated to be running almost 30% of Server systems around the world.

The Linux kernel, together with a host of other software components, applications and tools, most of which are developed under FSF's GNU project, constitute a computer operating system which is freely distributed by a number of organizations and companies. These distributions are usually named after the company which compiles and distributes or sells them. Some popular Linux distributions (compilations) include Debian GNU/Linux,[159] SuSe Linux[160] and Red Hat Linux.[161] Currently there are more than 100 such distributions[162] which work in different ways and serve the needs of a huge variety of users. All of these distributors use the same Linux kernel, but also provide a number of additional tools and applications.

GNU/Linux or Linux, whichever you prefer to call it, is a very stable, multi-user and

multitasking operating system [OS] which is being used on a very wide range of computers and devices. Computers running on Linux range between Super Computers[163] and Tiny Single-Chip Computers.[164] Linux is used to power devices such as cameras, PDAs, watches, robots,[165] (even a Robot Brain Surgeon),[166] mobile phones, audio and video devices, etc. (See also Linux vs. Windows: The Rematch)[167]

Apache

Apache[168] is the world's most popular web server. Netcraft's statistics show that Apache powers more than 60% of the world's web servers. This is about twice the size of Microsoft's IIS (Internet Information Server). Apache is available for more than 20 platforms, including Linux and Microsoft Windows.

Mozilla

Mozilla[169] is a wonderful Web Browser, available on Linux, Windows and Mac Operating Systems. Gecko, the engine behind Mozilla is also used in the current versions of Netscape.

OpenOffice

OpenOffice.org.[170] components include word processing, spreadsheets, presentations, drawings, data charting, formula editing, and file conversion facilities (including those for Microsoft Office formats). OpenOffice.org uses EXtensible Markup Language (XML) as a standard for its data formats because it is an industry standard and the best choice for interoperable documents, which is a huge plus since any documents created by the OpenOffice applications can be opened with other XML aware applications.

OpenOffice.org is currently available in more than 10 languages, and work is in progress for another 20 or so languages. Most of the work is done by volunteers. The L10N and I18N project contains a framework and tools for localization (l10n)[171] and internationalization(i18n)[172].

Koha

Koha[173]. is an integrated Library system made in New Zealand by Katipo Communications Ltd. and maintained by a team of volunteers from around the globe.

Sendmail

Sendmail[174] is the most widely used mail server software in the world accounting for at least 40% of mail servers.

Postfix

Postfix[175] is a newer mail server which was developed as an alternative to the popular Sendmail. It is designed to be faster and more secure than Sendmail.

BIND

BIND[176] stands for "Berkeley Internet Name Daemon", and is the Internet de-facto standard program for turning host names into IP addresses. More than 90% of the Domain Name Servers of the world use BIND.

PHP

PHP[177] (recursive acronym for "PHP: Hypertext Preprocessor") is a widely-used Open Source general-purpose scripting language that is especially suited for Web development and can be embedded into HTML.

Perl

PERL[178] is a high-level programming language with an eclectic heritage written by Larry Wall[179] and a cast of thousands. It is the favourite tool of any system administrator, and runs on most of the UNIX platforms, Windows and Mac.

MySQL

MySQL[180] is produced by the MySQL AB company, established by two Swedes and a Finn, produces MySQL, the most popular open source database server in the world, with more than 4 million installations powering websites, datawarehouses, business applications, logging systems and more. The MySQL database server is distributed under a dual licensing scheme, which means it is available at zero price under the GNU General Public License (GPL), but is also sold under a commercial license to those who do not wish to be bound by the terms of the GPL and require support.

The MySQL database has an estimated 4,000,000 active installations worldwide, and up

to 27,000 copies of MySQL are downloaded per day. Yahoo!, Cisco, NASA, Lucent Technologies, Motorola, Google, Silicon Graphics, HP, Xerox and Sony Pictures use MySQL for mission-critical applications.

Samba

Samba[181] is an award winning Free Software/Open Source implementation of Microsoft's SMB/CIFS protocol for file and printer sharing. Samba lets a Linux computer act like Windows NT or 2000 servers, offering a better performance and stability. Samba is a widely used software which makes a seamless co-existence of Windows, Linux and even Macintosh computers possible. According to an itweek.co.uk report,[182] Samba outperforms Windows 2000 by a wide margin.

Zope

Zope[183] is a leading open source application server, specializing in content management, portals, and custom applications. Zope enables teams to collaborate in the creation and management of dynamic web-based business applications such as intranets and portals.

A large number of other Free and Open Source software is included as: “Appendix 4 - Free Software” which is almost entirely taken from the GNU Free Software directory at: http://www.gnu.org/directory/

Chapter 5

A Review of the Actual Use of FLOSS Around the World.

> *" If someone had told me 12 years ago what would happen, I'd have been flabbergasted..."* Linus Torvalds. Quoted from *The Linux Uprising*.[184]

The actual use of Free and Open Source Software in the industrialized world, and indeed in the developing world, is very widespread, as will be shown in the following pages. Counting the initiatives and steps taken by a significant number of governments, international bodies, the public and private sectors, NGOs, etc., and noting the momentum FLOSS has gained during last couple of years, it is safe to say that it is unstoppable.

On the following pages:

- ✔ Some general comments, facts and figures.
- ✔ A review of FLOSS in the industrialised world.
- ✔ A review of some important initiatives, events and news which may have significant impact.
- ✔ A brief overview of the regional reports.

Some General Comments, Facts and Figures

Though it is not simple to accurately ascertain the market share of different FLOSS technologies and products, David Wheeler provides a very up-to-date assessment of FLOSS market share on a world scale in his excellent article Why OSS/FS?.[185]

Of all the available Free and Open Source Software, Apache[186] tops the list in terms of impact and market share at over 60% of all the webservers, with Microsoft IIS (Internet Information Server) at around 25%. (See he survey done by Netcraft[187] and E-soft.[188]). (The share of Apache web server was also found to be similar in a survey of 366 OneWorld partner organizations. Using Netcraft.Com, we conducted the survey in September 2002, and found out that out of 366 organizations, 203 had their web sites on Apache web server, 112 used Microsofts IIS, 10 unknown, and 41 were using other

servers like Netscape etc.)

GNU/Linux's share of web server operating systems is estimated to be roughly 30%, plus an approximate 6% of BSDs (FreeBSD, NetBSD, and OpenBSD) which are FLOSS. This can be contrasted to about 50% for Microsoft Windows. In monetary terms, “Coming from near zero three years ago, it has grabbed 13.7% of the $50.9 billion market for server computers. That figure is expected to jump to 25.2% in 2006, putting Linux in the No. 2 position, according to market researcher IDC. And get this: Starting this year, No. 1 Microsoft's 59.9% share in the server market will reverse its long climb and slowly slide backwards, predicts IDC” claims a Special Report in BusinessWeek.Com[189] “The Linux Uprising”.[190] On desktops, GNU/Linux has a very small share, but since the end of 2002 it has started to grow fast. In terms of Linux users, the number is estimated to be around 20 million at the end of year 2002. Another sphere where Linux is making huge inroads is embedded computing. All types of PDAs, mobile phones, SmartPhones, entertainment devices, web-pads, cameras and other devices are increasingly relying on Linux as a robust and reliable operating system. In December 2002, two major Japanese electronics manufacturers Sony and Matsushita, said they will jointly develop a Linux-based system for digital consumer electronics. Indian-born Simputer,[191] a low-cost alternative to PC which aims to bridge the digital divide by using a truly simple and natural user interfaces based on sight, touch and audio using innovative Information Markup Language (IML), is also based on Linux.

Sendmail leads the mail server market share, at more than 40%, followed by Microsft Exchange, at over 20%. BIND is another FLOSS, which is estimated to be used on over 90% of the world's DNS servers. Another number 1 is OpenSHH,[192] a free version of the SSH (Secure Shell) protocol suite of network connectivity tools, originally developed by Tatu Ylönen,[193] at more than 60% of the market. The growth in the use of OpenSHH is quite meteoric because at the end of year 2000, it had only 5% of the market.

Among the languages, PHP is the web’s number 1 server-side scripting language and Perl is the number 1 favourite scripting language of system administrators.

Two other pieces of software, the OpenOffice suite of productivity applications and the

Mozilla web browser, are very widely used, but no figures are currently available.

In addition to the general figures given above, some very interesting observations include:

- ➔ The fifth most powerful computer on earth as of November 2002 is Linux NetworX.[194]
- ➔ World's first robot brain surgeon runs on Linux[195].
- ➔ Linux is used in Space by NASA and ESA (European Space Agency) (see also FlightLinux).

A Review of FLOSS in the Industrialised World

USA, European Union, Netherlands, France, Germany, UK, Sweden, Norway, Finland, Denmark, Australia and New Zealand, Japan.

USA - Though we have not found overall figures of usage of FLOSS in the USA, the most popular Linux distribution company, Red Hat[196] does most of its business there. The widest use of FLOSS in the USA is said to be in academic and educational institutions, though its use in companies is growing at a mind-boggling speed.

USA Companies which use Linux include:

Amazon - The internet bookstore recently moved entirely to Linux, saving around US$ 17 million.

Google - The most popular search engine on the web runs on a cluster of over 10,000 Linux servers![197]

IBM – The company made a (much-publicised) US$1 billion investment on Linux, and in August 2002 launched a US$2.5 billion new state-of-the-art fab[i] or "center of nanotechnology", whose IT infrastructure is all Linux-based, controlled by some 1,700 1-GHz microprocessors able to access some 600 terabytes of data. According to an eetimes.com story,[198] "...Linux was evaluated against a Windows-based system and performed flawlessly for three months, whereas the Windows-based system failed after six

(i) Semiconductor industry abbreviation for wafer fabrication facility, where wafers are manufactured. It can also be called a front end as this is where semiconductor diffusion is done. A wafer fab needs a special environment. Extremely strict criteria for cleanliness (required for the high precision processes). The air in the manufacturing rooms is 10,000 to 100,000 times more pure than the surrounding air; and the operators wear special clothing.
(definition taken from: http://us.st.com/stonline/press/news/glossary.htm)

or seven days."

Dreamworks - Starting with the blockbuster animated movie "Shrek," Dreamworks has been using Linux to render 3D graphics and special effects. (For example, in the movie "Spirit, Stallion of the Cimarron").

Industrial Light and Magic - The special effects division of LucasFilm used Linux to render the 3D graphics in the latest Star Wars movie, "Attack of the Clones".

Kaiser Aluminum - One of the world's largest producers of aluminium sheet and foil, Kaiser Aluminium has chosen Linux for many applications on the manufacturing floor.

WesternGeco - IBM has built a Linux-based supercomputer for analysing seismic data. This machine is built from 256 IBM eServer xSeries. This is the second largest Linux cluster IBM has built for oil exploration, the largest being the 1024 xSeries cluster for Shell.

Merrill Lynch - One of the world's leading financial management and advisory companies, with offices in 36 countries and total client assets of approximately US$1.3 trillion, did a large scale Linux deployment in 2002 in order to cut costs and boost revenues.

United States Postal Service - It sorts all the bulk mail on over 900 Linux clusters scattered around the country.

US Governmental and Semi-governmental organizations using Linux include:

Apart from NASA's well known FlightLinux, NSA (National Security Agency) and DoD (Department of Defence) use Linux and other FLOSS for various purposes. A MITRE paper, "Use of Free and Open-Source Software (FOSS) in the U.S. Department of Defense"[199] (version 1.2.04 updated in January 2003), identifies some 115 FLOSS applications and 251 examples of their use in the Infrastructure Support, Software Development, Security Applications etc, at the DoD.

The City of Largo in Florida moved to Linux in 2002, and currently they are talking about Linux-based terminals in all the city's police cars.

The above list is only a very small sample of FLOSS use in the USA. People at M-Tech Canada have put up a Linux in Business[200] list, and Automation Access – AAX [201] has its own small list of Companies Using Linux.[202]

The European Union[203] The EU has taken many initiatives over the years to investigate the potential of FLOSS for its member countries. Some of the important projects are:

European Working Group on Libre Software[204] - was given the task of analysing the free software phenomenon, to create a set of recommendations for the EU and to create a paper to be presented to the Commission. The paper[205] was presented on 23rd of March 2000 in Brussels. Some observations and recommendations of the working group include:

- ➔ Open source software can be considered both a great opportunity and an important resource.
- ➔ Europe has now the opportunity of participating in, and benefiting from the open source movement.
- ➔ Open source software is already behaving rather well from a technical point of view, both in terms of quantity and quality, competing head to head with market leaders in several niches.
- ➔ The recommendations should be considered not as "how to help open source software", but "how to help Europe to benefit from open source software".

European IDA (Interchange of Data between Administrations)[206] is a strategic initiative to support rapid electronic exchange of information between EU Member State administrations, and which aims to improve Community decision-making, to facilitate the operation of the internal market and to accelerate policy implementation. An IDA feasibility study about POSS, or "Pooling Open Source Software",[207] conducted by Unisys and concluded in June 2002, finds that the sharing and pooling of software resources between European administrations based on the open source development model and using available mature Free and Open Source Software is desirable and possible.

FLOSS - Free/Libre and Open Source Software: Survey and Study – was completed in October 2002. The final report[208] of the study has produced excellent results in terms of its mandated targets, such as remedying the lack of information on FLOSS, and the development of a base for extending these to the broader economic measurement of non-monetary and trans-monetary activity in the information society, beyond the domain of OS/ FS. (Incidentally, the acronym FLOSS used in the present study is taken from this initiative.)

In November 2002, The European Union awarded a 250,000 Euro contract to Netproject[209] to examine the deployment of FLOSS in the German provincial state of Mecklenburg-Vorpommern. This project complements another project involving the deployment of Linux on the desktop for the UK Police IT Organisation.

(Andy Oram in this Oreilynet.com article reviews some EU initiatives, including OpenEvidence, which produces technology for "evidence" creation and validation of electronic documents.)

The Netherlands - Royal Dutch/Shell,[210] One of the world's largest petroleum companies, has decided to set up a huge Linux cluster.

France - The French Government has created the Agency for Technologies of Information and Communication in Administration (ATICA), one of whose missions is “to encourage administrations to use free software and open standards”.

Germany - Debeka, one of Germany's largest insurance and financial services groups, uses Linux on over 3000 clients. The SuSE Customer reference site contains a large list of companies using FLOSS in Germany and elsewhere. IBM and German Government signed a major deal involving SuSE Linux on IBM hardware for the public sector. The German City of Schwäbisch Hall is building IT infrastructure based on SuSE Linux and IBM Servers. The software used to handle the results from the last Parliamentary Elections in Germany used FLOSS platforms. The police force in Lower Saxony "Niedersachsen", Germany's second largest provincial state, plans to use Linux on 11,000 clients as of 2004. The German Bundestag uses Linux on its 150 servers.

UK - The UK government is currently considering open-source software as a way to avoid getting locked into proprietary information technology products, according to a news.com report. The Police Force in West Yorkshire, has taken delivery of its first Linux desktop computers, as part of a trial for English and Welsh police forces.

Sweden - Swedish Government also considers Linux according to this theregister.co.uk

report. IKEA, the giant Swedish furniture and home furnishings store (with stores throughout the industrialised world) uses Linux

Norway - The Norwegian government apparently has cancelled an exclusive contract with Microsoft to provide software for the computers in its public offices, according to a news.com report. The decision was encouraged by Administration Secretary Victor D. Norman, who is regarded as a conservative free-marketeer.

Finland – The City of Turku[211] is migrating all of its desktops to Linux and OpenOffice. Initially a pilot project of 200 computers is in progress as of end of 2002. This move could result in tens of other cities in Finland also making the same move.
According to an article[212] (March 2002) in Helsingin Sanomat,[213] the Finnish State Administration (Valtionhallinto) is seriously considering replacing Windows with Linux on all 147,000 computers under its control. This could result in a saving of 26 million Euros a year. Currently Microsoft Windows is running on 88% of all the state computers. Even the Evangelical Lutheran Church of Finland is considering a bigger use of Linux and other FLOSS according to a report[214] on their website. (Around 85% of the population of Finland are members of the Lutheran Church).

Denmark – According to an October 2002 report by Danish Board of Technology, the public administration can save billions of Danish kroners using Free and Open Source Software. Theregister.co.uk reports "Seven Danish IT directors, including Hans Lembøl, an IT manager for the city of Slagelse, have got together under the auspices of the Association of Danish Municipalities, to investigate open source software packages as an alternative to Microsoft products." Starting with an evaluation of StarOffice, "..Lembøl and his colleagues plan to evaluate Linux as a replacement for Windows 2000 on the server (and possibly desktop)." A deal between Sun Micrososystems and UNI-C (IT-Center of Research and Education of Denmark) allows all the school pupils, students and teachers to download the office program StarOffice for free and install it on their home computer. Alternatively they can buy it on a CD-ROM for the price of duplication: 10 kr per CD. StarOffice is the commercial twin of OpenOffice.Org.

Australia and New Zealand - After serious concerns over newer Microsoft licensing scheme,

many organizations in Australia, including the Federal Government are moving to Linux. Among big organisations making the move is Air New Zealand.

Japan – According to a Yahoo report, Japan plans to spend about 1 billion yen (8 million Euro) to fund Asian software developers working on open-source Linux operating system. Initially a sum of 50 million yen (400,000 Euro) has been allocated to study the possibility of switching government computers to an open-source operating system. Also, the Linux white paper 2003 (in Japanese, English summary from David Wheeler) finds that overall use of Linux increased from 35.5% in 2001 to 64.3% in 2002 of Japanese corporations, and GNU/Linux was the most popular platform for small projects.

All the above shows that FLOSS is already a serious contender and, not just on the fringes, as was the case many years ago. So phenomenal is the rise of FLOSS that Linus Torvalds is reported to have said "If someone had told me 12 years ago what would happen, I'd have been flabbergasted."

In conclusion of our brief survey of the FLOSS scene in developed countries, we can say that FLOSS is an attractive alternative in terms of cost, quality, reliability, security of software solutions, and is an invaluable source in terms of community, democratisation, human-rights, etc. Repeating one of the observations of the European [Commission] Working Group on Libre Software, "*Consider the recommendations not as "how to help open source software", but "how to help Europe to benefit from open source software,"* one can only reiterate that if FLOSS can be relied upon to help Europe it can help everyone else.

As far as we know, no research has been done which would show whether there is more jobs or less jobs are being created because of FLOSS, but one thing is for sure, a lot of entities have saved huge amounts of money in a multitude of ways, but where that saved money is invested is a question which needs further investigation.

Some Major Projects, Initiatives and Events

- which may have far reaching effects for the Developing World

In the following section, we will try to present a few initiatives, events and news, which may

have momentous and very pervasive effects on the overall development efforts of developing countries. They are not presented in any particular order, but at least one item has been identified in each broad area: Asia, Africa and Latin America.

1. Taiwan's "National Open Source Plan", as reported by the Central News Agency, the government news agency of Taiwan, in June 2002, to invest money into local FLOSS development efforts, and consequently to save money in the future, is very significant. The plan aims to improve the quality and levels of software technology in Taiwan, and involves the National Supercomputer Center

An English summary of the original Chinese language article,[215] (found at Kuor5hin), states that by 2005 the program will save the government about NT$ 2 billion (roughly 60 million Euros) and society NT$ 10 billion (roughly 300 million Euros). The number of computers in schools and in the Taiwanese government was estimated to be around 1,230,000 in the year 2000. The license fees alone for MS Windows and MS Office for these computers would be around NT $10 billion (roughly 300 million Euros).

The most important components of the plan, which really make it stick out from similar initiatives in other parts of the world, are:

- ➔ creating a totally Chinese free software environment and free software application development for Taiwan users
- ➔ training 120,000 users in free software skills,
- ➔ efforts of schools to provide diverse information technology environments to ensure the freedom of information.

As can be seen, the idea is not just to save money but also to spend money wisely, so as to get maximum benefit for whole the society.

The goal of teaching the basic skills of Free and Open Source Software environments is to be achieved by cooperating with Taiwan's community colleges and NGOs. 6 training centres will train 120,000 users, while roughly another 10,000 will get advanced courses, who will then help the further adoption of FLOSS.

The Taiwanese plan can potentially provide other developing countries with an example to follow. It would be a big help in chalking out similar plans in other circumstances. One must, however, note that in cases where governments and businesses in developing countries, or anywhere else for that matter, do not pay for software they will have very little or no possibilities of saving money from license fees. These countries have a unique chance to avoid the lock-in already now and invest in FLOSS solutions. (The news of the plan is also covered by the TaipeiTimes.Com,[216] and TheRegister.)[217]

2. In China, news of several parallel moves involving FLOSS have surfaced during 1999-2002. Various government bodies and institutes -- like the Ministry of Science and Technology, CAS [Chinese Academy of Sciences], Beijing Software Industry Productivity Center (a group said to be established by the government to organize Linux development in China), China Computer Software Corp, Red Flag Linux and many others -- have been interested in FLOSS, and a lot of news suggests that FLOSS is really being put to ever bigger use in China. However, one of the most significant recent steps has been the launching of China's first “dragon chip”, which is “equivalent to the performance of the Intel 486 CPU”, can run under Linux, and “will not fall into the foreign intellectual property rights trap”. Based on the “dragon chip” is the “Soaring Dragon” server, jointly developed by Shuguang Co. and the Computer Institution of the Chinese Academy of Sciences, which will be used initially in routers and Linux-based firewalls. At 200 MHz, it looks like a modest start, but Chinese scientists are planning to develop the chips equivalent to Pentium III already in 2003.

The significance of this step is to be seen in the context of discussions around so-called “trusted computing”. According to Professor Eben Moglen, “The most important threat to the survival of free software is the concept of “trusted computing,” which really means the building of hardware you as a user can't trust at all.” In this Slashdot interview,[218] Professor Moglen further states: “If the free software movement and its allies can avoid having "trusted" computing forced on PC consumers by either mandatory legislation or industry “consensus,” I believe free software will be around forever, and will become the dominant mode of software production and distribution in the course of the next two decades.” That being the fear and suspicion, and chip producers like Intel and AMD supporting and delivering “trusted computer” chips, the news from China, or a possible similar

development in some other country like say India or Brazil, may become godsend in defeating such a scheme.

3. In South Africa there has been a debate over the merits and demerits of FLOSS versus proprietary software in government, education, and official use during last couple of years (2001-2003). There has been news about the Microsoft donation of 32,000 Windows licenses for the schools, and a discussion about its worth and use.

A number of state agencies and bodies like National Advisory Council on Innovation (NACI), Council for Scientific and Industrial Research (CSIR), the State Information and Technology Agency (SITA), Centre for Public Service Innovation (CPSI), and the Department of Public Service and Administration (DPSA), have been talking about the greater use of FLOSS in South Africa. In January 2003, SITA announced its commitment "to transforming open source software from a niche product into a mainstream tool for delivering government services" during an OSS workshop attended by representatives from CSIR, CPSI, DPSA and SITA. The seminar participants expressed their determination to speed up the testing and implementation of FLOSS in government, setting-up an OSS unit within SITA and the development of a framework for assessing and recording the results of OSS use.

In addition to that, the Government Information Officers' Council (GITOC) has come up with a new document, "Using Open Source Software in the South African Government"(version 3.3 on 16th January 2003),[219] which proposes to go one step beyond simply using the FLOSS, namely contributing code to a community of developers. It also notes that "The South African Government is the largest procurer of ICT on the continent" and the government could significantly contribute and benefit by "Stimulating the local software industry. This will lead to better export potential and better capacity locally to satisfy the Government's ICT needs. It will also contribute significantly to human resource development, especially in the area of ICT." One should note that presently the South African Government's yearly spending on software licenses is R3bn (about 350m Euro).

These moves and initiatives in South Africa, if wisely implemented, can provide examples

for many other African countries, in addition to actual software and accumulated experience.

One more South African initiative which can have far-reaching effects for all developing countries is Translate.Org.Za. This project, as noted by Nico Coetzee in the Africa Report, (See Appendix) is aimed at translating FLOSS into all the 11 official languages of South Africa, and has already translated Mozilla to six languages: Xhosa, Zulu, Venda, Northern Sotho, Siswati and Tswana.

4. In Latin America, many hopes are pinned on LACFREE [220] -- Latin American and Caribbean Conference on Free Software Development and Usage due to take place in Peru on 11-13 June 2003 -- which will be the first conference of its kind in Latin America and the Caribbean, and is organised by UNESCO's Office in Montevideo as part of its Free Software Developers and Users Consortium.[221] The results of LACFREE, along with a joint declaration of its participants, will be presented at the WSIS - World Summit on the Information Society[222] in Geneva in December 2003. The conference is expected to pool continent wide-efforts aimed at promoting FLOSS.

An Overview of the Regional Reports

Limits on time and resources do not permit a thorough investigation of Free and Open Source Software in all the developing countries. One of the biggest hindrances is availability of data. My colleagues Frederick Noronha from India, Nico Coetzee from South Africa and Cesar Brod from Brazil have authored three reports: Asia Report (LIBERATION TECHNOLOGY for the lands of diversity? Free Software in Asia), Africa Report (Free- and Open Source Software in Africa) and Latin America Report (Free Software in Latin America), included as Appendixes 1, 2 and 3. Each of them has tried to find out as much as possible using online tools as well as personal communications with individuals and organizations involved in the FLOSS scene, as well as development efforts. The work they have done has not been very easy, given the fact that they did not have a chance to visit any of the “areas”, which are of course whole continents, with a wide variety of languages, in addition to the meagre channels of communication open in many countries. Nevertheless, the work done is significant and using the FLOSS model can be developed

further over the coming months and years. The hope is to put these reports on-line and to fill in the blanks by people from the concerned regions.

The overall FLOSS related activity in Asia, Africa and Latin America is seen in terms of level of usage of FLOSS solutions and technologies in the region, as well as writing code and other forms of contribution to FLOSS from these areas.

Another important indicator of FLOSS related activity is numerous societal, political and legal initiatives in different parts of the world, pointing to and promoting the use of FLOSS in the government, private sector and civil society.

At this stage it is simply far too early to see any results in terms of impact of FLOSS on civil society, but future research in this sphere could be illuminating.

Going through 20+ countries mentioned in the Asia report, the highest overall FLOSS related activity seems to be taking place in countries like India, China and Taiwan, (excluding Japan, which is not object of this study) followed by South Korea, Malaysia, Singapore, Thailand etc. Rest of the Indian sub-continent (Bangladesh, Pakistan, Sri Lanka, Nepal etc.) having a medium level activity, while Arab world (with the exception of Israel) seems to be the least active zone, only Afghanistan and North Korea being at the very end.

In Latin America, Mexico, Brazil and Argentina top FLOSS related activity in overall usage of FLOSS as well as writing code, followed by Colombia, Venezuela and Peru. The Latin American programmers have made significant contributions to the overall FLOSS projects around the globe.

In Africa, South Africa tops the list, closely followed by Kenya, Namibia, Nigeria. Though there is significant activity starting in countries like Ethiopia, Ghana and Zambia.

Of all the three regions reviewed, Latin America tops in terms of code contribution, but Asia is not far behind, and as noted earlier with reference to GITOC document, South Africa in the African continent is poised for more code contribution in addition to its

reasonably high use of FLOSS.

In his aptly titled report “Liberation Technology for the Land of Diversity”, Frederick Noronha, makes a very interesting observation: “In the next few years, the contribution of Asians to GNU/Linux is going to become increasingly apparent.” This observation is based on his intimate knowledge of the FLOSS scene in India and elsewhere in Asia. The point to note here is that there is already a lot of code being contributed now, but that is not advertised and thus not so visible. In the coming years, however, there will be more contributions and some will excel so much that they will get attention. The situation in Asia and even Africa can be contrasted to Latin America where the contribution of code to FLOSS started much earlier, and is duly noticed and recognised.

Another point Frederick Noronha makes about FLOSS in Asia is that FLOSS-related activity and the active use of FLOSS is not always noticed by government officials in many countries, and in cases where some do notice they pretty much fail to understand it, let alone understand its significance. It will take time and a lot of patience before the changes caused by FLOSS are felt.

Noronha walks through all parts of Asia, covering China with its Redflag Linux, BluePoint Linux, many projects and actions of the Chinese Academy of Sciences, etc. He also looks at India, several initiatives to make computing available to Indian languages, briefly reviewing projects like MayaVi, Kaai, Yudit etc. In the Arab world, he look at a very interesting grass roots initiative ArabEyes, which is dedicated to Arabization of FLOSS. ArabEyes spans several countries.

In his report “Free Software in Latin America” Cesar Brod notes the trend of legislative proposals in many Latin American countries (e.g. Peru, Brazil, Mexico, Argentina) aimed at fostering the use of Free and OpenSource Software in governments. These proposals, despite being quite rational and mild, are vehemently opposed by Microsoft and its sponsored groups like Software Choice,[223] CompTIA,[224] etc. Cesar Brod further notes: “It is very difficult to ensure transparency when someone doesn't want to provide information. When this is government information, it should, in principle, be readily available for the public this government rules and represents. The several proposals of [parliamentary] bills

which are trying to push Latin American governments to use free software take this in consideration. One must admit, however, there is not enough free software tools to run a government, and a lot of developed countries are not willing to use free software as a standard tool for government administration."

Cesar Brod notes that GNOME, one of the two competing GUIs (Graphical User Interfaces) available for Linux, was started by Mexican developer Miguel de Icaza, while working at the Institute of Nuclear Sciences (UNAM – Universidad Autónoma de Mexico). Cesar also briefly reviews projects like CódigoLivre at the UNIVATES and Rede Escolar Livre RS project in Brazil, UTUTU, BioLinux and Via Libre Foundation in Argentina, PHP-Nuke from Venezuela, INFOMED in Cuba, etc.

In terms of the future of FLOSS in Latin America, Cesar Brod has great hopes in the newly elected president of Brazil, whose presidency could positively affect the status of FLOSS in Brazil, and elsewhere in Latin America.

In his report, Nico Coetzee takes a look at various projects and initiatives which are certainly going to benefit Africa. He takes a brief look at Translate.Org in South Africa, OpenLab (South Africa and Nigeria), SchoolTool, LinuxLab etc. Also noted are Radio E-Mail in Guinea, and how Linux Wireless Router brings in subscribers for ISP in Ghana. After the completion of Nico's report, a new initiative, FOSSFA - Free and Open Source Softwre Foundation Africa, was launched on 21st February 2003 in Geneva during the WSIS PrepCom2 meeting. In its own words: "It all started during the ICT policy and civil society workshop in Addis Ababa, Ethiopia, when 82 participants from 25 different countries invited by APC - The Association for Progressive Communications, Article 19 and UNECA - United Nations Economic Commission for Africa assembled to discuss ICTs in Africa. The workshop participants agreed that open source software is paramount to Africa's progress in the ICT arena, and began work on a coordinated approach to support open source development, distribution and integration."

The Africa, Asia and Latin America reports are appended as follows:
Appendix 1 - Africa Report.
Appendix 2 - Asia Report.

Appendix 3 - Latin America Report.

Chapter 6

Factors Contributing to the Expansion of FLOSS in the Developing World

Three factors stand out when it comes to why many developing nations have started taking first, and sometimes second, steps towards FLOSS: cost, the anti-piracy campaign and security concerns.

1. Lower Cost

Definitely the most overarching factor is the lower cost, despite a well-known assertion that people in developing countries don't pay for software anyway. It is true that a large number of users in the developing countries don't and, more importantly, can't really pay for software. Jordi Carrasco-Muñoz, who works for the EU delegation in Vietnam, calculates that the cost of Windows XP and MS Office is between $560 and $800 (home to professional version, prices from Amazon.com). In a country like Vietnam, where the GDP per capita (2002) is $440 per year, the cost of just the operating system would be equivalent to one year and three month's wages of an average Vietnamese. "The cost-equivalent for the US, where the GDP per capita is $30,200 per year, would be $38,436 for just XP and Office". Therefore, “Is it ‘very surprising’ that the percentage of illegally-copied software in Vietnam is 97%?”, asked Carrasco-Muñoz during his presentation at the Open Source and eGovernance Conference in October 16-18 Washington, DC.

Relevant figures for other countries, as calculated by the Business Software Alliance (BSA)[225] are given in the following table:

25 Countries with the Highest Software Piracy Rates[226]

	Year 2000	Year 2001
Vietnam	97,00%	94,00%
China	94,00%	92,00%
Indonesia	89,00%	88,00%
Ukraine/Other CIS	89,00%	87,00%
Russia	88,00%	87,00%
Pakistan	83,00%	83,00%
Lebanon	83,00%	79,00%
Qatar	81,00%	78,00%
Nicaragua	78,00%	78,00%
Bolivia	81,00%	77,00%
Thailand	79,00%	77,00%
Bahrain	80,00%	77,00%
Oman	78,00%	77,00%

25 Countries with the Highest Software Piracy Rates

Kenya	67,00%	77,00%
Kuwait	80,00%	76,00%
Bulgaria	78,00%	75,00%
Romania	77,00%	75,00%
El Salvador	79,00%	73,00%
Guatemala	77,00%	73,00%
Paraguay	76,00%	72,00%
Nigeria	67,00%	71,00%
Malaysia	66,00%	70,00%
India	63,00%	70,00%
Zimbabwe	59,00%	68,00%
Honduras	68,00%	68.00%

Source: Seventh Annual BSA Global Software Piracy Study

The BSA document "Seventh Annual BSA Global Software Piracy Study" notes that the "United States and Canada experienced continued piracy, with the U.S. at 25%, up from 24% in 2000, but still the lowest of all countries worldwide. The piracy rate in Canada remained the same at 38%." One can only wonder what would be the percentage of illegally-copied software in North America if people were offered Windows and Office packages for $38,000.

It should be noted here that many have questioned the methodology of BSA in their calculations, which often ignores Free and OpenSource Software. Nathan Cochrane, in an article "Piracy and free software not always counted"[227] points to "phantom" piracy aimed at inflating losses.

Another article in The Register [228] is critical[229] of "the narrow view that money not spent on software licences vanishes from the economy as a whole. It doesn't - it's simply spent or invested on something else, possibly sustaining jobs elsewhere in the economy and recouping tax revenue there."

Jordi Carrasco-Muñoz thinks that the developing countries can neither **afford to miss** the benefits of the IT revolution, nor can they **afford its cost** (particularly of IPRs).

It is no secret that Free and OpenSource Software costs little. However, businesses and governments can not simply presume that if software itself doesn't cost much, it is also cheaper to move over to it. Everyone knows that buying a bubble jet printer from HP or Canon may be very cheap, but the cost of buying the ink cartridges definitely makes it a

more expensive solution than a more expensive laser printer. In order to get the accounting right, businesses often investigate the Total Cost of Ownership (TCO), which looks at the total cost of a solution, instead of just the cost of individual components. Even though "ownership" of software in TCO, as explained by Brendan Scott, is a bit anathema, since neither FLOSS nor proprietary software is actually owned by any user, the expense of operating and migrating to FLOSS are not trivial. This, however, should not confuse anyone into believing that FLOSS can be more expensive than proprietary software, because the fact of taking into account the additional operational costs, like retraining the users and hiring the right skill-set, simply puts the focus on a different problem: human resources and learning.

Nevertheless, costs associated with migrating to FLOSS are real, but at the end of the day, as many articles and studies have shown, such as those by the Robert Frances Group,[230] Cybersource Pty Ltd,[231] and MITRE's business case study of OSS, they are still much lower than the available proprietary solutions. If one also takes into account the "hidden" costs, like upgrades, then the difference in TCO is even wider in favour of FLOSS. Besides, the proprietary software companies have also noticed the lower costs of FLOSS, and are trying to find their place in a new and different market that is strongly influenced by FLOSS. This is evidenced by Microsoft CEO Steve Ballmer, when he says: "We have prided ourselves on always being the cheapest guy on the block - we were going to be higher volume and lower priced than anybody else out there, whether it was Novell, Lotus or anybody else," but "One issue we have now, a unique competitor, is Linux. We haven't figured out how to be lower priced than Linux. For us as a company, we're going through a whole new world of thinking." (See 15th July 2002 article at varbusiness.com by Rich Cirillo "Ballmer: Linux changed our game")[232]. In January 2003, Microsoft, in its filing with the US Securities and Exchange Commission blamed open source for a possible decline in its profits, and warned that the company "...may have to reduce the prices it charges for its products, and revenues and operating margins may consequently decline.." (See CNET.com staff writer Ian Fried's article "Microsoft: Open source could harm us")[233]. It would not be difficult to guess what Windows would cost if Linux was not there or if FLOSS were absent, and how TCOs would be calculated.

It is relevant to note that in the case of developing countries, the costs associated with re-

training users and hiring skilled people to migrate and run FLOSS based systems are not that high as in developed countries because of lower labour costs and, more importantly, people thus employed are locals contributing to the local economy rather than paying expensive software license fees. These costs become a non-issue if one has the chance to start from the beginning with FLOSS, instead of migrating from proprietary solutions. One doesn't need much maths to work out that ultimately the *cost of **not** changing now will exceed the cost of changing now*.

2. The Anti-Piracy Campaign

Many in the developing countries have realised that not paying for licenses for the software being used can not go on for ever. Home users may not come to this conclusion soon but governments and enterprises can not fail to note that the license payments for software will have to be made one day, if one keeps using proprietary solutions. This realisation, combined with the campaigns of BSA and WIPO, has become a de facto ally of FLOSS. The more aggressive these campaigns become, the more interested will countries become in FLOSS, as both short-term and long-term strategies. The short-term strategy entails using FLOSS as a lever in getting price reduction from vendors, and the long-term strategy entails investing in local FLOSS-based solutions to reduce foreign currency spending and increase support for the local economy.

3. Security and Technological Independence

Combined with cost, security is perhaps the most important factor pushing FLOSS in every country outside the United States.

In basic terms, security is understood as denying unwanted/unauthorised access, damage, modification or destruction of your system, to ensure confidentiality, integrity and availability of the information processed and stored by a computer. The unwanted in this case could be anything from thieves, rivals and terrorists to government agencies. Usually one has recourse to the law, which takes its course if and when a breach of security is discovered.

However, security is also seen in national and state terms where, apart from local intruders, government agencies, business rivals or crackers from another country (irrespective of that country being friendly or hostile) could gain unauthorised access. In this case the US is in a unique position since most of the software companies selling proprietary software coming from that country could be seen as secretly colluding with the US intelligence agencies.

For instance, “Big Brother” and “MiniTruth”, which emerged from the news of the US National Security Agency (NSA)[234] encryption NSAKEY found in Windows[235] and later in Lotus Notes,[236] are enough to create fear and suspicion for any government except the US. Adam Back,[237] who discovered the key in Lotus Notes, writes: “Anyway as clearly inside the application somewhere would be an NSA public key that the NSA had the private key for, I tried reverse engineering it to get the public key. In doing this I discovered that the NSA public key had the organizational name of "MiniTruth", and the common name of "Big Brother".”

In addition to the above news, a former NSA employee, Wayne Madsen, now working for Internet rights watchdog EPIC (Electronic Privacy Information Centre)[238] has publicly stated that “A lot of manufacturers play ball with the NSA”, “This is an area that the NSA is moving into a lot and we have to be really careful about it.” (The Full story is carried by ZDNet.[239])

The whole argument boils down to two things – verifiability and trust. How does one confirm whether a piece of software contains a backdoor or spyware? In the case of closed source software there is really no sure way of ascertaining the absence or presence of backdoors, but in the case of FLOSS, one can always go back to the source and check it line by line. Anyone buying software from closed source vendors (not only Microsoft Windows or Office Suite but all proprietary UNIX systems and software) can only take their word for it, something increasingly difficult given the record of most corporations.

Another aspect of security is what is called SPOF (Single Point of Failure) or a part which renders an entire system unusable when it fails. Keeping this concept in mind, many governments and IT departments plan to avoid reliance on a single OS, single vendor or

technology, single centre of operations or even single source of energy, so that if one fails at least some other parts of the system keep working. Following that logic, Otto Schily, Minister of the Interior of the Federal Republic of Germany, said in a statement quoted in a BBC story,[240] about his country's recent policy decision to adopt Linux and Open Source, "We raise the level of IT security by avoiding monocultures; we lower the dependency on single software vendors; and we reach costs savings in software and operation costs."

In addition to the practical problems mentioned above, most states want to achieve some level of technological independence, which is understood as employing policies geared to ever greater self reliance in terms of technologies. Investing in local software development based on FLOSS sits very well with the overall ideas of technological independence.

FLOSS solutions have proved their worth in every aspect of security. Even the NSA[241] has its own version of Linux, the SELinux or Security-Enhanced Linux,[242] which is increasingly used by security sensitive sites and establishments. SELinux uses "Mandatory Access Control" to harden its security. (For a more detailed description, check Susan Rajnic "An Introduction to the NSA's Security-Enhanced Linux: SELinux").[243] According to some reports, the intelligence agencies of Russia, China and many other countries have their own versions of secure Linux.

Security and privacy concerns, vis-à-vis proprietary software, are not limited just to governments and companies, but even to private individuals. Michael Jennings of Futurepower Computer Systems has set up a constantly updated website "Windows XP Shows the Direction Microsoft is Going"[244] which details many of the security issues related to Microsoft Windows XP. According to it: "Microsoft Office keeps a number in each file you create with Visual Basic macros that identifies your computer. Microsoft Office 97 keeps an identifying number even if there are no macros. (The free and excellent Open Office[245] does not have this problem, even when it uses the Microsoft file formats.)"

All of the security- and privacy-related concerns noted above make it very likely that more and more decision-makers in the developing countries look to FLOSS as a very viable alternative to proprietary solutions. Realising this, Microsoft has recently been talking about shared source and, according to some news, has offered to let some governments

see the Windows source code. This approach is not entirely new, since Microsoft has had a similar deal with the Austrian government. But as many critics have pointed out, these deals are done under a very strict NDA (non-disclosure agreement) which stops the party from disclosing anything under any circumstances whatsoever. Also there are reports that the source has been “shown” in a Microsoft-controlled environment. Besides, there is no guarantee that the source code shown to an official is the same from which the binaries are compiled: in other words the inspecting party doesn't really know if the inspected version is really the same as current the Windows executable.

It was not so long ago (May 2002) that a senior Microsoft Executive, Jim Allchin, told a US federal court that sharing information with competitors could damage national security and even threaten the U.S. war effort in Afghanistan. He later acknowledged that some Microsoft code was so flawed it could not be safely disclosed (See the story at eweek.com.[246])

Chapter 7

Obstacles to the Extensive Use of FLOSS in the Developing World.

Since it can be convincingly shown that developing countries definitely stand to gain in very many ways from an adoption and extensive use of FLOSS, the question that begs to be answered is: Why, then, is it not already widely adopted? There is no single conclusive answer to this question. However, we can point to a number of factors and issues which can be central to understanding why a majority of developing countries still do not make use of the opportunities provided by FLOSS.

The issues and factors can be broadly divided into 3 major groups:
1. Financial, 2. Technical, 3. Political and Social.

1. Financial

A lack of financial resources is of course a major issue with any development effort. Many governments often have to choose between acute issues, like poverty, illiteracy, ethnic conflicts, droughts, disease, lack of simple infrastructure, ICT, etc.

However, it is a simple fact that Free and Open Source Software are relevant to a development effort only if a reasonable investment in ICT infrastructure is made. If no hardware is available, software is good for nothing. It is beyond the scope and mandate of this study to suggest to any country where and how the available scant resources should be used. One can only say, in very general terms, that investment in education and ICT is something without which countries will find it increasingly difficult to cope with the needs of both the present and the future.

In more concrete terms, one important factor to note for policy makers is that ICT does not imply expenses only, but also carries a significant possibility of earning money, job creation, increased efficiency in meeting the needs of citizens, and the creation of a more informed citizen. It is in all of these contexts that FLOSS can give a helping hand.

2. Technical

A dearth of trained IT professionals is a very important factor impeding the spread of FLOSS in many developing countries. This issue can be best addressed by taking a second look at the educational and vocational training policies, which should make sure that the students get a chance to know multiple technologies, and are not limited by the predominance of a single vendor or technology in the educational curriculum and laboratories.

3. Overall Political and Social Issues

Bureaucracy.

Bureaucracy is perhaps the most fundamental barrier to a wider adoption of FLOSS. All bureaucracies, whether in the developed or developing countries, and whether in governments or in corporations, tend to be lethargic and bound to a set of written and unwritten rules which makes it difficult for them to respond in a dynamic fashion to a fast-changing world. It is difficult enough for anyone to cope with the pace of changes (technological as well as socio-political), let alone for a bureaucrat, a significant part of whose motivation is to climb the career ladder while covering his/her back.

That being the case, it is not difficult to imagine how bureaucrats in governments will respond to a technological solution which is not provided by a single vendor/company, but rather mainly the result of the voluntary efforts of a community of hackers. Many of them even fail to comprehend that such a thing is possible. Add to that a “reasonable” degree of FUD, and you have many bureaucrats suspecting communism.

Even in cases when a particular group of government bureaucrats is sympathetic to FLOSS, for whatever grounds (cost-saving, security, code access), its implementation can go wildly off target, as for example in the case of the "Red Escolar Libre" (Free School Network) project in Mexican Schools. (See "Mexican Schools Embrace Windows).[247] In the year 2000, Mexico had 120,000 schools. In order to achieve the goal of providing one computer lab consisting of 1 server and 6 desktops to all the 120,000 schools in Mexico,

someone calculated that instead of paying US$ 500 per server and US$ 55 per desktop license for Windows, a Linux CD would save a lot of money. It would indeed have saved a lot of money, but no proper plan was made to actually implement it in a properly structured way and to make the labs work. A CD with Linux software was shipped to the schools with the hope that it would simply be installed, like a painting on a wall. Consequently, the plan looked good on paper, but did not work. The problem here was not the software, but rather the implementation of a plan. Based on the Mexican Red Escolar Libre project, and learning from its mistakes, the Rede Escolar Livre RS project is sponsored by the government of the state of Rio Grande do Sul in Brazil. (Some more details of this project are given by Cesar Brod in the Latin America Report in the appendix.)

Corruption

Corruption is another ingredient of a situation in which FLOSS, despite being extremely cost-effective and of competitive quality, is still kept out because companies with enough cash can buy off decision-makers in order to bring in solutions which look great on presentation charts and in company propaganda. Corruption is not just typical of developing countries or countries with autocratic and authoritarian regimes, but is spread more or less across the world. For sure, it is not spread evenly, yet in many countries it has become endemic.

Even in countries which seem to suffer least from it, corruption is hardly as rare as one is made to believe. Consider, for example, what a Pratt &Whitney[248] spokesperson said, when explaining why the company charged the US Air Force nearly $1,000 for an ordinary pair of pliers. “They're multipurpose. Not only do they put the clips on, but they take them off.” The humour aside, when a company like Pratt &Whitney – which claims to be “a leader in the design, manufacture and support of engines for commercial, military and general aviation aircraft, space propulsion and power systems” and boasts on being “a $27.9 billion company that includes Otis elevators and escalators, Carrier heating and air-conditioning systems, Sikorsky helicopters and Hamilton Sundstrand aerospace systems” – can go so low as to charge $1,000 for a simple pliers from the US Air force and is involved in a number of well-known bribery cases, then there is something even more rotten than, say, a Tanzanian policeman extorting a buck or a Burmese customs official

taking bribes. Examples such as how Lockheed [249] bribed Japanese Prime Minister Kakuei Tanaka in the 1970s, how the Swedish company Bofors AB[250] bribed members of the Indian government in late 1990s to sell weapons,[251] or how in 2002 Oracle managed to sell a deal to the State of California[252] which had not been put out for competitive bidding, and then sold them more Oracle licenses than state employees to use them, are hardly isolated incidents. The recent demise of Houston-based energy giant ENRON[253] and details of how its bosses funded election campaigns of policy makers, leaving very few politicians in Washington not on the receiving end of "donations" from Enron or its auditor, Arthur Andersen, can only be shocking if one regarded corruption as the privilege and prerogative of Third World or East European regimes. A special report at The Centre for Public Integrity,[254] aptly titled "A Most Favored Corporation: Enron Prevailed in Federal, State Lobbying Efforts 49 Times",[255] describes the workings and successes of the "formidable lobbying machine".

According to a CorpWatch.Org story,[256] Arthur Andersen indulged in "a massive scheme to destroy documents related to the Enron meltdown." "Tons of paper relating to the Enron audit were promptly shredded as part of the orchestrated document destruction," a federal indictment against Andersen alleged. "The shredder at the Andersen office at the Enron building was used virtually constantly and, to handle the overload, dozens of large trunks filled with Enron documents were sent to Andersen's main Houston office to be shredded." Andersen was convicted of illegal document destruction, effectively putting the company out of business.[257] (Anyone interested in finding out how multinational corporations behave can take a look at "Bad Apples in a Rotten System. The 10 Worst Corporations of 2002") [258]

It wasn't many years ago (1996 and revised in 1997) that the OECD council recommended that those of its 34 member countries that had not yet disallowed the tax deductibility of bribes to foreign public officials should re-examine such treatment with the intention of denying deductibility for combating bribery in international business transactions. One can only note that the initiative was not about punishing people who either receive or pay bribes, but only to "disallow tax deductions" to those offering them. Many more examples can be cited in all parts of the world of what many researchers have described as "structural corruption", which conveniently is named 'lobbying', 'election contributions', etc.

The purpose of the examples given so far is neither to prove nor to disprove that there is widespread corruption in developing countries. The point being raised is that corruption can and does adversely affect the spread of FLOSS in many countries, especially the Third World, where corruption becomes more lethal when combined with the arrogant diplomatic missions of the developed world, who come to the defence of their own companies even when these companies are faulted at home for monopolistic behaviour. The best example related to FLOSS would be the intervention of the US Ambassador to Peru[259] in his efforts to support Microsoft against a bill tabled by Peruvian Congressman Edgar Villanueva.[260]

Many more examples can be found of how officials from developed countries intervene to "persuade" politicians and officials of developing countries when it comes to giving preferential treatment to "one's own". US Ambassador to Pakistan Robert Oakley, intervened on behalf of the American oil company UNOCAL[261] which was pitched against an Argentinian company, Bridas, (which has since merged with BP Amoco Argentina)[262] to convince Pakistani Prime Minister Benazir Bhutto for a deal on oil- and gas-pipelines through Afghanistan during the rule of the Taliban regime. The incident created a small scandal in Pakistan at the time. But the point being emphasized here is that in an entirely different part of the world raw corruption combined with the structural corruption called 'lobbying' can do wonders for companies with cash.

At the end of the day, corruption in this case is allied only to companies with enough cash and stakes, and is on the opposite side of FLOSS, which doesn't offer anything to decision-makers. When the government officials are corrupt, they are not really worried about saving on software or about the future IT capabilities of the country concerned, but about the commission which they personally may receive from a deal. One thing is sure: FLOSS doesn't corrupt.

Brain Drain

The 'brain drain' is another of those acute socio-political problems which is a big obstacle in any development effort on the part of developing countries. Irrespective of the amount of

resources spent by developing countries for the education and training of specialists and scholarships offered by developed countries, a pretty large number of the individuals happen to find better paid and more rewarding jobs in the industrialized countries. The intensity of the brain drain keeps changing for different professions in accordance with the market needs of developed countries. The current period of economic uncertainty in the Western world has somehow dampened the migration of ICT specialists, but a couple of years back the immigration was at its height.

In terms of ICT in general and FLOSS in particular, the effects of a brain drain are not as singular as in the case of other professions in the past. Thus, if an engineer or doctor moves from India or China to the USA or UK, there is little that person does and can do in terms of development effort in his or her home country, apart from perhaps sending money to relatives. But an ICT specialist, a software developer, can contribute in many ways to ICT solutions in the country of his or her birth while living abroad. This can take the form of working on projects such as localizations of software systems, research and development, participating financially in pet projects, etc. Thus the effects of the ICT brain drain are not that devastating as in other cases.

Political Freedoms

Many people in important policy-making positions tend to believe that lack of political freedoms may significantly hinder the development efforts of a country. However, the proliferation of ICT in China, South Korea (during its darkest dictatorial times), Singapore and Malaysia reveals no direct link between freedom and ICT. Software and any technology are neutral in terms of the level of freedom in a country, while the companies selling technology are not neutral. In general, companies are biased towards so-called stable regimes and political systems. A look at the investment commitments of multinational companies shows these to be tilted in favour of governments and regimes which offer a more “stable” form of government. (irrespective of whether it is a parliamentary democracy or not)

Even though GPL or other open source software licenses do not make any distinction between a despotic or democratic country, between a racist or a humanist, a sexist or a

feminist - allowing all users equal access to it - there is one significant way in which FLOSS differentiates from proprietary software companies. In terms of FLOSS, the lack of political freedoms in any given country ultimately results in conditions not conducive to the creation of a hacker community and culture, and FLOSS can not play a significant role if an active community of hackers does not exist. The fundamental tenets of hacker culture in North America and Europe are freedom and openness - everything else comes afterwards. Even if on the surface it would seem that the Open Source movement, as distinct from the Free Software movement, is more concerned about technical soundness and a continued improvement in the quality of the software they produce, the very existence of that community requires freedom and openness. Even if countries like China do have a significant hacker community, that community is ultimately going to clash with the official line of censorship and control.

Indeed, the same applies to hacker communities in North America, Europe, Japan, Australia, etc. One can see increasing signs of alarm among hackers at the blatant attempts of corporations and governments to intensify and extend control even to the level of hardware. Heated discussions around DRM, Palladium, Trusted Computing and similar initiatives are examples of such concerns.

One more point to note here is the relationship between freedom and ICT, especially the Internet. Many policy makers tend to think in terms of the Internet being a "virus of freedom" and as an inherent force of democracy which will threaten autocratic and authoritarian regimes. A new book "Open Networks, Closed Regimes" by Shanthi Kalathil and Taylor C. Boas of the Carnegie Endowment for International Peace,[263] examines and challenges those views on the basis of a study of Internet use in eight countries: China, Cuba, Singapore, Vietnam, Burma, the United Arab Emirates, Saudi Arabia, and Egypt. The authors rightly claim that: "The Internet, however, is only a set of connections between computers (or a set of protocols allowing computers to exchange information); it can have no impact apart from its use by human beings." (The first 2 chapters of "Open Networks, Closed Regimes" are available at firstmonday.org)

Legal Framework

Another concern often raised is the lack of a legal framework in many developing countries, which is believed to be the cause of many companies shying away from investing in these countries. Free and Open Source Software solutions and technologies are not directly affected by, or are not dependant upon, any specific legal framework. Anybody who wants to, can basically use and learn these technologies. However, it will be affected indirectly if a lack of investment results in no hardware to work with, or no private sector to participate in utilizing and benefiting from FLOSS.

Conclusions And Recommendations

Conclusions:

Is FLOSS a useful and significant tool for the developing countries? We are convinced that FLOSS clearly has the potential to help democratization and positively help find solutions to the most pressing problems faced by the populations of developing countries. More specifically, we see its relevance in the following specific fields:

Democratization

Even a quick look at the use of computers in the education sector, NGOs, alternative media, and civil society is enough to convince us of the potential of FLOSS. Students, teachers, journalists, and democracy activists have been using computers, email, web publishing, desktop publishing, and internet to get their message across the world, participating in societal debates, acquiring as well as disseminating knowledge, and skills.

All of that can for sure be done without it but FLOSS has some intrinsic characteristics that make it a convincing and integral ally of democratization process.

- **Community and Cooperation** - As described earlier, community orientation is one of the basic elements of FLOSS. The development process of Free and Open Source Software requires participation and the active role of communities, and the outcome and success of the work greatly depends on how well the community can communicate and cooperate – both key elements of democracy.
- **Freedom** - Freedom is the *raison d'être* of Free and Open Source Software movements. As described in chapter 7, any software can successfully be used by anybody for any purpose, but the full potential of FLOSS can only be realised if extensive political freedoms exist, creating an environment conducive for the existence of a community of hackers; after all, without hackers there is no FLOSS.
- **Openness and Transparency** - FLOSS is openness. There is hardly a more practical way to demonstrate the necessity and importance of openness and freedom of information than FLOSS itself.
- **Active Participation** – FLOSS, in addition to being a tool, is also a way to activate civil

society and NGOs and to improve their capacity to participate in political debate and other forms of social and political life.

Education and Research

FLOSS has a complementary and reciprocal relationship to education. One needs an educated section of the population to fulfil the full potential of FLOSS, and at the same time FLOSS helps, enhances, and complements education by providing tools to promote education.

In the case of education in computer sciences, FLOSS provides opportunities which nothing else can:

- ➔ Unrestricted access to the source code.
- ➔ An environment of unlimited experimentation and tinkering.
- ➔ Collaboration and interaction with a community of programmers, coders and users around the world.

In the case of the promotion of education, in addition to providing ready and available tools, FLOSS provides positive examples from projects around the globe. In practice this means that if someone in some other place has created a tool to reach a specific educational goal, one can take it as a starting point and build on it, without the need to "reinvent the wheel". The Dspace project and the Koha library software, mentioned earlier, are but two simple examples of such possibilities. As far as collaboration is concerned, Sourceforge.Net is perhaps the biggest collaboration project ever created, uniting tens of thousands of software projects and hundreds of thousands of people around the world. FLOSS itself has been called the most collaborative human effort ever.

In addition to the above, the inherent qualities of FLOSS make it a prime tool for achieving local language educational software, especially for languages which are not deemed commercially viable for proprietary software vendors. These languages include not only languages from developing countries, but many small European languages like the Sami language in the Nordic countries, Catalan, Basque etc, opening new possibilities for the speakers of these languages.

Alleviation of poverty.

If the adoption of FLOSS in developing countries is done wisely, it can help stimulate indigenous software industry and create local jobs.

In the case of Government spending, the resources potentially saved from license fees can be invested in local segments of industry, which has the biggest potential of job creation, and thus helping alleviate poverty. In the case of the private sector, money saved from license fees can enhance the competitiveness of a company, inducing it to invest more in areas it deems necessary, including job creation.

Reducing conflicts

Communities of FLOSS developers and users from opposite sides in a war or other type of conflicts can not only talk to each other but can potentially open channels of communication beyond the control of government and authorities. This possibility, not realised and utilized so far, can potentially help reduce many ongoing conflicts and prevent future ones.

Enhancing independence

Developing countries can use FLOSS to reduce dependence on industrial countries, thus enhancing political, economic and technological independence. FLOSS technologies are simply there to be taken and utilized: no one is there to ask questions or create hindrances.

Meeting international obligations

Developing countries can use FLOSS to address the issues of illegally copied software, thus meeting some of the requirements of the TRIPs agreement.

Recommendations:

The potentials shown in this survey of Free (Libre) and Open Source software are well in line with the Finnish development policy aims, as they are described in “Finland's Policy on Relations with Developing Countries” (Oct 1998) and other guiding documents of the Finnish ODA. Also, Finland is identified around the world as the native country of the father of the Linux kernel, as well as some other notable figures in FLOSS communities and software development. We, therefore, consider it very proper for the Finnish Ministry for Foreign Affairs to use, promote and support Free (Libre) and Open Source Software in multiple ways.

- ➔ The preparatory process for the World Summit on Information Society (WSIS, 2003/ 2005) would offer a good opportunity for Finland to promote and identify with FLOSS on a world platform, and thus take advantage of the fact that in the ITC sector Finland has had, and continues to have, remarkable contributions to the rest of the world other than the NOKIA company, with its products and services, as good as they as such are.

- ➔ Given the advantages in cost, quality and stability, we would recommend the MFA to further research, survey and consider the use of the FLOSS alternative whenever applicable, or considered feasible, within the MFA ITC systems. The Finnish NGO Coalition KEPA will during 2003 shift to Linux, and could provide practical experience to those interested. In the long run, this could lead to a welcome situation, where the Ministry itself would not only be a user of FLOSS software, but also a contributor to the code. This would also within the Ministry develop skills necessary in training developing country governments in FLOSS.

For Finnish ODA programmes, Free (Libre) and Open Source Software have a lot to offer and a lot to gain. Where Information and Communications Technologies are used as tools for efficient administration or other applications, we would recommend a step-by-step survey and consideration of the FLOSS alternatives in comparison to proprietary solutions. Further, surveying the needs and uses of, for example, database solutions in Finnish projects in different parts of the world with e-governance, e-democracy or e-education

links, could well lead to a decision to develop an easily adaptable FLOSS tool, and its translation into local languages, in which proprietary software may be unavailable. Again, this would be both using FLOSS, and contributing to the development of the code.

- ➔ Even proposing a pilot project of this kind would demand surveying Finnish programmes and projects from ICT perspectives generally, and from the perspective of the present study in particular. We do not know whether any survey of this kind has been done or initiated in the MFA. However, we recommend a pilot survey to this effect to be undertaken, including a specific component looking into FLOSS alternatives.

The Finnish government's February 2001 decision-in-principle on "Operationalisation of Development Policy Objectives in Finland's International Development Co-operation" states that "in order to better harness the potential of civil society, new ways of development cooperation will be developed in cooperation with non-governmental organisations". Combining this decision with both the technical and societal potentials of FLOSS as a movement would open perhaps the most promising prospects for Finnish contributions in this field. There are at least four angles from which to start exploring the field.

- ➔ There is a need for *further research and surveying* of the ground realities concerning ICT, especially FLOSS projects and the experiences of local Civil Society organisations in a more limited selection of partner countries. As shown in the field research reports of this survey (and Chapter 5.4), it turned out that any thorough field work would demand much more time-consuming legwork than what was able to be done within the framework of this overall survey.

- ➔ There is a need of *sensitizing Civil Society organisations* in our partner countries to the potentials of ICTs in general and FLOSS in particular, both in their own work and in the empowerment of the Civil Society. Access to and publishing on the Internet with a local content in the local language, and local job creation are only a few of the opportunities here.

- ➔ There is a need of *training of the motivated* NGOs and other Civil Society organisations in the basics of computing and FLOSS. This training should combine both technical ICT/FLOSS and community empowerment aspects. There could be a combination of local training programmes, and an international training course for the key persons and local trainers, arranged in collaboration with, for example, the Linux Institute of the University of Helsinki, which is to be founded in spring 2003.

- ➔ There is a need of *community building*. The locally trained ”grassroots hackers” should be or become natural members of both their local communities and Civil Society organisations as well as the worldwide Free (Libre) and Open Source Software movements, “hacker communities”, through the training process, their natural contacts and support networks, and the existing hacker networks, e.g. Linux users groups.

Our recommendation is that all these aspects will be given a further look, from the basis given by this ground-breaking research survey. The producers of this report, OneWorld Finland and KEPA, together with their partners and international networks, would be willing to participate in developing further these ideas into more precise pilot projects in the future.

Conferences and Seminars Attended:

- 〝Information Society LIBRARY or SUPERMARKET" June 2002, St. Petersburg, Russia. Organized by Attac Finland[264] together with The Globalization Institute (Moscow) and Computerra.[265]

- Conference on The New Economy in Development[266] May 2002, Helsinki, Finland. Organized by the UNU's World Institute for Development Economics Research - WIDER [267]

- World Forum on Community Networking [268] 2002, Montreal, Canada.

- Open Source and E-Governance[269] October 16-18, Washington, DC. Organized by infoDev,[270] the Cyberspace Policy Institute of The George Washington University - CSPRI,[271] and the UNDP.

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Eric Raymond	http://www.catb.org/~esr/
eWeek	http://www.eweek.com
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Gartner	http://www.gartner.com/
GNU FSF	http://gnu.org
Greens	http://www.greens.org/
Guardian	http://www.guardian.co.uk/
Helsinngin Sanomat	http://www.helsinginsanomat.fi/
iBiblio	http://www.ibiblio.org/
Infonomics	http://www.infonomics.nl/FLOSS
Infoweek	http://www.infoweek.com/
IPR Commission	http://www.iprcommission.org/
ITSecurity	http://www.itsecurity.com/
ITweek	http://www.itweek.co.uk/
Lawrence Lessig	http://lessig.org/
Linux	http://www.linux.org/
Linux Journal	http://www.linuxjournal.com/
News.Com	http://news.com.com/
Newsforge	http://newsforge.com/
New York Times	http://www.nytimes.com/
Nupedia	http://www.nupedia.org/
Open Source Initiative	http://www.opensource.org
O'Reilly	http://www.oreillynet.com/
Public-i	http://www.public-i.org
Red Herring	http://www.redherring.com/
Richard Stallman	http://stallman.org
Salon.Com	http://www.salon.com
Slashdot	http://slashdot.org
Softpanorama	http://www.softpanorama.org/index.shtml
The Register	http://www.theregister.co.uk/
Vandana Shiva	http://www.vshiva.net/
Vatican	http://www.vatican.va/
Washington Monthly	http://www.washingtonmonthly.com/
Washington Post	http://www.washingtonpost.com/
WIDER	http://www.wider.unu.edu/
Wired	http://www.wired.com
World Wide Web Consortium	http://www.w3.org/
ZDnet	http://www.zdnet.com/

Acronyms, Glossary, Terms.

This brief glossary has been compiled by using online sources. We appreciate the efforts of the compilers of these sources. Most important of these sources are listed below. Many thanks for compilers of these sources for making them available.

The New Hacker's Dictionary	http://catb.org/esr/jargon/html/frames.html
Salon's Free Software Project – Glossary.	http://www.salon.com/tech/fsp/glossary/index.html
Walt's Internet Glossary	http://www.walthowe.com/glossary/
Tucows Glossary	http://www.tucows.com/help/glos.html
Florida Digital Turnpike - Glossary of Terms Q-Z	http://www.fdt.net/support/q-z.html
The UNIX Acronym List	http://www.roesler-ac.de/wolfram/acro/index.htm

Term	Explanation
Adware	Software which displays advertising while running is called Adware. Usually display of advertisements can not be turned off. http://www.adware.info/ See also *freeware, shareware, spyware*
anonymous remailer:	A Net-connected computer that strips identifying information from an email message or Usenet post and then forwards it on to its intended destination. Anonymous remailers are a crucial element in crypto-libertarian freedom fighting, but are unfortunately not impervious to the powers of the state. http://www.salon.com/tech/fsp/glossary/index.html
APC	The Association for Progressive Communications
back door n.	In the security of a system, a hole deliberately left in place by designers or maintainers. May be intended for use by service technicians. syn. trap door.
CERN	Conseil Européen pour la Recherche Nucléaire (CERN) or the European Organization for Nuclear Research.
CIPR	CIPR (Commission on Intellectual Property Rights)
COTS	Commercial Off-the-Shelf
CPU	Central Processing Unit or the brains of the computer, where most calculations take place.
cracker n.	One who breaks security on a system. Coined by hackers in defense against journalistic misuse of the term "hacker." The term "cracker" reflects a strong revulsion at the theft and vandalism perpetrated by cracking rings. There is far less overlap between hackerdom and crackerdom than most would suspect.
DNS	Domain Name System, a system by which one Internet host can find another so it can send e-mail, connect FTP sessions, and so on.
DoD	US Department of Defence
DRM	Digital Rights Management also reffered as Digital Restrictions Management by critics.
EFF	Electronic Frontier Foundation
ESA	European Space Agency
EULA	End User License Agreement
fab	Semiconductor industry abbreviation for wafer fabrication facility, where wafers are manufactured. It can also be called a front end as this is where semiconductor diffusion is done. A wafer fab needs a special environment. Extremely strict criteria for cleanliness (required for the high precision processes). The air in the manufacturing rooms is 10,000 to 100,000 times more pure than the surrounding air; and the operators wear special clothing. http://us.st.com/stonline/press/news/glossary.htm
FAQ	Frequently Asked Questions
FLOSS	Free Libre Open Source Software
Freeware	See also shareware, adware, spyware
FSF	Free Software Foundation

Term	Explanation
FUD	Fear Uncertainity Doubt 〝Abbreviation for Fear, Uncertainty, and Doubt. A set of sales tactics employed by market leaders to cast aspersion on competing products. Computer products are often purchased on the basis of perceived market leadership because no one wants to get stuck with a losing product that might not be supported in the near future. The usefulness of using FUD to confuse a market is epitomized by the apocryphal saying, "No one ever got fired for buying IBM." A good example of FUD is Microsoft's tactic of pre-announcing products far in advance of their actual availability. All of a sudden the market for competing products evaporates as customers await a dominating Microsoft product.” http://www.therighthandwoman.com/techdefinitions/f.htm
GIMP	The GNU Image Manipulation Program
hacker n.	[originally, someone who makes furniture with an axe] 1. A person who enjoys exploring the details of programmable systems and how to stretch their capabilities, as opposed to most users, who prefer to learn only the minimum necessary. 2. One who programs enthusiastically (even obsessively) or who enjoys programming rather than just theorizing about programming. 3. A person capable of appreciating hack value. 4. A person who is good at programming quickly. 5. An expert at a particular program, or one who frequently does work using it or on it; as in `a Unix hacker'. (Definitions 1 through 5 are correlated, and people who fit them congregate.) 6. An expert or enthusiast of any kind. One might be an astronomy hacker, for example. 7. One who enjoys the intellectual challenge of creatively overcoming or circumventing limitations. 8. [deprecated] A malicious meddler who tries to discover sensitive information by poking around. Hence `password hacker', `network hacker'. The correct term for this sense is cracker.
HTML	Hyper Text Markup Language.
ICT	Information and Communications Technologies
IDA	European Interchange of Data between Administrations http://europa.eu.int/ISPO/ida/jsps/index.jsp
IP	Intellectual Property
IPR	Intellectual Property Rights
KISS Principle n.	"Keep It Simple, Stupid." Often invoked when discussing design to fend off creeping featurism and control development complexity. Possibly related to the marketroid maxim, "Keep It Short and Simple."
LDC	Least Developed Countries
LUG	Linux Users Group

Term	Explanation
MITRE	MITRE is a not-for-profit national resource that provides systems engineering, research and development, and information technology support to the US government. It operates federally funded research and development centers for the DOD, the FAA, and the IRS, with principal locations in Bedford, Massachusetts, and Northern Virginia. http://www.mitre.org/
MP3	The most popular Audio file format
NACI	National Advisory Council on Innovation (NACI), created to advise the Minister of Science and Technology of South Africa on the role and contribution of science, mathematics, innovation and technology, including indigenous technologies, in promoting and achieving national objectives. http://www.naci.org.za
NASA	National Aeronautics and Space Administration
NEPAD	New Partnership for Africa's Development http://www.nepad.org/
netiquette n.	The conventions of politeness recognized on Usenet, such as avoidance of cross-pointing to inappropriate groups and refraining from commercial pluggery outside the biz groups.
NSA	National Security Agency of the USA
OECD	Organisation for Economic Cooperation and Development
OED	Oxford English Dictionary
ogg	Free Audio file format
OS	Operating System
OSI	Open Source Initiative
OSS	Open Source Software
P2P	Peer to Peer Network
Palladium	' Palladium is software that Microsoft says it plans to incorporate in future versions of Windows; it will build on the TCPA hardware,
PDA	Personal Digital Assitant
RIAA	Recording Industry Association of America the trade group that represents the U.S. recording industry.
security through obscurity n.	(alt. security by obscurity) A hacker term for vendors' favorite way of coping with security holes — namely, ignoring them; documenting neither any known holes nor the underlying security algorithms; or trusting that nobody will find out about them, and that people who did find about them won't exploit them. This "strategy" never works for long.
Shareware	Shareware refers to software that is distributed at no price with the understanding that the user will probably pay for it later. Some shareware comes with a built-in expiration date (usually 30 days). Other shareware (sometimes called liteware) comes with certain capabilities disabled. In essence shareware is a marketing strategy. Shareware is called crippleware if and when it denies access to data stored or created with it after a period of time. In some case it may even cripple the operating system, requiring a reinstall. See also freeware, adware, spyware
SITA	State Information Technology Agency of South Africa

Term	Explanation
Source code	Source Code is a text, consisting of a set of instructions and statements that coders write in a language (such as BASIC, C, FORTRAN, or GPG.) which is understood by computers and humans alike. However in order to execute those instructions on a computer, the "set of instructions" need to be compiled, i.e, converted into a language which is understood only by the computer - a machine-language or **object code**. At this stage the compiled version of the "set of instructions" consists only of ones and zeroes, and become a computer program, hiding the original set of instructions -- **source code** -- from humans. Some more definitions of source and object code can be found at: http://labs.google.com/glossary
SPOF	Single Point of Failure
Spyware	Software that sends data back to a third party – without asking and/or notifying the user - is Spyware. http://www.adware.info/, http://www.spychecker.com/ http://www.doxdesk.com/parasite/ See also *freeware, shareware, adware*
TCO	Total Cost of Ownership
TCPA	Trusted Computing Platform Alliance an industry working group, initially formed by Compaq, HP, IBM, Intel and Microsoft in October 1999 that is focusing on improving trust and security on computing platforms, has since grown to over 150 participating companies. http://www.trustedcomputing.org/tcpaasp4/index.asp
TRIPS	Agreement on Trade-Related Aspects of Intellectual Property Rights TRIPS took effect on 1 January 1995. WTO Members considered as developed countries were given one year to comply whilst developing countries and transition economies were given until 1 January 2000 although for developing countries required to extend product patent protection to new areas such as pharmaceuticals, a further five years was provided before such protection had to be introduced. Least Developed Countries (LDCs) are expected to enact TRIPS by 2006 although the Doha Ministerial Declaration on the TRIPS Agreement and Public Health allowed them a further 10 years in respect of pharmaceutical products.
Trojan horse n.	A malicious, security-breaking program that is disguised as something benign, such as a directory lister, archiver, game or (in one notorious 1990 case on the Mac) a program to find and destroy viruses.
UNAM	Universidad Autónoma de Mexico
UNECA	United Nations Economic Commission for Africa
UNIX	From UNICS, a pun on its predecessor MULTICS (Unix wasn't originally designed to be a multi-tasking system) http://www.roesler-ac.de/wolfram/acro/all.htm#Unix Unix is a family of command-line-driven 32-bit operating systems. Unix is not an acronym, however the name "Unix" was half-jokingly named after an operating system developed by MIT, called Multics. Some common "flavors" of Unix include: Irix, SCO-Unix, Linux, AIX, SunOS, Ultrix, HP-UX, etc. Later, a graphical interface became available for Unix, called X-Windows. http://www.fdt.net/support/q-z.html

Term	Explanation
UNU	United Nations University
WIDER	World Institute for Development Economics Research
WWW	World Wide Web
XML	EXtensible Markup Language, the next-generation of HTML, is now viewed as the standard way information will be exchanged in environments that do not share common platforms Further information at http://xml.org/xml/aboutxml.shtml
zipperhead n.	A person with a closed mind.

(1) See David Wheeler's constantly updated article Why OSS/FS? Look at the Numbers! http://www.dwheeler.com/oss_fs_why.html#market_share
(2) http://www.nobel.se/economics/laureates/1998/
(3) The Oxfam Education report Chapter 1. http://www.oxfam.org.uk/educationnow/edreport/Chap%201.pdf
The full Oxfam Education Report can be found at http://www.oxfam.org.uk/educationnow/edreport/report.htm
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