

Looking for the missing link between creativity and governance in Open Source Communities.

Some implications from GNOME and KDE case study.

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1. Introduction

The phenomenon of Open Source Software (OSS) has recently attracted the attention of many scholars and professionals for special licensing contracts used to distribute the software as well as for creative and innovative performances. The literature on this subject has shown how the creative process is powered by relational and cultural richness, that is one of constitutional element of institutional context of OS (Open Source) community and that was formed from the need to manage the dense and extensive network of interdependencies activated from the principle of sharing property. The freedom to make changes and improvements to the source code and the possibility of sharing it within the community together with the opportunity of each individual to interact with the community to report bugs, improvements, ideas has resulted in:

1. The development of an alternative model, where more players work together to produce a common good contributing to improve it continually and to expand the variety of resources available and the potential for its future production;
2. A model of selection of variety, which is based on collaboration/contribution among equals (peer-review) in order to find the solution that best meets the needs of the community and, at

the same time, leaves room for the development of varieties not selected (eg Fork).

The value of these principles/mechanisms to support the development of creativity within these communities is widely recognized and accepted in literature. However, it would be a mistake to consider that there is a monolithic model, namely that there are no differences in their interpretation and application.

The objective of this contribution is to demonstrate how different implementations of common principles of governance impact on innovative and creative performances. Therefore, a comparative analysis of governance structure and development model of two OS projects will be presented. The two cases analysed are GNOME and KDE, two of the most popular and widespread desktop environment (DE) used by many UNIX systems (Linux, Solaris, BSD, ...). This two DEs are developed in accordance with different principles and organizational structures.

The case study was developed on the basis of official web sites of two DEs, the most important blogs kept by developers of each DE, and the official mailing list. The paper is structured in three parts. The first part (Section 2, 3 and 4) is dedicated to build the theoretical debate with reference to two issues: models of governance of communities on one hand, and the relationship between creativity and institutional context on the other hand. The second part (Section 5) is devoted to the analysis of case studies. We have chosen to take into account for each DE the specific historical process that has generated the current institutional framework and model of governance in order to understand the differences underlying the creativity performances. The analysis of official blogs and mailing lists have been rather useful to understand how the flows of creativity and knowledge grow in the community, and how an idea, that flows from a single person to the entire community, is improved and in the end is used by millions of people

in your PC. The study of these two case studies have made possible to deduce some specific assumptions on the link between governance and innovation process. The third part (Section 6) will draw some conclusions based on case studies.

2. The governance of creativity: from ownership to sharing

The phenomenon of OSS has become increasingly important in recent years, showing a slow but steady growth in terms of market share (Wheeler, 2007). However, we still know little about how the community works, those who take part in it and how projects develops (Healy, Schussman, 2003). It is possible to say that the phenomenon of OSS does not respect nor the standard software development (Sandred, 2001; Vixie, 1999) nor formal organizations (Neff, Stark, 2003).

The institutional foundation of OS community is based on licensing contracts called *open*. A licensing contract to be defined *open* must guarantee the right to anyone to modify and redistribute the contents of a software application under the same licensing terms. These licensing contracts are linked with an alternative vision of creativity and innovation. The purpose of this section, therefore, is to resume briefly the terms of this debate in order to make clear the main values on which are based OS communities.

Historically creativity was considered an individual innate character (Legrenzi, 2005). Recently, its social and cognitive dimension has begun to be recognized thanks to advances in cognitive psychology. This has launched a parallel process of rethinking about the best incentives to promote the development and application of this resource (Cohen, Sauermann, 2007; Farrell Shapiro, 2004).

Creativity was so far protected through the attribution of an exclusive property right, even if limited in time, on the output and the derivatives of creative process. The functionality of this measure is based on two basic

assumptions that the emerging phenomenon puts in crisis. The first is that creativity is a scarce resource and it has an individual nature. The combination of these two qualities explain, on the one hand the protection of this right and, on the other hand its application as a means useful to gain the incomes generated by the creative process. The second is that creativity is, recalling what was said by Farrell and Shapiro (2004), a mere fact of "transpiration". In this perspective the creative process is treated like any other work where physical size is prevalent.

This conception of creativity goes into crisis for two very specific reasons. First, if creativity is the product of the interaction between a multiplicity of actors who collectively contribute to the creation of a work and/or an innovation (Florida, 2004; Rullani, 2004; Lessig, 2001; 2004; Foray, 2004) and not an individual resource, then the allocation of individual property rights:

1. Incoherent in respect to the widespread nature of the creative process;
2. Incompatible with the need to broaden the participation.

The second element of criticism is linked to the alleged economic motivation behind each creative process (Cohen, Sauermann, 2007; Farrell, Shapiro, 2004; Bruni, Zamagni, 2004; Frey, 1997; Frey, Stutzer, 2002; Kahneman, 2007). Although this process appears as strictly selfish, and aimed to meet an individual utility, the nature of this utility is not predominantly and/or only economic but it responds to inner motivations related with the search of new ideas and limits to overcome through personal creativity. This definition includes the comparison with other actors. The artists and the inventors, as well as the entrepreneurs are people aimed to reach a personal utility. However, the utility is not conceived only as the production of goods for the market but it comprehends also the self-

realization of through his work. This is the element of subjectivity/personality in which the artist, the inventor and the entrepreneur express all their creativity and originality and it is also the element that allows to make their ideas, products and firms them different from any other. A creativity and an originality that is reflected not only in the possibility to exercise a right of exclusive property, but also in the recognition of others. Thus, creativity by its nature includes an element of gratuity which is reflected in the recognition and in the admiration of others. This element could be impoverished or better displaced (Frey, 1997) from an exclusive property right that limit the access to that good. The intellectual property therefore does not need to stimulate creativity *per se* but to finance the production and distribution infrastructure necessary to exploit completely the meaning.

Recently, a third factor has made necessary to revise the model of "financing" of creativity: the development of information and communication technologies (Tapscott, Williams, 2006; Benkler, 2006; Anderson, 2006). In fact, the development of these technologies has had two main effects:

1. It has improved the efficiency and effectiveness of collaboration at a distance;
2. It has resulted in a gradual reduction of fixed costs associated with the production and distribution of digital goods such as knowledge and culture.

For what concern the collaboration, the development of these technologies has not only reduced the costs of coordination, but it has helped to improve the quality of the interaction. The development of tools such as wikis, blogs and forums has helped to transform the processes of collaboration and creation in a mass and global phenomenon, where

everyone contributes, in connection with other, only to a small part of the entire good (Tapscott, Williams, 2006).

With reference to production costs, the digitalization of the production process and goods has resulted in a reduction of production infrastructure and fixed costs. The consequences of this process in the case of the development and production software are that everyone with a pc and a broadband have the tools necessary to participate to the global process. However, the same process of digitalization is happening in capital intensive sectors such as pharmaceuticals, where the development of bio-informatics is helping in reducing the costs of infrastructure needed to participate (Ganzaroli, Pilotti, 2008).

In the technological framework depicted the attribution of an exclusive property right not only is no longer consistent with high levels of creativity, since it is interactive, free and widespread, but also it becomes less and less necessary to finance the additional investments in machinery and infrastructure used to make progressively available and largely spread the output of this creative process. The result is a gradual increase in the creation of shared spaces based on an open property. In these spaces creativity and innovation are not supported by the right to take the value of their innovation in an exclusive way, but through the sharing of costs and benefits in an extensive network of people (Bonomi, Rullani, 2005). The advantage does not end in a simple division of costs, but it fosters a progressive and rapid expansion of available value niche market.

In this section we have seen the main principles of OSS phenomenon in which creativity and innovation flow freely through the various actors in the community (users, coders, maintainers, ...) which does not participate and cooperate in the name of a mere economic utility but they are moved from other motivations often personal (satisfaction, manufacturing, ...).

3. The choices of governance in communities OSS

In the previous were highlighted the main values which underpin the OS development model. These values do not define unambiguously the model of governance used, but delineate a space within the decisions can be taken consistently with them. The most famous arguments concerning the governance of OS projects are those of Raymond (1999) and Benkler (2002). The first describes the OS community as an egalitarian network where hierarchical and centralized organizational structure are absent. The metaphor used by Raymond is the *bazaar* in opposition to the *cathedral*, in order to emphasize not only the absence of hierarchies but also the chaotic nature of development in this processes. The second uses a transaction cost analysis and says that the OS model thanks to its peer-to-peer structure lowers transaction costs and provides a more efficient allocation of human capital. However, the analysis of the most important OSS projects (Krishnamurthy, 2002; Healy, Schussman, 2003) showed that the OS community is very different from that described by Raymond (1999) and Benker (2002). In fact, it appears far from being a flat network based on interactive sharing and/or an efficient router self-organized for the formation of human capital. In this respect Healy and Schussman (2003) observed in opposition to Raymond (1999) and Benkler (2002) that:

- In OS projects the role of project leader in guiding the development is fundamental;
- The presence or not of an effective leadership distinguish between successful and failure projects. The importance of leadership is due to the fact that these projects are highly based on voluntary participation and it should be nurtured and supported in the same way it happens in social phenomena;
- The hierarchical component is crucial in successful projects.

The purpose of this section, therefore, is to outline the category of analysis and the dimensions useful to analyse and characterize the choices of governance made by the two communities studied in the next section.

In doing so we take a configurational approach to governance (Markus, 2007). This means that we can represent all the instances of governance in a multidimensional space along which it is possible to characterize the different choices made. Therefore, in this descriptive space *open* and *closed* stops to be two inconceivable models of governance because they are based on a set of values not overlapping, but they become opposed ways to achieve the same purpose.

Based on these assumptions and on a careful review of literature, Markus (2007) has defined six dimensions that are useful to map the variety of models of governance in OSS projects.

The first dimension is the governance of property. This category refers primarily to two issues: the structure of licensing contracts and the presence and the role of non-profit foundations to which transfer ownership of these assets. To explain what is meant by property in the OS communities is useful to briefly explain the role of licences. It has been said that a OS licence must ensure that anyone has the right to modify and redistribute the software under the same licensing terms. In this way, the owner renounces to exercise the exclusive property right on the content, but it maintains the fatherhood. In other words, it is the only one who can decide what can be called with a certain name. For example, Linus Torvald is the only one who can decide what is Linux and what is not Linux. Then, the paternity guarantees to the owner an enormous power of control over the future development path. The exercise of that power, however, is limited by the risk of exit, given the completely voluntary nature of participation, and of forking, given the right to take a piece of code and to start an alternative path of development. Therefore, the property is constantly fostered to relate

with the community in order to maintain its power of leadership, representation and address. The establishment of non-profit foundations to which has transferred the ownership of the assets of the community, responds to the need to work on the same level with large profit companies, such as IBM, Sun and HP. This choice was not made by all OS communities and when it was made, it was often debated because it is viewed by the more radical members as a distortion of the principles of the OS model. For this category of analysis it is important to consider the statute, the charges, the rules for their election and the participation rules provided by companies.

The second dimension is represented by the vision and the objectives of the project (German, 2003; Nakokoji et.al. 2002; Chess, 2002). Especially important, as we shall see in two cases studied, results the vision of the project that has a great influences on governance model and community management.

The third dimension is represented by community management (Mockus et.al. 2002; O'Mahony, Ferraro, 2004; Krog et.al., 2003; Raymond, 1999). This category refers to the management of institutional roles within the community, their functions and how they are assigned. In more developed communities the roles of coordination and the methods of accreditation are typically defined. Generally, there are two major roles. The first is the role of *maintainer*, which is the one who has the task of governing the development of a specific project collaborating both with other maintainers, and with the property. In particular, the maintainer has the task to examine and decide what changes to include in any new release. The second role is the *credited developer* that can access directly to Concurrent Versions System (CVS). This is the system that the communities use to manage the development of shared source code. Who has access to CVS, therefore, may directly alter the source code. Both these roles are assigned on the basis of merit, but the criteria vary from community to community.

The fourth dimension is represented by the software development process (Jorgensen, 2001; Shaikh, Cornford, 2003; Yamauchi et.al., 2000). This category refers to the manner in which the requirements are defined, the tasks are assigned, and the changes and control of release are managed. In OS community, the definition of requirements and allocation of tasks are emerging processes. The requirements are defined on the basis of reports made in the forums. The tasks are self-selected on the basis of skills, competences and personal interests. The communities differ in their degree of hierarchy in the management of these processes, also depending on the degree of participation of enterprises in the software development process. Even the schedule of a new release may be subject to different degrees of control and programming.

The penultimate dimension is the method of conflict management and the process of change of the rules.

The last category concerns the information system (Jorgensen, 2001; Shaikh, Cornford, 2003; Yamauchi et.al., 2000). This dimension refers to the way in which the flow of information within the project is organized and to the tools used to manage it.

These six categories provide us with the basic dimension useful to characterize the models of governance implemented in the two communities object of our analysis in the following section.

4. Community OS, creativity and governance: what relationship?

The OSS is based on a complex system of relationships represented by the community. A community OS can be defined as (Healy, Schussman, 2003):

- A social movement driven by idealistic principles and objectives;
- A formal organization with a clear and intensive development programme with the objective to release innovative products and

technologies;

- A spontaneous and voluntary network involving a group of people who dedicate a variable amount of their time and their skills at no charge.

The presence of antithetical aspects and elements within the definition of community helps to understand how the forms of governance of this community may be different depending on which element has the priority. Considering it and keeping in mind that governance of an OS community does not assume a unique form remains to understand what connection there is between this and creativity.

The communities are active containers of creativity and knowledge because (Hemetsberger, Reinhardt, 2004):

- Knowledge is shared in the community and it is co-created through some processes and technologies that allow continuous and indiscriminate access to knowledge created (source code and manuals) to new users and future generations;
- They are governed by the presence of practices that allow to keep track of new knowledge produced (*version changes*) and of discussions related to most important choices (mailing list);
- The new members are guided through a process, with different degree of standardization, to the adoption of cultural norms and routines of community in which they enter. The new members are encouraged to observe the *modus operandi* of community itself before entering actively to be part of it.

It is therefore crucial the comprehension of how is managed the relationship between community and new users to understand the evolutionary paths, often divergent, of OS communities.

The importance of governance in determining the type and speed of innovation is confirmed by von Hippel (2001) that analyzing OS models talk about *user-centric innovation* and states that these innovations if properly distributed may reach higher performance than one reached by hierarchically organized structure. Von Hippel, therefore puts the attention on the fact that these innovations need to be properly organized and that an OS system is not automatically superior to hierarchically organized system and/or forms based on proprietary license.

In the next paragraph will try to explore the model of governance of KDE and GNOME trying to grasp similarities and differences.

5. GNOME and KDE: two models of governance compared

The decision to investigate two similar projects in term of functions and size derives from the observation that a lot of attention has to be put on the size of the project and in its relative importance (the kernel is more central than a new music player) (Healy, Schussman, 2003). In addition, KDE and GNOME are indicated by a rate of dissemination and adoption similar that does not allow in any way to determine the superiority of a DE compared to another.

5.1 KDE: governance and institutional context

The KDE project was founded in 1996 by Matthias Ettrich, a student of computer science at Eberhard Karls University of Tübingen in Germany, as personal response to his dissatisfaction with the desktop Unix (X-11), developed by the consortium X-Open. Ettrich considered that desktop not very functional, complicated to implement, use and develop. The goal of KDE, therefore, was to make available a DE that was functional, easy, technologically advanced and pleasant to use.

Ettrich chose Qt as application development framework. This application was originally distributed through proprietary license, and therefore

incompatible with a restrictive interpretation of LPG as well as insufficient to ensure continuity in the development of this platform. The choice of Ettrich, even though it was technologically based, had the effect to lead to the development of an alternative project (GNOME), and to lose the support of Debian (one of the most important and influential distributions Linux characterized by a restrictive interpretation of the GPL).

In 1998, Trolltech, the company that owns the copyright of Qt, has decided to adopt a dual licensing model (QPL) giving a partial solution to this problem. This license allows the user to decide whether to release applications developed through Qt under proprietary or GPL licenses. If the first option is chosen a fee for the purchase of licensing agreements has to be paid. In the second case, however, is not required to pay any fee. In no case this licensing model allows the redistribution of a modified version of Qt.

In the same year, in order to ensure continuity in the development of Qt, was founded the KDE Free Qt foundation that has the aim to make available the source code of Qt under BSD license if Trolltech for any reason should stop to develop the free version. The board of this foundation is composed of four members, two elected from KDE eV and two from Trolltech.

The development strategy and management model implemented in KDE reflect the typical OS philosophy aimed to foster the creative and chaotic dimensions of work. The direction of the development process is continually revised on the basis of suggestions, contributions and feedbacks made by the community. Despite the efforts to minimize the role of hierarchy, even in KDE project is established a group of developers that has the task of managing and coordinating the process in terms of development scheduling and selection of technical solutions. This became necessary in order to maintain a good level of effectiveness in decision-making process. This group is composed of about 20 members selected on the basis of merit and competences. The requirements and selection criteria for joining this

group are not defined precisely and formally. Furthermore, it is not even defined the process by which a new position is open and/or an application is made. Participants in the group communicate through a mailing list which is open to everyone only in reading mode. All members, therefore, can monitor the decisions of management, but they must use other mailing lists to notify and organize dissent against a decision.

The areas of contribution are currently five: software development, graphics, accessibility, translation and promotion. To facilitate participation, even in this case were defined some guidelines for efficiently and effectively contribute to the project.

KDE has the technological and performance excellence as main objective. The development of a DE is based on a great community in which although it is possible to identify actors who hold key roles is not immediate to understand the relationships and the decisional flows because of the absence of formal positions. Development is not tied to regular or fixed release cycles and it is subject to technological discontinuities in order to pursue excellence often at the expense of stability or graphics uniformity. Currently, the transition from KDE3 to KDE4 is undergoing and it is leading to a profound rewrite of the code and to a kind of revolution in terms of graphic interface. This step has been largely driven from a structural and functional point of view by Aaron Seigo the current president of KDE that has a recognized and indisputable leadership and from a graphical point of view by Oxygen team led by David Vignoni. Recently, Seigo has highlighted, through his blog, the need of new leaders for KDE4 stating that the development of a new DE is closely dependent on the presence of actors able to exercise a leadership in the project. Although the current version of KDE4 is only partially usable and that its development will continue for a long period, the project is having a huge success both among users and coders. This success seems only partly explained by the innovations introduced in KDE4 and seems more tied to the charm that participate in a

development of a completely new DE offers to the community.

5.2 GNOME: governance and institutional context

The project GNOME was founded in 1997 as spin-off of KDE. The main reason that led GNOME developers to exit from the original project was the dependence of it by a proprietary application development framework (Qt). Therefore, GNOME was based on an alternative development framework: GTK +, a toolkit for creating graphical interfaces distributed LGPL (Lesser General Public License). Currently GNOME is distributed in LGPL for the part relating to libraries, while the GPL is used to distribute applications. It has the advantage of ensuring that downstream developers could use a broader variety of licenses to develop and distribute their applications.

The GNOME project aims to develop a DE that is totally free, easy to use and develop, accessible to all and multi-lingual, both through the contribution of an organized community of volunteers, and through the support of leading companies engaged in development GNU/Linux and Unix. In order to achieve these objectives were defined projects and teams, that have the task of defining the guidelines for developing applications compatible with the style and the dictates of GNOME Human Interface Guidelines (HIG). The multi-language support is guaranteed by local working groups which translate user interfaces and manuals according to a set of international and strictly codified guidelines. Finally, even the time of release of each module are minutely defined in order to ensure a new release every six months.

The property on assets of the community, as well as the fatherhood on the software content, was transferred in August 2000 to a non-profit foundation. The foundation was established to ensure greater transparency and representativeness in the management of strategic decisions. The rapid growth of the community and users has made it necessary in order to

delegate much of management activities related to development of the project. The foundation, therefore, wants to be a guarantee for the members of the community on ways through which these decisions are delegated. In addition, in the statute are mentioned as tasks of the foundation: the management of relations with media, industrial and commercial partners, the resolution of any internal conflicts and the legal representation.

The foundation is managed by a board of directors that consists of seven members elected annually by members of the foundation. The Board is the main decision-making body within the foundation and it has the primary task of ratifying the decisions. Any decision of the Board may be overturned by a referendum.

The statute of Foundation count an advisory committee to which can participate companies or organisations that have an interest in the development of the project. This committee has no decision-making function, but it wants to be a permanent roundtable discussion that collects contributions from the industrial partners and other valuable shareholders.

GNOME puts at the centre of its development philosophy the concept of usability. The entire development of the DE is strongly based on a set of guidelines - HIG - which are compulsory for every module. Within the community is difficult to identify a strong leadership, even though there are some very charismatic actors and for each module there is a local leader who exercises, often in a strong way, its authority. The structure is therefore easily definable, as it is easy to identify the relational intensity and the relations of power within the community. However, the structure is far from being hierarchical. The cycle of development is half-yearly and it has the objective to constantly improve the usability and the performance of the DE. The development is regulated by a roadmap that is made along with the community. The DE has so far lived only a technological leap (it is currently 2 version). The roadmap for version 3 is open but there is no date and no real need to change the programming language because it believes that the

version 2 has still much room for improvement. Moreover, within the GNOME team a debate on the concept of innovation has recently started. From this debate emerges that a part of the community does not consider necessary radical innovations and technological leap to increase product quality but rather requires a new vision of the functions and the role of the DE. This argument is supported within the mailing list highlighting the lack of success in terms of sales over the predecessors of products like Windows Vista and Mac OSX Leopard. It should depend on the fact that these new operating systems play exactly the same features as predecessor, and so they satisfy exactly the same needs. Following this discussion the developers have highlighted the need for a new vision and new leadership within the project not so much to stimulate an evolution of the project but rather to rethink GNOME in an alternative way and create a new vision that is able to attract new programmers and a new community. In other words GNOME 3.0 does not want to be a technological evolution of previous product but it wants to be a new product designed to offer new features not previously present.

5.3 KDE and GNOME: a comparison

GNOME and KDE are characterized by different philosophies and goals that seem to influence, both the subsequent choices in terms of governance, and the composition of the community. In the first case analyses, the technical choices are addressed to achieve the highest possible efficiency and to use bleeding edge technologies. This type of radical innovation involves the user from a technical point of view because it requires a high number of beta-tester and the result of this evolution process is a DE hardly comparable with the previous as well as from an emotional point of view because it makes the users live a radical and “historical” evolution. In the second case analysed, the DE choose to focus on a constant increase in performance, usability and stability thus the end user faced with a product

quite similar release after release but steadily improved over the time. In other words, for an end-user it is difficult to notice the improvements from a release to another but these are clearly visible if two release not in a row are taken. From this derives a conception of innovation profoundly different. In the case of GNOME, innovation is conceived as a continuous and constant process of improvement strictly regulated by a series of structures and regulator actors. A key role is played by the roadmap that schedules all the development phases. In the case of KDE, innovation is conceived as a technological graphical and structural discontinuity. Therefore in this case there isn't a roadmap that drive the evolution process.

Both projects to facilitate and manage the participation have established guidelines to enable an effective and efficient participation to the project by new coders. However, it should be noted that the GNOME guidelines are highly formal and standardised whereas those of KDE are rather the result of the development experience accumulated by the community. This is reflected also in the management style in the two projects. Regarding GNOME, positions and roles are formally defined within the various teams and there is a tendency to cultivate a kind of mythology of the most famous developers. On the contrary in KDE, there is an almost total absence of leaders formally defined, this is an advantage in the phase of development of intra-version and in term of people involved but it creates problems in the technological leap because there is a poor tendency within the community to the select leaders and there is no formal mechanism for its recognition.

A substantial difference in terms of governance is finally given by the presence or not of a foundation within the two projects. The core KDE developers have repeatedly stressed how this project is and will always remain a project managed directly by developers. Specifically, developers stress the uniqueness of KDE in the OSS landscape since it is the only OS large project where it is not applied, nor the model of the "good dictator"

used for example by Linus Torvald nor a democratic and structured model based on a election. KDE, in fact, has a structure that is close to the configuration of the bazaar described by Raymond (1999) although it is not necessarily coincide with being chaotic and devoid of governance structures.

The choice to not establish any foundation unlike GNOME (but also Mozilla) indicates the lack of interest on the part of KDE developers to look for the support and involvement of corporations in the project. On one hand, this makes the community more free from the influences of holdings, on the other hand, this choice may have important influences in terms of diffusion and from a financial point of view. The foundations play an important role in managing the symbiotic relationship between projects led by community and commercial businesses. The absence of a KDE foundation remains a particular non-negligible, both in determining a model of alternative development, both in influence future developments. Furthermore, as stated by O'Mahony (2003) foundations have a key role in improving the variety in this community, stimulating unusual relations between the community and new players (software house and its coders).

6. Conclusions

This work allows to draw some initial conclusions. First, it seems possible to claim that technology does not determine directly the model of governance. It comes from the observation that although GNOME has chosen a more *open* development framework (GTK+) than KDE, the latter has adopted a model of governance based on the concept of peer-to-peer review and closer to the bazaar model than GNOME. Secondly, the concept of open source does not conflict nor with forms of governance more similar to the cathedral than the baazar model nor with commercial purposes. In fact, although GNOME has the aim to build a DE totally free, it has adopted

a model of governance more structured, standardized and formalized than KDE. Moreover, the presence of the GNOME foundation has facilitated collaboration with many commercial companies (Novell, Ximian, Intel...).

Regarding the relationship between governance and creativity we can draw three conclusions. First, governance has effects on creativity and innovative capacity since different models of governance determine different networks in term of size and quality. At this purpose, the presence or absence of a foundation it is very important because it works as *trait d'union* between market and community and it has effects on creativity since also it affects the intensity and extent of the network (O'Mahony 2003). In addition, the model of governance and the vision of innovation (radical versus continuous) appear closely related to each other since the propensity towards forms of radical innovation compared to forms of continuous innovation requires different capacity for coordination and management processes. At the same time, these choices attract different types of communities in terms of needs and user profiles. The greater openness and the tendency radical innovation in KDE project has the result to attract less professional users than GNOME. Secondly, despite the choices of governance affecting the creativity and innovative capacity is not possible to determine the superiority of a DE respect another, both in terms of users, and in quality of code. This implies a not unique vision of creativity and innovation, in fact also if it takes opposite forms and it is the result of different models of governance it attracts a comparable numbers of users and coders. Finally, the choices of governance made by the two DE seem to have given differing and partly opposing visions for the future. KDE is doing the fourth technological leap rebuilding from scratch a DE that will satisfy roughly the same needs as previous, whereas GNOME seems still looking for a vision for the future that can provide a new tool able of respond to needs of users not yet explored.

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