A critical, inward and outward view of Digital Ecosystems’ open, collaborative communities: interdisciplinarity, sustainability and scalability at the intersection of gift and exchange economies

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Abstract

The idea of ‘community’ represents a central notion in the body of knowledge emerging as part of the Digital Ecosystems (DEs) research and philosophy. This chapter draws from two deliverables produced for the DBE in order to highlight two important characteristics of communities and networks of practice, their knowledge and structural embeddedness. Knowledge embeddedness refers to the context specific frames of meaning and signification as indicated by the difficulties of translating knowledge across different communities. Structural embeddedness refers to the intertwining of socio-economic structures as expressed by the frequently overlapping character of digital, social, economic and professional networks. It is argued that these two aspects of embeddedness are crucial for the sustainability and scalability of Digital Ecosystems.

Introduction

Cooperation between epistemic communities is regarded as a crucial element for the realization of the DEs ambitious interdisciplinary research agenda. At the same time, the sustainability of emerging DEs largely hinges upon the cultivation of their ties with existing Free/Open source (F/OS) software communities. Within the context of the research these two types of communities along with other groups of DE stakeholders, such as Small and Medium Sized enterprises (SMEs), were examined as communities or networks of practice (CoP)/(NoP), that is, more or less tightly knit communities formed through the pursuit of a shared enterprise which act as repositories of experience and knowledge (Wenger E. and J. Lave, 1991).

The aim of this chapter is to highlight two important characteristics of networks and communities of practice: their knowledge and structural embeddedness and to indicate how they relate to the sustainability and scalability of DEs. Knowledge embeddedness relates to the dependency of knowledge on social context, which makes it difficult to translate across different CoP, domains and networks. Structural embeddedness refers to embeddedness of economic action in social relations and the way “the quality and network architecture of exchange relations influence economic activity” (Uzzi B., 2001:208). This chapter is organized as follows. After elaborating on the concepts of knowledge and structural embeddedness, the findings of two associated studies conducted for the DBE project are presented. The last section outlines why and how the two concepts are related to wider issues of scalability and sustainability of DEs.

The first study that is drawn upon is an internal report ‘In the Cocoon: translating complexity across communities and networks of practice in a collaborative open source project’ (Berdou E., 2005) and the second, deliverable D18.3 titled ‘Report on the Socio-economics of Free/Open Source: Working together at the intersection of the gift and exchange economies:
sustainability and scalability in F/OS’ (Berdou E. and P. Dini, 2005). Both studies examined dynamics of collaboration between different groups of actors involved in the project and in the wider, envisioned ecosystem. In particular, the internal report focused on the dynamics of cooperation and the implicit decision making processes of three groups of stakeholders internal to the project: regional catalysts, SMEs and BML designers. On the other hand, deliverable D18.3 provided a framework for critically understanding the main socio-economic dynamics of F/OS from the perspective of the interrelated activities of three groups of actors involved in the, wider, F/OS process of development, deployment and adoption: volunteer communities, businesses and public institutions.

1. Knowledge and structural embeddedness

The concept of knowledge embeddedness is closely linked with the view of learning, working and innovation encapsulated by the CoP perspective. The community of practice (CoP) perspective was originally developed to account for forms of learning and patterns of socialisation that take place within and across the boundaries of traditional organizations. The theory has its roots in social constructivism, a perspective that emphasizes the importance of culture and context in understanding what occurs in society. Lave and Wenger (1991), the two theorists who first elaborated the term, argued that a society’s knowledge is situated in relations among practitioners, their practices, and their social organization and political economy. Communities of practice, which may include such disparate groups as a team of fire-fighters, office secretaries and hackers, arise mainly through the pursuit of a shared enterprise. The socially embedded character of knowledge, however, which makes CoP very effective in organizing and sharing knowledge among their members creates considerable difficulties when attempting to codify and communicate this knowledge across this groups boundaries. In essence, the COP perspective argues that:

- Practice is highly localized and knowledge is inextricably connected to the social processes that create and maintain it,

- knowledge exchange and communication between and across different communities and networks of practice are not straightforward. In addition to the difficulties created by the loss of context that the codification of knowledge entails, there are additional barriers that may hinder cooperation, such as that of diverging agendas.

The concept of structural embeddedness was first developed by the American Sociologist Mark Granovetter. In his seminal article on ‘Economic Action and Social Structure: The problem of embeddedness’ (1985) Granovetter argued that “continuing business relations often become overlaid with social content that carries strong expectations of trust and abstention of opportunism” (1985:490). Granovetter defined economic embeddedness as the: “argument that the [economic] behaviour and [economic] institutions to be analysed are so constrained by social relations that to construe them as independent is a grievous misunderstanding” (1985:482).

Granovetter developed this idea partly as an answer to what he regards as “undersocialized” and ‘oversocialized’ accounts of human action. The first, is consistent with the perspective of neoclassical economics that: “disallow by hypothesis any impact of social structure and social relations on production, distribution and consumption.” (Granovetter, 1985:483). The second type of accounts is more common in some branches of sociology and emphasizes, for example, the importance of social processes, norms and values, at the expense of the political and economic structures permeating many aspects of economic life. If the concept of knowledge embeddedness argues for distinctiveness, the idea of structural embeddedness emphasizes connections that are expressed through the frequently overlapping character of
Digital ecosystems are composed of digital, social, economic and professional networks. These ties need to be taken into account as they shape the landscape of Digital Ecosystems and can therefore influence their development.

2. Internal Report: "In the Cocoon: translating complexity across communities and networks of practice in a collaborative open source project"

In this report the points of contact and departure of the strategies of regional catalysts, early SMEs adopters (software producers) and DBE designers at the beginning of the project were mapped and some concrete recommendations on how to improve DBE’s bootstrapping process were offered. In this research 15 interviews were conducted with representatives from each group, revealing some of the difficulties that arise through the construction and translation of social complexity into business and computing models and practices.

a. In relation to Regional Catalysts (RC) the results indicated that: Regional Catalyst representatives were assigned responsibilities primarily related to DBE adoption and dissemination. Although their specific goals were clearly identified in the DBE project’s Technical Annex, the way that these activities were pursued in practice was largely influenced by the specific dynamics of the region and by their networking capacity and skills make-up. The gradual elaboration of the SME recruitment strategy and the specification of the opportunity spaces helped to structure and focus the related activities. However, the initially underdeveloped business message of the project created significant challenges for RC partners who needed to translate the scientific and technical vision of the DBE into concrete business opportunities for SMEs. In addition to their primary tasks, RC representatives also had to coordinate contacts between SMEs and the various research teams in the project. Besides drawing attention to the difficulties of brokering knowledge between practitioners and researchers and of creating bridges between these two different modes of engagement, the interviewees also pointed to the moral implications of SME engagement and the way that their activities transformed them and informed their views of what being a Regional Catalyst meant.

b. In relation to early SME adopters, the results indicated that although the productive capacity of the DBE in terms of supporting the development of new services and applications was frequently acknowledged, the SME interviewees who were engaged during this period perceived the DBE primarily as a conduit for networking and for marketing their existing services and applications. At the same time, the technological and business aspects of the DBE were perceived and discussed nearly always in relation to each other. As their attitude to open source shows, this is characteristic of the problem-solving, hands-on engagement approach of SME representatives that focuses on the immediate opportunities and implications of the DBE technology and design for their businesses. There are several indications that this might also be their attitude in relation to the scientific aspects of the DBE, for example, the automated recommender of services. This poses some interesting challenges for the project. As the technological and scientific aspects of the DBE were translated into perceived opportunities or hindrances from the perspective of SME drivers, the DBE researchers were faced with the task of: a) clarifying their own assumptions about business and (re)aligning them with the realities of business practice b) maintaining a balance between the needs and requirements of SMEs and the scientific, technological and political vision of the DBE.

c. BML designers aimed to develop in essence a tool that would allow the integration of collaboration between software developers and software users and that would foster the
creation of new value chains within and across traditionally defined business domains. In order to achieve their goals, the team of developers initiated a methodology that aimed to combine top-down and bottom-up design approaches. During the first phases of the project, however, the development of the BML was predominantly guided by the top-down design approach which involved the examination of existing standards. This involved balancing the requirements of the platform against the dynamics of the industry and networking with organizations such as OMG. The two major turns in BML development involved the decision to adopt a lighter and more abstract meta-model and to adopt an emerging standard (SBVR) that would allow business participants to specify their needs without any technical knowledge of UML modeling techniques.

The wider implications of these actors’ strategies for the sustainability of the DBE were also investigated and some concrete recommendations for improving the bootstrapping process were made. The study highlighted:

a) some of the challenges involved in setting up the network of Regional Catalysts (RC) that, in addition to the business perspective, it is necessary to take into account:
   - where the RC intermediaries are located in the economic and political-industrial spectrum of each region; and
   - their technological or business orientation.

b) the importance of SME recruitment strategy for the process of bootstrapping the DBE. In particular it was argued that one of the ways of reaching out to open source communities is through the involvement of SMEs with experience in open source (OS) development community processes from the early stages of the project. It is possible that the engagement of OS communities will become increasingly difficult if the DBE is developed at the level of applications using proprietary standards.

c) The long term implications of aspects of the BML implementation, mainly:
   - how the adopted and/or imported ontologies and standards used by different business communities within the same domain will scale up within the context of the project; and
   - how the various vocabularies will be integrated and maintained across different

This challenge is amplified if we consider that different interpretations of domain models are not just a result of diverging viewpoints, but are often linked to competing interests associated with the use of specific standards and domain models.

3. Report on the Socio-economics of Free/Open Source: Working together at the intersection of the gift and exchange economies: sustainability and scalability in F/OS (D18.3)

This deliverable drew on a doctoral research study (Berdou E., Forthcoming 2007), adopting a holistic view of the F/OS process that took into account the intersecting activities of volunteer communities, businesses and policy. It was suggested that a twofold strategy for involving F/OS communities in the DBE would be an important aspect of the DBE project. More specifically, this study indicated that:

a. Volunteer communities display both mundane and unique characteristics of software development and social organization. Community managed F/OS projects are often structured in ways that remind us of traditional processes of software development in terms of use of technical tools, negotiating goals and priorities, editing and reviewing. However, they are also underlined by unique dynamics such as the intensive modularization of tasks,
the parallelization of the debugging process and a highly developed sense of shared ownership and responsibility. At the same time, the social foundations of communities, such as their purely meritocratic basis, have been revised as a result of studies that develop more elaborate frameworks of membership and participation.

b. The boundaries between the gift economy, the purview of communities, and the exchange economy, where proprietary development takes place, are more permeable than was originally assumed. The interconnections between the two value systems are intensified by the progressive commercialization of F/OS. Examples include companies contributing to community development and volunteer developers exchanging their reputational benefits for higher and better paid positions or improved access to venture capital. c. The business appropriation of F/OS raises more general issues with respect to software business models. In addition, there seems to be a considerable gap between the rhetoric about the business potential of F/OS and the barriers to formulating and implementing strategies that leverage it. Copyright concerns and lack of know-how regarding social and technical aspects of F/OS development are considerable barriers to its adoption by SMEs. Some of the most prominent business models are based on combinations of F/OS and proprietary code. However, companies that appropriate F/OS often do so without contributing back to the communities and without revealing code. The virtuous cycle between business and F/OS code that is often envisaged within the discourse is therefore rarely realized in its idealized form, that of a synergistic relationship between companies and communities. d. The sustainability and scalability of F/OS are dependent on a wide range of policy issues that involve most prominently patents and reverse engineering legislation. At another level of policy intervention, public institutions have shown in recent years an increasing interest in F/OS and a commitment towards open standards, but lack in many cases the social, technical and legal know-how to participate fully in the F/OS process. F/OS is leveraged both as an instrument for industrial development and as an integral part of the provision of e-Government services for administration, businesses and citizens. However, the policy framework concerning public support of F/OS is considerably fragmented. This is largely due to the way the issue is framed within the policy domain. On the one side, the debate concerning the welfare benefits of F/OS software is dominated by neoliberal arguments that consider public support as having the potential to distort the basis for competition in the software market. On the other, there are those who argue that the benefits of F/OS are not strictly economic, but are connected with the opportunities it offers for improved provision of and access to products and services for businesses, administrations and citizens.

Based on the above two strategies for involving F/OS communities in the DBE were suggested.

a) The first strategy, predicated on the distinctive characteristics of community development and their knowledge embeddedness, argued that the DBE should aim to facilitate the learning process for volunteer developers in order for them to become familiarized with the project’s code base and to cultivate a sense of shared ownership. Since it was impossible to involve communities from the early stages of the project, providing high quality documentation, maintaining active task lists and providing support on mailing lists and IRC channels would encourage the participation of volunteers.

b) The second strategy, following on from a recommendation in the internal report, was predicated on the embeddedness of F/OS in the commercial world. It aimed to take advantage of the overlapping networks of contacts and partnerships between companies, public organizations and volunteer communities. Given the limited timeframe of the DBE project this strategy is likely to be the most viable of the two. The involvement of
companies with ties in the F/OS world would additionally create multiple entry points for communities to become involved in various aspects of the DBE’s development, both at the level of the applications and at the level of the platform.

4. Knowledge and structural embeddedness and the question of sustainability and scalability of Digital Ecosystems

DEs encompass a large number of different public and private actors operating across different regions, industrial sectors, knowledge domains and institutional settings. These actors may have divergent agendas and the complexity of bootstrapping and establishing a functional ecosystem requires a coordinated effort on many levels of policy and intervention. Unlike emerging open collaborative communities, like F/OS or epistemic communities, which have an established framework for negotiating the requirements of the gift and exchange economies and in the light of competing notions of practice and meritocracy, DEs need to find their own balance in cultivating these relations across a complex cultural, geographical, socio-economic and institutional landscape.

As the two deliverables indicated, knowledge and structural embeddedness have multiple implications for the sustainability and scalability of DEs. For example, the difficulty of knowledge codification associated with the socially embedded character of knowledge is an important consideration:

- for understanding the opportunities and barriers associated with leveraging Information and Communication Technologies (ICTs) for improving knowledge codification (Steinmueller E. W., 2000). This is especially important for the design of Business Modeling Language.
- for understanding the difficulties involved in developing a policy framework aiming to translate the lessons learned at the level of distinct CoP to the level of institutions. This is also relevant for the development of the DE’s governance framework.
- for understanding the challenges involved in the communication and coordination between widely different communities and network of practice with divergent priorities.

The issue of knowledge embeddedness is associated with the challenges involved in balancing the local characteristics, knowledge and practices of specific CoP with the global requirements of DEs. The notion of structural embeddedness is useful in mapping the socio-economic and institutional landscape which DEs will intersect with and in understanding difficulties associated with reproducing or fostering similar types of cooperative ties within the context of the ecosystem. Deliverable D32.4 ‘Locational Issues for the implementation of the Knowledge base’ focused on the creation of a regulatory framework for building trust.

As Uzzi notes (2001), however, overembeddedness can have ambiguous implications for actors’ abilities to adapt to changes in their partner network. For instance a contractor that has become highly skilled at working with a certain manufacturer’s fabric, design specifications and building schedule, may be put at risk when this manufacturer moves offshore. DEs are expected to help SMEs adapt to these changes by supporting the creation of cooperative ties across geographical boundaries. The notion of structural embeddedness is therefore useful for understanding:

- How DEs are embedded in an existing socio-economic landscape and how their development is framed by existing cooperative dynamics.
- How DEs affect this landscape in their own right and, in particular, whether and how they disembed existing cooperative relations from their established networks of collaboration.
5. Bibliography


