



THE UNIVERSITY *of* EDINBURGH

## Edinburgh Research Explorer

### Entangled biographies

**Citation for published version:**

Mozaffar, H 2018, Entangled biographies: A multi-biographical approach in study of user communities around information infrastructures. in P Demartini & M Marchiori (eds), ECRM 2018: Proceedings of the 17th European Conference on Research Methodology for Business and Management Studies. ECRM Conference Proceedings, Academic Conferences and Publishing International (acpi), European Conference on Research Methodology for Business and Management Studies, Rome, Italy, 12/07/18.

**Link:**

[Link to publication record in Edinburgh Research Explorer](#)

**Document Version:**

Peer reviewed version

**Published In:**

ECRM 2018

**Publisher Rights Statement:**

This is the accepted version of the following article: Mozaffar, H 2018, Entangled biographies: A multi-biographical approach in study of user communities around information infrastructures. in P Demartini & M Marchiori (eds), ECRM 2018: Proceedings of the 17th European Conference on Research Methodology for Business and Management Studies. ECRM Conference Proceedings, Academic Conferences and Publishing International (acpi), European Conference on Research Methodology for Business and Management Studies, Rome, Italy, 12/07/18., which has been published in final form at [http://www.academic-bookshop.com/ourshop/prod\\_6457344-ECRM-2018-Proceedings-of-the-17th-European-Conference-on-Research-Methodology-for-Business-and-Management-Studies-PRINT-VERSION.html](http://www.academic-bookshop.com/ourshop/prod_6457344-ECRM-2018-Proceedings-of-the-17th-European-Conference-on-Research-Methodology-for-Business-and-Management-Studies-PRINT-VERSION.html).

**General rights**

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

**Take down policy**

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact [openaccess@ed.ac.uk](mailto:openaccess@ed.ac.uk) providing details, and we will remove access to the work immediately and investigate your claim.



# Entangled Biographies: A Multi-Biographical Approach in Study of User Communities around Information Infrastructures

Hajar Mozaffar

The University of Edinburgh, Edinburgh, UK

[Hajar.mozaffar@ed.ac.uk](mailto:Hajar.mozaffar@ed.ac.uk)

**Abstract:** In research into the field of technological user communities, we note the emergence of long-living user groups around large-scale information systems designed to be used over long periods of time, possibly decades. These communities around such complex infrastructures are growing in numbers universally. They facilitate effective information exchange, activity coordination, and advances in innovation between geographically, organisationally, and culturally diverse groups.

Complexities of the user communities and information infrastructures around which they operate, calls for consideration of multi-temporal and multi-spatial research into these settings. This paper is inspired by concerns about the methodological weakness of many studies of technology user communities; in particular as most studies often have a single site, short-term view of such settings. To achieve this, the current paper, intends to represent how the diverse presence of time and space in information systems user communities effects the outcomes of the research. Hence it applies the Biographies of Artefact – BoA (Pollock and Williams, 2008) approach to study of IS user communities. The paper which is a part of a larger study of Enterprise Resource Planning (ERP) user communities shows how the methodology is applied and it will reflect upon the implications of adoption of the BoA in investigating IS user communities within a limited time period.

In order to do this, the current paper primarily investigates the need for widening the study lens of communities around information infrastructures in different locales and moments. It then provides a critical review of the BoA approach. Then it demonstrates how this approach can be adapted and applied to a large number of communities around different products to fit in a shorter duration of the time, while it also takes into account the long-term presence and consequence of technological user communities and information infrastructures. This new approach in study of technological user communities is particularly relevant and timely, as scholars have called for better methods in understanding the ongoing challenges encountered in studies of infrastructures and their surroundings.

**Keywords:** User Communities, Biography of Artefact, Research Approach, Information Infrastructures

## 1. Introduction

There has been an increase in spatial awareness in studies of technology user communities through notions such as spaces of knowing, spatial proximity, localised learning, and knowledge spaces (Amin and Cohendet, 2004, Maskell et al., 2006, Matthiesen, 2013). The importance of space has also been a central theme in collaborative work studies (Olson and Olson, 2000). However, despite its importance, the ‘time’ dimension of user communities has remained relatively undertheorised. Activities unfold over time and therefore temporal aspects must remain the central theme in examination of collaborative practices conducted in community settings (Karasti et al., 2010). Hence, this paper will focus on the time dimension and examine ‘multi-temporal’ facets of user communities around technological artefacts.

This paper draws on 150 hours of observations of various user community events followed by 15 formal interviews with the governing body of the community, attendees of the events and the vendor employees. The observations were carried out on 24 events (including more than 85 sub-events) over a period of six years, between May 2010 and April 2013. The study also collected data from the group’s e-mail conversations and the web documentations available to its members. This data was collected between 2012 and 2016.

## 2. Biography of Artefact

In attempting to provide better templates for analysing technology over time and location, Pollock and Williams introduce the BoA approach, which asserts the need to move the analytical lens beyond the immediate inter-organisational level of direct interactions between suppliers and users. To do this they build upon the spatial metaphor of ‘Arena’ by Jørgensen and Sørensen. (1999): ‘...a development arena is a visualising spatial expression of processes of competition and co-operation. It should convey the idea that several actor-worlds are being construed within the same problem area. It depicts the idea that several actor

networks co-exist and interfere with each other within a certain problem space...'. This distances BoA from earlier approaches like ANT by suggesting that space is shaped by numerous other arenas in constant collaboration needing to be explored. ANT addresses multiple locales to the extent (and only when) actors move between spaces. It also does not consider how entrenched structures and repertoires of action shape and constrain action. BoA seeks to address both of these aspects using the notion of 'arena'. The concept of 'arena' counters ANT's approach in that, in ANT by 'following the actor' the researcher share the blindness of the actors being followed, meaning that if actors are unaware of other competing innovations then they don't appear in the analysis and lots of other innovations are therefore ignored. Instead, in BoA, by considering 'arenas', dislocated processes and actors are brought together into one place, allowing the researcher to analyse other innovation possibilities.

This characteristic of the BoA framework leads to examining the relationships between various arenas and how actions are set in broader environments. Secondly, the BoA framework also emphasises the need to move beyond a short timeframe, drawing attention to the changes occurring over time to organisation and technology. This refers to the term 'biography' as it follows an artefact over its lifespan. Pollock and Williams (2008) suggest that this could involve multiple levels of detailing and generality and the ability to move in and out of each level of analysis if need be. Finally, BoA underlines the fact that research that black-boxes technology and its vendor tends to lack examination of development processes and history behind technology formation. This leads to underestimation of design decisions as well as simplistic presumptions of development trends. As a result, a multi locale research is required to take into consideration design, implementation and use. Pollock and Williams (2008) suggest that to examine development and evolution of information infrastructures, different overlapping arenas should be studied, which include the development arena, the implementation arena, and the networks of external experts. In investigating these arenas, research needs to reflect upon not only the user and vendor, but also other actors surrounding the technology.

BoA argues that studies need to be tackled in extended timeframes and for this to happen complex temporal design methodologies such as a combination of longitudinal studies, follow-up studies and long-term historical investigations are required. However, like many other studies which have an artefact-focused agenda, by implying that success in technologies is realised through the mobilisation of a community of users (Oudshoorn and Pinch, 2005), BoA also places technology at the core of the analysis. This sometimes results in having a tendency to offer the vendor's view of the artefact and paying less attention to other perspectives. Hence, in this paper, by placing the community (an assemblage of different actor types and artefacts) at the centre of analysis, we aim to extend the BoA approach to offer a better understanding of growth and evolution of information infrastructures and its community in tandem. In doing so, we will also attempt to offer a more structured way of applying a biographical approach in the study of complex artefacts and user communities by introducing a phased-wise model of analysis.

### **3. Exploration of the events over time**

Our fieldwork in examining multiple spaces shows a dynamic view of the user communities by highlighting the role of time in the evolution of communities and showing how the purposes and hence the discourse and processes of several user groups change over time.

UKOUG is a collection of specialised groups. Each group comprising of volunteers from user organisations, the vendor, and intermediary organisations. This diversity of actors involved in the group, conforms to the first characteristic of the BoA, which is considering multiple actors and actor types. In this respect, the study was explorative in terms of discovering all the possible actors that emerged in the study spaces. This explorative approach made it evident that in various cases the same actors performed different roles over time and between different spaces. This also allowed for investigation of how each community interrelates with other arenas. To take into consideration the other two characteristics (multi-temporality and multi-spatiality), we moved the analytical lens beyond a single user group and looked into several spaces in tandem. This will be explained in more detail in the following subsection.

Here we will summarise the evolution of the events (with regard to the technology) of three specific user groups: Financial Special Interest Group (FSIG), Public Sector Human Capital Management Customer Forum (PSHCM), and Scottish Public Sector Oracle User Group (SPS).

PSHCM was a long-standing group running for almost 10 years. The activities of this group were observed from 2010 to 2013. We then followed the online activities to understand the changes over time. Table 1 summarises the activities over the four years.

Over the months as the PSHCM community grew in numbers and more users attended the meetings, more collaboration was observed in generating solutions. The community also became more organised in

approaching the vendor in developing UK specific needs. As a result of the successes that users achieved in this group, they launched a new public sector user community on the financial modules of the product, known as the Public Sector Financials Customer Forum (first meeting held in October 2012).

**Table 1:** A summary of PSHCM activities

September 2010	<ul style="list-style-type: none"> <li>• User experience of implementation of R12, issues and problems</li> <li>• Interactive talk of functionalities of self-service and unmet needs</li> <li>• Presentation of Oracle E-business Suite upgraded features and changes in Human Capital Management module</li> <li>• Interactive talk on requirements and new developments on 'academies' functionality, challenges in roll-out and use</li> </ul>
February 2011	<ul style="list-style-type: none"> <li>• Presentation of the Self Service Absence Planner product and its integration with Oracle</li> <li>• Update on Fusion applications (the new ERP product by Oracle).</li> <li>• Presentation on Oracle on the Human Resource Analytics product and its benefits</li> <li>• Update on the academies solution followed up from the meeting in September</li> <li>• Update on the status of School Workforce Census solution (a requirement by PSHCM user community).</li> </ul>
September 2011, May 2011	Users expressed their needs and solutions and asked Oracle for enhancements. Slow update provided on previous requests.
February 2012	<ul style="list-style-type: none"> <li>• Update on the enhancements requests prioritised by the community: Self Service Batch Element Entry (SSBEE) and Multiple Payroll Solution.</li> <li>• User stories: Implementation of Oracle Absence through Self-service functionality</li> <li>• Talks by Oracle on real-time information (RTI) functionality and its availability in different versions of EBS, updated support timelines, and Oracle's solution for teacher pensions.</li> <li>• Oracle explained their teacher pension solution. Then this led into an interactive session where users explained what they expected Oracle to develop to meet their needs.</li> </ul>
May and September 2012 and February 2013	<ul style="list-style-type: none"> <li>• Large extent of user involvement including sharing of stories as well as participating in solutions generation and exerting power on the vendor to incorporate their needs.</li> </ul>

We also studied sessions from FSIG, from October 2010 to September 2012. These user group meetings showed a transformation of functionality within the user group from what may be referred to as 'vendor and third party driven' events to more 'user-centric' sessions.

In the meeting held in October 2010, Oracle informed users about the latest features and functionalities of the system and trained users about how to set-up and work with the system (including multi-organisational architecture and Fusion application). There were two presentations by third party organisations on new products and some short presentations by users on their experiences in implementation and use of the system. There were also a large number of exhibitors presenting their products during the breaks. In this meeting, one of the users made a very sharp comment that third party organisations come to each meeting with promotions of their products. Other users supported this comment as they requested 'pure user meetings' where they can talk openly and share their ideas. This showed an increasing conflict, which had remained silent for a while but had burst into something that users asked to be acted on. Although some partner organisations were approved by users as 'helpful and informative', for the most part they were known as 'companies wanting to sell their products' or in more extreme cases as 'resellers of user ideas'.

The next meeting, held in February 2011 was very different. There was only one exhibitor, the number and contents of user stories had grown significantly, the focus had shifted from Oracle version 11i to R12. The event also had a 'Surgery' event in which users discussed their problems and requirements. In this event, other users and in some cases Oracle offered solutions. There was also an open forum in which users concentrated on their current issues with Oracle and discussed their solutions, workarounds and customisations. Oracle also asked for volunteers who would be willing to participate in design and test activity for a future version of the product to step forward.

In meetings that followed in May 2011 and September 2011, the contents were much similar to the February meeting: user stories and discussions of ideas amongst users in surgery sessions. In the cases of presentations by third party organisations, they also reported on their products through user presentations. What changed more significantly in the next meetings was the extent of attention given to Oracle R12, the most up-to-date version of the EBS. There was also a new initiative by Oracle to gather information from Oracle EBS Financials R12 customers for preparation of roadmaps for the future releases of R12 and Fusion applications (the new Oracle product line which was not released at that stage of the study).

In March 2012 and May 2012, two main 'pain points' were identified: 'E-Tax' and the 'Payments' process. These issues, which had led to limited usability of the functions and ad hoc customisations by users, were followed up as a result of participation of users in planning solutions and providing recommendations to the vendor. Then in September 2012, the first introductory workshops on the solutions for these two issues was held, which received a lot of input from the audience.

During the above mentioned period, the user group underwent significant transformations in two ways: 1) the aims and structure of meetings - from being a place where users received product updates and trainings from the vendor and other third party providers to functioning as a place where users' knowledge and experiences were shared; and 2) from version 11i of the product to version R12 and in occasional cases to Fusion applications.

Finally we studied SPSUG's first event on March 2011. This group was shaped as a result of conversations that took place in October 2010. In October a meeting was held in Oracle premises in Edinburgh entitled 'Quick Start Masterclass for Fusion Development with JDeveloper and Oracle ADF'. In this meeting, which was organised by Oracle, customers mainly from Scotland and North of England were trained on Oracle ADF. During the break times, one of the users from a Scottish Public Sector Organisation (John) started a conversation on the need for a Scottish Public Sector user group. The conversation was welcomed by other public sector users and led into the planning of the first event in March 2011. The planning took six months, in which John called for collaborations between Scottish users. He asked them to give presentations on their experiences at this event. He also asked Oracle and one of its partners to give updates on their new offerings. The user group meeting attracted 27 delegates, six speakers and two Oracle representatives. The meeting started with a presentation on the importance of having a SPSUG. The presentation involved a discussion of what the needs are and how they can be met by this group. Then three presentations were given by the speakers: a user presentation on the experience of moving from version 11i to R12, an Oracle presentation on the financial modules, and a partner organisation presentation on the golden rule of implementation management. Then a long discussion was shaped around the common issues faced by Scottish public sector users. This discussion went into details of their requirements and how they can convince Oracle to take them into consideration. In this regard, although the users found common grounds for collaboration and sharing of solutions, they were very doubtful on whether they would have enough power to exert on the vendor. Their main argument was that the number of users in Scotland is not yet sufficient for the exertion of power. There was also a feeling of not having the 'suitable contacts' to get in touch with Oracle. The group then agreed that having the power to influence the products was the highest aim of the group. However, not all members reached agreement on having enough authority yet. Hence, they decided to assess the situation in two years' time in anticipation of having a larger body of public sector users in Scotland who would have a 'louder say' which could 'influence vendors products'.

#### **4. Discussion: The Biography of Community**

This study shows the need to explore user communities beyond a single timeframe as the lifespan and trajectory of the community is inextricably wound up with the development and evolution of the technology. The study revealed how the emergence of technologies leads to the formation of new communities and how the evolution of technologies influences the attached communities (and vice versa).

The findings show that observation of user communities at different points in time, present a different perception of their functions. Therefore, we need a longitudinal approach to gain a better understanding of their nature. The biography of a community is dependent on two time dimensions: the community age and the product age. These present two 'multiple historical timeframes' (Williams and Pollock, 2011) when investigating user communities and their actions with respect to a particular technology. So the object of analysis is not a standalone community, instead it is an entity (i.e. the technology user community) which functions predominantly in response to a second entity (i.e. the technology).

Therefore multiple intertwined timeframes exist which need multi-levels of analysis. Table 2 shows a possible division for the age of community and age of products proposed by this study. This categorisation of ages,

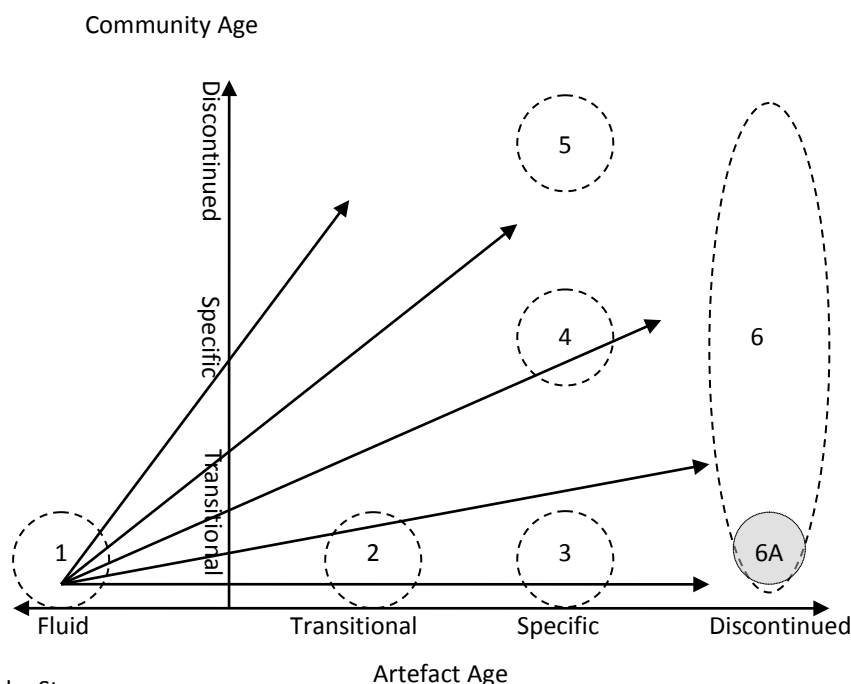
which we have adapted from Utterback and Abernathy's dynamic model of innovation (Utterback, 1974, Abernathy and Utterback, 1978, Utterback, 1994), explains the dynamic nature of the community during the evolution of a technology. Utterback and Abernathy's model offers four phases of lifecycle: fluid phase, transitional phase, specific phase and discontinuity. In their model in the 'fluid phase', there is a considerable amount of product and market uncertainty. Developers are not sure about the features of products and customers are not certain about their needs and expectations. Then after there is a standardisation of the core components and features, the product enters its 'transitional phase', in which the uncertainty lessens and the dominant design emerges. Then the evolution enters the 'specific phase' in which the product proliferates in the market and finally after its replacement with other products it enters 'discontinuity'. By adopting this stage division, we are not conveying anything with regard to the technological evolution and the inputs to design and development. Rather we are using this categorisation to show a stage-wise nature in the lifecycle, for both technology and its surrounding user groups.

In the categorisation offered in this paper, the product age can fall in any of the four phases whereas the community age may only fall in the last three phases. As the aim of this research is to provide a community perspective on information infrastructures, we propose a slight change to the original model by incorporating the view of users and vendors on the products to define each stage. To do this, primarily, we divide the product lifecycle into three stages: (1) prior to product release; (2) throughout release and while supported by the vendor; and (3) post product support stage, also known as 'de-supported'. The first stage is while the product is not commercially available to all users; it could range from the idea generation period, to development and test in pilot sites. This is the 'fluid' phase at which the vendor is keen to know the users' requirements and users are curious about the future technology and only have an incomplete 'vision' of it. The second stage starts as the product is publicly released for general implementation. This stage is then divided into two further periods in the perspective of adopting organisations: the first is the period when the majority of the users are in pre-implementation and implementation phases of the product, and the second stage is the period in which the users are predominantly in their post-implementation phase. We refer to these two stages as the 'transitional' and the 'specific' stages of the product respectively. Finally, the last stage of product age is when the product is no longer supported by the vendor. These products are out-dated products, which are still used by the user organisations; however, the organisations cannot obtain a support licence for them from the vendor. This means that the vendor is no longer obliged to provide support or patches for the bugs in the system. We refer to this period as the 'discontinuity' phase of the product age.

**Table 2:** Community/ Product Age Characteristics

<i>Stage Name</i>	<i>Description of Community Age</i>	<i>Description of Product Age</i>
Fluid	-	Unreleased products; Initiates from product design Continues until initial early adoptions
Transitional	In the process of formation or newly formed	Newly released products; Initiates from early adopter user organisations; Continues until the majority of user organisations are in the pre-implementation or implementation phase; Vendor product support available
Specific	Established Communities; Structured events	Released products; Majority of user organisations in the post-implementation phase; Vendor product support available
Discontinued	No events organised or recurring event cancellations	User organisations in the post-implementation phase; Vendor product support expired

Community age is defined based on the event development and member enrolment of each user group. There are three stages in the community age: transitional, specific, and discontinued. The transitional age is when a community is in the process of formation or it is newly formed. In such communities, the rate of member enrolment is high and there is high uncertainty in the details of the events. As a result of this, diverse needs are negotiated and new events emerge continuously. The events of these communities are not yet set into routines and the community members meet on a need basis. There are also communities stemming from existing communities and following similar forms that have a more structured launch. PSFCF was an example of such community. Yet again, they are more flexible in their agenda and members negotiated on needs and plans.



**Figure 1:** Biography Stages

The specific stage starts as the community events occur on a more regular basis. The needs of the community members are recognised and acknowledged; new needs arise on a less frequent basis, and then evaluated by the organising committee. An example of these occurred in the FSIG in October 2010 in which a number of users argued about having too many third party organisations in the meetings. This led to significant change in the FSIG in February 2011, in which the sessions started to be more focussed on ‘user stories’ rather than ‘third party sales pitch’.

Finally, the discontinued phase occurs as the regularly organised events lessen gradually, the members leave the community or withdraw from attending the events, until a point that the community stops functioning.

We present Figure 1, to illustrate the possible environments and spatial metaphors with respect to product lifespan and community maturity. This figure illustrates how the community may evolve from one phase to the next in either direction.

In this model, the community can move from one stage to the other on two different dimensions. The horizontal axis demonstrates the age of the artefact so moving from left to right shows the changes that occur as the artefact evolves over time. The vertical axis shows the community age, hence moving from bottom to top shows the different positions a community could be based on its maturity. The numbers on the graph illustrate some possible points of time of the biography of the community. For instance, Area 1 shows the communities in the process of formation or newly formed communities around unreleased products – this includes products under development and test. Area 2 illustrates the communities under formation or newly formed communities around newly released products. As the product matures and the majority of users (members of the community) become live on the product, the nature of the community moves to areas 3, 4 or 5 based on the maturity of the community. These communities are all surrounding the same types of artefact with respect to product lifespan: released products adopted by users and supported by the vendor.

Figure 1 shows a linear view of transformation of a user community. However, our empirical case shows that there are points of time when the evolution of the community from one stage to the next goes beyond the linear movement on the X- and Y-axis. It can form a spiral movement. This occurs as a community centred on a particular product changes nature due to the introduction of new versions of vendors’ products. This is evident in cases where the community matures around a particular product and then the product evolves into its discontinued stage. In such cases, the mature community continues its existence in a stable situation but new versions of the old products become the main point of attention for the community. This shows the possibility of a spiral movement on the X-axis. An Example was the FSIG which functioned around financial modules of Oracle 11i products. As version 11i moved toward its old age, version R12 became the point of focus for the community. In this way, the community continues its functions around the new version. Hence in a single

community, as time goes on the old artefact will be ruled out by the new artefact. In such cases, there is a possibility of formation of a new user group around a discontinued artefact. In such cases instead of having a spiral move on the Y-axis, a new community is formed. This is shown in Figure 1, in area 6A.

## 5. Conclusion

In this paper, we have produced a multi temporal study of user communities. In this way, we have unfolded both the history of the community and its underlying artefacts. This multi-temporal timeframe is vital to capture not only the evolution of technology but also the evolution of the communities attached to it. Accordingly, what we observed in the community was a co-evolution of both the space and the technical artefact. Without such an analytical lens detecting the dynamism of the community and its effect on the technology, and vice-versa, would have not been possible. For instance examining a newly formed community around a newly released version of the product could imply that the user group is a 'marketing community' (Szmigin et al., 2005) in which users are being updated about the future products. Instead, what we observed was a bi-directional influence as the technology shaped the community and, the community reformed the technological artefact.

The biographical approach in the study of communities enables the researcher to view the community as an 'arena', a concept used to refer to a space that holds together different elements (e.g. actors, artefacts, and standards) and several locales of knowledge and actions. In this way no actor is made 'other' (Pollock and Williams, 2008). Through this lense, we can observe not only a wide range of possible actors but we can also account for their potential conflicting viewpoints. So following a biographical approach, we observed several overlapping 'arenas', each showing a different view of the community. Moreover, through this multi-spatial lens we could see that the diverse range of actors are performing differently in each setting. The variation of the roles as well as change of members' attitudes towards the community over different locales as well as over different timeframes (both with regard to product and community maturity) shows the need for multi-spatial and multi-temporal studies.

Finally, in contrast to the mainstream studies around user communities of information infrastructures, which refer to user communities as merely an 'innovation community' (Lakhani and Von Hippel, 2003, Von Hippel, 2005) or studies that only focus on communities knowledge practices such as 'communities of practice' (Wenger, 1999), without considering the evolution of technology or the conflicting viewpoints on the technological artefacts, a biographical approach enables us to see a co-evolutionary community with heterogeneous practices. This shows the importance of considering 'time' and 'space' as key elements in study of such user groups. This is not just to say that we should study the same community(ies) for longer – rather that we should deploy more nuanced methods for accessing such complex spaces. Therefore, this study shows that instead of prolonging the study duration, we can study the same family of artefacts and several user groups at different stages of their lifecycle simultaneously. It also suggests that the same artefact families –for instance different products from the same vendor - can be studied at the same time to capture different characteristics of varying spatial and temporal aspects.

## References

- ABERNATHY, W. J. & UTTERBACK, J. M. 1978. Patterns of industrial innovation. *Technology review*, 80, 40-47.
- AMIN, A. & COHENDET, P. 2004. *Architectures of knowledge: Firms, capabilities, and communities*, Oxford University Press on Demand.
- JØRGENSEN, U. & SØRENSEN., O. 1999. Arenas of Development: A Space Populated by Actor-worlds, Artifacts, and Surprises. *Tech. Anal. & Strat*, 11, 409-29.
- KARASTI, H., BAKER, K. S. & MILLERAND, F. 2010. Infrastructure time: long-term matters in collaborative development. *Computer Supported Cooperative Work (CSCW)*, 19, 377-415.
- LAKHANI, K. R. & VON HIPPEL, E. 2003. How open source software works: "free" user-to-user assistance. *Research policy*, 32, 923-943.
- MASKELL, P., BATHELT, H. & MALMBERG, A. 2006. Building global knowledge pipelines: The role of temporary clusters. *European planning studies*, 14, 997-1013.
- MATTHIESEN, U. 2013. KnowledgeScapes. *Knowledge and the Economy*. Springer.
- OLSON, G. M. & OLSON, J. S. 2000. Distance matters. *Human-computer interaction*, 15, 139-178.
- ODSHOORN, N. & PINCH, T. 2005. *How Users Matter: The Co-Construction of Users and Technology (Inside Technology)*, Cambridge, Massachusetts; London, England, The MIT Press.
- POLLOCK, N. & WILLIAMS, R. 2008. *Software and Organizations*, New York, Routledge.



- SZMIGIN, I., CANNING, L. & REPPPEL, A. E. 2005. Online community: enhancing the relationship marketing concept through customer bonding. *International Journal of Service Industry Management*, 16, 480-496.
- UTTERBACK, J. 1994. Mastering the dynamics of innovation: how companies can seize opportunities in the face of technological change.
- UTTERBACK, J. M. 1974. Innovation in industry and the diffusion of technology. *Science*, 183, 620-626.
- VON HIPPEL, E. 2005. *Democratizing innovation*, the MIT Press.
- WENGER, E. 1999. *Communities of practice: Learning, meaning, and identity*, Cambridge university press.
- WILLIAMS, R. & POLLOCK, N. 2011. Moving Beyond the Single Site Implementation Study: How (and Why) We Should Study the Biography of Packaged Enterprise Solutions. *Information systems research*.