
RECLAIMING THE NOOSPHERE

The Cultural Impact of Free Software

Abstract

This paper is an attempt to explore the geo-political and cultural impact of Free and Open Source Software and the development strategy on which it is based. As heated debate continues over the validity and legality of intellectual property rights, legislation and file-sharing on the Internet, I argue that free software has provided much of the arts, sciences and media with a highly influential ideological and technical framework, based on cooperative creation and shared property, that has had a transformative and empowering impact on culture as a whole.

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“Certainly the electro-magnetic discoveries have recreated the simultaneous ‘field’ in all human affairs, so that the human family now exists under conditions of a ‘global village’. We live in a single constricted space resonant with tribal drums.”

“Every new technology necessitates a new war.”

Marshall McLuhan, War and Peace in the Global Village, 1968

A New Global Technology

Marshall McLuhan, media theorist responsible for coining the term “global village,” noted the effects triggered by the distribution of radios to Algerians in the late 1950s. The Voice of Fighting Algeria radio show became an instrumental force in mobilizing the Algerian people against French occupation and turned a technology that was originally used as a virtual arm of the occupying power into a tool that unified a resistance movement. Half a century later there is a battle going on for control of a new rapidly evolved global communications system, in particular what has come to be known as the Internet. Questions abound over who should own, police, limit, access or create not only the content of the Internet, but also its underlying structure, its nodes and synapses of wire or electromagnetic spectrum, its licensing apparatus and its accompanying global technology and ownership standards.

This may at first appear to be a technical issue with limited cultural significance, but an examination of how such questions were resolved in past technological evolutions, and how the sciences, arts and even basic freedoms of interpersonal communication are being effected today yields a host of socio-cultural issues which deserve significant dialogue. Without a rapid re-evaluation of the effects of private enterprise, intellectual property and trade liberalization on this developing global communications systems there is a risk that freedom of thought, access to often life-saving information and the ability to freely build upon past human discoveries will simply be commodified and sold as products in a global information market. This paper is an attempt to explore the geo-political and cultural implications of a global battle being fought in court rooms, internet bulletin boards, street protests, trade negotiations and artists studios over the relationship between ownership and information.

Free Software

There is an ideological battle being fought in the world of communication technologies which has exploded out of its technical closet into the wider cultural, societal, scientific and philosophical undercurrents of 21st Century thought. On a simplistic level, this struggle is over computer software and whether it is something to be owned or shared. On a more abstract plane it is a struggle for the freedom to participate in the technological developments of our time and to understand their significance. Free Software, along with its

less radical counterpart Open Source Software¹, is a flourishing collection of collaboratively developed, freely editable and accessible computer code that has been developed since the birth of computing by people who see programming as their art. These programmers are determined to secure their freedom to change, improve, learn from, teach with and freely share the substance of their creative work. Free and Open Source Software (FOSS) is a combination of computing without the commercialism, gift culture in the high-tech arena and alternative development models brought to life by self-proclaimed “geeks” who occupy disparate nodes of a global computer network.

Under the FOSS model of software development, a computer program can be created by a group of volunteers, often spread across the globe and political spectrum, whose common interests are in creating a piece of digital code that can be used and edited by its creators and shared with the world at large upon completion. The vast majority of FOSS programmers are fundamentally opposed to the traditional applications of intellectual property to software for the simple reason they limit the ability to tinker with, or “hack” the code. Contrary to the popularized media representation, “hackers” are simply people who thoroughly enjoy programming computers and playing with the possibilities made available by computing.

Source Code and Binary

Computer programs have two major sets of code that are substantially different in function. “Source code” is the human readable content which was written by a programmer and which many other programmers are capable of adapting for their own needs when it is provided. “Binary code,” on the other hand, is read by the computer and can not be edited by a person. When Intellectual Property is applied to computer programs, ownership and possession of code restricts programmers from accessing the “source code” of a program and forces them to use the binary code as provided. “While hackers see the spread of free software as socially beneficial because it allows a diverse range of ‘others’ to deploy their software ... the primary significance of FOSS is personal: it is something which protects the ‘food’ for them to ‘hack on’” (Coleman, 2004). FOSS is a strategy to keep source

¹ The difference between “free software” and “open source software” is mostly a matter of semantic preference as opposed to technical differentiation. “Open Source” was a kind of spin off term meant to remove the obvious political and sometimes confrontational nature of the term “free software” in order to maximize acceptance in the wider commercial software world. Over the course of this paper I use the abbreviation FOSS to refer to both names simultaneously, as the differences are basically a matter of preference and that have insignificant effect on my discussion.

code freely accessible which, as we shall examine, has provided an alternative ideology of creative production for fields far beyond the software world.

Copyright Gets "Hacked"

"Using copyright as its vehicle, the copyleft places copyright literally on its head and in the process demystifies copyright's "absolute" theory of economic incentive. The copyleft says, we are not the passive "subjects" of an almighty, unchangeable law, but actually can create the law to serve us for other ends: in the case of FOSS, that of free speech" (Coleman, 2004).

The legal ground in which the FOSS movement has its roots is composed of a set of unique manipulations of copyright law which are sometimes referred to as "copyleft." The most important of these is the GNU General Public License, or GPL. "The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users" (Free Software Foundation, 1991). The basic requirements of the GPL license are that code can be altered and freely distributed under the condition that you include all the code, particularly "source code" you first received, and documentation of the authors and changes made. Further, you must always extend the rights given to you on to those to whom you distribute work. This assures that no one is able to make insignificant edits to code and then copyright the work as their own. The GPL has worked with amazing success and has never been discredited in court, primarily because of the fact that one must accept its terms in order to make any changes to the code itself. This simple "hack," or creative twist, to existing copyright law has been instrumental to the continued success of the FOSS and has inspired a host of other "copyleft" concepts in the arts to which we will return later.

FOSS culture and analysis

Non-profit organizations and foundations such as the Free Software Foundation and the Electronic Frontier Foundation have been working to promote the understanding and protection of the FOSS movement and defend the rights of programmers and computer users against what they see as government and industry attempts to privatize or control the flow of information on the internet. What begins to emerge when one reads the writing of the FOSS proponents and historians is that these programmers and hackers view of their world as a culture. They write of "gift economies," establish vocabulary, ethical systems and advocate particular models of behavior in the software development process. Pro-

grammers, hackers and lawyers have been writing manifestos, anthropological analysis and precise explanations of the FOSS world since its inception. In this regard we have the unique opportunity to hear the “emic” perspective of the FOSS world from those most intimately involved (Kelty, 2004). I will not attempt to rephrase what has already been eloquently provided by FOSS advocates over the years:

“How far can free software go? There are no limits, except when laws such as the patent system prohibit free software entirely. The ultimate goal is to provide free software to do all of the jobs computer users want to do—and thus make proprietary software obsolete.” (Stallman, 2002)

- **Richard Stallman**, *Founder of the Free Software Foundation*

“Gift cultures are adaptations not to scarcity but to abundance. They arise in populations that do not have significant material-scarcity problems with survival goods. We can observe gift cultures in action among aboriginal cultures living in ecozones with mild climates and abundant food. We can also observe them in certain strata of our own society, especially in show business and among the very wealthy.

Abundance makes command relationships difficult to sustain and exchange relationships an almost pointless game. In gift cultures, social status is determined not by what you control but by what you give away.

Thus the Kwakiutl chieftain’s potlach party. Thus the multi-millionaire’s elaborate and usually public acts of philanthropy. And thus the hacker’s long hours of effort to produce high-quality open-source code.

For examined in this way, it is quite clear that the society of open-source hackers is in fact a gift culture. Within it, there is no serious shortage of the ‘survival necessities’—disk space, network bandwidth, computing power. Software is freely shared. This abundance creates a situation in which the only available measure of competitive success is reputation among one’s peers.” (Raymond, 1999)

- **Eric S. Raymond**, *The Cathedral and the Bazaar*

“Humans have not inhabited cyberspace long enough or in sufficient diversity to have developed a Social Contract which conforms to the strange new conditions of that world. Laws developed prior to consensus usually favor the already established few who can get them passed and not society as a whole ... To assume that systems of law based in the physical world will serve in an environment as fundamentally different as cyberspace is a folly for which everyone doing business in the future will pay ... For example, if we continue to assume that value is based on scarcity, as it is with regard

to physical objects, we will create laws that are precisely contrary to the nature of information, which may, in many cases, increase in value with distribution.” (Barlow, 1994)

- John Perry Barlow, Founder of the Electronic Frontier Foundation

Since FOSS projects are nearly always collaborative and free of cost to users, much of the cultural identity of FOSS hackers has been built around how best to assure due credit for work done. Because of the absence of financial motivation, much of the anthropological analysis of the FOSS world has been based around Marcel Mauss’ “gift culture” concept. What can be seen in the FOSS community is a side-lining of capitalist organization in favor of a collaborative system of technical creation. Programmers are deeply committed to creating software for free, while seeing this process as an important ethical struggle against commercialization of technology and learning. And it’s working. In June 2004 the open source server application Apache was being used to run more than 67% of the active web-sites on the Internet, with three times the popularity of Microsoft’s web server (Wheeler, 2004). While Apache’s popularity is based partially on it’s being free of cost, the freedom that system administrators gain by being able to alter the very code that runs their servers has made for a double incentive that has virtually cemented the software as industry standard in the web server world. Another example of rapid growth to overtake commercial software use is the hypertext processor PHP. Recently surpassing Microsoft’s ASP, PHP has shown continuous growth and popularity due to the same reasons that brought Apache its remarkable success (Wheeler, 2004). It must also be emphasized that as these projects become increasingly important in the world of Internet communication, online media and global business, the participation in their development rises exponentially. With literally thousands of programmers working to improve software, finding and fixing bugs and assuring security, the momentum inherent in their growth is compounded. This is surely noticed in the business world as well, as free software offers a large competitive advantage due to its lack of cost. “The verdict of history seems to be that free-market capitalism is the globally optimal way to cooperate for economic efficiency; perhaps, in a similar way, the reputation-game gift culture is the globally optimal way to cooperate for generating (and checking!) high-quality creative work” (Raymond, 1999).

Creating Alternatives to Commercialized Computing

Invisible to most people outside the worlds of programming or high-tech industry, the FOSS community is committed to assuring autonomy and freedom in the virtual world.

Instead of allowing a massive push for capitalist models of production to run the Internet, these high-tech artists have developed an entire alternative system of internet activity and existence that is both free from commercial influence and cost in the software realm, and independent of government interference, two aspects that are most likely interdependent. It is now possible to build a computer of parts, install an operating system like Linux and an accompanying windowing system such as GNOME and perform nearly all the same tasks that can be done on a Windows XP computer without ever paying for software. Office suites, photo manipulation systems, chat, email and web browsing can all be done without incurring the increasing burden of software costs or complicated licensing schemes. Perhaps more importantly, activists, artists, NGOs and development specialists can now use the tools provided by computer technology without giving any of their money or support to monopolies like Microsoft with whom they often feel a large political conflict. On a very basic level the FOSS community has provided an alternative to capitalist economics and commercialism in the world of computing, and done so successfully. So successfully in fact, that many other fields are following in their path.

Free Culture

In early 2004 a law professor from Princeton named Lawrence Lessig published a book called *Free Culture* about the implications of copyright law and intellectual property on culture and the arts (Lessig, 2004). In accord with the principles contained in his writings, Lessig did more than simply make a copy of his work available for purchase in book form. He provided a free version of the book on his website in multiple formats and used a new form of copyright protection called Creative Commons to allow other artists and writers to use his work as they chose. Exposure to and interest in Lessig's work was dramatic. A student group at the Swarthmore University created a website and organization, called Swarthmore Coalition for the Digital Commons, based on his ideas. Dozens of representations, of the book, including audio, website and multimedia formats were created by fans who took advantage of the unique copyright system which encouraged derivative works by others. Basically, the meme Lessig unleashed into the wilds of the Internet began to circulate in dramatic ways, a benefit that was likely as much as result of the chosen method of publication as the popularity of its ideas.

Lessig's book "is not much about the Internet itself. It is instead about the consequence of the Internet to a part of our tradition that is much more fundamental, and [...] much more important. That tradition is the way our culture gets made" (Lessig, 2004). *Free Culture* traces the roots of copyright law throughout the 20th century and shows how previously

successful applications of copyright theory and practice are being systematically changed to favor major media conglomerates and content owners over the rights of a new generation of artists and creators. The purpose of this account is not to paraphrase Professor Lessig, but to demonstrate one of the most important ways that the thinking of FOSS programmers has left the confines of software creation and began to effect culture and creativity as a whole. The Creative Commons licensing system which Lessig used is the work of a non-profit organization who's lawyers created a variety of copyright deeds which are freely available to artists, writers, musicians and other creators to use for their work. This inversion of the copyright system, based on RMS' GPL license, has resulted in a rapidly growing collection of creative content that is meant to be shared, a kind of immediate public domain in the arts. As websites emerge to catalog this new "common content" and a vocabulary and literature concerning it evolves, one begins to see a global creative community who's blatant intent is to offer an alternative to a commodity-based market in information.

As Christopher Kelty writes of these "commoners," in a recent edition of *Anthropology Quarterly*, "they nonetheless share something with the Native Americans, Peruvian farmers, or diasporic peoples so commonly studied in anthropology: they seem vitally concerned with developing new strategies for maintaining a threatened 'way of life,' which they see both as legitimate and as in need of innovative means of defense—it is their 'culture'" (Kelty, 2004).

Media Empowerment

"We believe that culture is a two-way affair, about participation, not merely consumption. We will not sit at the end of a one-way media tube and buy things until we look like the people on Friends. With the Internet and other advances, the technology exists for a new paradigm of creation, one where anyone can be an artist, and anyone can succeed, based not on their industry connections, but on their merit."

- The Free Culture Manifesto

The polarization between the commercial and common property is becoming a part of the art world with much success. Musicians are now easily able to find others who are happy to have their work sampled and altered, books are being written by collaboration between people in different continents, entire encyclopedias, media movements and activist strategies are being organized around the simple philosophy that cooperative creation works. Independent media sites are tracking politicians, recording manifestations to assure more

accurate estimates of participants while documenting police hostility, organizing actions and sharing techniques on a global scale, mostly from a grassroots level, and with FOSS software that fits neatly their often anti-corporate political leanings.

IndyMedia, a self subscribed “democratic media outlet for the creation of radical, accurate, and passionate tellings of truth,” runs a network of dozens of websites in every continent which encourage people to post their own accounts of events in their communities as sources of alternative viewpoints and information. As technology costs have dropped to the point where an affordable digital camera can document events and eyewitness reports can be posted and read around the world in minutes, projects like IndyMedia have grown immensely popular. As both a venue for alternative news coverage and a space for non-commercial unembedded journalism, the Internet has become a massive and important source of daily news and dialogue. Weblogs (or blogs), have exploded in popularity in the last two years, with millions of people learning to voice their ideas and opinions online. Internet media is essentially becoming a two-way system, where participation involves both creation and consumption simultaneously, and as software and technology continue to evolve the media creation is becoming nearly as easy as the media consumption once was. Free blogging systems, nearly all based on FOSS, have progressed to the point that the technical skills needed to setup a simple journal-based website are comparably to those necessary to check a web-based email account. As these skills become increasingly necessary in workplaces and schools, media dynamics of the past, based on elite media creation by a few and consumption by the rest, are evolving into new dynamic of media participation.

Free the Academy!

Artists have been appropriating work, sharing styles, collaborating with and stealing from each other for centuries, so it may not be surprising to find them doing the same digitally in the 21st. The Academy, however, has a slightly more rigid reputation for protecting individual contributions and seeing publication as a sign of success and approval from one’s peers. But the peer-review, journal publication system of academic publishing will soon need to contend with more open, and open source, publishing models.

The Public Library of Science (PLOS) project was created by a science professors and graduate students to free scientific scholarship of the expensive, inefficient and often elitist journal publication system. PLOS provides a web-based system where students, professors and others can publish papers to be peer-reviewed and ranked by each other and eas-

ily accessed online for anyone who may find them useful. The project has seen enormous success in its first field, biology, and has greatly increased the number of papers written and cited in that field over the last three years.

By removing the lengthy acceptance, review and publication processes, the restrictive subscription costs and the physical distribution elements of traditional scientific scholarship, PLOS and others have created a new dynamic dialogue of scientific thought in academic circles. Graduate student research is now shared across the world in a matter of days or hours instead of months, with negligible cost or even environmental impact. Scientists appear to be building a library of “common content” in parallel to that being made in the arts, and here again, it’s working. The major obstacles to this becoming the standard for scientific publishing are not from scientists themselves, but from the science publications industry at large. But, “the opposition of most established journals to open access has left it to new journals like PLoS Biology and BioMed Central’s Journal of Biology to lead the way” (Brown, 2003). PLOS now publishes three print journals and operates with a multi-million dollar budget from a variety of grant monies and is supported by large portions of the scientific community.

Another dramatic example of open academics is MIT’s Open Course Ware (MITOCW). The Massachusetts Institute of Technology has recently instituted a policy of providing their course curriculum and materials online for universal access. The MITOCW project has proven incredibly popular to those wishing to learn without concern for formal degrees or the means to attend such a prestigious university. It’s also become a resource for smaller educational institutions with a desperate need for high quality course contents and curriculums. Other universities are beginning to follow MIT’s example, one that could lead to a democratization of the educational process where access to learning institutions is at least partially available to all (Fisher, 2004).

Ethical Issues

“The conversion to digital technology means that every work of utility or beauty, every computer program, every piece of music, every piece of visual or literary art, every piece of video, every useful piece of information – train schedule, university curriculum, map, chart – every piece of useful or beautiful information can be distributed to everybody at the same cost that it can be distributed to anybody. For the first time in human history, we face an economy in which the most important goods have zero marginal cost. And the transformation to digital methods of production and distribution therefore poses to the twenty-first century a fundamental moral problem. If I can

provide to everyone all goods of intellectual value or beauty, for the same price that I can provide the first copy of those works to anyone, why is it ever moral to exclude anyone from anything?"

- Eben Moglen

Moglen is of course overlooking some serious issues, the most important being that the distribution models he imagines assume universal access to computers and internet infrastructure. Internet access is overwhelmingly limited to wealthy nations or individuals with the means to acquire the necessary technologies. But as technology improves, and as FOSS helps make access affordable to more people, a movement towards Moglen's utopian vision is beginning to happen. Cities and governments are beginning to provide free wireless access to citizens, libraries and schools are making the Internet a primary resource for students and local computer evangelists have begun guerrilla style broadband networks for their communities to help neighbors and friends gain access without monthly payments to the telecommunications industry.

So while many statements along the lines of Moglen's digital ethics have been partially ignored because of the disparity of Internet access worldwide, they are not unworthy of consideration. What if the communications technology we have seen explode in the last two decades reaches a point where 95% of the information created on the planet is available to 95% of the population at a nominal cost? Is there a point where access to this global library of information may become an issue of human rights and not simply a commodity? Should a person have to pay to access information that may save his or her life if that information has no cost inherent in its duplication and distribution?

Another often overlooked concern in the world of computing concerns the physical manufacturing of the microchips and processors that provide the innards of today's computers. "Chips make me think of the eyesight of women in Singapore and Korea, going blind during the process of crafting the fiddly little wire," says Susan Leigh Star, quoted as a chapter intro in Michael M. J. Fischer's *Worlding Cyberspace: Toward a Critical Ethnography in Space, Time and Theory* (Fischer, 2003). Fischer provides a unique ethnography of cyberspace in which he gives focus to the practically ignored human and environmental contamination inherent in the creation of computer hardware. "Office use of software and terminals ... is so far removed from the manufacturing of the chips in 'clean rooms' ... that it is far too easy for many to forget the production processes when talking about cyberspace" (Fischer, 2003). His piece continues to document the severe toxicity of the chemical

process of chip manufacturing, including the increased miscarriage and birth-defect rates in silicon valley and the subsequent changes made by companies in the way that workplace illnesses were recorded in order to lower the public realization of the problem (Fischer, 2003). Fischer's exposé is an important one whose subject matter is deserving of in-depth research and public dialogue as computing becomes an even greater part of personal lives and global interaction.

Futurist Musings on the Implications of FOSS

As the impact of FOSS philosophy continues to be felt well outside the technical world of software creation, some futurist speculation becomes entertaining if not profoundly relevant. Dr. Francis Heylighen, founder of the Global Brain Group and the Principia Cybernetica, has written extensively on the useful conceptualization of the Internet as a global brain. "Society can be viewed as a multicellular organism, with individuals in the role of the cells. The network of communication channels connecting individuals then plays the role of a nervous system for this super organism, i.e. a 'global brain'" (Heylighen 1996). Heylighen's global brain model stems from a sophisticated analysis of the structure of the Internet and its use of hypertext references, known more commonly as links, and their parallel with the associative memory characteristic of the human brain.

Theories of the planet as a global organism are not new, nor even always controversial in the scientific literature of the 20th century. Buckminster Fuller famously and influentially referred to our planet as "Spaceship Earth", while James Lovelock provided a convincing scientific argument in the late 1970s that the planet can be seen as a large self-sustaining organism which he referred to as Gaia (Lovelock, 1979). The Gaia hypothesis, as Lovelock's theory has come to be known, was not without its critics at the time, but 25 years later it has yet to be seriously debunked and has only grown in popularity. But perhaps the true godfather of the global brain concept is the obscure Jesuit priest Pierre Teilhard de Chardin. Some fifty years ago in his *Phenomenon of Man*, he writes, "Is this not like some great body which is being born - with its limbs, its nervous system, its perceptive organs, its memory - the body in fact of that great living Thing which had to come to fulfill the ambitions aroused in the reflective being by the newly acquired consciousness?" (Teilhard de Chardin, 1955) He referred to the global consciousness of this new "living Thing," with its striking resemblance to Lovelock's Gaia, as the "noosphere," a term which has taken on significant importance in the intellectual analysis of the Internet (Teilhard de Chardin,

1955). Teilhard de Chardin's writings have experienced rebirth in recent years, as the noosphere concept has been increasingly used in reference to the strong parallels between global communications networks and an organism's nervous system (Kreisberg, 1995).

Freedom in the Noosphere

From a perspective grounded in cybernetics and the noosphere concept, the FOSS movement and the evolution of its philosophy into the arts and sciences becomes much more than an incredibly efficient model of software creation or even just a potentially better organizational theory. When thinking of the Internet as a "global brain" the importance of freedom in the software running the Internet becomes a glaringly important issue. The simple fact that FOSS is free of charge in the large majority of cases makes access to this super-human nervous system possible for more people. But more importantly, the freedom of people to look at the technology underlying the Internet, to investigate its synapses and nodes, and to develop their technical structure as a collaborative human project, not as a trade secret, becomes an issue of fundamental importance. Assuming we are developing a kind of global brain, is it desirable for its underlying makeup to be a protected piece of intellectual property belonging to a massive corporation? Were this the case it is nearly inevitable that a massive portion of human intelligence would not be able to afford participation due to lack of funds, propriety hardware schemes would limit access to machinery made by the owners partner corporations, governments could easily police content and our collective intellectual capacity as a planet could become another set of commodities in the global marketplace.

As the debates rage over globalization and its effects, I find it important to recognize that some form of "planetization" is practically inevitable, and that the struggle we are undergoing as a species is rooted in learning how to proceed in this process. There are proponents for a global capitalist system who would prefer to see nearly all resources, services and even ideas organized and distributed across the planet as commodities in a global market. Another perspective views the globalization process as a project of human collaboration with the goal of mutual development by means of the sustainable management of "spaceship earth." We may well discover that a virtually ignored subculture of computer programmers, who have so often been stereotyped as anti-social loners, have contributed to this planetization process a most profound model of global cooperation whose impact beyond its technical confines has helped to promote a new understanding of how human minds can collaborate in a uniquely global process of creation.

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