

Free or Open? The ideology of CAMBIA and their BIOS Initiative compared to the ideologies of the FOSS movement.

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Declaration of originality

I hereby declare that this thesis is a product of my own original work and that it has not been previously submitted to any other university or institution for any type of degree. All sources are duly acknowledged.

October 2006, Tone Winge

Dedication

This thesis is dedicated to those among my family and friends who continued to believe in me and my ability to see this project through, when I had difficulty in doing so. To my parents in particular, who have been supportive throughout my entire education.

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Abstract

The Australia based organization CAMBIA is through their BIOS Initiative trying to implement some of the same principles within innovation in the biological sciences that have so far been successful and proven their staying power within the Free and Open Source Software movement. Building on a text-based analysis of available documents published by or on the organizations in question; this thesis looks into the two separate ideologies that exist within this movement, that of FSF and that of OSI, to discover their differences and similarities. Those findings are then used as a background when analyzing the ideology of CAMBIA and BIOS to see which of the two ideologies within software the ideology of CAMBIA/BIOS has most in common with. It is argued here that the ideologies of FSF and OSI are different from each other in their underlying logic. Ethical considerations are most important for FSF, while OSI places most value on practical considerations. When the ideology of CAMBIA/BIOS is analyzed it is shown how their ideology, despite some shared traits with the ideology of OSI, has an underlying logic and structure that has most in common with the ethical considerations and opposition to the dominant value system of the FSF ideology.

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1. Introduction

Drawing up lines to separate private property from common resources, and transforming common resources into privately owned property have never been done without differences of opinion and debate. Whether it is a question of commonly governed natural resources such as land, being converted into private property, or information goods and knowledge being turned into intellectual property (IP); it has tended to be a contentious matter. In England in the eighteenth century it was the enclosure controversies related to the enclosure movement, where common land through a series of enclosures, actually going on from the fifteenth until the nineteenth century, were being fenced off and turned into private property (Boyle 2003). Today, the patenting of genetic material and biotechnologies and the copyrighting of software have caused considerable controversy. Many would argue that the next battle for public goods and accessible commons will take place over information goods, especially enabling technologies.

In many ways this battle is already going on, and has been going on for a while. One of the main arenas for the fight is the software industry where the alternative movement promoting free and open source software has been pitted against the mainstream industry and its giants, Microsoft being the obvious example. Lately, similar movements have been visible in everything from encyclopedia work to medicine, and within the biological sciences especially, the idea of making key technologies freely available seem to be gaining ground. One organization in particular has been successful at garnering attention and placing itself on the agenda; the Australian based organization CAMBIA with its BIOS (Biological Innovation for Open Society) Initiative. With the BIOS Initiative, CAMBIA is aiming to create a protected commons for biological innovation. And together with the movement for open and free software, CAMBIA/BIOS constitute some of the main actors in the struggle to protect and create pockets of commons within a world of privatization and property rights.

In this thesis, it is these actors and the thinking and rationales behind what they do and why they are part of this struggle that will be at the center of attention. Within the movement working for free and open source software, there are two distinct organizations, the Free Software Foundation (FSF) and the Open Source Initiative (OSI), with different argumentation behind what they want, and the ideologies of both these organizations will be presented and analyzed here. These two ideologies from the world of software will serve as a background framework for comparison when trying to discover and analyze the ideology of

CAMBIA and BIOS. As the forerunners in the fight for the protection of commons and the public domain, FSF and OSI served as inspiration for future initiatives, and it is very likely that CAMBIA and BIOS have been inspired by and that their ideology has features in common with the ideologies of FSF and OSI. A goal when analyzing the ideology of CAMBIA and BIOS will therefore be to determine to what degree their ideology has been inspired by FSF and OSI, and since these two ideologies will be shown to be rather different from each other, which of the ideologies the ideology of CAMBIA and BIOS has most in common with. It should be noted though, that the purpose here is to do an ideological analysis of CAMBIA and BIOS, not to examine whether they are actually putting their ideology into practice in a faithful way. This means that it will be outside the scope of this thesis to look at the practice and organization of CAMBIA and BIOS and to what degree they are successful in implementing their principles as these are expressed in their ideology.

While the amount of academic work on the alternative movement of free and open source software has increased the last few years, relatively little work has been done on similar attempts within the biological sciences. One of the reasons for this being, of course, that it is a rather new phenomenon. Since the sum of existing research is limited in itself, it is not surprising that practically no studies have been done from an ideological angle, looking deeper into why some groups and organizations are trying to promote these solutions. No one has really investigated into their purposes and goals, their rationales and argumentation. Seeing as information goods very well might be ‘the new battleground’ for the public good, it is important to look into the ideologies of the organizations that are promoting solutions differing from the generally accepted ones and that are fighting what might be called, as Boyle (2003) chooses to do, a new enclosure. It is vital to get an understanding of their ideology, what they want, why they want it and how they want to achieve it, to be able to see their world view in relation to the dominant one.

What might be called ‘open source’ principles are interesting research in general because of the role they have come to play within the movement opposing the IPR oriented direction our society is moving in. It is within software these principles have demonstrated most transformative potential and the most staying power so far, and outside software it is within the biological sciences the concept has had most progress the last years. Even though biological science is different from software development, the two disciplines also share some of the same characteristics, and as a result, some of the same problems. A comparison of these two areas and the movements within them pushing for change therefore makes sense.

Since they have come furthest along the way of the OS inspired projects in the biological sciences, and because of their ability to attract attention as well as monetary support, for example from the Norwegian government, the BIOS Initiative and CAMBIA were chosen as the case most worth investigating among the different OS efforts within the biological sciences.

To answer the question of what type of ideologies can be found within FSF and OSI, what type of ideology CAMBIA and BIOS possess and to what degree it is similar to the ideologies of FSF and OSI, the thesis has been divided into two main parts. The first part, chapter two, deals with software. First out is a presentation of free and open source software, outlining the characteristics of this movement and how it differs from the rest of the software world. Then the issue becomes what separates the two organizations within this movement from each other, and after a short introduction about the ideology concept, first the ideology of FSF and then the ideology of OSI, are presented and analyzed. Chapter two is rounded off with a section that uses the value system concepts of Parkin (1972) to see the alternative ideologies of FSF and OSI in relation to the dominant value system.

In chapter three it is CAMBIA and their BIOS Initiative that are in focus, and the chapter starts with a section introducing the organization, to provide a background for the analysis coming later. The next section presents the dominant value system of today with regard to Intellectual Property Rights (IPRs) and related topics, since it is vital to gain an overview of this value system to be able to see what CAMBIA and BIOS are trying to achieve in relation to it. Last, but not least, the third section of chapter three is about the ideology of CAMBIA and BIOS. Their ideology is presented and analyzed, as well as compared to the ideologies of FSF and OSI, to see which of these two it has most in common with. The ideology of CAMBIA and BIOS is also analyzed as a value system, to determine which of Parkin's (1972) concepts of subordinate and radical value systems it represents the best, and where it stands in relation to the dominant value system.

2. Free and Open Source Software

2.1 An introduction to Free and Open Source software

To denote free and open software by a common name, the acronym FOSS (Free and Open Source Software) is often used. The main purpose of the following section is to give an introduction to this phenomenon and explain what differentiates it from closed and proprietary software, rather than talk about the differences within the alternative movement itself, since these will be dealt with later, and to serve that purpose I will use the common acronym.

To distinguish FOSS from traditional software two elements are normally emphasized; the use of different licenses and the different programming and communication structures (Crowston and Howison 2005). However, these two elements are both linked to a more basic difference compared to closed/non-free software; the different treatment of source code. The set of instructions that make a computer run is what we call software, and programmers write these instructions. After the initial writing of the instructions by human programmers, the instructions then get translated into a form that computers can understand. Source code is the name of the product of the initial authoring made by and understandable to knowledgeable humans, while object code is the binary product of the translation that can only be read and understood by machines, as it is expressed in a series of ones and zeroes. The difference between traditional software and FOSS is that while the distributors of traditional software, such as Microsoft, only include object code when they distribute their product, source code is distributed alongside the object code in FOSS (Lessig 2003).

The idea behind the distribution of source code is that any software user should be able to not only run, but also to study, modify and change the software, and to be able to do this access to the source code is a precondition. Both the Free Software Definition (Free Software Foundation 2006a) and the Open Source Definition (Open Source Initiative 2005) emphasize these rights, as well as the right to distribute the modifications and improvements made to the original software, so the wider community will benefit. The reasoning behind why these rights are needed varies between the two movements, but the differing ideologies of FSF and OSI will be dealt with in the next section and I will therefore refrain from going deeper into that subject matter here.

To keep the work of the FOSS community accessible and to avoid appropriation by proprietary actors, the FOSS movement has used the intellectual property laws in a new and creative manner. Instead of leaving its work in the public domain, it has chosen to take advantage of the rights copyrighted material bestow on the holder by creating licenses that restricts the manner the licensee can use the licensed software in a different way than copyright normally does. The goal is to ensure that after the source code is released it continues to remain available for modification and distribution. If the developers of the code had chosen just to release the code into the public domain and renounce their copyrights, it would have been possible for those who make improvements to make the improved version proprietary and closed. In that way the FOSS project might have degenerated rather quickly (Feldman 2004).

The most used and perhaps most important license is the GPL (the GNU General Public License), which among other things requires that enhancements and derivatives must be made available on the same open use and distribution terms as the original software. This approach has been named 'copyleft' (Feldman 2004). It has been estimated by surveys that more than 70% of non-proprietary software uses copyleft licenses as their main form of contractual mechanism (Gonzalez 2003).

Within the FOSS community a number of different licenses are in use, some of them are 'viral' in nature like the GPL, an expression reflecting the fact that these licenses 'infect' all modified work with the requirement that they also be redistributed under the same conditions. The contract is meant to be transmitted through a distribution chain, and although the contractual validity of the copyleft clause has been questioned by some scholars, the opinion seems to be that copyleft licenses seem valid, but that until they have been tried in court no certain conclusion can be drawn (Gonzalez 2003).

One of the interesting aspects of FOSS licensing is the way copyright protection is used, for example in copyleft licenses to make the licenses enforceable, while the goal of this use is quite the opposite of how copyright is normally used. The norm is for copyright to be directed towards the regulation and protection of ownership, and it is part of the intellectual property laws that govern information and other intellectual property, but the FOSS system advocates more or less the opposite. All the same, copyleft licensing is dependent on the copyright laws to survive in its current form (Gonzalez 2003).

As has been shown, the fundamental aspect of FOSS is that the user/licensee must get access to the source code, as well as the right to make changes to it, among other things for the purpose of adapting it to own needs and correct bugs. This is again part of the explanation

for another characteristic feature of FOSS, that is, the way software is developed by a loose-knit community of programmers from different locations and organizations sharing code to improve and fix software programs, communicating and collaborating across various distances by the use of modern-day communication tools like the internet. When interest in FOSS has increased during the last few years, it is among other things due to this seemingly new organization structure. Other reasons include the rapid diffusion of some of the most successful FOSS products, such as the Apache web server and Linux, and the substantial investments made by major corporations like IBM in FOSS projects (Lerner and Tirole 2000).

Although the term FOSS can be used to describe software independent of how it was developed and by whom as long as it makes the source code available under a FOSS license, the licensing practice has fostered some typical FOSS development practices that differ greatly from how traditional commercial software is being developed. Open access to the source code means that anyone with the necessary skills can modify FOSS made by anyone, and while this freedom was exercised mostly by physical sharing such as exchange of disks in the early days of FOSS, the creation and sustainability of communal style development projects at quite large scales has been made easier since Internet became what it is today (Von Hippel and Von Krogh 2003).

In the practical organization of FOSS projects, the Internet does play an important role. FOSS projects normally have their own homepage that serve as the main communication tool for the participating programmers. This tends to be where the original creator(s) of the project make their idea known and where others can post their contributions, be it suggested improvements or warnings of bugs that they have discovered.

FOSS projects can be compared to what is termed 'user-driven innovation'. This type of innovation has been seen in other industries, and it has been demonstrated how sophisticated users can accelerate the technological progress (Lerner and Tirole 2000). Advocates of user-driven innovation often stress how users of a certain product tend to be the ones who know what kind of improvements and innovation that is needed, based on personal wants and observations. This is also true in FOSS, where a project normally is initiated by a small group or an individual with an idea for something interesting they want for a business, intellectual or personal reason and where other programmers participate through self selection (Von Hippel and Von Krogh 2003).

The initiators of a project generally also become the leaders or 'owners' of the project, serving as maintainers who take on the responsibility of project management. This means that after a rough version of the code that outlines the functionality envisioned has been developed

and made available to all who want it via downloading from the project website, the founders of the project typically set up mailing lists for those interested in using or developing the code and if the project is successful in attracting interest and contributions, the project leaders are the ones that choose among the posted contributions the specific improvements that are to be included in the 'authorized' version of the code (Von Hippel and Von Krogh 2003).

Studies have been done on the motivations of those participating in FOSS projects. Why people would choose to spend time and effort on an activity not giving them any monetary benefits has been a puzzling question for many. Findings suggest that the motivations vary, but that some of the most important reasons can be placed in two different categories: internal factors and external rewards. The internal factors in this connection are motivations that are rooted in the psychology of the individual, while the external rewards are motivations that originate from the environment (Hars and Ou 2002). Among the internal factors we find intrinsic motivation, which is a type of motivation that is determined by a person's need to feel competence, satisfaction and fulfillment by doing things he or she enjoys and masters, altruism, where the goal is to increase the welfare of others, and community identification, which can be considered as a variant of altruism where the feeling of belonging to a community encourages a person to do things for that community and this type of behavior has been termed 'kin-selection altruism' (Hars and Ou 2002).

But although intrinsic motivation and different categories of altruism do play a part in why FOSS programmers spend their time on FOSS projects, external rewards are also important. These are often indirect rewards and are divided into future rewards and personal needs. A programmer devoting his time to FOSS can do this based on a conscious expectation of getting future benefits from his efforts, in one form or another. Future rewards can come in the form of revenues from the sale of related products and services, it can come from the development of human capital resulting from the FOSS learning experiences, it can come from self-marketing, since participating in a FOSS project can be a good way of demonstrating ones skills in a visible way to the rest of the programming community, and it can also come from peer recognition, derived from a desire for esteem and fame (Hars and Ou 2002).

Personal needs is another category of external rewards. This type of motivation reflects how FOSS programming often is the result of the personal needs of a programmer for specific kinds of software functionalities (Hars and Ou 2002). As already mentioned a FOSS project is often started by a programmer as a consequence of a particular need that programmer wants to have fulfilled.

Because of its ability to draw from a diverse set of motivations, Hars and Ou (2002) conclude that the FOSS movement has the potential to give traditional software development heavy competition.

When describing why FOSS is superior to traditional software development, proponents of this development style also stress the dangers of the FOSS practice and how to avoid them. Raymond (1999) talks about how the risk of forking is being minimized by the strong social pressure against it in the FOSS community.

As can be seen from the above, FOSS has some characteristics that separate this type of software quite clearly from the type of software produced and distributed by companies like Microsoft. The differences have their roots in both licensing and development practice, and more fundamentally in how they treat source code. However, as previously mentioned, there is some difference of opinion within the FOSS movement as well, mainly regarding ideology. These will be further explored below. When speaking of the FOSS movement as a common entity I will continue to use the acronym FOSS, but when the issue is the differences within the FOSS community I will either talk about free software and the opposite as non-free software, or open-source software and the opposite closed software. Thus the proper name for the software made and sold by Microsoft would be either non-free or closed, depending on the context. This is done to reflect the way the organizations themselves name their efforts.

2.2 The differing ideologies of The Free Software Foundation (FSF) and the Open Source Initiative (OSI).

2.2.1 Ideology

In this section the focus will be on the differences within the FOSS movement. The purpose is to outline the ideological differences between the Free Software Foundation (FSF) and the Open Source Initiative (OSI), the two most important and vocal organizations within the FOSS movement, and to create an analytical framework that in later sections can be used to analyze CAMBIA and the BIOS initiative. Documents available on the OSI and FSF WebPages, representing the views of the organizations will be the starting point for analysis. Prominent among these will be the texts written by Eric S .Raymond and Richard Stallman, since the first is one of the founders of the Open Source movement and some of his articles have been quite influential, and the latter is the leader and main ideologue of the Free Software Foundation.

In terms of practical recommendations FSF and OSI have a lot in common; they advocate more or less the same practice and approve of many of the same licenses, although not all. When it comes to their rationales however, they differ quite a lot, and it can be argued that they represent two different ideologies within the FOSS community.

Since the term ideology has been used in many different ways, I will first present its common uses and clarify which definition of the word I find the most useful in this context and why and how I intend to use it.

It is perhaps the Marxist definition of the term ideology that has had the most impact on how the word is understood in modern thought. Before Marx changed the meaning of it, however, ideology was created as a term by ‘the ideologues’, a group of French post-Enlightenment theorists who defined ideology as a ‘science of ideas’ (Mullins 1972). This ‘science of ideas’ was simply a technique for discovering truth, as opposed to Marx’s use of the word, where ideology means a certain quality of thought – one that is distorted or illusory.

There are two different understandings of ideology within the theory developed by Marx and Engels. The first describes how each class by the nature of its interest forms its own beliefs, while the other talks about how the mode of production creates a dominant class which generates a dominant ideology that works to subordinate the other classes (Abercrombie and Turner 1978). The last one is the conception of ideology most often associated with Marxism. Ideology is looked upon as something that enables the dominant group to have maximum control with a low level of conflict. This is due to how ideology; values, symbol systems and conceptions of the world, ideas about the way things are, how the world functions and how it should be, works to legitimize the current order of society, and is not necessarily done in a deliberate way by the group in power (Lye 1997). Abercrombie and Turner (1978) revisit the concepts used by Parkin, who separates the normative order into three meaning systems; a dominant value system, a subordinate value system and a radical value system. The subordinate value system promotes responses to issues that are accommodative of the dominant value system, while the radical value system advocates opposition.

Another conception of ideology de-emphasizes the Marxist view of ideology as a distortion of reality and is more in line with the early understandings of ideology as the science of ideas and their origin. But ideology is taken to be the ideas themselves, rather than a science of ideas, and the purpose of the ideas is considered to be political. Within this view ideology can be defined as ‘an action-oriented system of beliefs’, as was done by Daniel Bell (Bell in Sypnowich 2001) and as such its role is to motivate people to act or not to act in a

certain way. Conceptualized in this way an ideology can either serve the status quo or call for its overthrow (Sypnowich 2001). It is this tradition of looking at ideology as a system of political ideas that will mostly underlie this analysis, but the Marxist views will be kept in mind and used when suitable.

2.2.2 The ideology of the Free Software Foundation

The Free Software Foundation (FSF) has, as its name implies, the word ‘free’ and freedom at its core. FSF is a non-profit organization that was launched by Richard Stallman in 1985 and the term ‘free software’ as used by Stallman and FSF includes a philosophy and an understanding of software as one of the most important building blocks in the information society and the need for the control of this infrastructure to remain available to all (Klang 2005). FSF therefore has as its mission “to preserve, protect and promote the freedom to use, study, copy, modify, and redistribute computer software, and to defend the rights of all Free Software users” (Free Software Foundation 2006b: 1), and as is often mentioned in their information material they consider free software to be a matter of liberty, not price. To explain how the concept should be understood one is encouraged to think of ‘free’ as in ‘free speech’, not ‘free beer’. This means that free software might be priced without losing the right to carry the name, and as free software advocates like Stallman emphasize, the opposite of free software is not commercial software but non-free software. Non-free software can be given away without charge, but as long as the user is not free to run, change and redistribute the program with or without changes the software is not free.

As can be seen from the above, FSF has a clearly ethical and moral agenda, indicated by the use of words like ‘freedom’, ‘rights’, ‘liberty’ and ‘free speech’, and when explaining why software should be free Stallman (1992) dismisses the maximization of developers profits as a criterion for judging the appropriate way of handling software creation and use, and places “the prosperity and freedom of the public in general” (Stallman 1992: 1) in its stead. He also makes it clear that the question of how decisions about the use of software should be made cannot be decided by current law. Stallman is of the opinion that the law should conform to ethics, rather than the other way around. According to him the only way of answering the question of whether software should have owners or not, is by looking at who benefits from and who is hurt by the different solutions, as well as how much and why (Stallman 1992).

By stating that the law should conform to ethics and moral criteria rather than the other way around, Stallman is in line with natural lawyers, who think that what the law is must be determined by what it ought to be. As opposed to positivists, who argue that what the law is and what it ought to be must be separated, and that whether the law does or does not meet moral requirements is not relevant in that regard, the law must be obeyed (Sypnowich 2001).

When talking about sharing, this principle of putting the moral before the legal surfaces once again. Stallman relates how many software users choose to share their software even if the licenses and laws don't allow it. Doing this will make them feel guilty and create psychosocial harm unless they justify it by "deciding that these licenses and laws have no moral force" (Stallman 1992: 5). Here it is apparent that moral and ethical criteria are prioritized before the actual laws. However, even if Stallman and by extension FSF, places the moral before the legal, they are advocates for changing the practice and wording of the law rather than simply breaking it, and for that reason cannot be accused of promoting criminal acts and disobedience.

The value and importance of sharing is crucial for Stallman (1992). He maintains that sharing of software is an ethical concern and that the restrictions on sharing have detrimental effects on society. These negative effects of restricting the distribution and modification of software can be sorted into three different levels of material harm; fewer people will use the program, none of the users can adapt or fix it and other developers cannot learn from it or use it to base new work upon. Stallman's argument regarding the first level of harm is that by assigning an owner to a program the total contribution to the society of that program is reduced. This happens because each time a potential user of a program chooses to forego the use of it on account of having to pay and not having any rights, this harms that person without actually benefiting anyone. Since software is a different type of good from material objects, and the cost of reproducing and copying it is considerably less, the point made among others by FSF is that it does not make sense to use the same type of owner assignment and intellectual property rights on software and other similar information goods as on material objects.

In addition to this comes the psychosocial harm that according to Stallman also results from the same level of material harm. His assumption is that the natural thing for most people is to share when they have something their neighbor could use and the sharing of it will impose no cost on them. When this natural impulse is being reined in by for example software license agreements that prevent the buyer of legally sharing the program with others, the

people buying the software feel compelled by inner psychological pressure to justify their choice and so they downgrade the importance of helping one's neighbors. As a result the public spirit suffers. This type of psychosocial harm is a consequence of the system allowing software to have owners (Stallman 1992).

Not being able to modify and adapt programs because the license forbids it and the software package does not include the source code is the second level of material harm. The software user is therefore not able to fix the program or adapt it to his or her own needs. This creates a lot of frustration for users, and in many instances they have to settle for a sub-optimal solution to their needs. This also creates another type of psychosocial harm according to Stallman (1992). It harms the spirit of self-reliance because it induces the average user without the necessary means to develop a new program from scratch to give up. Stallman claims that the resignation and discouragement resulting from this can spread and contaminate other areas of life as well.

The third level of material harm is the level that affects software development. Rather than still being an evolutionary process where the developers build on each others work for the benefit of all, the creation of software is now happening in closed circles due to the existence of owners. Not being able to 'stand on the shoulder of giants' makes it necessary to start from scratch when developing programs and the hiding of code also prevents students and future practitioners from studying and learning from existing programs. Stallman (1992) claims that the intellectual field of software does not live up to its potential because programmers can only learn from other programmers in their own company. He also thinks that the current practice has harmed the spirit of scientific cooperation. Stating that scientists used to cooperate even when their countries were at war, he blames the drive for profit for destroying what international conflicts could not.

By looking at how Stallman treats the issue of harms resulting from what he calls 'obstruction of software' and the arguments he uses, it is easy to see that he considers the implications of non-free software to be quite far-reaching. For him it is not only a question of software use and innovation, but also a question of freedom that affects the whole society and how it works, as well as the feeling of happiness and fulfillment of people in general. Linking the non-free character of software to associated psychosocial harm he tries to demonstrate how the public spirit and the spirit of self-reliance as well as the spirit of international cooperation suffers from the lack of freedom imposed by restrictions on software change and copying. The solution to this problem, as Stallman and his supporters see it, is free software. One can summarize the argument by saying that society should have free software both

because the current regime has widespread negative effects and because free software in itself is the optimal solution. Citing Vaclav Havel in saying “Work for something because it is good, not just because it stands a chance to succeed” Stallman (1992: 8) displays his ideological stance and underlines that even if proprietary software might be successful by its own terms, it is not good for society, and it is better to work for free software, exactly *because* it is good for society.

An important binary in the FSF ideology is the free/non-free dichotomy. The term free is clearly the privileged one, and simply by using this type of terminology and defining it the way they do, the underlying values of the foundation become apparent. FSF are quite plain spoken about their own ethical and moral agenda. By using a word like ‘non-free’ in the sense of freedom about the phenomenon they oppose, they succeed in devaluing this position and reduce those who advocate it to somebody who is opposed to freedom.

The terms ‘we’ and ‘they’ also create a dichotomy, with the effect of producing in-groups and out-groups and the reader is supposed to identify with and support the FSF positions. Interestingly enough, these terms are not only used to distinguish FSF from proponents of non-free and proprietary software, but also to make a distinction between FSF and the open source movement (Berry 2004). Stallman is anxious to make the differences between the two movements known, and although he recognizes that they agree more or less on the practical recommendations, he wants to show how their fundamental principles differ. Because he wants to separate FSF from OSI, he encourages a certain choice of words regarding software. He is clear about preferring the terms ‘free’ and ‘non-free’ rather than ‘open’ and ‘closed’ (Stallman 2005). In not only using language in a particular way, but in pressing the need to use specific terms above others, Stallman acknowledges the power language and words can have and admits to being in a kind of hegemonic struggle with OSI (Berry 2004).

According to Berry (2004) FSF makes use of elements from enlightenment philosophy, communitarianism and the ideals of the academic communities to present a strong moral position. He also sees a Kantian flavor in the way people are called to abide by the moral laws of FSF and claims that some sort of a categorical imperative appear to be the basis of its philosophical foundation in that what is ethical for the individual is deemed to be generalizable. Berry stresses the importance of ethics and freedom for FSF, and cites a personal communication from Stallman saying “I consider free software a human right, and thus a moral norm” (Berry 2004: 70) as his basis for claiming that the basis for their philosophical position is that access to the source code of software is a human right. This

right-based approach is supplemented by the freedom element and the view that freedom of the individual is linked to freedom from the tyranny of technology which non-free software is an agent of (Berry 2004).

By speaking of free software as a human right Stallman makes a linkage to the UN Declaration of Human Rights, but he also refers to the US Constitution to justify his position. He actually makes use of the US Constitution both to argue in favor of his view on the right to source code by making a reference to the Bill of Rights, and to emphasize that the Constitution doesn't require a system of copyright; it only permits it (Berry 2004). Stallman (1992) states that his underlying assumption of giving software users equal worth to that of software writers is not opposed to the US legal traditions. Even though he is not of the opinion that the US Constitution or the Supreme Court is always morally right, he points to what they have to say about copyright and how it has been designed to supposedly benefit the public to show that his arguments are not as far from the generally accepted as his adversaries sometimes claim. His argument is also to put the interest of the public first, but he is not of the opinion that the current regime of copyrights does this, and promotes free software as what the public need.

The needs of society and a general awareness of the social dimension of issues surfaces a lot in FSF documents and the writings of Stallman. Stallman considers an antisocial spirit to be the greatest problem of our time, and draws the line from failing banks and schools to the homeless population and the prison population. His thesis is that non-free software and what he calls software hoarding is part of a bigger picture of a "general willingness to disregard the welfare of society for personal gain" (Stallman 1992: 13). It is a vicious cycle where the antisocial spirit feeds on itself because we get more unwilling to help others the more we see that they will not help us, and Stallman sees free software as a way of breaking the circle and contributing to a change of attitudes by creating an efficient system that both encourages and runs on voluntary cooperation. To describe Stallman's ideas and the ideology of FSF, one can create a term like 'grand visions' to emphasize how the line is drawn from non-free software to other problem areas of society rooted in the same non-cooperative contemporary spirit and how freedom and prioritization of the ethical and moral will help solve these problems.

Sartori (1969) links ideology to 'beliefs', making 'belief systems' the general class so that ideology becomes an under category together with pragmatism. According to him a belief system can be defined as "the system of symbolic orientations to be found in each individual" (1969: 400). He separates a pragmatic belief structure from an ideological belief structure by

the nature of its cognitive authorities and its emotive status. On the cognitive dimension the question is whether the belief system is closed or open. The degree of openness is decided by the willingness to change existing principles and choices as a result of new information (Sartori 1969). With regard to this the belief system of FSF can be characterized as rather closed, since they have certain ethical yardsticks they abide by quite strongly, such as the need for freedom, and are not willing to abandon.

The emotive status of a belief system can be either strong or weak, depending on whether the beliefs are intense or feeble, passionately or weakly felt. In other words, the emotive status is a measurement of ideological passion (Sartori 1969). It can be argued that FSF displays rather passionately felt beliefs, and therefore the organization can be seen as strong on the emotive dimension. The belief system of FSF can thus be described as ideological, as the term is used by Sartori, since he reserves this word for belief systems that have a closed cognitive structure and a strong emotive status. Individuals and groups that hold to an ideological belief system tend to be more or less impenetrable to external influence and they are strongly motivated when it comes to expansion of their own belief system (Sartori 1969).

Although placing FSF in a box in this way of course is a simplification, the description does fit the organization quite well. FSF are trying to expand their own belief system by convincing others their way of treating software is right, and although it might not be accurate to label them as ‘impenetrable to external influence’, since many of their ideas and principles are probably inspired by discourses in the society at large, they do have a set of principles they stand by decisively.

In summary the ideology of FSF can be described as freedom and rights oriented and occupied with ethical and moral issues. Non-free software is regarded as something that creates both material and psychosocial harm, and is part of bigger problems in society at large, such as an antisocial spirit and lack of cooperation and sharing. Free software is seen as a solution that can help redeem some of these problems.

2.2.3 The ideology of the Open Source Initiative

The Open Source Initiative (OSI) is a non-profit organization that in 1998 created and now manages and promotes the Open Source Definition, and that differs from FSF in their rationale for promoting what they have chosen to call open-source (OS) software. In fact, OSI was created to promote their view on OS software and their own terminology, which is

different from that of FSF. The founders of OSI recognized the pragmatic benefits of software liberty, but wanted to deemphasize the talk about freedom, which they considered disruptive and a hindrance for expansion into the domain of corporate software development, where Stallman, FSF and free software were mistrusted (Hill 2005). OSI was founded and the new term 'open source' was coined, to promote their ideas in a way that distanced them from the political freedom talk of FSF. When launching the term the focus was on promoting OS as a software development model, rather than on ethical and moral issues connected to software (Klang 2005). The main idea of OSI is based on the following reasoning: "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" (Open Source Initiative 2006a: 1).

As this piece of argument reveals, the attention is focused on what OS can do for software innovation, its quality and speed. It is emphasized that when source code is made available this will make the software evolution go faster and produce better products than when the source code is hidden. This argument is explored more fully in Eric Raymond's "The Cathedral and the Bazaar" (1999) where he outlines his views on the benefits of OS. According to Raymond the trademarks of the OS development model is early and frequent releases, delegation and openness, and he named this development's style 'the bazaar' and compared it to the more centralized work in 'the cathedral', where work is carried forth carefully planned by small group working in isolation and where nothing is released before it is finished.

Raymond (1999) claims that good software most often is the result of a developer seeking to fill his or her own needs. Necessity is, along with love for programming, regarded as the force behind software invention. In the OS world this is supposedly utilized better than in traditional closed software development because the programmers choose what to work on. According to Raymond this is one of the reasons for the high average quality of OS software (Raymond 1999). To create good software Raymond also stresses the importance of rewriting and reusing code, as well as recognizing good ideas from others. He labels this 'constructive laziness' and underlines how it is both easier and also might give better results to start from a good partial solution rather than from nothing at all (Raymond 1999). Access to the source code is a precondition for this, so on this issue Raymond is in agreement with Stallman on the need to build on the work of others. They both think that access to the source code and the

right to use and change it, so as to be able to ‘stand on the shoulder of giants’ is vital for the software evolution. Closed/non-free software is regarded by both as an impediment to this.

Another important element of the OS development model as it is presented by Raymond (1999) is the role of users. Coupled with early and frequent releases of the software, a user base can be very helpful and contribute to rapid code improvement and effective debugging by diagnosing problems, finding bugs and suggesting solutions. By encouragement, users can become co-developers, especially if they are treated as such. Another tenet of Raymond also describes this position, namely that by treating the testers as a valuable resource, they will most likely become a highly valuable resource. Raymond (1999) actually considers the Linux development model as a more consequential invention than the Linux kernel itself, as Linux and its success was the case that brought the OS development model to the attention of the general public. By releasing early and often and incorporating the feedback from his users, Linus Torvalds, the man behind Linux, kept his users and co-developers stimulated and rewarded, and he scaled this model up to a level of intensity that could match what he was working with. This cultivation of his co-developers together with his use of the internet as a tool for collaboration made Linux and the development model work.

By maximizing the number of people working on debugging and development, Linus may have acted according to what Raymond (1999) has named ‘Linus’s law’ and which states that “Given enough eyeballs, all bugs are shallow” (1999: 41). This is one of Raymond’s key arguments considering OS, as well as a central part of his explanation for why software developers should choose OS and the OS development model. The point is that if enough people work with and on the software, somebody will discover the problems and somebody will come up with a solution for them. And if the groups of testers and co-developers are large enough this will happen quite rapidly. This mechanism is similar to what sociologists have called the ‘Delphi effect’. The ‘Delphi effect’ describes how “the averaged opinion of a mass of equally expert (or equally ignorant) observers is quite a bit more reliable than that of a single randomly-chosen observer” (Raymond 1999: 42). In the case of Linux the fact that the contributors are self-selected might also help the Delphi effect along (Raymond 1999), since self-selection can make for highly motivated participants.

As can be seen Raymond is mainly preoccupied with the development model of OS, the bazaar style, and how it performs better and more efficiently than other development models for software. His concern is to explain this model in a way that will prove its superiority to people outside the OS movement and so induce more people within the

software industry to adopt this way of developing software. Raymond and OSI want to convince people by proving the advantages of the bazaar style, not by talking about values like FSF.

As an exception to the rule of bazaar style supremacy, Raymond mentions that even though testing, debugging and improvements benefit from this development model, a bazaar project needs to build on something. It is very difficult to originate a project and code from ground up using the bazaar style. The community of developers must have something to work with/on (Raymond 1999). But as long as there is something to work on and improve, Raymond maintains that the OS development model makes for the best results. His thesis is that even though coding in itself is a mainly solitary activity, the finest software comes from utilizing the attention and brainpower of large groups of people, and that the developers who recognize this will have a competitive edge.

However, for someone to be able to develop software in the manner described above some conditions must be put in place. When it comes to the legal aspects, the licenses must allow the source code to be viewed and modified. But although Raymond recognizes this as a defining part of OS and a prerequisite for the OS model to work, he is not as focused on this point as Stallman is. He does not talk about access to source code as a right, and he spends most of his time and effort on explaining in detail the OS model and its benefits for innovation. Another precondition for the model to work is available and pervasive Internet. Without Internet developed to a level where it could be made use of, and cheap enough to be accessible to a wide range of people across the world, Linux and OS in general would not have been as successful in gathering a large user base. Other factors that should be in place, according to Raymond, for the model to work, are cooperative customs and a leadership style that encourage participation from users and allows the developers to exploit the possibilities the model and internet offer to the fullest (Raymond 1999).

As already mentioned Raymond and OSI are mostly concerned with the practical benefits of OS and what they call the OS or Linux model, and after having made clear what he deems to be the key aspects of this model, how it works and why it ought to be adopted by software developers in general, Raymond compares the workings of the OS model and the Linux world to the free market. Inspired by Adam Smith and his theory about the invisible hand of the market, he argues that the OS community can be seen as a collection of selfish agents that by attempting to satisfy their own egos creates a self-correcting spontaneous order that is more efficient than anything that could be produced by central planning (Raymond 1999).

By making this comparison he exposes both his own favorable view on the advantages of the free market and some assumptions and thoughts about FOSS that differs quite distinctly from that of Stallman and FSF. While FSF and Stallman regards the inclination towards sharing and cooperation as a part of human nature that is being inhibited by non-free software, Raymond and OSI reveal a different view on human nature as well as on FOSS, when focusing on how a key benefit of OS is its ability to utilize selfishness. Altruism is dismissed by Raymond (1999) as just another way of satisfying the ego, on the basis that altruism itself is merely another form of ego satisfaction for the altruist, and the goals of the OSI are not explicitly related to ethics and moral, like that of FSF. Raymond himself thinks that the OS culture will triumph “not because cooperation is morally right or software ‘hoarding’ is morally wrong, but simply because the closed-source world cannot win an evolutionary arms race with open-source communities that can put orders of magnitude more skilled into a problem” (Raymond 1999: 67). In parenthesis he also states that neither he nor Linus believes that closed software is morally wrong.

Again it is apparent how Raymond and OSI want to emphasize that the benefits of OS lie mainly in its practical consequences for software efficiency and innovation, and how they want their position to be free of moral agendas and ethical issues. The appeal of OS is supposed to lie in what it can offer as a new and exceptional approach to software development, not in the freedom Stallman thinks it can offer. This position is also visible on the homepages of OSI where they declare that they “think the economic self-interest arguments for open source are strong enough that nobody needs to go on any moral crusades about it” (Open Source Initiative 2006b: 4). Here they demonstrate a clear wish to distance themselves from FSF, and by their choice of words show an almost hostile attitude aimed at ridiculing those who choose to use moral arguments. Previous to this citation it is also made clear that OSI does not have a particular position on intellectual property rights, and indeed both Raymond’s writings and the documents available on the OSI homepage display a wish to avoid these topics and keep the focus solely on economic issues. It might almost be argued that they view these matters as something toxic that is better left alone.

This antagonistic attitude surfaces yet again when they declare that they are promoting OS software on “solid pragmatic grounds rather than ideological tub thumping” (Open Source Initiative 2006b: 4). Similar to how FSF acknowledged that they are engaged in a hegemonic struggle with OSI, OSI seems to have reached the same conclusion. According to Raymond (1999) it is possible to sort the main differences between the FSF and OSI ideologies along two dimensions. The first dimension is the degree of zealotry; whether FOSS is regarded as a

means to an end or an end in itself, while the other dimension measures the degree of hostility towards commercial software. Raymond regards Stallman and FSF as both very zealous and as anti-commercial, although Stallman makes a distinction between commercial software and non-free software and considers himself to be against the latter not the first. So whether Raymond is justified in making a distinction by use of these categories might be debated, but at least he succeeds in making it easy to comprehend what he regards to be the characterizing features of OSI as opposed to FSF. Therefore, it is clear that, as was done by FSF, OSI also use the OSI – FSF dichotomy as a way of calling attention to their identity as distinct from that of FSF.

While the open – closed binary is important in the OSI documents, it does not contain the same confrontational weight as the free – non-free binary used by the FSF. This is something that is underscored by Raymond (1999) also and he speaks of it as a conscious choice. By focusing on the model and its advantages and speaking of closed software not as something morally wrong, but as something less beneficial for software development, the binary is meant to come across as less value based. The terms ‘us’ and ‘them’ are avoided and rather than creating group collectives he claims to be a spokesperson for, Raymond privileges the individual (Berry 2004).

In Berry’s (2004) opinion neoliberalism is an important part of the ideology promoted by Raymond and OSI. As he sees it they use arguments of technical efficiency and neoliberalism in an attempt to present their position as natural, rational and commonsense. They want to draw a sharp distinction between the technical objective sphere and the political sphere and place their own arguments in the first (Berry 2004). This can indeed be seen throughout their whole argumentation process. However, it might be argued that they operate with a narrow definition of ‘the political’, and that a wider one would place them firmly in the political sphere. Some would even declare that ‘everything is politics’ and that all choices are political. And even if a narrow definition of politics is retained, the claim of OSI that their position is purely technical and rational and not concerned with normative and moral issues, is in itself a normative position; one that places value on empirical content and technical efficiency. More importantly, in the case of OSI, they also take a normative stand when preferring the rule of market like institutions to that of centralized authority, this actually being one of the main issues dividing political parties and voters in many contemporary societies.

According to Berry (2004) Raymond’s writings are permeated with his ideological position. This ideological position is one where libertarianism is strong and where an

American anti-government, anti-centralist rhetoric is used to argue in the favor of the power of a rational choice and the ability of uncoordinated selfish actions to produce collective goods. His ideas about minimal government might be seen as borrowing elements from Locke's ideas on pre-governmental life, and for some OS supporters his strongly libertarian and sometimes eccentric positions have actually caused enough discomfort to drive them away from OSI (Berry 2004).

Corresponding to a neoliberal position, OSI's conception of freedom is fairly different from that of FSF. When speaking of freedom, OSI has in mind an economic freedom; a freedom to choose within a system of market relations. Their concern is for the individual to have the freedom to work on any project that is of special selfish interest, and should the consequences of this happen to be beneficial to others then that is a result of the workings of the free market. When it comes to code the view of OSI is once again different from that of FSF. Although both organizations uphold access to source code as of fundamental importance to software, they do not have the same notion of what code essentially is. While FSF regard source code as a collective good, OSI has a more property oriented outlook on the issue. However, ownership is transferred from the underlying source code to the project. The control, structure and direction of the project is looked upon by Raymond as something that belongs to the founder or leader of the project in question, and he likens OS ownership to land tenure and argues that the ownership customs of the hacker culture resembles Lockean property rights. It is also quite clear that the owner figure and leader is given most power in the OS model. Democracy is not an issue and a hierarchical structure is envisioned (Berry 2004).

As mentioned above, technical efficiency is an important element in the OSI ideology. Technical efficiency is believed to be best achieved with many people working simultaneously on the same project, as expressed in the previously mentioned key tenet of Raymond; 'given enough eyeballs all bugs are shallow'. Raymond is also in line with the technocratic belief that the best technical solution is the most efficient one and regards centralized control systems and big social projects as inefficient. The market is considered to be the better mechanism for delivery of goods and services and the profit motive regarded as the greatest source of technical efficiency (Berry 2004). This view on technical efficiency is in line with their vision of development where, in addition to technical efficiency, capitalist progress is the main goal and where the achievement of more effective and profitable solutions without regard for values is wished for. This is rather different from the FSF ideology, where an Enlightenment ideal of progress as something to benefit the whole of

humanity like a collective good can be seen. So while both OSI and FSF operate with a linear model of progress, they differ in terms of the ends envisioned (Berry 2004).

Above, in the section on the ideology of FSF, their belief system was described in the terminology of Sartori (1969) as ideological. The decisive elements in this categorization were the closed cognitive structure and strong emotive status of the FSF belief structure. What is the most suitable characterization of the belief system of OSI by use of Sartori's framework?

Sartori separates four different types of belief systems according to their dominant elements. The adamant belief system is also called ideological, while the flexible belief system is the typically pragmatical one, characterized by an easy acceptance of changes and lack of outward dynamism. Together these two make up the dichotomy of ideology and pragmatism, but there are also two other systems created by the same analytical framework. A resilient belief system is known by its resistance to change and its lack of dynamism and outward orientation, while the holders of a firm belief system are open to change as well as motivated toward outward expansion (Sartori 1969).

This last category is probably the one that describes the belief system of OSI the best. OSI is indeed seeking outward expansion. They want to convince as many as possible that their way of treating code and developing software is the best. Thus they can be said to have a strong emotive status. The elements of the belief system are strongly felt and firmly held. The degree of passion might be said to vary among OSI members and supporters, but in general they can be classified as strong on the emotive dimension. At the same time the belief system of OSI is more open to change than that of FSF. On the whole their belief elements are more open to evidence and argument. Even though, as has been discussed, the writings of OSI and Raymond are not value free, they do rely more on the practical benefits of the OS model, and so will be more open to change should empirical evidence suggest it, than the more expressively value based FSF. Therefore, on the cognitive dimension they are in this context deemed to be open. Their belief elements might be persistent, but not altogether impermeable and, as a result, changeable at least in principle.

As was the case with FSF, this categorization of OSI is probably a simplification, but it is nonetheless helpful and provides useful insight into the ideology of OSI. According to this characterization of OSI they fall into the category of firm belief systems, rather than flexible, even though this last category is the one Sartori (1969) labels as pragmatism and as such the opposite to his concept of ideology. The belief system of OSI is, as analyzed in this

manner, not as pragmatic as Raymond wants to portray it, and it has in common with FSF the wish to persuade and expand.

To sum up, OSI is mainly concerned with the practical advantages that accrue from open access to the source code of software. The goal of their ideology, as an action-oriented system of beliefs, is to motivate people to act in accordance with their recommendations about software development. They want the focus to be on the characteristics and benefits of the OS development model, and the arguments to be not about values, but the positive consequences of this model for the speed and quality of software innovation.

2.2.4 FSF, OSI and value systems

The relationship between the ideologies of FSF and OSI, and between these two and the dominant view on software and source code in society, might be viewed as similar to the relationship between what Parkin (1972) termed a dominant value system, a subordinate value system and a radical value system. In line with the Marxist conception of dominant and subordinate meaning systems, this terminology also adds a third level of ideological consciousness; a radical one.

The reasoning is that the most powerful people in society will also have the best means to legitimize their situation and this results in the dominant value system. As was touched upon in the beginning of this chapter, the subordinate value system is different from, but subordinate to as well as accommodated within the dominant one (Hall 1993). It is in many ways a “negotiated version of the dominant value system” (Parkin 1971: 82). While a subordinate value system promotes accommodative responses to the dominant one, a radical value system promotes opposition (Abercrombie and Turner 1978). The radical value system stands counter to the values of the dominant ideology (Hall 1993). As an action-oriented system of belief it can be said to call for an overthrow of the status quo.

If the dominant value system in the context of software is represented by companies like Microsoft and their attitude towards source code, property rights, copying, and sharing, then the subordinate value system might be said to be represented by OSI. OSI, with their ideology, are not really in opposition to the hegemonic views in society in general and the business world in particular on property rights, profit, the free market and capitalistic progress. Although their approach to software development differs from that which has been the norm, they aim to place this new approach within the current regime, so as to better appeal to the business community of software. By explicitly avoiding talking about values and

ethical issues, as well as by their approval of neoliberalism and market mechanisms, OSI do indeed embody an accommodative response to the dominant value system.

FSF and their ideology, on the other hand, have more in common with a radical value system. With the freedom and right to copy and change source code as part of their declared agenda and with their view on non-free software as a problem for society in itself, as well as part of bigger problems in society at large such as an antisocial spirit and lack of cooperation and sharing, they are quite clearly in opposition to the dominant value system. Unlike OSI, they are not particularly happy with the current system and its hegemonic ideology, and they have an unambiguous desire for change. Free software is regarded as a step in the right direction towards a better society where different norms rule.

The attitudes towards OSI and FSF among both the public in general and the business world in particular strengthen the supposition that OSI embody a subordinate value system, while the ideology of FSF can best be likened to a radical value system. OSI and their ideas have been welcomed by the commercial software world whereas FSF and their position have been viewed with more skepticism and hostility. Since their arrival on the scene it is OSI and their terminology that have received most attention and reached the widest audience. It is not unlikely that this is due to the fact that they challenge hegemonic beliefs to a lesser degree than FSF.

In this chapter the most important differences between FSF and OSI have been explained and the ideologies of these two organizations within the FOSS movement have been outlined and analyzed. Thus, an analytical framework has been constructed that will be used in the analysis of BIOS and the underlying ideology of this CAMBIA created initiative. In the following chapter the purpose will be to give an analysis of BIOS and CAMBIA.

3. CAMBIA/BIOS

3.1 An introduction to CAMBIA and BIOS

The first section of this chapter will be devoted to introducing the BIOS initiative and its founding organization CAMBIA. A short description of the history, structure and activities of both CAMBIA and BIOS will be provided, the purpose of which is to give the necessary background information for the portrayal and analysis of their underlying ideology in the following section. Since the goals and visions and the rationales behind will be the subject of analysis in a later section, these issues will only be sketchily touched upon here.

The BIOS initiative was launched by CAMBIA in September 2004 with the goal of making the tools of innovation in the life sciences more available (Dennis 2004). Inspired by the FOSS movement they wanted to apply a similar approach to innovation in the biological sciences. Later in this chapter the BIOS initiative and CAMBIA will be explored in the light of the already established FOSS movement in the information technologies and its two different ideologies. As already explained BIOS is an acronym for ‘Biological Innovation for Open Society’, but the word itself means ‘life’ in Greek (BIOS 2006c). In the same vein CAMBIA means ‘change’ in Spanish and Italian and is meant to succinctly describe its mission. And while the name of the organization originally was an acronym for ‘Centre for the Application of Molecular Biology to International Agriculture’, CAMBIA has ceased to use this acronym as the mandate of the center has been expanded to include methods for all areas of the life sciences (CAMBIA 2006a).

The non-profit research institute of CAMBIA is based in Canberra, Australia, and has a team of about 40 people from around the world with diverse educational and vocational experiences working together to create “new enabling tools to foster innovation and a spirit of collaboration in the life sciences” (CAMBIA 2006b: 1). CAMBIA was established in 1991 by Richard Jefferson, now CEO and chairman of the institute, to give developing countries access to the new tools of molecular biology and by that enabling them to apply them to their own needs (O’Neill 2003b). Jefferson wants to bring the tools and possibilities of biotechnology closer to the land; to local plant breeders and growers who know best how to adapt the technologies to local wants (The Economist 2001). He thinks the current approach to biotechnology, with its focus on gathering knowledge rather than developing methods and a lot of energy going into the sequencing of genomes, is sub-optimal. Therefore, the research

center is working on a selection of projects intended to show that another way of doing science is possible (Masood 2000).

CAMBIA's research is mainly focused on areas that have the potential to be of strategic importance in terms of creating a sustainable agriculture. And their goal is to develop enabling tools for increased innovation related to agricultural production, as well as public health, through the use of molecular biology. This is to be achieved through CAMBIA's research programs; one in molecular technologies and one in functional genomics (CAMBIA 2006c).

The molecular technology research program has developed a collection of tools, among them a new transformation method called TransBacter, which was created to serve as an alternative to *Agrobacterium* (CAMBIA 2006d). *Agrobacterium* has been the preferred tool for plant genetic engineering for a long time. Because of its wide host range, this soil bacterium currently serves as the favored method for transferring genes in plants. However, during the more than three decades that this bacterium has been used in biotechnology research many *Agrobacterium* related patents have been granted, and the complex landscape of IPRs surrounding this gene transfer technology is now presenting a real obstacle to its use in both the private and public sector (Chung et al 2006). A simple search using the US patent database will for example reveal that 7119 patents related to *Agrobacterium* have been granted since 1976 (USPTO 2006). As a solution to this problem the researchers at CAMBIA came up with TransBacter, a new method for transferring genes to plants that uses non-pathogenic bacteria outside the *Agrobacterium* genus, and made it available to all that may want to use it (CAMBIA 2006d).

Another important element of the molecular technology research program is the search for new genes of interest that can serve as marker genes. One gene that is strongly associated with CAMBIA is the *gusA* gene from *E.coli*. This gene has been extensively used due to its versatility as a marker gene for plant genetic transformation as well as molecular physiology studies (CAMBIA 2006d).

The search for gene switches is a part of the molecular technology research program that is deemed to be highly relevant for the achievement of sustainable agricultural practices. Tissue-specific, controllable gene switches that can control gene expression are potentially very useful and Cambia's objective is to be able to activate the genes by the application of cheap and easily available substances to crops, so as to give the farmers the possibility of participating actively in the management of transgene use (CAMBIA 2006d).

As part of their molecular research program CAMBIA has also constructed a set of modular DNA vectors to be used in plant transformation research, and sometimes it is possible for scientists to use one of these vectors instead of creating a specific vector for an experiment (CAMBIA 2006d).

The research program on functional genomics represents, according to CAMBIA and Richard Jefferson, a whole new approach to the manipulation of plant genomes (Masood 2000). As opposed to the standard introduction of novel genes to a plant from its distant relatives or perhaps even from outside the plant kingdom, CAMBIA wants to develop methods for exploiting the natural ability of genomes to respond to changes and environmental demands (CAMBIA 2006e). Rather than introducing foreign genes, they want to simulate what a plant naturally does in evolution and make use of the potential that may lie hidden in the genomes to create agriculturally important traits that are easily followed in breeding programs and can be adapted to specific environments and markets. Another possible benefit of this approach is that by utilizing a crop's own genes and thus avoiding the introduction of alien genes, it might be easier to achieve consumer acceptance of the resulting goods (CAMBIA 2006e).

By promoting this approach to the manipulation of plant genomes CAMBIA wants to avoid what they consider to be limitations on the ability to capture outcomes in current functional genomics programs. What they perceive to be a too narrow focus on identifying single genes responsible for traits is believed to have created a reductionism contributing to failure, because most agriculturally important traits are multigenic and rather complex in nature. Genome redundancy and the complexity of genetic interactions are other factors that often make it difficult to achieve successful outcomes (CAMBIA 2006e).

Another technique with revolutionary potential that CAMBIA is working on is apomixis. Apomixis is the name of the ability, occurring naturally in some plants, to reproduce by asexual clonal reproduction, but through seeds (CAMBIA 2006e, Masood 2000). This technique has the potential to fundamentally change plant breeding technology, because succeeding with it would mean that farmers can avoid buying new seeds every year to be able to keep the high yields of hybrids. Farmers would attain greater autonomy and choice in the planting of future generations and it would be easier to adapt superior cultivars to local conditions (CAMBIA 2006e). Reproduction through apomixes would also diminish the propagation of diseases from crops that carry viruses with each cutting that is planted (Masood 2000).

The techniques CAMBIA has developed are made available through open-source licensing at BioForge. BioForge is the part of the BIOS initiative that targets their goal of promoting ‘cooperative open access technology development activities’ (BIOS 2006a). The BIOS initiative consists of three parts, each targeting one of their three main objectives. While the internet community of BioForge was constructed to be a place where scientists from around the world could collaborate on fostering biological innovation, the BIOS licenses were meant to help achieve this by promoting ‘innovation system structural reform’ and thus creating a protected commons for enabling technologies (BIOS 2006a).

Normally, licenses for patented technology impose rather strict conditions on the licensee, and include fees or royalties or both (BIOS 2006b). The BIOS licenses on the other hand, do not require any royalties or fees of the licensee, but anybody who wants access to the technologies in the ‘protected commons’ created by BIOS must agree to a particular set of legally binding conditions. These conditions demand that the licensees, in exchange for access to the technologies, agree to share any improvements they might make and not appropriate the ‘kernel’ of the technologies and changes made to it for themselves exclusively. Any discoveries made concerning bio-safety must also be shared. In addition, the licensees have to consent to not preventing other licensees from using the technologies and improvements in developing different products (BIOS 2006b). These conditions are quite similar to the requirements of the GPL and other copyleft licenses, in that they specify that improvements to the licensed technology must also be made available on the same terms as the core technology.

As of now, two BIOS licenses have been developed, and a third one is being drafted. The first license is the Plant Enabling Technology License, which has been used by companies and non-profits in both the developing and the developed world. There is a similar license for health-related technologies under development, and because of the quite substantial interest in the use of BIOS licenses in relation to the sharing of genetic resources there is also a Genetic Resource Technology License (BIOS 2006b).

Even though the BIOS licenses have been developed with the FOSS movement and their licensing practice as inspiration, there is an important difference between the two areas; within the biological sciences the most used IPR is patents, while in the software industry it is copyright. These two types of IPRs are rather different in nature, and therefore the FOSS inspired licensing within biotechnology creates a different type of concerns than what has been the case in software. One such issue is the question of patent misuse, and whether the licensing practice of BIOS and other similar projects run afoul of anti-trust legislation. But

even if the different nature of patents and copyright and the issues that arise as a result are worth mentioning in this context, it is outside the scope of this thesis to explore the matter in full depth. The licensing practice of BIOS might be said to resemble ‘patent pools’, where access to patents is tied to other patents and the members license their technology to other members in turn for licenses from them (Boettiger and Burk 2004). Patent pools may violate anti-trust regulation if they function as coordinating mechanisms for cartels, but in the case of BIOS these concerns are unlikely to arise because of the non-exclusive nature of the licenses (Boettiger and Burk 2004).

The last part of the BIOS initiative is the PatentLens, which is a tool for ‘intellectual property informatics and analysis’ (BIOS 2006a) that is intended to increase patent transparency and make it easier to navigate the IPR landscape. The PatentLens database contains an extensive collection of patents and patent applications from a wide range of countries. It is updated continually to include new areas and jurisdictions, as well as new applications and granted patents from the already covered jurisdictions, and there are no fees attached to its use (CAMBIA 2006f).

Since BIOS is a CAMBIA created and managed initiative and the activities of the two entities to a certain degree overlap, they will in the following sections be treated as one when it comes to the analysis of their ideologies. It is assumed that they more or less share the same underlying ideology and purpose, and therefore, that even if it is the BIOS initiative that is the main focus of analysis, CAMBIA documents and statements will also be of relevance.

3.2 The dominant value system of today

Later in this chapter one goal of the analysis will be to determine whether the ideology of CAMBIA/BIOS is typical of a radical value system and to what degree their ideology is in opposition to the dominant value system of today. To provide a background for that analysis this section will explore the parts of the current dominant value system that are relevant in this context; intellectual property rights and their linkage to the economic system.

Intellectual property rights (IPRs) can be defined as “the rights given to people over the creations of their minds. They usually give the creator an exclusive right over the use of his/her creations for a certain period of time” (WTO 2006: 1). The history of IPRs is quite long; patents can be traced back to the 15th century in England, while copyright has its main roots in the French revolution of 1789 (Mueller 2003). IPRs are part of a wider system of private ownership and property rights that since the transformation from socialism and

communism to capitalist-style economies in Eastern Europe, Russia and China in the last quarter-century, has been brought to a previously unattained level of importance (Demsetz 2002).

Demsetz (2002) argues that an important, though maybe implicit, assumption behind the influential perfect-competition model, is the assumption made about private-ownership institutional arrangements and the belief that to secure perfect competition all scarce resources should be owned privately and securely. The perfect-competition model was developed towards the end of the period between 1776 and 1930, when the logic and tools of economics were put in place with key contributions from people like Adam Smith, David Ricardo and John Stuart Mill. In this fairly prominent model the existence of a perfect-ownership system is implicitly assumed (Demsetz 2002). It is the same type of logic and the same assumptions that make up the rationale for IPRs.

According to Benkler (2001) the current dominant paradigm on productivity postulates that production must be organized in one of two forms: market-based exchanges or firm-based hierarchies. Both types depend on “clear property rights to control resources and inputs” (Benkler 2001: 4). Benkler argues that this paradigm and its underlying assumptions have led to a development where the information economy is being built on the same building blocks as the economy of steel and coal; property rights and contractual exchange.

In the same vein, Boyle (1997) claims that the legal form of the information age is intellectual property; in terms of ideology and rhetorical structure as well as practical economic effect. In an information society one of the most important sources of power is the ownership and control of information, and therefore IPRs are becoming more essential. Boyle states that the centrality of IPRs will continue to increase, mainly due to two aspects of the current information economy; one being the enhanced homologisation of different forms of information and the other the decreasing proportion of product costs together with less intellectual attention being devoted to medium compared to message.

IPRs are granted to more and new types of information with the rationale that they will contribute to further innovation and discovery (Boyle 1997). It is believed that if inventors do not have the ability to exclude others from using their invention, due to the non-rival and non-excludable nature of information goods, they will not be able to charge for their products and as a consequence there will be no incentives to create. A limited monopoly in the form of IPRs is offered as the solution to this problem (Boyle 2003).

This line of argumentation is not new, but with the lowering of costs related to copying and transmission of information-intensive products, together with the increased

importance these types of goods are believed to have for the economy, it has gained additional authority. The assumption is that the strength of IPRs should vary inversely with copying costs (Boyle 2003). Together with the ideal of original creation and the resulting logic that there is no need for a public domain if it is possible to create out of nothing, this argumentation about the need for incentives is part of the logic behind the spread of IPRs that can presently be seen (Boyle 2003). An example of the expansion of IPRs, as well as an illustration of the link between IPRs and the market, is the way the GATT (the General Agreement on Tariffs and Trade) has been used to turn intellectual property violations into trade violations, one consequence of which is the laying down of a particular vision of intellectual property that is approved and sanctified by its connection to 'the market' (Boyle 1997).

Boyle (2003) labels this expansion of IPRs 'the second enclosure movement', comparing it to the English enclosure movement of the eighteenth century where common land was fenced off and turned into private property. As was the case in the first enclosure movement, "things that were formerly thought of as either common property or uncommodifiable are being covered with new, or newly extended, property rights" (Boyle 2003: 37). According to Boyle the rationale behind this new enclosure movement is more or less the same as it was in the original enclosure movement. It is argued that only by the extension of property rights the necessary investment of time, ingenuity and capital to produce innovation will be guaranteed. Private property rights are viewed as a necessary incentive to research. In Boyle's opinion the attitudes to IPRs and their purposes have changed, the underlying motto now being that 'more is better'. Property and property rights in any form are regarded as so beneficial that they should be extended basically everywhere. Together with stretched interpretations of the criteria of novelty and non-obviousness there have been attempts to introduce IPRs over what would previously have been considered mere compilations of facts. In the dominant value system there is no faith in the productive power of the commons, and the view is that any type of commons will be inefficient. The conclusion reached is that expansion of property rights is required to fuel progress (Boyle 2003).

This view is also in accordance with an important part of the dominant value system of today; the post-Cold War 'Washington Consensus', where it is claimed that growth and efficiency can only be achieved through markets. And as was done in the related perfect-competition model it is assumed that markets are dependent upon property rights. Boyle (2003) claims that the arguments in favor of the expansion of IPRs actually rest rather heavily on the assumptions of what he calls the 'neo-liberal orthodoxy' or the 'Washington

Consensus'. The goal of neo-liberal economic thought is to minimize the role of governments and create well-functioning free markets where one of the only roles of the state is to define and protect property rights (Boyle 2003). Yet again it is apparent how the prominent place of IPRs in the legal-economic system of today is connected to the fundamental role property rights play as a prerequisite for functioning markets in a dominant value system characterized by its prioritization of exactly that.

In this section the relevant part for this context of the dominant value system has been presented and the importance of IPRs in this value system and their linkage to essential economic beliefs has been explained. This was done to enable a comparison of the current dominant value system to the value system represented by the ideology of CAMBIA/BIOS later in the chapter.

3.3 The ideology of CAMBIA/BIOS

3.3.1 CAMBIA/BIOS and their ideology

Ideology was defined in chapter two as political ideas, or, 'action-oriented systems of beliefs' that are meant to motivate people to act or not to act in a specific way, either to serve the status quo or to cause its overthrow. It is the same understanding of the concept that will underlie the presentation and analysis of the ideology of CAMBIA/BIOS, but as was done in the analysis of FSF and OSI, the Marxist inspired categories of Parkin will also be used. The purpose of the following section is to discover and analyze the ideology of CAMBIA/BIOS and compare it to the two different ideologies in the FOSS movement that was described and examined in chapter two.

As was mentioned previously, when the BIOS initiative was launched by CAMBIA in 2004 they wanted to improve the access to the tools of innovation in the life sciences. Their approach to the issue of access to enabling techniques is shaped by their conception of the current system and what they perceive to be its problems. According to CAMBIA/BIOS many individuals and groups in both the developed and the developing world are prevented from accessing and harnessing the technologies of the biological sciences due to the current business and legal landscapes (BIOS 2006c). Innovation for or by the excluded and poor does not in their view take place to a satisfactory degree as a result of the ruling scientific, regulatory, legal and economic paradigms that both shape and reflect what technologies are available for problem solving. In their opinion there are many examples of the limitations

created by this system; from the dominating position large multinationals increasingly hold in agriculture to the very limited attention paid to health applications that could better the situation of the poor compared to the amount of resources spent on high-margin pharmaceutical applications for the rich (BIOS 2004).

CAMBIA/BIOS argue that the innovation system as it exists today is encouraging the appropriation of important enabling technologies in the biological sciences through IPRs, normally patents. The substantial increase in patenting is assumed to have made the task of accessing all the necessary components of a technology needed for its use impossible for all but the most powerful corporations (BIOS 2006c). Because biological technologies to an increasing degree are not independent, but inter-reliant technologies with a need for an assortment of key components to function that might all be individually protected by patents, lack of access to any one of the components both prevents the use of the technology by potential users and hinders the cooperative improvement and customizing of the technology that are required to meet a diverse array of users needs (BIOS 2004). According to CAMBIA/BIOS the interdependence of a fragmented set of technologies and the IP practices surrounding them are some of the elements that results in Fear, Uncertainty and Doubt (FUD) (BIOS 2006c), which again destroys investment incentives and confidence in both the public and private sector. But while the multinational private sector has chosen to solve this problem by the collection of large IP portfolios and cross licensing, the public sector and the small entities in the private sector are at serious disadvantage due to their modest portfolios and small capital and willingness to license out publicly developed technology. The big corporations are only interested in investing in the highest margin products, and therefore there is a crucial lack of attention to the products of interest for smaller and/or less capital-rich markets (BIOS 2006c).

It is above all the situation of the disadvantaged of the world that CAMBIA/BIOS want to address. They argue that the problems faced by disadvantaged groups across the world, either they come in the form of environmental degradation, poor nutrition, lack of sustainable food production or diseases and medical conditions, are not being attended to by modern biological technologies, despite what they consider to be the undeniable potential impact of these technologies. The reason for this letdown is assumed to be a structural failing in the way science is being applied to the promotion of economic and social development. Modern science in general and biotechnology in particular have been evolving in a world dominated by high-capital and high-margin applications that are of little relevance to the four billion people around the world living in poverty or exclusion. The IPR regimes are made to

promote and protect this innovation system, and together they contribute to the disempowerment of the poor. The extensive and growing use of patents in the biological sciences is believed to have created a thicket of rights and barriers to innovation that marginalize those most in need, because only the resourceful possess what is necessary to overcome them (BIOS 2004).

Richard Jefferson, the previously mentioned CEO of CAMBIA, argues that “big money is triumphing over public interest” (Jefferson 2003: 1) in the area of biotechnology. In his opinion science is no longer being fully transformed into something of value to society, because the market is left to rule. He judges the market forces to be neither balanced nor representative of the public interest, and feels that high-capital agents, strictly economic considerations and following unwise use of IPRs are characteristic of the situation in the area of science today. In his opinion public agencies are no longer able to compete with the multinational companies, and as a consequence the public good is ignored and the delivery of innovations and innovative capacity to neglected people and problems is threatened (Jefferson 2003).

When it comes to the market forces and the way they work, the opinions of Jefferson are quite different from those of OSI. The OSI ideology, especially in the form advocated by Raymond, stands for an altogether more positive outlook on the market, and OSI consider the market to have beneficial consequences for innovation as well as for society in general. When OSI is promoting FOSS, this approach is not looked upon as something conflicting with the rule of the market. Their view on FOSS, its importance and its role in society is, as already mentioned, not in opposition to the ruling economic paradigm and its market centered focus.

In their description of the current innovation system and how it affects the situation of the poor and excluded the concern of CAMBIA/BIOS for the disadvantaged and their wish to use the biological sciences to benefit development are very visible. They are not satisfied with the way the system is made up and how it is working today, and changes are deemed to be necessary. The want for change and the dissatisfaction with the innovation and IPR systems are something CAMBIA/BIOS share with FSF, who think that the workings of the current system are detrimental to society. But while the barriers to sharing are the main cause of concern for FSF, CAMBIA/BIOS are most worried about how the system ignores the problems faced by the disadvantaged. In their opinion there are structural faults to the current system that can only be overcome by structural reform, mainly in the shape of a change in how IP is managed. Since one of the key explanations offered by CAMBIA/BIOS of why the ruling innovation system needs to change is the way it neglects the needs of a large

percentage of the world population, it can be argued that an underlying assumption in their ideology is that science and innovation should be organized and handled in a way that includes the needs of people across the world, regardless of their financial situation and influence. With the concern for the poor and disempowered at the core of their arguments, their ideology can, just as the ideology of FSF, be described as value based and focused on ethical issues.

The emphasis placed on values is also evident when CAMBIA/BIOS describe their own goal as being “to forge new mechanisms to empower biological innovations by and for those most neglected in the high capital world, without turning our backs on the beauty and potential of science and technology” (BIOS 2006d: 1). It is the desire to meet the needs of the neglected that is the driving force behind their actions. They want to change the innovation system as it functions today and “develop new innovation systems for disadvantaged communities and neglected priorities” (BIOS 2006a: 1), and in their yearning to change the situation, there is a clear moral condemnation of the current circumstances with regard to both the way the innovation system functions and its consequences. The belief in the potential of biological innovation, a term that can be defined as the human manipulation of living systems for the purpose of improving and sustaining life and life quality (BIOS 2006d), when it comes to bettering the situation for those left the worst off by today’s system, is quite strong. It is believed that biological innovation, if used right, can have a definitive impact on human livelihoods.

In many ways two of the most important assumptions in the ideology of CAMBIA/BIOS are the strong belief in the potential of science and technology to benefit the world and the awareness that this potential is not being fully exploited in the current innovation system. These two assumptions make up the rationale for why a change in the system of innovation is needed, and the efforts of CAMBIA/BIOS are intended as a push in the right direction, towards a system of innovation that does not overlook the needs of those without capital and power, and where the potential of biological innovation is explored to its fullest.

The strong belief in and positive outlook on science and technology that are displayed in the above quotations from the WebPages of the BIOS initiative, are symptomatic of what might be called ‘technology optimism’, as opposed to a more pessimistic view on the consequences of science and technology for human kind. This optimism demonstrated by CAMBIA/BIOS with regard to the positive potential of science and technology shares common ground with the belief in knowledge and reason and their transformative potential

that was essential in the enlightenment movement and philosophy of the 18th century. The shared elements with enlightenment philosophy are something CAMBIA/BIOS have in common with FSF. The ideology of FSF, as has been touched upon before, has also commonalities with enlightenment philosophy.

The purpose of BIOS and what the initiative wants to achieve, is supposed to be indicated in the name chosen for it; 'Biological Innovation for Open Society'. The term 'biological innovation', which was defined above, is used to emphasize that BIOS is more than a biotechnology initiative. Even though biotechnology is central to the initiative because of the opportunities it represents and since the access to use is so threatened in this domain, all forms of biological innovation are relevant to BIOS due to the constraints faced by the disenfranchised user groups in every area. The goal of creating an 'open society' is also essential to the institutional philosophy of CAMBIA and BIOS (BIOS 2004).

Both CAMBIA and BIOS hold to a philosophy they call their '3-D' vision. This vision is made up of a set of priorities and a set of actions. The three goals that guide their priorities are the wishes to decentralize, democratize and diversify. In setting up decentralization as a priority CAMBIA/BIOS want to emphasize the importance of developing local solutions to problems at the level of farms, ecosystems and regions. They would like R&D activities to be geared towards the variability in agricultural production and consumption, so as to increase the sustainability and robustness of the solutions. In the inclusion of democratization as a priority lies a call for the participation of farmers in the development of innovations to suit their needs, as well as the involvement of local researchers that can contribute with their knowledge of local circumstances. CAMBIA/BIOS want to develop policies and technologies that are responsive to and target the real needs and concerns of the public. When speaking of diversity as a guiding priority, CAMBIA/BIOS have in mind the rich diversity of genetics, societies and environments and their wish to encourage strategies and methods that make use of and maximize this diversity. In relation to diversity they also want to underline the need for a diversity of solutions rather than a prescriptive approach (CAMBIA 2006g).

The second set in the 3D vision of CAMBIA/BIOS is the set of actions, which is meant to guide their choice of procedures and form their interventions, and consists of the steps design, develop and deliver. In the design of technologies and policies CAMBIA and BIOS try to be very conscious of the context, including the IP landscape that their products must operate in. When developing their methods and technologies the focus is on practicality and what potential use the tool in question can be of to their users. The users and clients are also main concerns when it comes to the delivery and dissemination of the invented tools and

technologies. Success is only judged to have taken place if the technologies in question are incorporated into programs of innovation, and CAMBIA/BIOS are striving to provide technologies and tools with as few constraints on their use as possible (CAMBIA 2006g).

When looking at the 3D vision espoused by CAMBIA/BIOS it is possible to discern some of the most central elements in their ideology. As can be seen from the above explanation of their 3D vision, the value placed on local solutions and participation is very high. Their approach to science and technology is also meant to be very user-centered; the potential users and their diverse needs and innovative capabilities are supposed to be placed at the core of their proceedings. These elements make it possible to use the term ‘bottom-up’ to describe the approach advocated by CAMBIA/BIOS. Rather than looking at the world and offering solutions to perceived problems in a ‘top-down’ manner, CAMBIA/BIOS want to foster participation. They want to involve the potential users of their technology in innovative work directed toward solving problems at a local level taking into consideration local possibilities and constraints. As was mentioned before, to what degree CAMBIA/BIOS are actually succeeding in doing this and how they go about achieving it in practice is outside the scope of this thesis, and these issues are therefore left to be taken up by other studies.

The mentioning of participation, local solutions and democratic innovation is something that alongside the need for empowerment of the poor surfaces a lot in different documents where CAMBIA/BIOS describe what they want to achieve. This approach is very in tune with the participatory development approaches, which belong to a paradigm currently dominating the view on the best way to promote development held among development practitioners and academics. In this paradigm the most important slogans are precisely ‘participation’ and ‘empowerment’ and there is a number of different ‘participatory approaches’ vying for attention, that are supposed to include the benefactors of development programs in the process of both defining problems and finding the appropriate solutions. This paradigm has had quite a pervasive influence on different organizations, initiatives and programs that in some way or another operate within the area of development. In this connection the term ‘development’ is used in a wide sense to indicate an improvement of life situation for the underprivileged, and ‘development work’ is efforts that target one or more areas in an attempt to achieve this. With their focus on ensuring that enabling technologies are accessible to all, especially those who cannot easily access them under the existing regime, and their wish to advance science and technology that might benefit the poor and powerless, CAMBIA/BIOS are in many ways involved in development work. Since they are engaged in

development efforts it is not so strange that they might have been influenced, either directly or indirectly, by the paradigm that are ruling the ground in development circles nowadays.

Apart from the elements in the 3D vision, the examples of the importance placed on participation, local solutions and empowerment by CAMBIA/BIOS are quite many. In the BIOS initiative proposal it is emphasized how they are focused on “the empowerment of the more than four billion people at the bottom of the economic pyramid and their creative capacity for innovation as a sustainable intervention in human development” (BIOS 2004: 6). In the same document it is also underlined how their view is that “sustainable and equitable development can only happen through the committed and creative participation of those experiencing problems in the generation of robust local solutions” (BIOS 2004: 2). These quotes illustrate the central place these values take up within the ideology of CAMBIA/BIOS, and how participation and empowerment are looked upon both as means to an end, and as goals in their own right. Participation and empowerment are considered crucial for the process of finding local solutions and achieving development, but also deemed to have a value on their own.

This participation and empowerment centered part of the CAMBIA/BIOS ideology has most in common with the ideology of FSF compared to that of OSI, because of the clear ethical position that is taken. As previously explained, OSI likes to emphasize that their position is not related to ethical and moral issues, but comes from a pragmatic consideration of benefits in terms of efficiency and quality. FSF, on the other hand, do take a stand on moral and ethical issues and stress that, in their opinion, the issues connected to access and IPRs are ethical in their nature. Therefore, even if neither FSF nor OSI have a particular position on development and participatory approaches, it is the ideology of FSF that lies closest to CAMBIA/BIOS on this issue.

As has been touched upon before, CAMBIA/BIOS have been inspired by the FOSS movement and what they have achieved within software and want to use the same recipe within the biological sciences to accomplish the same kind of success. The new innovation model that they would like to implement consists of the same elements as the one that has been successful in the software area; collaborative invention and a protected commons.

Collaborate invention, or cooperative open access technology development, is the second element of the three that make up the BIOS initiative. The objective is to develop a new interactive R&D paradigm to foster the creation of new technologies and solutions. By harnessing the communication power of the Internet and drawing on the minds and creativity of a diverse set of collaborators, CAMBIA/BIOS want to develop a collection of technologies

that are superior to the ones in use at present. BioForge was set up to serve as a site where collaborate invention could be organized and take place.

The protected commons is being created by use of the BIOS licenses, which regulate what can be done and not to the licensed matter. When patentable and patented technologies are placed in a protected commons, the patent system is exploited in a manner that enables use rather than prevents it (BIOS 2006e). This approach has been chosen as the best way to ensure access, over the alternative of placing technology in the public domain, because it is felt that the public domain does not offer enough protection against private appropriation (BIOS 2004). The argument is that information placed in the public domain will be in danger of being seized upon by the companies that can afford to and developed into patentable products (BIOS 2006e). This argumentation is very similar to the one offered by the FOSS movement, where it is argued that creations left in the public domain are in danger of being altered in a minor way and then closed off from public use by IPRs.

In addition to recognizing quite openly the inspiration they have drawn from the FOSS movement, CAMBIA/BIOS are also emphasizing how their thinking has elements in common with the philosophy of academic communities and the forceful drive to share the results of scientific work that tends to be found there. The academic ideals have also been a source of inspiration for FSF. CAMBIA/BIOS also trace their roots back to the sharing principles practiced by the farmer-breeders throughout agricultural history (BIOS 2004), and what is often called common heritage thinking and principles. In the common heritage tradition genetic resources like seeds are looked upon as something that belongs to the whole of man kind, and not something it should be possible to take out IPRs on to limit the access of others (Fowler 1994).

However, despite the fact that Jefferson today makes references to the FOSS movement and underlines how CAMBIA/BIOS have similar objectives to and have been inspired by FOSS, at the time when he first came up with his ideas for CAMBIA he was unaware of the existence of FSF, and OSI had not even been created yet. But although CAMBIA and Jefferson's ideas about sharing was developed independently of the movements in software, later on, especially in the creation of the BIOS licenses, he has been quite influenced by them (Poynder 2006).

As previously mentioned, the ideology of CAMBIA/BIOS can be characterized as value-based with an ethical and moral agenda. The values and ideals this ideology is based on are visible in the language used by CAMBIA/BIOS to express what they want to achieve, as well as in the goals themselves. Certain words and expressions occur frequently in

CAMBIA/BIOS documents and when central people from CAMBIA/BIOS explain their vision in the media.

One such term is ‘public good’. This phrase is very essential in the CAMBIA/BIOS ideology, because the public good is exactly what these organizations feel should be a priority and something to steer by when legal systems for innovation are drawn up and decisions regarding investments in science and technology are made. The wish to serve the public good is fundamental to CAMBIA/BIOS, but the term and what they mean by it is never really defined. It is clear that they want what is good for ‘the public’ to be decisive, but in real life more often than not ‘the public’ will be divided on what they want and what will benefit whom. However, within the CAMBIA/BIOS ideology there is an unambiguous stated prioritization of the poor and disadvantaged, so it can be assumed that when CAMBIA/BIOS want to work for ‘the public good’ these groups are taken into consideration. It is also quite clear that ‘the public good’ is associated with access and open practices, and ‘public good’ considerations are often contrasted with only looking after the economic bottom line.

Another central term in the CAMBIA/BIOS ideology that surfaces when for example Jefferson outlines what he considers to be the problems in the current innovation system in the biological sciences and what needs to be done, is ‘democratization of innovation’. When speaking of the need to democratize innovation, what Jefferson wants is to “ensure that the core of innovative capability is distributed and shared in such a way that people are bound legally, in acquiring access, to share improvements they might make themselves” (O’Neill 2003a: 1). In Jefferson’s opinion one of the purposes of CAMBIA and their BIOS initiative is to provide tools and technologies to the disenfranchised that they themselves help to design (Masood 2000).

As can be seen from these statements, sharing of and participation in technology development is considered crucial for innovation to deserve the name democratic. It is also felt that science can only be relevant to the process of equitable and sustainable development if it takes place in a system of democratic innovation that is sensitive to the operating constraints faced by the problem solvers. To a certain extent CAMBIA/BIOS seem to equate open innovation with democratic innovation. Increased openness, together with sharing and participation is believed to contribute towards democratization of the biological sciences (BIOS 2004).

Sharing of information, enabling technologies and improvements is very central in the ideology fronted by CAMBIA/BIOS. The importance of sharing is reflected in the frequency with which the word occurs in their documents. When something is shared, in the vocabulary

of CAMBIA/BIOS, it is made available for use (BIOS 2006e). As was the case with FSF, the importance placed on sharing is also characteristic of CAMBIA/BIOS, and it is believed that in the current environment of protecting patent rights a fear of sharing is induced in people who would otherwise be favorably disposed towards it (BIOS 2006f). This alleged fear of sharing is very similar to the ‘psychosocial harm’ argumentation presented by Stallman and FSF, where the assumption is that the natural urge most people have to share with their neighbor what that neighbor could use when it does not impose a particular cost on themselves, is being held back by the license agreements normally employed in software. This is believed to have a detrimental effect on the public spirit. While the argumentation engaged in by CAMBIA/BIOS does not go into the same depth on this subject as Stallman does in his writings, some of the same meaning is conveyed.

The human rights concept is also essential to the ideology of CAMBIA/BIOS. An important part of their effort to achieve structural reform of the innovation system is described as being to “increase fairness in access to the tools of innovation as a fundamental human right” (BIOS 2006c: 3). When they define access to the tools of innovation as a human right CAMBIA/BIOS are taking a pretty firm stand on the question of access and who merits it. If access to the enabling tools of innovation is recognized as a human right, this could for example mean that nobody who wants to use these technologies can be denied it or hindered by IPRs. The tying up of the concept of human rights to the question of access is an element of the CAMBIA/BIOS ideology that makes it natural to compare it to the Human Rights Based Approach to Development (HRBAD). In this approach, which has come to hold quite an influence in development and aid circles in the last decade, development is defined as promotion and fulfillment of and respect for human rights (United Nations 2006). Empowerment and participation are essential elements in this approach, but it is nonetheless different from the previously mentioned participatory approaches because of its expressed linkage to rights and uncompromising attitude towards these (United Nations 2006). With their promotion of access to the tools of innovation as a human right, CAMBIA/BIOS embrace the principles and discourse of the HRBAD. And, even if ‘the right to access’ as they define it cannot be found among the recognized human rights, the approach to development advocated by CAMBIA/BIOS can be linked up to the right to food, since one of their ultimate goals is to end hunger and malnutrition by easing the access to essential tools and improving the relevant technology.

The view on access to innovation and technology as a rights issue is another element CAMBIA/BIOS share with FSF. As was mentioned above, Stallman and FSF consider access

to the source code of software to be a human right. OSI and Raymond, on the other hand, do what they can to avoid talking about access as a right and want to keep the focus on the practical and economic benefits of the open source model. Indeed, all the values and moral and ethical issues that have been mentioned as part of the CAMBIA/BIOS ideology; the public good, democratic innovation, sharing and human rights, are elements that make the ideology of CAMBIA/BIOS more similar to that of FSF than that of OSI. In addition to the fact that some of the same elements can be found in both the FSF and CAMBIA/BIOS ideologies, the presence of explicit moral and ethical elements at all, is an indication of the similarity between these two ideologies. The absence of an explicit recognition of the relevance of ethical and moral questions is one of the key elements that separate the ideology of OSI from the ideologies of FSF and CAMBIA/BIOS.

When the ideologies of FSF and OSI were analyzed above it was found that there is a conscious choice behind their use of language and preferred terms. The decision to use either free or open source about the type of software solutions they are promoting was made very deliberately to signal their attitudes and to emphasize what differentiates them from each other as well as from non-free/closed software. CAMBIA/BIOS use the open source terminology, but it seems to be less of a conscious choice and endorsement of the OSI part of the FOSS movement, and more of a natural consequence of this terminology having more or less won the battle for attention in the mainstream media as well as in some academic circles. Their choice of the term ‘open society’ though, appears to have been consciously made because they regard this phrase as less likely to be misunderstood than for example the word ‘free’ that is used by FSF (BIOS 2006g).

As already mentioned, CAMBIA/BIOS acknowledge the inspiration they have drawn from the movement pursuing openness in software, but in most of their written materials they do not distinguish between OSI, FSF and the FOSS movement as a whole. However, in an expansion of their original proposal some knowledge of the two distinct organizations within FOSS and their differences is demonstrated (BIOS 2006g). In this document an open recognition of the similarities CAMBIA/BIOS share with the ethos of FSF can also be found. According to CAMBIA/BIOS they have in common with FSF the view that ‘Freedom to Innovate’ is a human right and that the goal of their activities is to create this freedom, not to deliver or create cheap or free goods, although this can be a positive consequence of the liberty to share and innovate (BIOS 2006g). And in addition to acknowledging the ethos they have in common with FSF, CAMBIA/BIOS also recognize their similarities with OSI when mentioning how “the degree of accommodation of private enterprise and capital recruitment

mechanisms by Open Source has more resonance with the challenges of innovation in the life sciences, where time frames and capital thresholds are of much larger magnitude than in software engineering”. But, unlike OSI and FSF, who both use binaries to make a clear distinction between different ways of developing software and the attitudes that go with it, CAMBIA/BIOS do not really provide an antonym to go with their open source biological science. They describe the problems caused by the existing system and draw up a picture of the changes they would like to make, but when it comes to the language they use to communicate their message, it is less colored by the need to separate different ways of handling innovation by the use of definitions than the case is with OSI and FSF.

An interesting aspect in this regard is how Jefferson and CAMBIA/BIOS despite the lack of binaries and confrontational antonyms in their vocabulary seem to possess a need to distinguish themselves from other movements promoting solutions that might seem similar to those they are advocating. While both FSF and OSI use their binaries ‘free versus non-free’ and ‘open versus closed’ to emphasize how their approach is different from the mainstream solution as well as from each other, the same tactic is not used by CAMBIA/BIOS. When prodded however, Jefferson reveals a keen need to explain the differences between what CAMBIA/BIOS is trying to achieve and the goals of for example The Open Access Movement. It is important to him that CAMBIA/BIOS are not confused with Open Access, since he regards it as crucial that they are not promoting only open access and access to knowledge but the capability to actually be able to use scientific knowledge and tools (Poynder 2006). In a way this need makes CAMBIA/BIOS similar to both FSF and OSI, since they all seem to care about separating themselves from other similar movements close to or within their own field.

Although CAMBIA/BIOS do seem to possess only a limited understanding of the differences of ideology existing within the FOSS movement, the documents on their internet pages and the fact that they have listed two articles of Yochai Benkler as recommended readings suggest that they have been following the academic debate about FOSS, similar phenomena and their potential and possible impact on societal development. Benkler is among the major scholars contributing to the knowledge about and thinking around FOSS and related modes of production. One of Benkler’s (2001) main points in his article “Coase’s Penguin, or, Linux and the Nature of the Firm” is that what he calls peer production is of great possible importance for the whole information, knowledge and culture economy and that it might well outperform market and firm- based production in some of these areas. The academic enterprise is one example illustrating how peer production works. Within the

academic world “thousands of individuals make individual contributions to a body of knowledge, set up internal systems of quality control, and produce the core of our information and knowledge environment” (Benkler 2001: 7). This type of production is non-proprietary, and the resulting products are looked upon as part of a commons that no one is the owner of and from which nobody can be excluded (Benkler 2001).

In Benkler`s opinion (2001) peer production is a superior type of production, for one thing because it allows individuals to select and volunteer for the chores they are most suited to perform. This makes peer production especially appropriate for activities where human capital is the main input. The systemic advantage of peer production over markets and firms is that it is able to match the best available human capital to the best available information input in an effort to create the most desired information products. In the last decade peer production has been emerging on a greater scale, and one of the reasons for this is the declining price of the physical capital needed in information production. In addition, the decreasing costs of communication make human capital the primary economic good involved by lowering the cost of information intensive peer production (Benkler 2001).

As an approach to induce economic growth through innovation and information production, the strengthening of IPRs that can currently be seen is in Benkler`s view the wrong way to go. IPRs are looked upon by him as a hindrance to the process of matching human capital to information inputs and thus creating new information goods, by reducing the amount of information inputs available. While people looking at IPRs in a more favorable light will argue that IPRs function as an incentive and that investments in research might not be made without them, the argumentation presented by Benkler is similar to the argumentation in the CAMBIA/BIOS ideology on how the existing IPR system represents a barrier to innovation.

In his article “Sharing Nicely: On Shareable Goods and the Emergence of Sharing as a Modality of Economic Production” Benkler (2004) takes his theories on peer production to the next level by including this category of production in a third system of economic production that is supposed to exist alongside markets and the state. This third type of production consists of social production and exchange, and Benkler argues that the scope and relevance of this production type have increased and are still increasing. As a technology dependent type of production, the factors have shifted in its favor. Sharing as it is occurring today in information and communications production is happening in a quite impersonal, project- or function-specific and decentralized manner, and depends rather heavily on technology to be efficient. The decreasing cost of the necessary technological tools, such as

internet, have made them widespread throughout most of society and enabled sharing as a form of economic production (Benkler 2004).

According to Benkler (2004) there is a particular class of goods that is especially suited to sharing. Due to their lumpiness and medium granularity these goods possess a systematic overcapacity that can be utilized by people other than the owner. Lumpiness, as defined by Benkler, describes the degree to which the goods “provision functionality in discrete packages rather than in a smooth flow” (2004: 277). Granularity is meant to capture technical characteristics of the goods as well as the demand and wealth in the relevant society. By these measures a PC will be lumpy and mid-grained in most of the western world. It will be lumpy because “you cannot buy less than some threshold computation capacity ” (Benkler 2004: 277) and once you buy it you possess a certain amount regardless of whether you need all of it or not. The medium granularity is a result of private ownership being quite widespread when it comes to PCs in the western world and how these privately owned PCs “systematically exhibit slack capacity relative to the demand of their owners” (Benkler 2004: 277). Because of these characteristics it will have an excess capacity that can be put to use by social sharing (Benkler 2004).

When CAMBIA/BIOS list these two articles as recommended readings on their web page it suggests that they identify with and have drawn inspiration from the theories Benkler presents. They might consider the BIOS initiative to be a type of peer production, and look upon the technologies and materials it encompasses as sharable mid-grained and lumpy goods. Most importantly however, they have probably drawn encouragement from how Benkler portrays peer production and different types of social sharing as viable and efficient forms of economic production that are well adapted to our current society and its economic, technological and social characteristics. If Benkler is right in assuming this, it might mean that CAMBIA/BIOS are likely to succeed in their endeavors.

Other than referring to Benkler’s articles on their web page and briefly mentioning the FOSS movement every now and then with a particular focus on the success of Linux as an example to follow in terms of alternatives to the dominating system of innovation, CAMBIA/BIOS do not really talk explicitly about their inspiration, ideological or otherwise. And, as already mentioned, even though they consider the FOSS model to be worthy of following in other areas of innovation besides software, CAMBIA/BIOS do not show any detailed knowledge about the characteristics of the two different ideologies within FOSS.

Nevertheless, whether it is a factor they are conscious of or not, CAMBIA/BIOS do have some basic elements in common with FSF. The agendas of both FSF and

CAMBIA/BIOS are characterized by something more than the practical considerations of OSI regarding what the most efficient system for governing innovation is; they both work for what they consider to be the public good and a better society. Within the CAMBIA/BIOS ideology the needs of developing countries have a special place, while within the FSF ideology it is the society's need for the freedom to share that is the main priority. These two priorities do not run counter to each other though, quite the opposite; sharing is essential to CAMBIA/BIOS and often mentioned by Jefferson as the way to attain the much needed innovation of useful tools and techniques.

Since the OS terminology is dominating both the discourse surrounding software and the language within CAMBIA and the BIOS initiative however, the image of CAMBIA/BIOS in the media is to a larger degree associated with the Open Source part of FOSS than with FSF, even though it is this part of the movement that CAMBIA/BIOS have most in common with in terms of ideology. The tendency to equate the efforts of CAMBIA/BIOS with Open Source can be illustrated by how CAMBIA and the BIOS initiative are portrayed under the headlines of "Open-source Agriculture" and "Now, open source in Biotech" (Stewart 2005, Jishnu 2005). In these articles, as well as others, CAMBIA and BIOS are described as organizations promoting Open Source solutions within the areas of biotechnology and agriculture. They are presented as connected to the vocabulary and ideas of Open Source, without any mentioning of the other part of the FOSS movement.

Another aspect of the portrayal of CAMBIA/BIOS in the media is the focus on how their initiative is meant to result in free access to biotechnology. There is a tendency to emphasize the cost free aspect of the BIOS initiative rather than the freedom to operate and improve. To use the FSF terminology, it is the 'free as in free beer', rather than the 'free as in free speech' aspect that gets the most attention, although this last type of freedom is not entirely ignored. The reason for this distribution of attention might be that the 'free as in free beer' concept is easier to get a grasp on and communicate, but it could also be due to the attention paid to costs, transaction costs and license costs especially, by CAMBIA/BIOS. For them it is crucial to increase the access to and availability of important enabling techniques, so that scientists and practitioners in developing countries in particular can use them and adapt them to own needs. But even though costs are important in this context, because the costs that come attached to the use and licensing of a technique often act as a hindrance to the actual utilizing of it, it is also part of the project for CAMBIA/BIOS to ensure that the users have the right to further develop and change the techniques and to create an innovative commons by making it a legal duty for licensees to place the improved techniques back into

the protected commons. And as was mentioned earlier, it is the ‘Freedom to Operate’ and the ‘free as in free speech’ aspect that is regarded as most important by CAMBIA/BIOS.

Many different terms could be applied to illustrate key characteristics of the CAMBIA/BIOS ideology. In the section on FSF, the term ‘grand visions’ was employed to describe how FSF and Stallman connect what they regard to be the problems caused by non-free software to the problems created in our society in general as the result of the non-cooperative spirit they feel to be dominating. According to FSF, freedom and a clear prioritization of the ethical and moral will help to solve all these problems. This term is useful with regard to CAMBIA/BIOS as well. Their ideology too is concerned with problems on a grand scale and contains visions of how to change the world for the better. In their documents they link many of the causes of suffering in the developing world to how the system of innovation works, and they propose a collection of solutions to help redeem the problems. Therefore, it can be said that they do indeed have ‘grand visions’, and this is one more element their ideology has in common with the ideology of FSF.

In the previous chapter the ideologies of FSF and OSI were characterized according to the categories introduced by Sartori (1969) to classify belief systems. As was mentioned, the criteria used to determine which category a belief system belongs to were whether the beliefs were open or closed on the cognitive dimension, and whether the emotive status was strong or weak. By use of these criteria FSF were said to have an ideological, or adamant, belief system, while OSI was considered to have most in common with a firm belief system.

When it comes to the belief system of CAMBIA/BIOS, their status on the cognitive dimension is a bit difficult to determine. This is because CAMBIA/BIOS hold to values and goals they are unlikely to stray from, such as their desire to end hunger and poverty by using the tools of the biological sciences, but at the same time have an attitude towards the means that make help them reach this end that is more open than for example the attitudes held by FSF. CAMBIA/BIOS seem more open to evidence and argument regarding what might be the best way of achieving their professed goals, as well as more open toward negotiating with their adversaries than the more cognitively closed FSF. In the BIOS Initiative Proposal (2004) for example, it is written that they want to promote and negotiate “a détente with current institutional IP holders and potential adversaries of open-access innovation mechanisms” (BIOS 2004: 12). Even so, their ideology is not as open on the cognitive dimension as OSI, and a new term like ‘medium-open’ would probably describe their cognitive status best.

With regard to their emotive status, CAMBIA/BIOS come closer to displaying strong affect and passion than weak affect and passion. Demonstrating motivation toward outward

expansion, although not in an aggressive form, in their efforts to promote a different way of advancing innovation and fostering development, they show one of the characteristics of strong affect as defined by Sartori (1969). Strong emotions and passion are also revealed when central individuals within CAMBIA/BIOS, such as Jefferson, talk or write about the world situation and why and how it should change. Among other things this passion is evident when he declares that “scientific research, no matter how brilliant, without the ability to use it to deliver products of public value, is of only academic interest” (Jefferson 2003: 1).

Following this characterization the belief system of CAMBIA/BIOS can be found somewhere in between the adamant and the firm archetypes. Since FSF was classified as having an adamant belief system and OSI a firm one, this also places the belief system of CAMBIA/BIOS in between the belief systems of FSF and OSI. As the ideology of CAMBIA/BIOS has been shown to have most in common with the ideology of FSF, without being similar to it in every way, this finding suggests the hypothesis that the ideology of CAMBIA/BIOS has its place between the ideologies of FSF and OSI, inspired by both, but closer to that of FSF than that of OSI since the ideologies of both CAMBIA/BIOS and FSF have an explicitly value based foundation.

In general the ideology of CAMBIA/BIOS can be described as oriented towards a change of the status quo, with a value based and ethical focus. It has been inspired by the thinking around empowerment, participatory development, bottom-up approaches and rights based approaches to development that holds a prominent place within development and aid circles. The current business and legal landscapes are regarded as major obstacles for a type of innovation that takes the needs of the poor and disadvantaged as well as the public good in general into consideration. Their ideology also displays a strong belief in the great potential of science and technology, and to harness the possibilities of science for the public good they propose to implement FOSS inspired licensing to create a protected commons within the biological sciences.

The following paragraph in the BIOS Initiative Proposal (2004) sums up the essence of what the goal of the CAMBIA/BIOS ideology as an action-oriented system of beliefs is rather nicely: “By promoting new thinking, new institutional mechanisms, new technologies and a new business model, BIOS will catalyze the empowerment of both 1st-world and 3rd-world innovators to address local, small-margin, small market innovations in food, agriculture, public health, industry and environment” (BIOS 2004: 7).

3.3.2 *CAMBIA/BIOS and value systems*

The normative order can, as already mentioned, be seen as made up of three competing meaning systems; a dominant value system, a subordinate value system and a radical value system. While the subordinate value system is accommodative in its relationship to the dominant value system, the radical value system promotes opposition and stands counter to the values of the dominating value system. In the previous chapter the ideology of FSF was likened to a radical value system and the ideology of OSI was found to have most in common with a subordinate value system. The goal here is to determine whether the ideology of CAMBIA/BIOS mostly represents a subordinate or a radical value system in its relationship to the market friendly and IPR dependent dominant value system of today that was outlined in an earlier section.

CAMBIA/BIOS do indeed critique the current system, and their attitude towards the innovation system as it functions today can be interpreted as opposition to the dominant value system. The current system of innovation is portrayed as dominated by a handful of large multinational companies and CAMBIA/BIOS believe that the legal, scientific, regulatory and economic paradigms constrain the innovation that is needed to target the problems of the less fortunate (BIOS 2004). As was touched upon in the previous section, the innovation system in the biological sciences is considered to target only relatively high-margin markets, and the IPR and investment practices are thought to encourage private appropriation of enabling technologies, both of which hinders innovation for and by the poor and excluded from taking place. According to Jefferson “the law and our own institutions have let us down” (Jefferson 2003: 1).

In the section describing the dominant value system of today it was demonstrated how the market is regarded within this value system to be the best regulatory mechanism for practically every type of transaction that takes place in our society, as well as how IPRs and property rights in general are considered to be a prerequisite for the markets to function well. The CAMBIA/BIOS ideology does not look as favorably on the rule of the market. As was mentioned earlier, CAMBIA/BIOS feel that science will not be transformed into something of use to society as long as it is left solely up to the market to decide. The market forces are judged to be neither balanced nor representative of the public interest. This attitude towards the market does suggest that when it comes to this essential part of the dominant value system, the ideology of CAMBIA/BIOS stand counter to its values. An interesting question that it is outside the scope of this thesis to answer, but that might merit further research, is

whether the practice and actions of CAMBIA/BIOS also stand counter to the values of the dominant value system.

With regard to IPRs and especially patenting, Jefferson repeatedly states how it is a system “whose complexity, expense and misuse....is stifling innovation and enterprise in the biotechnology industry, not encouraging it” (O’Neill 2003b: 1). Patent thickets and FUD (fear, uncertainty and doubt) are important terms in the CAMBIA/BIOS vocabulary surrounding IPRs and their consequences. The word ‘patent thickets’ is meant to describe the chaos of rights that have arisen as a result of extensive and overlapping patenting (BIOS 2004), while the acronym FUD comprises the fears, uncertainties and doubts that abound within the biological sciences due to confusion about patents. CAMBIA/BIOS want to dispel patent FUD and clear up the patent thickets by increasing the transparency surrounding these rights and creating ‘work-arounds’ and a protected commons. They are out to change the global patent system, reform the structures surrounding innovation and break the grip big multinationals hold on the enabling tools and techniques of innovation (Red Herring 2006). Therefore they might be said to represent a radical value system that promotes opposition to the dominant value system.

When declaring that “the real incentive for true inventors is not getting a patent – its being creative and having fun” (GenomeCanada 2005: 2), Jefferson is displaying a view on the motivational factors for engaging in innovative work that runs counter to the values of the dominant value system. Within the dominant value system patents are regarded as a necessary incentive that encourages innovation by giving a promise of profits and the possibility to exclude others from using your invention without permission. As was explained earlier it is believed that innovation will not take place without a system of patents and other IPRs. Jefferson does not accept this premise, and CAMBIA/BIOS can therefore be said to be in opposition to the dominant value system with respect to the rationale for IPRs.

In addition to promoting a new way of using patents, by utilizing them to promote innovation instead of discouraging it, CAMBIA/BIOS also want to reform the way science is being done. They feel it is necessary to change the way gene technology is being applied to agriculture. CAMBIA/BIOS are therefore more or less in opposition to both the scientific paradigm and the dominating value system and its reliance on the rule of the market and patents.

However, CAMBIA/BIOS are not after the destruction of the patent system. Rather, they want to change the way patents are being used, by employing them to create a protected commons and spaces for sharing. And even though CAMBIA/BIOS are clearly not satisfied

with the current regime and out to change the status quo, and so are in opposition to the dominant value system, their approach to this system is marked by a willingness to talk to and negotiate with their potential adversaries, rather than a promotion of conflict. This, as already mentioned, is also visible in their language and in their lack of 'hostile binaries'. In distinguishing between the tools of innovation and its products, and reserving the need for complete openness and availability for the tools, they are trying to build the foundation for an acceptable compromise with the proprietary thinking and business actors that are dominating the biological sciences (BIOS 2004).

Despite the non-confrontational attitude that is demonstrated by the willingness to negotiate and forge compromises with the actors representing the dominant value system however, the ideology of CAMBIA/BIOS has more in common with a radical value system than a subordinate value system. The values of CAMBIA/BIOS, their dislike of the market as lone ruling mechanism and their prioritization of working for the public good, do run counter to the values of the dominant value system, and with their desire for a change in the current patent system they are in opposition to the status quo. These two aspects make their value system more similar to a radical value system than a subordinate one, and by that once again more similar to the ideology of FSF than that of OSI, although they are open to the possibility of co-existence and cooperation with the more proprietary dominating value system.

Table 1: Outlining the main differences and similarities

	FSF	OSI	CAMBIA/BIOS
Cognitive status	Closed	Open	Medium-Open
Emotive status	Strong	Strong	Strong
<i>Belief system</i>	Ideological/Adamant	Firm	Adamant-Firm
Value position compared to the dominant	Runs counter to the dominant values	Similar to the dominant values	Runs counter to the dominant values
Attitude to the dominant value system	In favour of structural changes	In favour of reforms/moderate change	In favour of structural changes
<i>Value system</i>	Radical	Subordinate	Radical
<i>Main orientation</i>	Ethical considerations	Practical considerations	Ethical considerations

4. Conclusion

In this thesis it has been shown how FOSS is different from non-free and closed software because the source code is distributed along with the object code under a license that grants the licensee the right to study, modify and change the software, as well as the right to share it, with or without changes, with whomever he or she chooses. Some FOSS licenses, called ‘copyleft licenses’, demand of the licensee that any changes and improvements made to the original software are shared under the same type of license as well. FOSS is in addition characterized by particular programming and communication structures. Since the source code is distributed along side the object code, this allows software users around the world to participate in the correction and production of software, and this, coupled with the communication possibilities offered by internet, gives FOSS projects a huge human resource to tap into when developing their software products.

However, within the FOSS movement two distinct organizations are vying for attention, the veteran FSF and the somewhat newer creation OSI. In the above it has also been demonstrated how each of these two organizations have their own separate ideology. When the ideology of FSF was analyzed it became clear that this ideology is distinguished by a moral and ethical agenda where sharing and the public good are values that are given great significance. Within this ideology access to the source code of software and the freedom to change and share it are viewed as human rights, and non-free software is regarded as an impediment to a healthy society. FSF is out to change the current practice and the status quo, and thus their belief system, as the term is used by Sartori (1969) can be labeled as ideological because of a closed cognitive structure and a strong emotive status.

OSI on the other hand is more preoccupied with the efficiency of innovation and the opportunities the development model introduced by Linux has to offer in that respect, than values and ethical considerations. They feel that the advantages of this model, with its focus on early and frequent releases, delegation, openness and maintenance of a large user base, are enough of a reason for choosing it above the more traditional approach of closed software. In their ideology therefore the public good as the idea is presented by FSF has no place, and access to source code as a right and other values are left in the background or ignored. With OSI, freedom is connected to conceptions of the free market, and an undercurrent of neoliberalism is running through their ideology. So although OSI like to portray their ideology as pragmatic and value free, this is not the entire picture. In some ways however, it is more open to empirical evidence and practical considerations than the ideology of FSF, and

therefore it might be said to have a more open cognitive structure. Together with a strong emotive status this makes for a firm belief system.

One might illustrate the differences between the ideologies of FSF and OSI by placing them on opposite sides of a continuum running from ethical to practical considerations, with FSF being closest to the ethical end and OSI on the other side of the spectrum.

As the concept of value systems is used by Parkin (1972) the ideology of OSI has most in common with a subordinate value system, while the ideology of FSF is more similar to a radical value system. This is because, as was explained above, FSF is more in opposition to the dominant value system, represented by the big software companies like Microsoft producing non-free/closed software, than OSI. The values of the OSI ideology do not stand counter to the values of the dominant value system and the changes it promotes are easier to accommodate within the existing system, than what is the case with FSF.

CAMBIA was described as an organization that wants to provide especially developing countries and their scientists with better access to the tools of molecular biology, as well as change the way science is being done. The BIOS Initiative, which was launched by CAMBIA in 2004, is their way of targeting the issue of access to enabling tools. This initiative consists of three parts. The first is the FOSS inspired BIOS licenses, the purpose of which is to create a protected commons where technologies can be placed and accessed without the risk of private appropriation. The second part is BioForge, a platform for cooperative innovative activities on the internet, where scientists from all over the world can work together to create new tools and technologies. The third and last part is the Patent lens, a searchable database containing patent documents from the United States and European patent offices as well as information and tutorials on patents and patents policies, the aim of which is to increase the transparency surrounding IP.

When the ideology of CAMBIA/BIOS was presented and analyzed, the ideologies of FSF and OSI were used as a framework for comparison, and it was found that all in all the ideology of CAMBIA/BIOS has most in common with the ideology of FSF. Although it should be noted that it also contains some elements that are more similar to those that could be seen within the OSI ideology. As was established to be the case with FSF, the ideology of CAMBIA/BIOS is also characterized by a wish to serve the public good. Both these ideologies have a value-based foundation and an agenda that can be categorized as occupied with moral and ethical issues.

Central in the CAMBIA/BIOS ideology is the desire to change the current innovation system to make it better able to address the situation of the poor and disadvantaged.

CAMBIA/BIOS possess a strong belief in the potential of science and technology and its ability to improve the livelihoods of underprivileged people around the world, but in their opinion this potential is not nearly being exploited to its fullest in the existing innovation regime. A change of the status quo is therefore believed to be necessary, and as was mentioned previously, their suggested solution is to implement FOSS inspired licensing to create protected commons where both scientist and practitioners can access enabling tools and come together in cooperative innovative efforts.

Values and key terms like democratization, decentralization, development, empowerment, participation, sharing and rights are essential in the ideology of CAMBIA/BIOS, and the emphasis placed on these principles makes this ideology more closely related to the ideology of FSF than that of OSI. Nevertheless, even though the ideology of CAMBIA/BIOS in its values and structure has most in common with the ideology of FSF, with regard to some aspects, like their non-confrontational and cooperative approach to the business world, they share similarities with OSI.

This middle position, but closer to the ideology of FSF, could also be seen when the ideology of CAMBIA/BIOS was categorized according to the concepts of Sartori. As a belief system, their ideology was found to belong somewhere in between an adamant and a firm belief system, and thus also between FSF and OSI. This was due to the medium-open character of their cognitive status, coupled with their strong emotive status.

As a meaning system relating to the dominant value system of today, a system which was described as inspired by neoliberal thought, stressing the importance of well-functioning free markets and the role IPRs play as a prerequisite for this, the ideology of CAMBIA/BIOS was portrayed as being closest to a radical value system. This type of value system is in opposition to the dominant one and its values stand counter to those of the dominant value system. In the analysis above, this was found to be the case with CAMBIA/BIOS, since its ideology is characterized by wanting to change the status quo and the values that were just described are rather different from and partly runs directly counter to those of the dominating value system.

Seeing as the ideology of FSF was categorized as a radical value system too, this is yet another trait the ideology of CAMBIA/BIOS shares with the ideology of FSF. The ideology of OSI on the other hand, was found to have most in common with a subordinate value system.

This means that the answer to the question of which of the ideologies within the FOSS movement the ideology of CAMBIA/BIOS has most in common with, is that despite some

similarities in approach and attitude with the ideology of OSI, the ideology of CAMBIA/BIOS have in its underlying structure and values most in common with the ideology of FSF. If the ideology of CAMBIA/BIOS is to be placed along the same ethical to practical considerations continuum that was mentioned before, this would mean that they would belong on the ethical side of the spectrum, together with but not as far out as the ideology of FSF. The shared traits with OSI are not worth ignoring however, since the willingness to compromise together with their lack of confrontational attitude, might make it easier for CAMBIA and BIOS to reach a wider audience and succeed with their mission.

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