'Let the Source be with you!' – Practices of Sharing in Free and Open-Source Communities

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Abstract

Free and Open-Source Software (F/OSS) Communities enjoy a long history of sharing. They share source code, knowledge, social approval, communal ties and a 'hacker' ethics of giving back and helping others. Empirical investigation into the F/OSS network exhibits five central practices of sharing: *materializing* intellectual capital (sharing code/economic capital), *creating* intellectual capital (knowledge sharing), *seeding* of culture (sharing social capital), *relating and bonding* (sharing symbolic capital), and *signifying* (sharing cultural capital). Through processes of *sharing in, sharing out* and *sharing across* core members, contributors, and the public, F/OSS communities circumvent the capitalist logic, and sustainably contribute to an open, global system of sharing common goods.

Introduction

Free and Open-Source Software (F/OSS) Communities enjoy a long history of sharing. In F/OSS projects organizational structures have emerged that enable a large number of volunteers to commit themselves to freely chosen work. John (2011) has recently coined the notion of 'sharing communities of production' for such communities, as compared to 'sharing communities of consumption' – both upcoming and distinctive forms of sharing in the Web 2.0 and Web 3.0 era. Researchers have investigated how members of the open-source community use the networking effect in a technological as well as in a social sense for knowledge sharing (Tuomi, 2001; Lee & Cole, 2003; Morner & Lanzara, 2004; Lanzara & Morner, 2005). Other research has been concerned with integration processes of aspirant members, cooperation and coordination of contributors, gift-giving, and cooperation between companies and the open-source community (Lakhani & von Hippel, 2000; Bergquist & Ljundberg, 2001; von Krogh et al., 2003; Zeitlyn, 2003; Dahlander & Magnusson, 2005). F/OSS projects are fascinating study objects for their distinct form of collaboration among people with quite diverse backgrounds as professional coders, students, enthusiast users and followers; for their passionate involvement, and for some amazingly sophisticated pieces of software, which they freely share.

Researchers agree that F/OSS communities not only share source code but also knowledge, social approval, communal ties and a 'hacker' ethic of giving back and helping others (Himanen, 2001; Hemetsberger, and Pieters 2001a, 2006, 2007, 2008). Viewed from a Macro perspective, however, sharing has a much greater impact on F/OSS communities, as well as on society at large. Sharing source code turns into a valuable public good; sharing knowledge creates a global conglomerate of intellectual capital through various know-

ledge creation practices thus, accumulating member-generated expertise; cultural norms and values translate into sources of social identification through passage of culture; social approval becomes publically significant recognition; and communal ties turn into advocacy, and resistant forces. Yet, sharing is not to be misunderstood as gift-giving, or as mere exchange. Sharing, according to Belk (2010), tends to be a communal act of giving and taking that links us to other people. It is not the only way in which we may connect with others, but it is a potentially powerful one that creates feelings of solidarity and bonding.

The purpose of this article is to explore and conceptualize key practices and dynamics of sharing in F/OSS projects, and discuss their theoretical and practical implications for online sharing cultures.

Exchange, gift-giving, and sharing

From its early days on, the Internet culture was built on norms of collaboration, cooperation, and a willingness to share resources when others requested them (Rheingold, 2000). As Belk (2010) has observed, sharing expertise, labor, ideas, and more is a quite common practice within peoples' private domains, and increasingly online. The Internet as a technology and open space has provided a potent infrastructure for sharing on a global basis. Social practices of sharing in F/OSS communities have been approached from various perspectives, including economic views (Lerner & Tirole, 2001), community of practice and knowledge sharing (Lee & Cole, 2003; Lanzara & Morner, 2005; Hemetsberger & Reinhardt, 2006), theories of social exchange (Hemetsberger, 2001b), gift-giving (Raymond, 1999; Bergquist and Ljundberg, 2001; Hemetsberger, 2001b; Zeitlyn, 2003), and movemental, ideological notions of sharing (Hemetsberger, 2007).

Whereas economic models force practices of sharing into a non-altruist, capitalist logic of an individual profit rationale, community of practice and social exchange approaches provide much more elaborate explanations into the multifacetedness of sharing. F/OSS practices of knowledge sharing and creation have been described as strongly technology-mediated (Lanzara & Morner, 2005), with a strong emphasis on social norms of sharing knowledge, and an extensive culture of open access to archives and mailing lists that enable community members to *re*-experience collective reflection. Whilst research in this area is elaborate and insightful with respect to knowledge sharing, other important facets of sharing enjoy only limited attention within this field.

Social exchange theories focus attention on the relations between actors and the factors that explain the emergence, maintenance and termination of exchange. In contrast to most offline exchange relationships, online collaboration mostly constitutes a complex system of exchange (Bagozzi, 1974, 1975) involving a potentially huge number of social actors, who enter and maintain relationships with the expectation that doing so will be rewarding (Blau, 1964). Whereas most economic transactions are simultaneous exchanges, social

exchange is not primarily based on expectations of immediate and clearly specified rewards but rather on unspecific and general hope for social approval. This creates a 'general social indebtedness' that forms the basis of a community (Haas & Deseran, 1981).

Some authors have criticized the paradigmatic assumption of reciprocity in exchange models and introduced the notion of gift giving (Belk & Coon, 1993; Raymond, 1999; Hemetsberger, 2001b; Giesler, 2006). Gifts are primarily given without expecting anything in return, except a rewarding feeling of doing something good for others. Yet, notions of gift-giving do not permeate throughout F/OSS cultures, and across levels of commitment. Only core contributors and leaders in F/OSS communities share a strong gift-giving ethos (Hemetsberger & Pieters, 2001a). Furthermore, critics argue that gift-giving is subject to the same 'expected reciprocity' logic as depicted in theories of generalized exchange (Belk, 2010). Repayment of the 'gift' becomes a moral obligation (Wasko & Faraj, 2000, p. 168).

Sharing takes on a different quality from exchange, and gift-giving. Whereas both explain how people regulate access to important resources, sharing implies that actors do not claim ownership on any of the resources they share. Sharing, according to Belk (2010) is characterized by collective ownership, or free access. This is a particularly interesting viewpoint for F/OSS projects where collective outcomes are freely shared on a permanent basis, safeguarded by specific licensing schemes that aim to keep the source code open. Sharing requires no invitation, generates no debt, and may entail responsibilities as well as rights. Downloading a copy of source code does not diminish the value of the software, which qualifies for a perfect system of sharing (Raymond, 1999). Belk (2010) introduces the notions of *sharing in* and *sharing out* so as to distinguish among prototypes of sharing that come close to family sharing and regard ownership as common, and those which share things with people, who stay outside a close circle of friends, constituting a practice that creates no bonds.

Baudrillard (1993) and Melucci (1996) argued that contemporary consumer movements' actions are geared towards offering, or sharing. F/OSS communities underscore this argument in that they show how consumers liberate themselves from the economic cost-calculation logic, and offer a different model at a cultural and symbolic level. Sharing develops forms of action aimed at the autonomous production of cultures which are based on an abundance of symbolic and material wealth. As F/OSS communities share their products for free, they extricate themselves from the asymmetric power and dominance in the market. In doing that, they produce enormous cultural capital in a Bordieuan sense. According to Bordieu (1986), capital can present itself in three fundamental guises: as *economic capital*, which is immediately and directly convertible into money and may be institutionalized in the forms of property rights; as *cultural capital*, which is convertible, on certain conditions, into economic capital and may be institutionalized in the forms of educational qualifications; and as *social capital*, made up of social obligations ('connections'), which is convertible, in certain conditions, into economic capital and may be institutionalized in

the forms of a title of nobility (Bordieu, 1986). By generously sharing their products and its source code, F/OSS developers create an abundance of economic, cultural, educational, and symbolic capital (Raymond, 1999), which liberates consumers from being indebted and constrained. By embracing all four kinds of capital, the F/OSS movement gained substance and power. The free flow of those assets lies at the core of the community's attempt of liberation from the stranglehold of the market. Sharing, thus, becomes a powerful means of progression and emancipation. This article aims to investigate and understand social practices of sharing within F/OSS communities, and discuss its implications for sharing and accumulation of capital in online communities, in general.

Method

This research applies a qualitative, interpretive approach, including netnographic elements (Kozinets, 2002). One data set used for analysis herein consists of a web survey among individuals involved in open-source projects. The survey was posted at the most frequented community site – slashdot.com. Respondents were asked to report freely about their involvement with open-source, the motivations for their involvement, what they think they have gained through their participation, and the projects they are involved in. 1139 full responses were analyzed. Depending on the quality and amount of their contributions to the community, subjects were classified either as core, contributors, or public users/affiliates. Content analysis was applied to uncover respondents' motivations and viewpoints on practices of sharing within the F/OSS network. Content categories were deduced from contemporary theories on motivation, social exchange, gift-giving, and sharing.

Non-participatory 'netnographic' inquiry (Kozinets, 2002) and 'grounded theory' (Strauss, 1987; Goulding, 2002) have been chosen as appropriate methods of conducting research into the cultural aspects of online consumer communities. Accordingly, several online sources and project sites within a time span of more than ten years have been sampled and analyzed to provide additional insights into practices and dynamics of sharing in different F/OSS projects. Relevant sources for observation and reading had been chosen based on the number of hyperlinks, the amount of traffic, and the number of postings on the respective site. Online sources comprised Slashdot.com, a moderated site that is dedicated to news for people interested in online technology, open source, software and computers in general, and general societal and political-ideological developments. Further investigated sites implied more technology and F/OSS related discussions on freshmeat.com, source-forge.net, sfs.org, opensource.org, eZines as for instance linuxtoday.com, wired.com, and their regional counterparts in Germany and Austria: heise.de, or futurezone.at. Discourse analysis and constant comparative method (Charmaz, 2006) was applied to uncover practices of sharing, and to understand online systems of sharing.

Findings

Online systems of sharing are pervasive. Yet, F/OSS systems offer exceptionally rich examples of sharing all kinds, and huge amounts of economic, social and cultural resources on a global basis, thus, offering insights into several sharing practices and their interrelatedness. Empirical investigation into the F/OSS network exhibits five central practices of sharing: *materializing* intellectual capital (sharing code/economic capital), *creating* intellectual capital (knowledge sharing), *seeding* of culture (sharing social capital), *relating and bonding* (sharing symbolic capital), and *signifying* (sharing cultural capital).

With free sharing of ideas among consumers, free access to information and free access to software code, the F/OSS community accumulates a very powerful cultural resource, that of a 'global brain'. Contributors are working together because the outcomes of their collective effort exceed an individual's abilities by far, whereas their own contributions, in concert with others, lead to amazing results. In online relationships, quality and excellence of solutions are not contingent upon the possession of resources but instead upon the capability and ability to combine and deliver resources in a way that meets the needs and expectations of others. Knowledge resources that are hoarded for the purpose of exerting power are therefore useless. Instead, knowledge sharing is facilitated through Web-based technology, and individuals can benefit greatly from these resources. Openly visible commented source code may actually be interpreted as a *materialization* of individual minds in a compressed and structured form, and provides the basis for practices of sharing invaluable economic and intellectual resources.

Whereas the enormous code base of F/OSS projects materializes the intellectual capital of the Commons, which multiplies the more people can openly see, download, and work with it; discussion lists exhibit the interactive process of knowledge creation through mental experimentation (Hemetsberger, 2006). In practices of *creating* knowledge, developers openly and publicly 'experiment' with ideas and possibilities to implement new software functionalities, as demonstrated in the discourse among three developers below.

> On Sunday 30 March 2003 22:15, xxx1 wrote:
>
> > On Mon, 31 Mar 2003 01:44, xxx2 wrote:
>
> > > On Sunday 30 March 2003 11:47, xxx1 wrote:
>
> > > > The "Source File" is a confusing concept. Source of what?
>
> > > True that, but what could be used instead? "New file" ? - Naw, it could be older!
>
> > > "File that is going to replace the existing file" ? - Kinda long, isn't it?
>
> > > "File about to be copied" ? - Same as above, too long.
>
> IMO if there is something hard to describe with words, then visualize it :) [snip]

> > Might it be helpful to drop the "existing" and "source"– label and make

> > the "source" semi-transparent or some other effect to show that it's not

> > existent at the destination folder rather than being about to be copied?

> Perhaps the concept should be "current document, rather than source file".

> I did like the arrow too, although obviously the CPU load for the animation

> would need to be tunable for low performance machines.

When the idea of this arrow came to my mind i was indeed thinking of a non-animated one. but this is something for our kde-artists :) i believe even a non-animated arrow will make clear what happens to which file in which direction.

Knowledge, herein, is not only shared but instead created in discourse among contributors, creating even more valuable resources. Contributors have developed various forms of figurative language in order to overcome the problem of abstract, text-based talk. As the discourse shows, KDE developers use analogies to express and materialize their thoughts regularly so as to create a basis for collective reflection, and sharing. Power in online relationships is not contingent upon the possession of resources but instead upon the amount of shared cultural resources. Through materialization in source code, reflections on discussion lists, or textual narratives on Websites, F/OSS communities lay ground for sharing intellectual resources, and developing economic capital in the form of freely available software.

Whereas knowledge is created within community boundaries as it requires involvement and a certain level of expertise on the side of the developers, software as the F/OSS community's source of economic value is shared across boundaries with the public. Sharing software, however, does not necessarily include social bonding. Only intense knowledge sharing and creation in constant interaction with others also strengthens social ties and leads to close friendships. Thus, *boding* is an intense form of sharing and building social capital that is dependent on expertise and strong commitment to contribute. Bonding as a practice of sharing exhibits strong similarities to what Belk (2010) has described as forms of sharing as part of companionship. Sharing is not the only way in which we may connect with others, but it is a potentially powerful one that creates feelings of solidarity and friendship, as we can read in the following quotes.

"A place to belong to. I found my home." (contributor)

"The user community surrounding it is also an intelligent and whimsical bunch, working on all sorts of interesting applications, so it's fun to hang out with them, even if it's only virtually." (contributor)

Sharing differs from economic exchange, which rarely creates friendship among people. Economic exchange may create economic obligations between buyers and sellers, but it

generally fails to forge social bonds. Sharing economic resources with non community members does create at least weak forms of relationships, which I call herein *relating*. Relating denotes practices of networking, or entertaining weak forms of affiliation, which makes the F/OSS network particularly strong and politically relevant as a market actor, who resists hegemonic forces of contemporary capitalist market systems (Hemetsberger, 2008). Viewed from this perspective, relating is also a way of mobilizing forces, or attracting users thus, strengthening the market power of F/OSS software. Yet, sharing economic resources alone cannot explain loyalty unless it is coupled with a strong value basis.

Another form of social capital building, therefore, is reflected in shared values and norms that are seeded across various sites, and among various actors. Values are typically formulated for identification and integration purposes. Yet, in the case of F/OSS communities, values might differ significantly but goals are commonly shared. The specific cultural framing of their endeavor is used as differentiation strategy in order to delineate their social practice from that of other players on the market. Similarly, the emphasis on a passionate way of coding, to programming as a 'labor of love', the F/OSS narrative of artist work is proliferated in an attempt to differentiate them from those, who do their job for money. Their emphasis on radical openness has provided them with a new rhetoric and a set of practices concerning authorship, ownership, speech, politics, and technology (Kelty, 2004).

> "Free software and the bazaar development model are not the answer to all the problems in software development; but I believe in the free exchange of ideas, and free-source softwareis exactly that." (contributor)

The role of values is to provide authenticity by being aware and creating awareness; by lived freedom; by being a passionate coder, and by being compassionate towards others. The sharing culture, widely based on the notion of freedom, attracts many enthusiasts who otherwise lack opportunities to realize their ideas. Culture, in order to be passed on, must be highly visible. *Seeding* practices, reflected in discourse and common practice help create visibility, and build up social capital. Seeding commonly constitutes a practice of 'sharing out', which makes it an integrative practice and provides a source for identification. Relating and *signifying* are different in that they provide important social resources from the wider public. Similar to concepts of public relations and goodwill, reputation and social approval are 'shared in' and transformed into invaluable social and cultural capital for the community.

> ".... I think that status and reputation had a definite part in it. Moreover, taking a role in creating and shaping something that many people will use and benefit from is exciting." (core contributor)

> "I made it free software because I wanted other people to benefit from my work. Also, it is exciting and gratifying to have thousands of people using

what I wrote, and sending comments on it, suggestions, etcetera." (contribu-
tor)

As demonstrated in the above quote, social approval from the public seems to play a deci-
sive role in the F/OSS sharing network. With every piece of work submitted, feedback is
provided within hours or even minutes (Lakhani & von Hippel, 2000). An even more pow-
erful motivator are the responses of hundreds, thousands, sometimes even millions of peo-
ple downloading and using the software someone has written and shared. Hence, practices
of signifying, which imply commenting, giving feedback, or downloading, are powerful
practices of sharing, creating and abundance of social resources to be shared across and
among many. The more people all over the world, who use and share the outcomes of
F/OSS communities, the more the community at large has increased its economic, cultural
and social capital. As Figure 1 shows, practices of sharing constantly cross boundaries
between the core of the F/OSS network, the periphery, and the interested public, reflecting
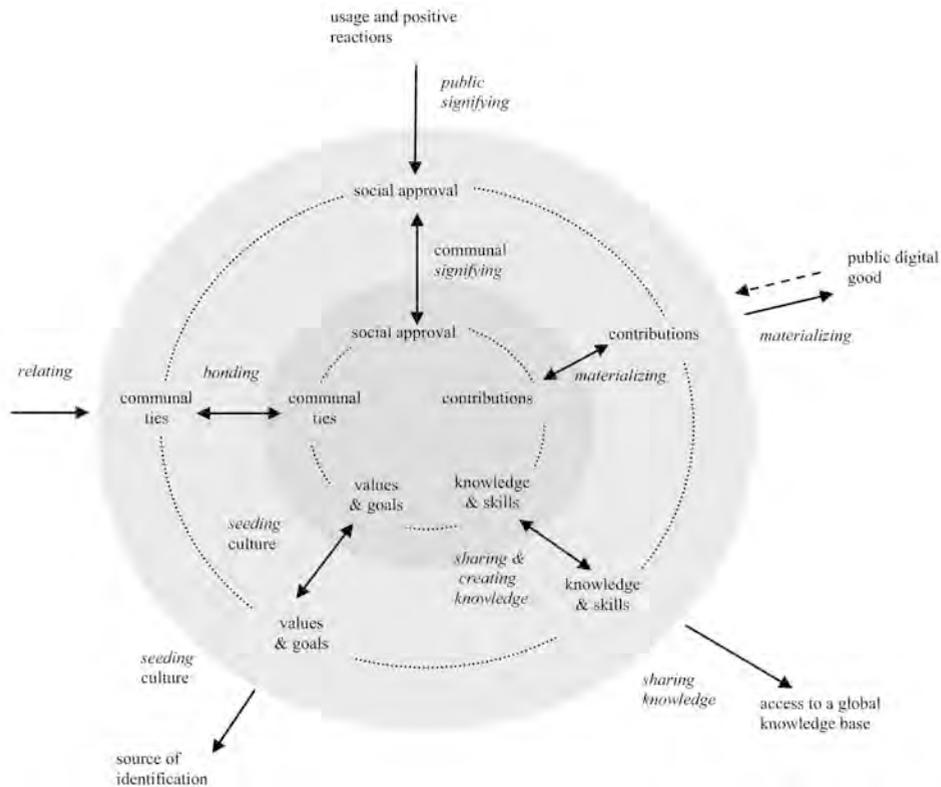a lively and successful sharing community.

Figure 1: Processes and Practices of Sharing In, Sharing Out, and Sharing Across

The findings also indicate that sharing does not only cross group boundaries but also different forms of capital. Some might argue that the notions of sharing values, social approval, or economic value do not follow the same inner logic, because some resources are divisible (software), whereas others seem indivisible (ideology) (Hirschman, 1994). Indivisibility of resources commonly leads to social conflicts about resources.

> "Whether FOSS is 'capitalist' or 'communist' or 'volunteerist' is completely irrelevant, and quite frankly I think anyone who constantly tries to hammer the FOSS square peg into one of those round holes is doing so for their own purposes.

> FOSS is what it is. In some ways, it's capitalist, in others, it's communist, in others, it's volunteerist. That's really the beauty of the movement; you get out of it what you want to get out of it, and you put into it what you *want* to put into it." (contributor)

Contrary to Hirschman's assumption as the above quote demonstrates, ideological conflicts for example, are solved by a culture of pluralism and common goals, which might be the smallest common denominator but which community members and the public can agree on (Hemetsberger, 2007). As a consequence, economic, social, and cultural capital are 'shared across' and among all members of the network. In literature, divisibility and indivisibility has been portrayed in a rather deterministic manner; yet, the F/OSS example shows that indivisibilities are *perceived* indivisibilities, and therefore, can be solved. 'Sharing across' practices among various forms of capital and people provide means of dividing economic, social and cultural capital that might otherwise seem indivisible.

Discussion

Sharing is a powerful practice that manifests a community's ability to alter the state of the(ir) world. Empirical evidence from the F/OSS community shows that through sharing in and sharing out, critical resources can be attracted and funneled so as to sustain sharing practices of the core, the contributors, and the public. 'Sharing in' practices help build trust and serve group bonding purposes through extensive sharing of economic, social, and cultural capital. 'Sharing in' is exclusive in that it only invites people with a specific amount of expertise. Therefore, 'sharing in' helps to build and preserve cultural resources and serves the purpose of strengthening the inner core. 'Sharing out' is a practice of sharing with the public, however without sharing strong social bonds. 'Sharing out' basically strengthens weak ties through practices of materializing, creating, or relating, following the logic of 'everyone being better off when resources are shared'. Interestingly, 'sharing out' economic and cultural capital is not restricted in an economic sense, because economic capital (source code) is divisible hence, not scarce.

Social bonds and relationships are exclusive. Access to those social resources is regulated by the total amount of sharing. In other words, and contrary to common assumptions and prior conceptualizations (Lerner & Tirole, 2002; Hemetsberger, 2001a; Hertel, Niedner & Herrmann, 2003), social recognition and status within the F/OSS community not only depend on the amount of contributions to the community provided by a single contributor but also on the amount of downloads, or the intensity of 'sharing out', because it demonstrates how potent the community and its members are. The more people share in total, the greater the accumulation of economic, cultural and social capital. Therewith, F/OSS communities exploit the strength of weak ties (Granovetter, 1973), and accumulate mobilizing forces for collective action (Melucci, 1996). For these practice of sharing that move beyond the borders of community membership and form of culture, I introduce the notion of *sharing across*. 'Sharing across' is given when different forms of economic, cultural and social capital are shared across core members, contributors, and the public, for instance when the public acts as advocate for F/OSS software, or shares their thoughts and comments with single contributors. 'Sharing across' is an extended or hybrid form of 'sharing in' and 'sharing out', partly as a result of sharing out, partly as a result of Internet technology and open online communication. 'Sharing across' leverages the accumulative power of online sharing systems by bringing together 'sharing communities of production and consumption' (John, 2011). 'Sharing across' only works in open systems, where all kinds of resources can flow freely. Therefore, online systems of sharing are fervently protected, for instance through specific licenses, which safeguard access to invaluable, free resources. This is not only sustainable but even takes on a quality of eternity, as all bits and pieces are perpetually shared and 'live on in the creations of the Commons (Hemetsberger, 2004). It is also movemental in that it accumulates cultural capital and mobilizes forces, such as downloaders and contributors, who constantly reproduce 'the natural order of things' in a culture of openness. 'Sharing in' is familiar, 'sharing out' appears noble but 'sharing across' also shows subversive and provocative elements as it circumvents prevailing modes of transaction in capitalist economy, solves indivisibilities, and introduces radically open forms of sharing.

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