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Working Paper Series

The Debate and the Community

“Reflexive Identity” in the FLOSS community

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The debate and the community

'Reflexive identity' in the FLOSS community

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*“[...] gli altri, nei quali cerchiamo soltanto
l'emozione rimasta in noi incomprensibile,
sperando che per miracolo
nello specchio dell'altro
si chiarisca e delucidi”.*
Giorgio Agamben, *Genius*.

Abstract

In order to simply communicate members of the Free/Open/Source Software community (FLOSS) have to “negotiate” the system of meanings they use to interface with the world and with the communitarian environment. But this means reshaping also their own visions of the world, redefining their identities. Community aims, principles and *ethos* act directly on members' identities, making them internalize the communitarian structure of rules. The first contribution of this paper is then showing how the concept of ‘reflexivity’ developed by Giddens can link Wenger’s idea of community of practice to developers’ incentives. The result is that it is possible to find a mechanism, the reflexive identify process, acting as *an antidote to free-riding* and thus sustaining the cooperative production of FLOSS. However, the same mechanism shows that the community can be defined as an *unstable* (i.e. subject to “revolutions”) and *dissipative* (i.e. burning much more resources than the ones actually producing the outcome) object. On the theoretical side, the same mechanism asks for a wider conceptualization of practices. Using Habermas concept of ‘practical interest’ and ‘communicative action’ it is shown that the interaction between developers distributes among the different layers constituting the community debate, and that each one of these layers, not only practices, has a crucial role in defining developers’ identities and thus their motivations.

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Introduction

The idea of community of practice has been used to describe the social processes at work when different individuals interact in organizations. The same perspective is here applied as a tool to define the main social processes constituting the Free/Libre/Open Source Software (FLOSS) community space and their effects on developers' incentives. Following the discussion on *reflexivity* started by Giddens (1991) and using the concepts of *practical interest* and *communicative action* defined by Habermas (1968, 1981) this model is however “enlarged” to embody other two main points, sometimes overlooked by the literature:

- First, the modification in individual identities induced by agents' interaction is seen as dependent on something more than what a narrow conceptualization of practices allows. The 'communicative action' (Habermas, 1981) driven by each individual's 'practical interest' (Habermas, 1968) constitutes a layer of the interaction process which should also be taken into account. Thus, the ongoing debate between the FLOSS community members (where the communicative action develops) is essential to the process shaping developers' “visions of the world”, and thus incentives, even if it is not necessarily related to their collective problem solving activity.
- Second, this discussion is strictly linked to developers' motivations. Along the paper it is shown that when developers' identities meet the debate, they are modified by it, so that actors internalize the community rules and opportunistic behavior becomes a second order choice. This makes the FLOSS a suitable model to take into account when creating policies aimed at spreading or sustaining the FLOSS-like structure outside the software sector.

This second point allows a further discussion of the community characteristics. The particular attention given to motivations, in fact, is useful to define two main properties of the community, which are usually left behind by the literature.

- First, it is possible to see that internalization of rules is not always the case. Some individuals could have a lower sensitivity to interaction and to the community debate, given also the particular environment (the virtual space) where they take place. The community is then defined as a *dissipative* object, where many developers have to be “mobilized” in order to make a subset of them internalize the rules of the community and increase their level of contribution.
- Moreover, when the clash between the social and the individual identities reaches high level of dissonance, the community can become unstable, causing a major reconstruction of the social identity (a revolution) or the break down of the community itself. *Instability* is then the second emerging property.

The contribution of the present paper is precisely developing this argument using a set of different references, mainly from those regions of economics and management that are open to the sociological and philosophical discourse. The first section shows that a discussion on developers' motivations can be enriched by Giddens' concept of reflexivity. Section two describes the Reflexive Identity Process and investigates its properties. This process is general, and it can be expanded outside the software sector. Section three discusses the effect of this concept on the community-of-practice theory, while section four eventually concludes.

1 Incentives and reflexivity

1.1 Beyond instrumental incentives

The economic discipline, where I belong, focuses on incentives related to indirect gains individuals can achieve through their activity as FLOSS developers. In this perspective the two main mechanisms driving their actions are: a) own-use of software b) signaling, reputation and career concerns. The idea is that FLOSS developers produce software because they cannot easily find in the market what they need (Bessen, 2001) and/or because they want to signal to the community as a whole or to the job market their capabilities (Lerner and Tirole, 2002).

However these two incentives alone are not enough to justify the incredible growth of the FLOSS community. The empirical analysis seems to confirm this point of view showing that signaling and reputation are not ranked among the most important developers' motivations while own-use is important but among other equally crucial factors (Ghosh *et al.*, 2002; David *et al.*, 2003; Lakhani and Wolf, 2005). These factors are incentives related to the social and psychological dimensions of code sharing, such as fun in programming, the need to feel creative, identification with a group, peers' regard, ideology and so forth (Raymond, 1998a; Risan, 2006; Weber, 2000; Lakhani and Wolf, 2005; Bitzer, Schrettl, Schröder, 2004, Earnshaw, 2004; Osterloh and Rota, 2004; Dalle *et al.*, 2004). For a more realistic description of the phenomenon then we need to explain and "unwrap" this last finding.

Economic explanations have to be interwoven with psychological, anthropological and sociological explanations. Talking about communities this movement appears a necessity. The communitarian institution, in fact, can be placed on the boundaries between different social sciences. Understanding the community structure -and especially its incentive scheme- means then taking into account the insights produced by theories developed inside a wide range of fields. Even if my background is rooted in economics and management, this paper tries to perform such opening relating economic literature to the insight coming from other social disciplines. I believe that bringing on stage those economic theorists that open the door to other disciplines and connecting their arguments to specific concepts such as community of practice, reflexivity, practical interest and communicative action, can create a fruitful bridge between different fields, able to make some specificities of FLOSS -usually overlooked- emerge.

1.2 Two paths of 'reflexivity'

Giddens' contribution (1991) offers a useful starting point to understand how incentives can be related to developers' social and psychological dimensions. Giddens' work is a breakpoint in the social science evolution, but for what the present paper is concerned, only a small part of it will be taken into account. What is of interest here is the change Giddens' vision has induced on the definition of identity. Individual identity is conceived of as a dynamic object, constantly revised by the subjects to cope with the emerging contradictions and novelties induced by her interaction with the environment. The interaction between the social context and the subject is "stored" in individual biographies which provide the material the subject reorganizes and re-structures in order to shape her new identity. In this process two main "reflexive moments" can be easily identified. On the one hand, each subject is recognized as part of a social context which in turn is shaped by and shapes her identity. The term 'reflexive' here represents the cyclical dynamics typical of complex processes where single units determine the emergent properties of the whole system and in turn are shaped by these properties. On the other hand, reflexivity refers also to the psychological process undertaken by the subjects when they search -both consciously and unconsciously- their new identity. Individuals construct their new self-identities by means of their active reflection on their biographies.

Being identity the very place where values and principles driving agents' actions are defined (in economic terms, the place where *preferences* are defined¹), it appears a crucial concept to understand developers' social and psychological motivations. This in turn means that both sides of reflexivity have to be investigated to give a clear picture of how these motivations work.

Lindgren and Wåhlin (2001) follow one of these two paths developing the concept of *Reflexive Identity Construction* (for the sake of brevity, the acronym RIC will be used henceforth). In RIC "The word 'reflexive' is linked to our capacity to reflect and think about ourselves in relation to otherness in a particular context. [...] Men and women are not just mirrors of environmental conditions but also possess their own opinions that in some sense are distinctive. [...] The phrase 'identity construction' can be said to draw attention to the self-preservation instincts of the particular individual concerned." (Wåhlin, 2003, p. 12)². Individuals, and especially those who move across the boundaries of different social and organizational contexts, feel continually the necessity to cope with the contradictions novel situations open in their current identity. In their empirical analysis, the authors show that individuals reflect upon the "breaks" in their biographies in search for the answers to questions like "Who am I?" and "Where am I going?", so that "Reflexivity is used by individuals in the process of getting to know themselves better." (Lindgren and Wåhlin, 2001; p. 362). The authors notice that "In these situations people tend to turn inward in search of deeper values and/or theoretical grounds for their pathfinding. [...] Moreover... In our empirical study we observed that our respondents gave voice to something beyond self-fulfillment and instrumentalism. [...] Elements of this more profound identity, beyond institutionalised identities, are constructed in a reflexive manner." (Lindgren and Wåhlin, 2001; p. 370). Thus, reflection affects not only the superficial layer of the identity, but acts also at a deeper level. In other words, RIC shows that reflexivity is a "powerful" tool to redefine individuals' identity: it can reach and act upon the regions of the subject's identity where the drivers of individual behaviors are rooted, where her system of values and aims belongs.

The perspective on reflexivity the present paper offers, i.e. the *Reflexive Identity Process* or RIP, is complementary and tightly interwoven to RIC, but develops along the second path departing from Giddens' intuitions (1991). In this case 'reflexivity' has to be conceived of as representing the dynamic loop connecting individual identities to the system of social rules and norms conveyed through the interaction with the other members of the community each individual lives in. The peculiar relation between individuals' identities and the social context represented by RIP enables also a clear definition of the mechanism behind social rules internalization, and thus individual behaviors and motivations. This way, it is possible to give a description of the process underpinning FLOSS developers' psychological and social motivations, and to show how RIP gives them the power to become *antidotes to free-riding*, i.e. drivers of cooperation. By the same token, RIP is used to highlight the limits of such a social process, namely *dissipation* and *instability*.

As a last note before a deeper description of RIP, consider that the coevolution between the individual and the social dimensions has been recognized also by part of the economic literature in the context of theory of institutions. Bowles (1998) shows that different allocation rules (being them "capitalistic", "communist", "patriarchal" or "corporatist") "[Affect] who meets whom, on what terms, to perform which tasks, and with what expectation of rewards [...]. These allocation rules therefore influence the process of human development, affecting personality, habits, tastes, identities", (Bowles, 1998, p. 76).

A sharp empirical evidence of this is offered by Henrich *et al.* (2001), who performed a set of experiments, as the Ultimatum Game and the Public Goods Game, among individuals of 15 small-scale societies in Asia, Africa and South America. In the regressions aimed at explaining the observed agents' behavior, individual variables (such as sex, wealth, ...) have been found to have a marginal role, while a great forecasting capability has been found in the social variables (features of

the social structure of each ethnic group and/or village the individuals came from). A further ethnographic analysis of these communities enabled the authors to explain this outcome. Institutions shaping the interaction of individuals in their everyday life were mapped into the experiments, determining subjects' behaviors much more than what their individual characteristics could do. This means that the institutions shaping agents' interaction in each group are fundamental in determining the behavior of their members.

As a last step, since the creation of institutions and norms is an emerging property of the interaction among agents, the "reflexivity circle" can be closed around the co-evolution of collective institutions and individual behavior (Coriat, Dosi, 1998).

2 The Reflexive Identity Process (RIP)

2.1 Theoretical account. From interaction to internalization of rules: the central role of the debate
The idea of RIP departs from the concept of community of practices (Wenger, 1998). The nexus of ties that constitutes a community is a twofold space. On the one hand the common space is used to produce the artifacts of the community. On the other hand in the same space -and together with the first activities- individuals construct their 'representations of the world'. This last term reflects the semantics, the system of meanings, through which reality is organized and filtered to be intelligible. The community carries on a continuous collective negotiation of meanings, in which each member of a community relates to the others in order to define, make sense of and evaluate (i.e. give a meaning to) the system of facts they share. In figure 1, the first part of the graph, named *A*, represents precisely this phase.

Again Wenger (1998) notices that this inter-subjective process acts back on each community member, re-defining her identity (Lindgren and Wåhlin, 2001). Golden-Biddle and Rao (1997) describe this coevolving dynamics in the field of nonprofit organizations: "Organizational identity - the shared beliefs of members about the central, enduring and distinctive characteristics of the organization- constitutes part of the shared meanings held by members. In a social construction perspective, identity becomes an important collectively-held frame invoked to make sense of their world [...]. Identity influences not only how members define themselves, but also their interpretation of issues and roles, responses to problems, and feelings about outcomes", p. 594. Similarly, Lin (2003b) describes the dynamic negotiation of meanings and its effects on identities in the specific FLOSS environment as follows: "Social worlds and identity are interactively constructed, and perspectives and aspirations emerge dynamically from this interaction. Since meanings are both culturally created and mediated, all interpretations or perspectives are based in communities or social worlds". Consistently, Tuomi (2001) states the fundamental role of communities in determining individuals' identities: "[A] community [...] does not emerge from putting together a sufficient number of individuals. On the contrary, individuals became persons with individual identities through their membership in the various communities they are members of. Identity [...] is grounded on communities, with their specific systems of activity and collective meaning processing."

At the end of the day, then, the individual necessity to organize the reality into a structure of meanings triggers a process of interaction through which individual identities are shaped (to see how this process could work in practice in a virtual environment see Rheingold, 2000; Levy, 1984; Preece, 2000). Refer again to figure 1, letter *C*, to see a graphical representation of this process.

Notice that this process does not develop only around the practices the community members apply in their interaction process. The construction of meanings, in fact, is also a conscious and dialogic process. Individuals' visions of the world emerge also from their positions in the different debates populating the social environment of the community, being these debates about software development or not. The system of meanings defining the space in which software development is

undertaken (its "ontology") is a social construction produced by the set of members' practices as well as through developers' *dialogic* interaction. The roots of this dialog are however wider than those determining the negotiation triggered by the practices, and, as we will see in the next sections, can be found in Habermas' (1968, 1981) definition of 'practical interest' and 'communicative action'.

Consider for example the case of a FLOSS user who decides to interact with the community just to fulfill a specific need of her. Entering the debate undertaken by the community in order to find out the code she needs forces the user not only to interact with the other members at the level of the practices, i.e. to solve the specific problem she has, but also to approach a set of visions of the world she did not consider before, and she was not aware or had just an abstract idea of. She finds herself in the need of answering questions and acquiring positions about topics she never thought of. In other words, the positions emerging from the debate start to interact with her previous structure of principles.

Moreover, consider that the topics are determined by the community social environment, i.e. they are reflecting the dilemmas and the contradictions the community is facing. This means that the set of topics is an image of the fundamental points around which the community is evolving, and that is why the newcomer is led to take a position with respect to them.

In taking a position she also commits herself to this position. The cost of not being coherent, in fact, is not only the social punishment of the exclusion from the community: it is a cost in terms of *dissonance*. Dissonance can take different forms, as -for example- 'moral' or 'expressive' dissonance (Kuran, 1998), and represents the mismatching between the individual's identity components, being they behaviors, opinions or traits. As Kirman and Teschl (2006) argue building on a series of different theories (e.g. Akerlof and Kranton, 2000; Higgins, 1987; Livet, 2004, 2006) dissonance results in a "psychological wellbeing loss". Individuals experiencing dissonance try to reduce it changing the different elements of their identities to re-establish coherency (Kirman and Teschl, 2006). One way of doing this is to conform the individuals' visions of the world, i.e. their identities, to what the other members of their social groups expect, i.e. internalize the social context and thus its rules. Of course this is just one possible outcome of the process. We shall discuss the other possible outcome, the action the individuals can take to adapt the social structure to their beliefs, in the next sections. By now, consider that this line of argumentation leads directly to the conclusion that, under certain conditions, when an individual takes a position³, she is pushed to behave coherently, redefining her identity around this new ethical structure. In economic terms this means that individual's *private preferences* adapt to the *public preferences* expressed by the community (see figure 1, letter **C** and **D**).

To have an idea of this process consider the case analyzed by Westenholtz (2003). The author follows an individual in his attempt to create a firm developing FLOSS and offering services related to the produced programs. As the activity of the firm expands, the subject is asked to accept also contracts implying the use of a certain percentage of closed code. This creates dissonance in the subject's vision of his work. He is pushed to take a position, and he chooses to accept the contracts. He solves the resulting dissonance adapting his identity to the new situation: "He enters into the practice of using closed codes, and he makes sense of this practice by establishing a border between 'specific themes' and 'universal themes'. In relation to the former, it is acceptable to have business secrets." (Westenholtz, 2003; p. 7).

Going back to the previous example, from the view point of the properties this process induces on the community structure, the specific position chosen by the user is to a certain extent irrelevant. Both sides of the *querelle*, in fact, usually embody a certain trait of the community, and thus a common set of rules. If this is the case, whatever side the individual chooses to join, she will commit to a position embodying the community rules common to both positions. This means that the process of rules internalization does not necessary lead to a *common* vision of the world. Individual *a* and *b* can have different opinions and principles before and after the process. And still

the internalization of the common rules takes place because the dialog -and not the specific positions the involved users decide to support- make the communitarian debate enter the definition of members' identities. The communication process *itself* creates the internalization.

2.2 RIP at work: an empirical account.

2.2.1 *Illustration through a case*

The *querelle* between Free Software advocates (mainly gathered around the Free Software Foundation, FSF) and the Open Source Software proponents (represented by the Open Source Initiative, OSI) can be a good case to describe the RIP at work.

Dahlander gives a precise description of the debate: "Coinciding with Netscape's (the web browser) release of the source code, a number of prominent individuals met in 1998 to discuss the benefit of open versus closed source code. They felt that FSF's accentuation of freedom was hard to combine with the interests of firms, and that this ultimately would hinder a further diffusion of the open code to mass markets and commercial firms. [...] Proponents of open source feared that 'free' would be mistaken to mean anti-commercialism' By using 'open source', one hoped to diminish the confusion that 'free' caused, due to its use as in 'free speech' being often misunderstood economically as in 'free beer. This had the result that the number of articles written on FOSS and Linux grew from 1998 and onwards" (Dahlander, 2005; p. 17).

This debate concerns the very structure of the community, and it is considered fundamental by community members. In the FLOSS-EU survey (Ghosh *et al.*, 2002) 48% states "I think of myself as a part of the Free Software community", 32.6% says "I think of myself as a part of the Open Source community" and only 19.4% of the sample do not care. The FLOSS-US survey (David *et al.*, 2003) presents similar numbers: "I identify more with the Free Software community" has been marked by 31.4% of the responders, while 31.5% marked "I identify more with the Open Source Software community"⁴.

The debate around this topic is then a crucial arena where different visions of the community and of the whole FLOSS movement meet, contaminate and confront one another. Even if a newcomer was not aware of such a distinction before entering the community, the interaction with other members is likely to push her to take a position and express her opinion on the topic. The debate on this issue and the comparison with the others' positions, thus, strongly affects the newcomer's vision of the world, changing her identity accordingly.

However, both the 'free' and the 'open' field share the belief that software has to be produced and redistributed following the principles of FLOSS licenses and in a cooperative manner. The community rule the newcomer internalizes is precisely this common feature. Whatever is the position she decides to adopt, her identity will be reshaped according to the common principle shared by the two positions.

2.2.2 *Statistical assessment of the phenomenon*

The previous case gave a first empirical insight of the RIP process. However, to be able to give not only a qualitative evaluation of the phenomenon, but also a quantitative perspective, a second empirical investigation has been undertaken. The analysis is based on a web survey opened in May 2, 2006 and closed in May 30, 2006, and composed by 41 questions relative to developers' participation, motivations, education, job and benefits received from the participation in the FLOSS community⁵. Invitations to answer the survey were sent directly to most of the Italian Linux User Groups and at some mailing list frequently read by FLOSS developers. Anyone who considered herself a member of FLOSS community could participate. In total there were 338 responses.

The question relevant for the present analysis is shown in table 1. The answers it received were 229

divided in the following 7 items (plus an “other” option which received only 18 answers):

Table 1. Question on the function of the debate for FLOSS developers

<i>What was the role of the discussion with the other members of the community in your decision to continue to participate in the Open Source world? (max 3 answers)</i>	Percentage of answers (over 230)
<i>a – none</i>	8.73%
<i>b - it made aware of new job opportunities</i>	19.21%
<i>c - it has stimulated my creativity providing me with new problems and new solutions</i>	61.14%
<i>d - it allowed me to discover specific needs I did not think about</i>	27.95%
<i>e - it made me aware of new problems and new points of view</i>	58.95%
<i>f - it made me feel part of the community</i>	27.95%
<i>g - it made me become aware of the fundamental role of the Open Source in the nowadays society</i>	46.72%

The seven possible answers presented above have been built in order to relate them to some of the main incentives the empirical literature has highlighted, so that they could account for a wide range of functions the debate can cover. Among all this functions three of them emerge as crucial: the stimulus of creativity (letter *c*), the discovery of new view points (*e*) and the awareness of the role of FLOSS in the society (*g*).

In order to assess the Reflexive Identity Process in the light of the previous results, consider that the RIP can be here represented by answers *e* (the debate) and *g* (role of FLOSS in the society). This mapping resembles the situation studied in the case reported in the previous section, where the discovery of new points of view through the debate is coupled with the responder’s acquisition of a position in the debate around the FLOSS role in the society. In particular notice that answer *g* has been written in such a way that it can span both sides of the *querelle* “free” vs. “open” described in the previous section, and thus capture the adherence to a position independently of the position itself, as required by the RIP.

Having established this mapping, the result that the RIP touches the most important functions of the debate follows immediately from the table.

But from the same data we can go a bit further asking if these dimensions are related in the way described by the RIP. The description of the process provided above calls for a specific relationship. Not only we should observe a positive association between items *e* and *g*, but this must be more important for those individuals who are not already at the center of the debate, but still in the periphery. The former are likely to have already developed their opinions, while we want to isolate the mutual effect of *e* and *g* before this event. Thanks to two other questions in the survey it is possible to stratify the sample of respondents according to their use of emails and forums on a weekly basis. Those who are less likely to communicate are also those who are less likely to be at

the center of the debate, and thus represent the reference group. In order to further enrich the analysis, they can be also compared to the most communicative ones.

In the survey it is asked to report the average number of messages sent by the respondents to forums and mailing lists over a week. The median of these variables across all the 229 individuals⁶ is 3 and 5, respectively. The sample can be stratified considering as a reference group those who declared to post in an average week at most 3 messages to the forums *and* 5 messages to the mailing lists, and as a comparison group the set of those who usually send a higher quantity of both messages. The two samples are composed by 69 and 65 individuals, respectively. To see how the relationship between items *e* and *g* develops in the two samples consider the following table reporting for both the samples the correlation between item *e* (the debate) and all the other items⁷.

Table 2. Correlation between item *e* and the other items in table 1.

<i>Sample and correlation</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>f</i>	<i>g</i>
<i>e</i> for the reference group (N=69)	-0.278*	0.178	0.155	-0.003	0.288*
<i>e</i> for the comparison group (N=65)	-0.046	0.385*	0.026	-0.012	-0.324*

**Significant at the 5% level*

As the previous results show, in the reference group the discovery of different points of view thanks to the debate is positively associated to the awareness of the importance of the role of FLOSS in the society the discussion induces in the respondents. Not only is the correlation positive and significant at the 5% level, moreover, if compared to the other possible functions of the debate, it is also the highest. In the control group, where developers are already at the center of the debate are likely to have already developed their opinions, the discovery of several different opinions though the debate is negatively correlated to the awareness of the FLOSS role, and instead creativity is the main factor to which the heterogeneity of the points of view is positively related to.

This discussion shows that the Reflexive Identity Process, as exemplified by the case described in section 2.2.1, can be considered a dynamic mechanism accounting for some of the main forces related to the communication side of the community.

3 The properties of RIP

3.1 The gain: an antidote to free riding

Production and consumption of commons can be undermined by opportunism. Cooperative enterprises that require the involvement of several actors can be destroyed by the misalignment between public and individual incentives. On the contrary, organizations realizing such an alignment are characterized by a greater degree of stability. For example, the relationship between users and developers in FLOSS is stable, because each one of the two sides benefits from the activity of the other (Raymond, 1998b). On the contrary, the sharing attitude of software developers before the eighties was undermined precisely by the increasing appropriation of ideas that were freely exchanged before. In this case each participant in the cooperative process had a private incentive strong enough to lead the cooperative regime towards its end. FLOSS was born precisely as a response to the strategies (Nuvolari, 2005). The GPL erases the possibility of appropriating the code of the community, and coordinate developers' behaviors around cooperative strategies (Gambardella, Hall, 2006). But "around" the GPL and outside it (e.g. BSD) many free-riding behaviors are still possible. For example, following the idea that many open source developers participate in the FLOSS production mainly because they need a specific function not already implemented, we should observe under provision of FLOSS due to "strategic waiting". Instead of getting involved in the projects developing the programs similar to the ones they need, many developers would simply wait until those projects' members actually create the software they need⁸.

Thus, when approaching FLOSS from an interdisciplinary perspective, where all the different interests of the developers have to be taken into account, free riding becomes a crucial phenomenon. This is even truer when FLOSS is conceived as a case study able to open a door on a peculiar way of producing innovation. Understand what limits free riding in the FLOSS model can be useful to imagine how to foster cooperation in other environments where a FLOSS-like model of innovation has still not emerged.

To begin to analyze the capabilities of the FLOSS community to marginalize opportunistic behaviors the first step is to consider what are the limits in which the community constrains free riding, i.e. what is developers' perception of it. Consider the following quotation:

"Open Source communities permit some members to take much more than they give, provided they do not violate minimal membership rules. [...] The literature on CPR, public good provisioning and free riding has probably over estimated the potential destructive role of small number of non contributors, assuming that their behavior should inevitably self-propagate. This is not necessary true" (Bonaccorsi and Rossi, 2003; p. 33).

FLOSS developers seem not to expect other members to free-ride and not to think of free-riding as a possible strategy they could pursue. This means that the explanation relative to the mechanism by which the FLOSS model reduces free-riding has to be searched at the individual level, in developers' system of aims and values. The question then becomes: "Why are developers insensitive to free-riding?"

"Cooperation reflects a transformation of individual psychology so as to include the feeling of solidarity, altruism, fairness, and the like. Collective action ceases to become a prisoner's dilemma because members cease to regard participation as costly: it becomes a benefit in itself, over and above the public good it is intended to produce" (Elster's words as reported by von Hippel and von Krogh, 2003; p. 216).

The process described by Elster is precisely what has been called here RIP. RIP changes the relationship between the community and the individual, because the individual's motivations have changed to take into account the new scale of values and principles originated by the interaction. Free riding, then, is not only a condemned and punishable behavior: it becomes a secondary option, simply neglected by the members. Another quotation from the managerial literature can make this point clearer:

"If the firm members are successfully induced to pursue the entrepreneurial vision as their own, they may be less likely to engage in figuring out opportunities for opportunistic choices. The simple reason is that their attention tends to be diverted away from such a line of thought. This seems to explain why firms with successfully implemented business conceptions [...] are much less faced with opportunism than the governance approach would have it. [...] The rationale here is not necessarily to refer to any normative power that an accepted social model may exert" (Witt, 1998; p. 173).

The process Witt describes in the context of the organization of the firm corresponds to the passage shown in figure 1, letter **D**. The spreading of the entrepreneur's vision makes the firm members' identities and motivations move to a level where "their attention tends to be diverted away from" free-riding. Again, RIP seems to be at work as an antidote to free riding also in this context.

3.2 A first limit: instability

Notice that the terms used in the previous paragraphs has the flavor of the possibility. The process

analyzed above, in fact, does not always develop as described. If the debate carried on by the community members is *physiological*, i.e. both positions take for granted the structure of rules upon which the community is based, the debate develops as said (see figure 1, letter **D**). However, when the mismatch between participants' identity and the framework underpinning the dialog is too wide and touches the community "roots", dissonance can be ineffective in homogenizing private and public preferences, making harder the internalization of the community rules. As Kuran (1989, 1995) shows, these tensions can be preserved as latent in many individuals until they explode and question the very structure of the community, which then becomes the center of the debate. The result is that the community can be transformed into something different, some of the members can decide to exit and the aims and rule of the community can be deeply modified. In Kuran's (1989, 1995, 1998) words, the system enters a phase of *revolution* (see figure 1, letter **E**). If the community survives the transition, however, it starts over its activity in the new acquired position, remaining on the track of the physiological debate until a new revolution is triggered.

The *querelle* analyzed above opposing 'free' and 'open' software advocates is an interesting example also because it is precisely on the boundary between the physiological debate and the revolution. By now, we observed a physiological debate, where the two positions confront one another but share the same principle relative to source code openness. As Dahlander (2005) states, however, "These two camps (FSF and OSI) share the goal that the source code must be available, but disagree about many underlying beliefs. OSI felt that it opened up the possibility for firms to commercialize and make money on FOSS", p. 17. The increased importance of economic actors in the FLOSS arena can trigger serious changes in the community structure. "For-profit interests have emerged in conjunction with a changing institutional infrastructure to embody a more pragmatic attitude to firms. This in turn means that the way FOSS was intended to work (with many similarities to Merton's ethos of science) might change over time", Dahlander (2005), p. 27. Firms' interaction with the community could in fact evolve towards a point where firm-based projects become a significant part of FLOSS production. The bifurcation at this point can be expressed by a question: "Will firms be able to preserve the features of the production process *Free Software advocates* believe are essential?". A positive answer to this question keeps the debate on the track of a physiological evolution of the community (figure 1, letter **D**). A negative answer, instead, means that Free Software advocates' dissonance between their private preferences and the new structure of meanings and values the community expresses will increase. If a certain threshold is reached, the debate will be moved to a point where the distance between the two positions is too wide to be closed. Principles other than code-sharing and which do not have a common root shared by all the community members will acquire more importance and will become the center of the debate. Eventually a revolution, being it a 'break-up' or a transformation of the community, may occur (figure 1, letter **E**).

A similar process is described by Witt (2000) in the context of the theory of the firm. The extent at which a firm can grow is determined by the evolution of the "business conception" underpinning it. If the entrepreneur succeeds in spreading her business conception among the firm members (i.e. she is able to acquire "cognitive leadership"), an initial growth is sustainable because opportunism is "neutralized" by a process similar to the RIP one. However, at a certain point, the higher level of organizational complexity will trigger the need for a reorganization, and thus for a change in the business conception structure. If such a change is successful, the firm is enabled to grow. If it is not, the clash between the entrepreneur's and the firm members' business conceptions results in several effects, one of them being also the re-entry of free-riding in the set firm members' possible strategies. Also in this case, then, the attrition of different visions of the organization triggers a "revolution".

In nuce, there is an intrinsic instability in the evolution of communities, where revolutionary phases can succeed to physiological phases of stability and vice versa.

3.3 A second limit: dissipation

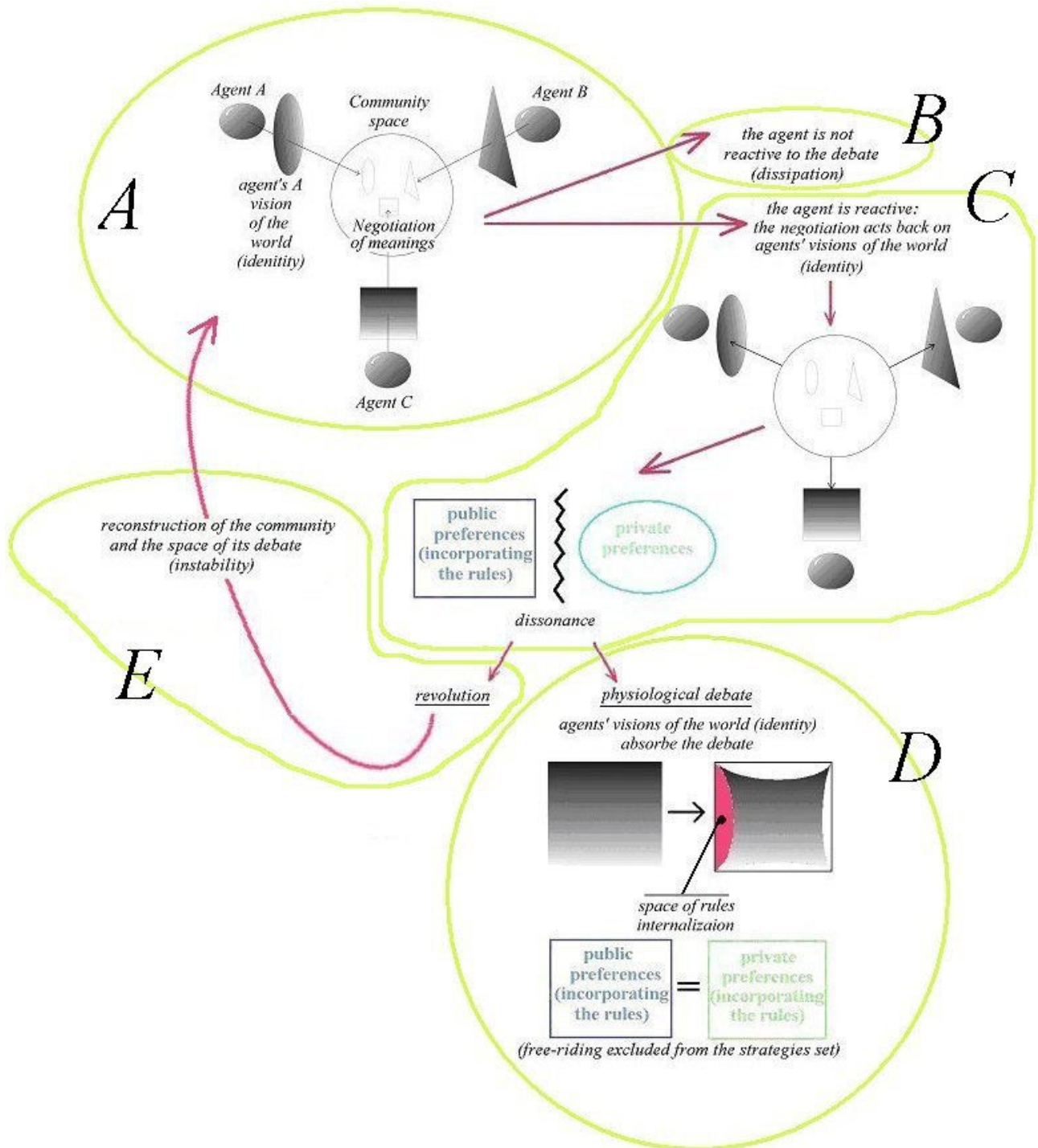
Among all the users registered on SourceForge.net, only a small set of them is actually active (David and Rullani, 2006). This means that the RIP is not affecting each and every developer at the same degree. Thus, RIP cannot belong to the set of “oversocialized” formulations of social interaction (Granovetter, 1985), and it is instead perfectly consistent with the “embeddedness” view (see figure 1, letter **B**). And in fact, RIP does not affect all the community members, just the most “sensitive” subset of them. But does this mean that RIP is a weak and negligible process? Two main points can be made to state its strength.

First, it is a general process. As the sociological and philosophical literature show, the processes upon which the different form of reflexivity are based are *innate*, and in this sense ‘necessary’ (Wenger, 1998; Habermas, 1968, 1981; see also Fougère, 2004; for an account of this with respect to Bakhtin’s theory). This means every individual is affected by them, and thus by both RIP and RIC (Lindgren and Wåhlin, 2001). However, reflexivity becomes important only in those contexts where interaction is actually able to trigger these processes. The FLOSS community is just one possible space of interaction, and it could be not so relevant for a certain typology of users. For example, the interaction aimed at producing FLOSS moves through the internet. The studies relative to computer-mediated communication (e.g. Carbone and Ferri, 1999) have shown that it cannot be considered as something “less” than face-to-face communication. It is a different way of communicating, but still able to convey strong feelings and emotions (Rheingold, 2000). However, each individual reacts differently to CMC. This results in a different perception of the quality and quantity of interaction, i.e. a different perception of the “thickness” of the relationship. If an individual is not reactive to CMC, her participation in the FLOSS community is unlikely to be able to trigger reflexivity processes. On the contrary, more reactive individuals will be involved enough in the social environment of the community to trigger those processes.

Second, as Sacco and Zamagni (1996) showed, “some (possibly relatively small) degree of altruism may upset non-cooperative social conventions; if moreover a large enough number of players behave (possibly just moderately) altruistically, an efficient, cooperative social convention could be eventually brought about”, p. 267. This means cooperation rules based on mechanisms as the RIP can be strong enough to survive, propagate and become conventions even if they are not shared by every member of the group in the first place.

In other words, the RIP mechanism can strong enough to affect a substantial number of developers, but at the same time it characterizes the FLOSS model as a *dissipative* process, where, in order for the core developers to emerge, the community must have mobilized and “burnt” a huge amount of resources (i.e. participants).

Figure 1. The Reflexive Identity Process (RIP).



4 RIP and community of practices: some extensions

A community of practice is based on actors' urge to re-establish the coherence of a vision of the world challenged by the phenomena emerging through the interaction. The whole process takes place at the level of practices. "Members of the FLOSS contend the meaning of 'the FLOSS' by programming, contributing codes, reporting bugs, distributing packaged solutions, publishing

articles, or simply using a set of software, and in so doing, to make sense of the FLOSS. In this sense, FLOSS is a negotiable idea, not a stable set of artifacts: 'the' FLOSS" (Lin, 2003a). In other words, the need for a common understanding of the problem the community is tackling and of the consequent structure of the working practices applied by its members are the mechanisms inducing actors' interaction and the subsequent modification of their identities (Wenger, 1998). And in fact when FLOSS is framed inside the concept of community of practice it becomes a socio-technical process centered on problem solving (Lin, 2004b). "In the problem-solving process, the members negotiated their definitions of the problem and its components, exchanged their opinion by proposing their own conjectures. The materials -(i.e. the code and the scripts) in which the negotiation was embedded and which also embodied different ideas- are examined from different angles to represent both the problem and the solutions" (Lin, 2004a).

From this description it is easy to see the "dependence" of the RIP from the community of practice model. But even if RIP moves along the same line, it is not bounded by it. This because its very origin can be placed in what Habermas (1968) defines 'practical interest', and its development follows the rules of Habermas' (1981) 'communicative action', two concepts wider than community of practice. In what follows, I will try to explain this difference and to show how the community of practice model can be extended to embody also these other principles.

4.1 The practices and the debate

The first extension which can be taken into account is relative to the concept of 'practice'. Practices are usually conceived of as products of the agents' "on-the-job" activities. However, in the FLOSS community, the debate animating the social environment of the community (for example relative to the role of firms in FLOSS production and diffusion) has a similar effect on developers' identities, and should be included in the picture.

As Fougère (2004) notice, Bakhtin stresses the importance of 'otherness' as a necessary means to define one self's identity. In order to create our own identity, in fact, we need to see 'ourselves from outside'. This *immanent* need, i.e. a need which is structural and primary to human beings, leads individuals to seek a relationship with others they can use as 'mirrors' and criterion for comparison. But this can be done only if individuals constitute a linguistic communication, and thus if they create a common understanding of the language by means of which they interact. To do this, each one has to figure out how the other interprets the dialog they are having, i.e. she has to imagine to 'wear the other's shoes'. The need for common understanding in a dialogic situation has been defined by Habermas (1968) as *practical interest*, which is also *immanent*. The practical interest generates the need for a *communicative action* (Habermas, 1981), i.e. for a dialogic situation in which the involved individuals raise instances of validity with respect to the concepts they are expressing. This in turn generates mutual recognition and reciprocal legitimation as participants in the debate, constituting the basis for the 'communitarian relationship' acting on individuals' identity.

The reflexive identity idea springs from this mechanism, and thus it *comprehends* the community of practice concept. But it widens the basis of the process of identity reshaping and "opens up" a narrow definition of practices to a wider set of phenomena. The boundaries of the action and of the impulses stimulating the reshaping of the actors' identities are broader than the community-of-practice ones. The action, in fact, is still situated, but in a dialogic framework, rather than in a specific objective context.

This perspective is a small and humble echo of Latour's discussion aimed at broadening the concept of *actor*. In his theory, actors are humans as well as non-humans entities connected to a series of factors defining them and determining the conditions of their actions. The idea is to place on the same level both artifacts and subjects (Latour, 1988), avoiding a distinction which darkens the nexus of forces actually surrounding the actors. The aim of what has previously discussed, i.e. the

call for a wider definition of practices, follows a similar necessity. Limiting the set of elements influencing developers' identities -and thus behaviors- to a narrow concept of practices makes difficult to detect a series of other fundamental elements. Others' opinion not related to the problem-solving activity of the community, 'cheap talk' and all other communicative acts of the developers have the same weight of practices in the function determining individuals' behavior: they are all different faces of the same interaction process. The main idea here is to merge the practices and the practical interest, recovering the most human parts of the interaction, i.e. the simple dialog between actors.

This means that also opinions and positions gathering attention during the community debate can be considered *boundary objects* fundamental to shape FLOSS community evolution. Teli and De Paoli (2006) develop a study which offers an interesting perspective on this. They analyze the licenses of two projects, GRASS (a geographical information system) and OpenSolaris^{TM2} (an operating system), and especially the debate developers carried on with respect to them. Their aim is to describe the properties of these licenses as textual boundary objects. As the authors state: "Our discussion can be considered as focused [...] on diverse moral, technological, scientific and economical behaviors which can be considered included or excluded by the boundaries traced by and through the licenses." (Teli and De Paoli, 2006, p. 3). A similar perspective can be applied to boundary objects which are *not necessarily* inscribed in a set of artifact, such as the different opinions in the community debate. As licenses, each one of the two sides in the 'Open vs. Free' *querelle* trace boundaries excluding or including certain features which directly define those who oppose to or join them. As licenses, both sides give a representation of the features they embody which is shared by the community and extends beyond it. As licenses, each position in this debate could thus be considered a boundary object defining the social space of FLOSS.

Concluding, a community as the FLOSS one, which is for sure a community of practice (Lin, 2003a; Edwards, 2001), is also something more, and is able to create high level of commitment also outside and beyond the practices and the artifacts of software development. Every scope of communication relative to the community is the place where collective and individuals' identities are shaped. Thus, commitment is created not only at the level of the practices, developing software and working together, but it spreads along every level of the linguistic communication.

4.2 The community and the incentives

The second extension is the link between the community-of-practice model and developers' incentive scheme. The literature relative to communities of practice, in fact, is mainly focused on the learning and legitimation mechanisms triggered by social interaction.

However, interaction has the power to affect also individuals' drivers of action, acting on individuals' identities. As said in previous sections, reflexivity is powerful enough to make social context directly enter individuals' system of values and principles, and thus to their motivations.

The community of practice represented by FLOSS should then be considered not only the mechanism behind social learning and legitimation, but also a system where the social dimension acts directly on developers' drivers of actions fostering cooperation.

In other words, the very mechanisms at work in a community of practice should be considered also basic elements of the debate on developers' motivations. This movement will enrich the picture allowing for the description of a series of new processes, such as RIP, constituting the "antidote" the FLOSS as well as other communities have against free-riding.

5 Conclusions

The paper discussed the social processes of the FLOSS community applying a community-of-practice perspective. Being into a community means sharing not only a production process, but also

a space in which in every moment individuals are forced by the interaction to share their visions of the world. Participants are pushed to form, and express, opinions on the topics felt as crucial by the community debate. Taking a position, participants commit themselves to a specific set of rules, which is then embodied in their motivations and excludes opportunism from the set of possible behaviors they could pursue. However, this is not true at the same degree for each and every individual in the community, even if it is general enough to constitute one of the main pillars upon which the community is built. The community is then a *dissipative* object, in the need of “mobilizing” a lot of developers to make the most “reactive” ones internalize its rules and increase their involvement. Moreover, when the level of dissonance between the individuals’ system of values and the community rules is too high, the internalization of rules can be replaced by an accumulation of latent disagreement, which can explode and propagate triggering a *revolution*. In this phase communities transform themselves and –if they survive- reallocate the community structure of meaning and the collective debate on another trajectory.

Following the same line of inquire, the paper has also showed that the concept of practices should be formulated in a broader sense, to embody also opinions and positions in the debate the community develops. Individual identities and the social space of the community, in fact, are also shaped by this level of interaction. At the same time, the paper also discusses how these concepts can be related to developers' motivations, calling for a wider definition of the effects interaction is able to produce on the involved individuals.

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¹ Part of the economic discipline has highlighted the importance of identity, as the following quotation shows: “[...] a source of motivation is missing from current economic models of organizations. [We] characterize this missing source as identity. By identity we mean a person’s self image — as an individual and as part of a group. The rituals [...] and other organizational features can change the way people see themselves; they become part of the organization and internalize its rules. In [...] organizations, such identification - or lack of it - plays a critical role in determination of work effort, incentive schemes, and organizational design”, Akerlof and Kranton (2005), p. 1.

² In an older work, Wåhlin and Lindgren state: “By using the word 'reflexive' we draw attention to the fact that people reflect upon life in different critical situations, and also that their reflexivity is revealed when they articulate their narratives in interaction with others (for example, ourselves as researchers). This reflexive identity can also be described as a bridge between the theoretical concept of 'self-identity' and the concept of 'social identity' which again

emphasises the continual re-definitions associated with identity construction.” (Lindgren and Wåhlin, 2001; p. 361).

³ Notice that “taking a position” means signaling one’s opinions to the other members of the community, i.e. being placed on the space representing the debate the community is undertaking. In this perspective, also the choice of not taking any of the already established positions of not taking a position at all correspond to a specific signal on the opinions of the subject on the discussed topic.

⁴ To further explore the terms of the debate, see Giuri *et al.* (2002), Stallman (1998), Weber (2004) and the web site of the *Open Source Initiative* (www.opensource.org/) and of the *Free Software Foundation* (<http://www.fsf.org>)

⁵ The survey was developed and implemented by Alberto Artana in the context of his undergraduate dissertation (supervisor: Alfonso Gambardella). As long as the survey is concerned, the author of the present paper was among the additional supervisors. See Artana A. (2006), “FLOSS – Italian Survey: Motivations Analysis”, Undergraduate Dissertation, Università Commerciale Luigi Bocconi, Milan, Italy; to have further information on the survey.

⁶ Among the 229 respondents, 14 individuals did not report any information regarding the messages they post either to the forums or the mailing lists.

⁷ The variables representing the items are dummy variables taking value 1 if the respondent has marked that item, and 0 otherwise.

⁸ A limit to this strategy can be found in the complexity of the needed functions: if the needed software is particularly different from everything else under development, everyone interested in it would have an incentive to start the development, otherwise she or he runs the risk of waiting too long (Bessen, 2001).