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# Inside the New Sites of Innovation:

## How User Communities Influence Complex Enterprise Technologies

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# Abstract

User groups have been recognised as one of the most important coupling mechanisms between users and vendors. There are hundreds of such groups around the world attached to complex technological artefacts and systems. Innovation scholars have referred to these groups as the new sites of innovation and gone as far to suggest that vendors may struggle to survive without the user-led innovation that derives from these forums (von Hippel, 2005). This is particularly the case for software products. However, despite their growing academic and policy importance, and notwithstanding the fact these communities have been in existence for more than three decades, the Information Systems literature has not yet explained the complex workings of such groups.

This study produces one of the first ethnographic studies of a major software user group linked to a complex packaged enterprise system. It describes and characterises the range of functions carried out by this group, which includes their internal workings and organisation, how members relate to each other, how the group links to the vendor and other intermediaries, and the group's attempts to shape the development of its technology. A key focus of the work is the various tensions and barriers found in these communities.

To analyse this group the study adopts and extends the Social Shaping of Technology (SST) and its recent offshoot, the 'Biography of Artefact' (BoA) framework. This thesis contributes to these approaches by showing the importance of multifaceted time dimensions and heterogeneity of spaces in examining users groups.

Whilst existing studies using these approaches have looked at the evolution of technology over extended periods, this thesis contributes by considering the co-evolution of the technology *and* the community attached at the same time.

This allows us not only to gain a better conceptualisation of the user group but as a result see new forms of innovation invisible to more dominant perspectives. It challenges economist led understandings of user-led innovation which tend to give

only a rather superficial understanding of the process by which users create new innovation.

In particular, and through arguing for the need to take into account both ‘success’ and ‘failure’ in the process of user-led innovation, the thesis offers the concept of *‘artification’* to explain further complex outputs originating from the interaction of these actors in multiple spaces and over long periods of time.

The thesis also extends theories of the Social Shaping of Technology by depicting innovation as an arena where different actor spaces act collectively, but also compete, and as a result wield influence on different stages of the technology lifecycle. This leads to a further contribution of this thesis in the field of Information Systems research by suggesting that enterprise software innovation is a community achievement. In particular, the research proposes the concept of *‘unification’* to show the collective acts of users in aggregating their needs to participate in the development of technology.

The study concludes by offering insights and recommendation to practitioners and policy makers for deploying user communities for better technological outcomes, both in terms of design and development as well as implementation and use.

## Declaration

In accordance with the University of Edinburgh Regulations for Research Degrees, the author declares that:

(a) This thesis has been composed by the author

(b) It is the result of the author's own original research

(c) It has not previously been submitted for any other degree or professional qualification



Signed:……..

Date:……

*In the name of God*

*I dedicate this work to the people I love the most,*

*My father, my mother, and my husband*

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# Abbreviations

| | |
|---|---|
| **ADF** | Application Development Framework |
| **AIM** | Application Implementation Methodology |
| **ANT** | Actor Network Theory |
| **BoA** | Biography of Artefact |
| **CoP** | Community of Practice |
| **CRM** | Customer Relationship Management |
| **EAP** | Early Adopter Program |
| **EBS** | E-Business Suite |
| **ERP** | Enterprise Resource Planning |
| **HCM** | Human Capital Management |
| **HR** | Human Resource |
| **HRMS** | Human Resource Management System |
| **ICG** | Inventory Code Group |
| **IOUC** | International Oracle User Community |
| **IS** | Information Systems |
| **JDE** | JD Edwards |
| **OSS** | Open Source Software |
| **PSFCF** | Public Sector Financial Customer Forum |
| **PSHCM** | Public Sector Human Capital Management |
| **SPSUG** | Scottish Public Sector User Group |
| **RTI** | Real Time Information |
| **SCM** | Supply Chain Management |
| **SCOT** | Social Construction of Technology |
| **SIG** | Special Interest Group |
| **SLTI** | Social Learning in Technology Innovation |
| **SMP** | Statutory Maternity Pay |
| **SSBEE** | Self Service Batch Element Entry |
| **SST** | Social Shaping of Technology |
| **STS** | Science and Technology Studies |
| **TCE** | Technology Configuring Events |

| | |
|---|---|
| **TEBS** | Technology and E-Business Suite |
| **TOAD** | Tool for Oracle Application Development |
| **UKOUG** | United Kingdom Oracle Users Group |
| **VDE** | Volume Date Entry |

# 1 Introduction

## 1.1 Background to the Topic

Academics and policy makers recognise the importance of the user for innovation. This means that how firms foster links with users becomes crucial, and managing those linkages over long periods of time takes on importance. The user group potentially represents the key mechanism in enabling this interaction: both between peer users and vendors. Users are brought together in the same space to share ideas and knowledge, and the vendor is also in attendance able to benefit from this exchange. Vendors have attempted to develop bonds with their existing and potential users through such communities, in order to derive benefit from user innovations (von Hippel, 2005; Smith & Shah, 2013). However, despite the importance of the role of 'users' in innovation, which has attracted a large body of studies, 'the community' and its complex linkages and heterogeneities have been less highly regarded. In this thesis, I argue that rather than focusing on 'user innovation' alone and viewing users' individual acts as enablers of the process, we need to broaden our lens and investigate the role of communities as new spaces for innovation.

There is a large deal of discussion surrounding innovation 'for users, by users'. The key vision is that innovation is no longer an act that occurs within the boundaries of the technology supplier firm. Rather it continues as the technology goes beyond the vendors' organisation and reaches its wider audience including partners, intermediaries and customers. The latter in particular has attracted much interest, which has led to the devotion of many studies to concepts such as 'user innovation' (von Hippel, 2005), 'open innovation' (Chesbrough, 2003), and 'customer co-innovation' (NESTA, 2010).

There is a large volume of published studies describing the ability of users to develop or modify products to meet their own needs in different fields, which argue that a considerable number of important products and processes are developed by users (Baldwin and von Hippel, 2011). The studies go back many decades, for instance Enos (1962) shows that 43% of innovations in petroleum processing were developed by users. Likewise, von Hippel (1976) reports that users were the innovators of 76%

of scientific instruments. Similar results are shown by Knight (1963) in computer products (26% of innovations by users), Freemen (1968) in chemical processes and process equipment (70% of innovations by users), and Shah (2000) in sport equipment (60% of innovations by users). These studies continue to date: for instance, more recently Ackerly et al., (2009) and Smith and Shah (2013) show the ability and gains of users in innovating within the medical device industry. More generally, scholars argue that 10% to 40% of users in different fields engage in product innovation activities (von Hippel, 2005). There is also evidence of user innovative activities stemming from differing geographical regions. Gault and Von Hippel (2009) and de Jong and von Hippel (2009) report on user process innovations in Canada and Netherlands. Von Hippel et al., (2010) also state that 6.2% of the UK population have recently created or changed products to cater for their personal needs.

Perhaps more than any other industry, the software industry has observed a considerable amount of user involvement in the design of technologies. Formal involvement of users in innovative activities is now largely seen as a practice by many industries[1]. This has been a focal point for many scholars for the past three decades. Examples of user innovation studies in software industry include Urban and Von Hippel (1988) who demonstrate that 24% of users innovate in printed circuit CAD software; Morrison et al., (2000) argue that 26% of users innovate in library information systems, and Franke and von Hippel (2003) illustrate that 19% of users innovate in use of Apache software security features.

The basis for this high number of innovations by users is defined as deriving benefit from use of the product of innovation (von Hippel, 1988; Kline & Pinch, 1996)

[1] Examples of this are projects supported by NESTA such as V-Jam in 2008, in which Virgin Atlantic brought together its customers to receive their insights leading to development of new web-based application, and, T-Jam, in which Tesco's customers offered insights for enhancement of its online grocery shopping. We can also see this trend being taken up in the past few years by the world's largest software companies, such as Microsoft and Oracle, as they offer several annual user innovation awards.

rather than profiting from the selling of innovation to others (von Hippel, 1988; Chandler, 1994). The process of user-led innovation is described as a result of discovery through use (Shah, 2009)[2]. Smith and Shah (2013) describe the process of user innovation as identifying a range of previously unrecognised needs, immersing oneself into the context of the problem and developing innovative knowledge, which results in sharing and interacting in user communities in order to extract a pool of heterogeneous knowledge that might solve a particular problem and thus diffuse innovation.

However, it is not solely innovation by users but also the user community innovation requires exploration. The current studies on user communities highlight the existence of such user group spaces as locales of innovation. Despite this, and the fact that von Hippel (2005) introduced the concept of the 'innovation community', the focus of the extant studies remains on the users, and possible multi-directional linkages between different actors in the community are disregarded.

Nevertheless, looking more closely at the studies of user communities in software, we see that the importance of user groups has been widely discussed. Von Hippel (2001, Pp. 83-84) explains that 'user innovation communities shouldn't exist, but they do', and argues that the products of such innovations can compete 'head-to-head' with manufacturer innovations. Examples of such innovation have been highlighted in the development of many different types of software technologies. For instance there is a longstanding recognition of the role of such groups in the development of open source software (OSS) (Von Hippel & Von Krogh, 2009; Roberts et al., 2006; Von Krogh & Von Hippel, 2006; Garriga et al., 2011; Von Hippel & von Krogh, 2011; von Hippel, 2005). Hyysalo (2010) also refers to communities as source of innovation for vendors around health information technologies. Similarly in the case of complex workplace technologies such as enterprise resource planning (ERP) solutions, Clausen and Koch (1999) state that user groups are essential for conquering the complexity of system implementation,

[2] Keynote speech by Sonaly Shah on 'Community-Based Innovation: From Sports Equipment to Software' in OOPSLA 2009 Conference, Orlando, Florida

and Pollock and William (2009) indicate these user groups as spaces where users' ideas can be fed back to the vendors.

Despite their importance, the literature across a number of domains – including Information Systems (IS), Innovation Studies and Technology Management - falls short of explaining the intrinsic and complex functions of such communities. This has led to highly embellished discussions of user innovation in some sections of the industry (such as OSS) and less attention to the fundamental and practical details when it comes to more complex technologies (such as ERP). The mainstream studies around user innovation share a basic assumption that in response to particular needs which are not fulfilled by suppliers, users innovate (von Hippel, 2005). These studies, which illustrate economists' views on user innovation, tend to offer superficial views of innovation by ignoring the tensions and conflicts which result from the heterogeneity of these communities. The majority of scholarly attention in this field has been given to quantifying users' motivations as inputs to the innovation process, and showing the successful products as outputs of the process. In this manner, they have focused selectively upon certain aspects and moments of user innovation and thus they offer a highly simplistic account of these matters. Critical analysis of such theories should be able to give a more comprehensive analysis of the details and the outcomes. Not doing so has led to uneven development of research in this field.

Firstly, economists do not offer sufficient insight into detailed processes and outcomes of innovations by communities. Secondly, there is no unpacking of the wide range of actors and the influence they may wield in enabling the growth of innovation. Instead, there is a focus on those known as 'lead users' (von Hippel, 2005) that face the need ahead of the market and generate a solution. Thirdly, the lack of a detailed understanding of user communities has led to a further assumption that user groups are purely 'sites of innovation'. In this manner, there is no inquiry into the details of functions or the tensions involved in such communities which may lead to or detract from the innovativeness of such settings. Again, this shows a narrow comprehension of the complex nature of these groups.

These assumptions form the initial points of criticism which will be addressed by this thesis. However, on a second note, whilst there is the assumption that user innovation is rife in certain sectors and around certain technologies, in other areas there is (rather perversely) the reverse assumption. For instance in the field of enterprise technologies, there are limited studies which acknowledge user involvement in design of applications, and those that do so mainly focus on the design phase of the product's life cycle. This is the stage at which a very small number of prospect user organisations are brought together by the vendor to generate inputs in order to establish the basis for the application. In this way, there is almost no recognition of user innovation activities after the technology leaves the vendors' premises.

This issue in itself is contrary to the concepts developed in the Social Shaping of Technology (SST), one of the key analytical frameworks deployed in this thesis, which criticises the linear models of innovation (as well as technological determinism) and calls attention to the bidirectional influence of social and technological contexts on one another (Mackenzie & Wajcman, 1985). This school of thought offers a range of notions to uncover the role of the wide array of actors involved in technological evolution. Despite this, although invaluable in identifying the role of various actors and actor worlds in technological evolution, there is inadequate attention given to spaces where these different actor worlds meet, and where they form a single locale of operation in which technology is encountered collectively: the technology user community. These gaps in understanding the role of user communities in complex technological artefacts form the second point of attention which will be addressed in this thesis.

Taken together, this problematization of the initial assumptions in User Innovation studies, the gaps in the literature concerning complex information systems, and the insufficiency of attention given to combined actor spaces in studies of Social Shaping of Technology, form the background of the research and the author's motivation to pursue this thesis.

## 1.2 Research Aims and Questions

Given the acknowledged importance of the user group in product development there is a need to develop better knowledge of the internal workings of these communities

and their role in shaping technological artefacts. With this in mind, this thesis has the following overall purpose: *to explore the detailed functions of technology user communities and to characterise their role in the user innovation process.* In an attempt to address this broad issue more specifically, four overarching questions will be addressed.

Currently there are few, if any, studies that provide a detailed picture of user groups. In this manner, several attempts have been made to theorise groups of users connected to technologies. However, though insightful, researchers tend to ignore the complex artefact in their studies and highlight 'innovation' as the main aim of these communities. Backgrounding of the technical has led to partial understanding of such spaces in the evolution of technology. Therefore this thesis aims to fill this gap by answering the question of:

1. *How do the technology user groups operate and how are they organised? What are some of the major roles and functions played within these groups?*

In answering this question the aim is not to offer a systematic typology. I am aware that any typology will always be incomplete, but nevertheless I see this typology as a beginning which can be strengthened/ critiqued through further research. Also I will enquire into the organisation of these groups, paying particular attention to any problems and tensions that may emerge, and how these are managed. For this purpose, I will initially throw light on the major challenges and tensions faced by organisers and participants within these groups, and then I will show how such tensions are managed in order to form an enduring community attached to a complex technology.

One important reason why the study of technology user groups has remained underdeveloped, I would argue, is because of the lack of appropriate analytical frameworks. Settings containing highly complex technological artefacts and a diverse range of actors (with dissimilar interests and goals) are difficult to study. Current approaches to the study of such communities offer what might be conceived as 'snapshot' studies (Pollock and Williams, 2008) which only present partial insights. Furthermore they tend to disregard the technological content. As a result,

current approaches do not offer effective insights into the details of user innovations in complex settings. To overcome these issues, I will address the questions of:

2. *How might we study the evolution of technology user groups across time? How should we conceive the mutual influences of the community and the technology?*

One type of user community is online or virtual user groups. Whilst the studies of such groups have gained momentum, they foreground the free and ready availability of information in such communities (e.g. Lakhani & von Hippel, 2003; Wasko & Faraj, 2005). This perspective offers a rather 'communitarian' view of these groups, which suggests that help is always and easily obtainable. However, research on the study of knowledge suggests that there is no guarantee that electronic knowledge sharing always, or automatically, takes place (Alavi & Leidner, 1999; Orlikowski, 1996). In this thesis I aim to question the unproblematic existence of support in user groups of organisational technologies. In doing so, I aim to answer the question of

3. *How do online user communities enable support and how can we theorise the cross organisational help that occurs in such settings?*

It is known that end user innovation occurs around complex enterprise technologies (Hyysalo, 2010; Johnson et al., 2013). Earlier studies of enterprise technologies show that innovation does not end in the manufacturers' research and development labs and continues as the technology is implemented and used by its users (e.g. Williams et al., 2005). In this respect authors such as Fleck (1988) and Sørensen (1994, 1996) highlight different actors influencing technology at different levels. Some studies go further and flag the importance of user groups in influencing enterprise systems (Koch, 2010). This idea chimes well with economists' arguments within the definition of user groups as sources of innovation (von Hippel, 2005; von Hippel, 2007; West & Lakhani, 2008). However, despite this knowledge, there is very limited understanding of the detailed role of such groups in the shaping of such complex technologies. Similarly, the existing accounts fail to explain the extent of the influence a community may have on a technology. In this manner, economists tend to disregard the difficulties and barriers surrounding it and assume that users'

innovative actions result in successful products. However, in this study I aim to question this assumption through unpacking the notion of 'success' itself. To address these concerns shortcoming I aim to attend to the questions of:

4. *How can we theoretically understand the process and paths of user innovation and how do we conceptualise their outputs?*

To answer these questions, this study will look into the fine grain details of a collection of user group events (both face-to-face and online) around an ERP application, which is organised by a central voluntary organisation. In this respect, the first theme of this thesis is to investigate the reasons for the lack of a well understanding of the inside story of technical user communities, and to aim to uncover this inside story by explaining the different functions and tensions within different groups of diverse interests. I will then use a biographical approach to offer a time-oriented perspective on technology user communities. To extend the findings, particularly around support user groups, I will also examine an online customer forum used for daily interaction of user organisations. Finally, I will draw a detailed map of user innovation from where it starts in a single organisation through to its evolution in a user group and the paths it may take during the process.

## 1.3 An overview of the Research Approach and Methods

Integrated package information systems are complex artefacts. It has been shown that simple methods of investigation can provide a somewhat partial view of these systems (Pollock & Williams, 2008). These studies present only short term outcomes, mainly at the sites of implementation, resulting in what we would see as 'snapshot' studies or 'localist' stories of the technology (*ibid*). To understand these complex artefacts constituted through a grouping of human and material elements, one must analyse how they blend into organisational practices alongside how they change over time, across multiple spaces (Koch, 2005). Therefore I will adopt the 'Biography of Artefact' (BoA - Pollock & Williams, 2008) approach, which takes into account multiple time and locale dimensions in its investigation of complex technologies.

In this context, I will conduct an interpretive ethnographic study around one of the world's leading ERP packages in order to examine the dynamics of user groups and user innovation. An interpretive approach should be used because very few theoretical precedents exist in the field; this enables us to provide insight into the context of this study and the processes within that context (Walsham, 1993). The ethnographic approach in this thesis will involve various data collection methods including participant observation, semi-structured interviews, document analysis, and informal social interactions with participants in these settings. The study will cover a diverse range of study spaces, including user group meetings (as the main field of study), user conferences, online customer forums and user organisations. This is to comply with propositions made about the richness that multi-sited ethnography offers in understandings of complex objects (Marcus, 1995; Hine, 2007) and to conform with the BoA approach which requires strategically moving the lens to different settings and selecting the methods of data collection and analysis.

The primary mode of the data collection method used to explore these diverse settings will be ethnographic observations. However, I will not enter the field as a 'blank slate' (Evans-Pritchard, 1950), rather due to my in-depth knowledge of the technology and experience of its implementation and use; I will therefore enter the field as a 'native' researcher. This will enable me to obtain a 'strategic ethnography' (Pollock & Williams, 2009) design for the study in which the research setting and its scope will be informed by empirical understandings of the spaces and issues under scrutiny. The second data collection method which will be used in this study is semi-structured interviews with the participants of the events. These interviews will be used to supplement the observation notes and validate the findings. Through these interviews, multiple perspectives from different actors will be captured at different research sites. Furthermore I will additionally analyse archival data such as minutes of meetings, internal company documentation and online forums in order to obtain current and historical data for current actions and outcomes.

## 1.4 Outline of the Dissertation

This thesis provides an overview of the literature in three relevant fields of research: Information Systems, User Innovation Studies, and Science and Technology Studies,

which will be expanded in more details in the empirical chapters. This will be followed by the methodology chapter explaining the wide range of methods used in the study. This is observed through my analytical lens (the BoA) which suggests that different methods and research lenses are required in the study of different settings. The four chapters will then explain their own findings and discuss them with respect to the literature. Finally the thesis will conclude with a further analysis of the four chapters, demonstrating their relations as well as their inclusive contributions.

In Chapter 2, I will review the literature that informs my multidisciplinary perspective in the study of user groups around complex technological artefacts. In order to execute this, I will start by explaining from the literature how packaged software generally came into being and how state-of-the-art studies characterise the role of users in the evolution of these packages. In this respect, I will first explain the tendency of existing research to analyse enterprise packages at the time of their implementation within the user organisation, and secondly I will illustrate the recent debates around users' roles during the design stage of such applications. In this respect I will show that the literature does not offer a great deal around user innovative actions in this context. Then, in section 2.3, I will explore a different strand of studies and explain the economic perspective on user innovation in which von Hippel argues that many products and service innovations are developed within user sites where the product is used, rather than where it is manufactured. I will highlight how this strand of literature typically uses quantitative methods to look at aspects such as motivation for innovating or freely revealing ideas. Furthermore, in this section I will also explain the studies on technology user groups and highlight that the majority of these studies explore only the motivational inputs and successful products. Finally in section 2.4, I will offer an overview of the development of the literature in science and technology studies around the social shaping of technologies. In this respect I will explain concepts such as 'innofusion' (Fleck's, 1988), 'domestication' (Sørensen, 1994, 1996) and 'social learning in technological innovation' (Williams et al., 2005) in order to highlight the role of users in the evolution of technologies. This chapter will conclude by going through the problems in the current assumptions concerning user innovation studies and the existing gaps

of literature with regard to user involvement in technology design in the studies of information systems and social shaping of technologies.

After having problematized the state-of-the-art research in Chapter 2, Chapter 3 will go on to explain my epistemological and ontological orientation as being socially constructed through an interpretive approach. In this manner I will demonstrate how this interpretivist stance will help me to comprehend the user groups as they are articulated by their actors. Then in section 3.4 I will go into details of the strategic ethnography approach which I will use in this study. This is will be followed by the data collocation and data analysis methods. Finally in this chapter I will offer an outline of the field of study along with my personal insights into the research process. This section will highlight that technological knowledge, effective access and appropriate research design are the three key enablers in conducting this research.

In Chapter 4, I will start by problematizing the current literature on technology user groups, indicating that the lack of multi-spatial, multi-temporal research has led to a partial understanding of such user groups when attached to complex technologies. These two issues will be dealt with in Chapters 4 and 5 consecutively. In Chapter 4, I will explore several user groups and classify their detailed functions, which will offer an initial typology of possible functions by such groups through ethnographic data analysis on user group events. In particular, this chapter will focus on the effects of the heterogeneity of actors and spaces and their diversity of functions as enablers of technological evolution. This chapter will also explain some of the tensions within such groups and discuss how such challenges, often caused by diversity of actors and actor interests, are managed. Chapter 5 will then conduct a multi-temporal insight into the user groups and illustrate how the technology and the community co-evolve. In order to do this, an adaptation of the BoA approach developed by Pollock and Williams (2008) will be used as a framework, however, in doing so, I will initially problematize the approach and offer an extension to accommodate for the evolution of the community and its technological contents in tandem.

Next, in line with the research framework that suggests study of different spaces, in Chapter 6, I will explore the online dimension of the user group by looking into a

virtual customer forum with the intention of explaining the nature of users' practices and knowledge exchange in such settings.

While in chapters 4, 5 and 6 the unit of analysis will be the user groups, in Chapter 7 I will shift the focus to one of the emerged functions: user-led and community innovation. In doing so, I will follow user-initiated solutions around the core technological artefact and aim to conceptualise innovation paths and the role of user groups in technological evolution. In order to do this, I will use a symmetrical approach to explain the outputs of innovation as they are seen by different actors and as they move from one space to the next, which will enable me to examine the biography of each output as it moves over time and space. The outcome of this will be to capture the outputs of the innovation process which are not visible through conventional means of examining user innovation.

While each chapter will discuss its own findings, in Chapter 8, I will bring together all of the findings of the previous chapters and show how they jointly contribute to knowledge, practice and policy.

# 2 Literature Review

## 2.1 Introduction

This chapter provides an overarching review of the literature on three main fields of academic research related to this multidisciplinary study: 1) Information systems and the growth of enterprise resource planning applications; 2) Studies of user innovation and user communities; and 3) Science and technology studies. The aim of this chapter is to illustrate the state-of-the art work of leading academics whose research facilitates the analysis and positioning of the contributions of this study into the wider literature. Each of these fields will be analysed in more detail in the empirical chapters (Chapters 4, 5, 6, and 7) with a more critical perspective to problematize the existing assumptions and highlight the gaps.

This chapter is organised in three separate sections on each of the mentioned topics. In the next section, 2.2, I will offer a historical perspective on the literature on information systems and the growth of ERP applications. The section will highlight the difference between enterprise systems and traditional information systems and explain what the existing literature says about user involvement in shaping standard enterprise-wide packages. Section 2.3 will highlight the role of user communities in the innovation process, and look into existing studies on user innovation in order to reveal the differing topic strands that are widely discussed. Then, in section 2.4, I will present an overview of the research on science and technology studies which throws light on the social shaping of technology. Finally in section 2.5 I will conclude by highlighting the gaps that can be covered through an interdisciplinary study of the three areas of research.

## 2.2 Information Systems and the Growth of Enterprise Resource Planning Applications

The growth of information and communication technologies (ICT) driven by hardware and software systems has transformed different aspects of computing applications across organisations. At the same time businesses are becoming increasingly more complex, with different departments demanding more inter-functional flow of data for decision making and efficient management of resources.

In this context, companies demand effective systems to improve interoperability within and across firm boundaries in order to enhance competitiveness. This demand has led to the creation and advancement of computers and organisational information systems (Davenport, 2000; Brady et al., 1992).

The organisational information systems come in two shapes: bespoke systems designed to meet the requirements of a single user organisation, and packaged applications which are developed to meet the needs of various businesses. The expansion of packaged applications was followed by the development of generic integrated applications such as Enterprise Resource Planning (ERP) systems, Supply Chain Management (SCM) applications, and customer Relationship Management (CRM) systems. However, just over two decades ago there was much doubt surrounding the success of such systems, as experts believed that it was unlikely that generic application was able to cater for the needs of diverse organisations. The 'standard' features of these applications were seen as barriers to adoption in organisations of differing and complex needs. . However, the compelling and rapid force for their adoption led to the majority of the Fortune 500 companies having implemented ERP products (Kumar & Van Hillegersberg, 2000), and the technology forming 70 per cent of software sales (Sawyer, 2000) by the end of the twentieth century. This growth continued as many companies reacted to the market hype by adopting such systems in an era of instability (Kumar & Van Hillegersberg, 2000; Klaus, et al., 2000). In the next sections I will focus on the reasons for the birth and growth of enterprise-wide generic packages and then review the literature on ERP relevant to the focus of this thesis.

### *2.2.1 Birth of Generic Information Systems*

The first business application software was developed in the 1950s (Davenport, 2000), during which the primary constraint for software developers was the limitation of hardware (Friedman, 1989). This trend continued and by the late 1960s, centralised computing systems were developed. Over the following 40 years development of stand-alone applications were continued with the purpose of serving business functions demanded by organisations (Davenport, 2000). Hardware production was however improved in a very rapid manner, resulting in an increase of

computing and telecommunications capabilities per unit price. Conversely, software remained high in cost and limited in availability, leading to the identification of the 'software crisis' in the late sixties (Pelaez, 1988). This stimulated improvement of quality and reduction of cost for software production by tackling the issue in two ways: initially a change of software development processes was undertaken via new methodologies; followed by the re-use of code, through a range of methods such as object-oriented programming. During these years, software developers built computer-based tools to improve software development processes, and by the 1980s tools were available which could support the complete software development lifecycle. At the same time the focus shifted from data processing to the creation of specific information outputs in order to aid decision-making. At this stage, standard programmes known as Commercial Off-The-Shelf (COTS) or packaged software was developed. This led firms to search for a number of different software consumers to buy the same COTS software, allowing the development costs to be shared, which resulted in the recovery of software development investments (Campbell-Kelly, 1995, 2003). By 1992 it was known that standard software production could reduce software cost by distributing it amongst various users (Brady et al., 1992).

Throughout 1990s the market for packaged software grew rapidly and by the end of the twentieth century it formed 70% of software sales (Sawyer, 2000). This development initially dealt with the core mathematical functions of computers, such as operating systems, programming languages and utilities (e.g. database systems). Brady et al., (1992) explain this shift using Ward's (1987) model which categorises applications into four types based on their 'benefits versus resource use': 1) Turnaround - applications newly developed for the firms which consume a large number of resources but offer minimal benefits; 2) Strategic - applications which prove to be beneficial for the first developer, so while using a high amount of resources they are also highly beneficial; 3) Factory – As similar systems are developed by competitors and spread over other organisations they become more competitive and consume fewer resources but stay highly beneficial; and 4) Support – applications which are highly spread over organisations and become infrastructural. Brady et al., (1992) suggest that within this model firms show a tendency towards the

use of package solutions instead of customised software. They then indicate that all types of software become commodities once their importance to the sector is recognised. This leads to the development of 'generic industrial applications' such as payroll and finance systems with similar functions throughout different organisations (Brady et al., 1992).

These applications were developed separately (and unconnectedly) for particular organisational functions, which resulted in programs that could not directly communicate and were limited in terms of information sharing. So, organisations had various applications to embrace their information needs, which in many cases gave rise to the duplication of data. These systems were hard to modify and difficult to maintain (Davenport, 2000), and as a result, challenging to link to one another. Hence the focus shifted away from the automation of particular activities within the firm, and towards sharing information across the firm (Fleck, 1988). However, this integration was initially built in custom-build applications and not in generic solutions.

In late 1980s the need for highly inter-related coordination and real-time integration, as well as the demand for generic systems, led to development of Enterprise Resource Planning (ERP), the term coined by Gartner (Pollock & Williams, 2009). ERP systems can be considered as 'generic systems' (Fleck, 1993) which can provide solutions for a wide range of organisations. They may also be known as 'configurable systems' (*Ibid*.) because they can be configured to meet different organisations' needs. Essentially, ERP allows a company to integrate the data used throughout its entire organisation (Wylie, 1990; Mabert et al., 2003).

ERP systems in general evolved from technologies designed to facilitate manufacturing operations (Klaus et al., 2000). The early versions of these manufacturing systems were developed as inventory control systems which then grew into Material Requirements Planning (MRP) and Manufacturing Resource Planning (MRP II) applications. Subsequently, MRP II was expanded into ERP in order to incorporate other enterprise processes such as finance and sales (Davenport, 1998; Kumar & Van Hillegersberg, 2000).

As organisations started to grow in global markets, they sensed the need to implement worldwide business solutions (Walsham, 2008). This sense was appreciated by international management consultancies which led to growth of ERP systems (*ibid*). Moreover, the rich functionalities offered by these systems and the awareness about the potential benefits for the adopting organisations were amongst many different incentives that encouraged companies to implement these systems (Ross, 1999). Since then, a large number of scholars have written about the benefits of ERP adoption (see for instance Shang & Seddon, 2000; Klaus et al., 2000; Leon, 2008; Hunton et al., 2003; Lengnick-Hall et al., 2004). Simultaneously many authors have argued about the risk of adopting a one-size-fits-all system to an organisation, highlighting issues such as the misalignment of processes, the culture of the host user organisation and the standard package (see for instance Soh et al., 2000; Yen & Sheu, 2004; Luo & Strong, 2004; Soh & Sia, 2004; Sia & Soh, 2007; Morton & Hu, 2008). In the sections that follow I will give an overview of the state-of-the-art literature on involvement of the user in ERP products.

### *2.2.2 Literature on Enterprise Resource Planning Systems*

Generic applications can be defined as communities of constitutive joint technologies (Koch, 2007). They are characterised by their standard nature. In this respect, there is not a considerable difference between them and many other commodities. Producing commodities mean carving homogeneity (Kopytoff, 1986) to cater for heterogeneous settings. In this manner, they can be 'configured' (Fleck, 1988) by various actors to meet their diverse needs. This standardisation is enabled through a strategic social distancing of suppliers from users (Johnson et al. 2013). In response to these detachments, users employ various ways of meeting their own needs such as innovating or assembling into groups or communities (von Hippel, 2005) to overcome the 'standardisation' and 'distance' barriers. These characteristics are seen in a broad class of technologies such as ERP applications or Health Information Systems.

Enterprise systems have been widely discussed by academics for the past two decades. Esteves and Pastor (2001) identify 189 studies from 1997 to 2000 (only five of which count for the early years, i.e. 1997). Moon (2007) highlights a further 313

articles published around different aspects of ERP between 2000 and 2006. More recently Eden et al., (2012) conducted a further study of ERP literature between 2006 and 2012 which points to 198 research publications. In their study, Eden et al., (2012), also explored into the earlier research on ERP literature and offered a comparison of their findings over the following three periods: 1996-2000, 2001-2005 and 2006-2012. They illustrated that, by far, implementation studies were the most widely discussed during all periods. They also showed that usage studies have gained momentum in the third period while other parts of the ERP lifespan have been less scrutinised.

According to Esteves and Pastor (2001) ERP literature is largely organised based on the phases of its lifecycle from decision making and procurement, to implementation, to use and maintenance and finally to evolution and retirement. This categorisation misses a very important stage in the ERP lifespan, which is its design and development. More recently Pollock and Williams (2008), provide a more complete account of ERP research which categorises its lifecycle into five phases: design, development, procurement, implementation and support.

As discussed in Chapter 1, the overarching theme of this in-depth research is to throw light on the continuous involvement of users in the different stages of shaping generic enterprise application and highlighting the role of user groups in the growth of these systems. For this reason I aim to seek out literature that explains the users' influence on technology at various stages of its lifecycle. Hence I use Pollock and Williams' (2008) categorisation to incorporate existing literature that covers a full picture of ERP from its inception to the end of product support. An overall review of the literature mainly demonstrates that the studies which involve user engagement with the product lie in design, development and implementation phases, which will be explained in the next section.

### *2.2.3 User Involvement in Technology Development*

ERP systems are designed to respond to the needs of a wide range of user organisations, thus while they need to cater for specific user requirements, they should also be generic enough to be implemented in different organisational settings. The literature concerning information systems and packaged system design

predominantly focuses on the extent to which user requirements should be incorporated in the system. This has given rise to debates around two related issues: first the ‘generification’ of the application versus the particularity of needs, and secondly, the lack of a direct user-vendor relationship for the purpose of avoiding user specific design challenges (Bansler & Havn, 1996; Williams et al., 2005; Pollock, 2005) versus the significance of the need for the existence of the link in designing a successful application (Carmel & Becker, 1995; Sawyer, 2001).

Salzman and Rosenthal (1994) claim that the proximity of vendors and users in enterprise applications leads to an uncontrollable volume of demand, and therefore users should be kept at distance throughout the different stages of product creation. In opposition to this are those that stress the importance of proximity to users in the design processes. For instance, Keil and Carmel (1995) stress that the closeness of the user-developer link directly affects the success of the software technology. These contrasting arguments lead to the further question of ‘which’ users are to be distanced and ‘which’ users are to be kept proximate and questioned about system requirements (Wagner & Newell, 2004). Following these arguments are those that highlight the influence of the length of the vendor-user link and its influence on generification of applications. For instance while Bansler and Havn (1996) highlight the need for distance at design in order for the software not to be tied to specific user needs and hence unmarketable, Pollock and Williams (2008) report on the need for various types of links and hence varying proximity at different stages of design and development of ERP packages.

Furthermore, the design of ERP applications is grounded in the assumption that there are a range of processes, known as ‘best practices’, which can be applied across organisations to improve their process efficiency (O'Leary, 2000). These ‘best practices’ are then developed into the system as a baseline in a way that can be configured to cater for diverse organisational settings. In order to design the systems based on ‘best practices’, two main approaches have been proclaimed: the first approach is based on theoretical models rather than direct interaction with users. This approach, which was predominantly prescribed for design of Computer-Aided Production Management (CAPM) packages rather than ERP applications, suggests

that the generic system requirements are extracted from text books (Webster & Williams, 1993). In contrast, the second approach, predominantly discussed by scholars, involves user engagement in the process. According to Bansler and Havn (1996), the vendor develops an initial version of the system based on a 'proxy' organisation needs. These user organisations, also known as ‘pilot sites’, have direct influence on shaping the basis of the system (Pollock & Williams, 2008). The system is then redesigned, maintaining the generic aspects demanded by other organisations, and coded out the organisation’s specific features. The literature defines this process in terms of identifying ‘universal aspects’ (Bansler & Havn, 1996) and applying ‘generification’ (Pollock & Williams, 2008). Clearly this ‘generic’ view of needs and its exclusion of specificities could lead to tension in the supplier–user relationships (*ibid*).

Other studies of the design and evolution of ERP systems mainly focus on the integration of emerging technologies with ERP applications. Examples are studies of enterprise application integration (Bahli & Ji, 2007), SCM and ERP (Bose et al., 2008), and Vehicle routing tools and ERP (Mendoza et al., 2009). What is largely evident in this literature is the suppliers’ ‘technical exercise of power’ in designing the system and having the ‘autonomy’ to shape the application (Howcroft & Light, 2006). The greater part of ERP studies, in one way or another, explain vendors’ control in shaping packages and giving emphasis on vendors’ selection of user requirements to be incorporated in the system (Howcroft & Light, 2006).

The research on users’ involvement with the product then moves on to the ‘implementation’ phase, which is the most widely discussed theme in ERP literature (Eden et al., 2012). The notion of ‘ERP implementation’ often refers to the stage in which the application is introduced to the user organisations. Generally this phase takes several months or years until the application is able to represent complex organisational processes (Worthen, 2002). Due to their standard features, they need to be ‘adapted’ to meet the needs of the user organisations (Moon, 2007). These adaptations may range from ‘configuring’ the parameters to ‘customising’ which refers to modifying the system by changing the standards or adding programs. Consequently these customisations are typically not supported by the vendor

organisation. According to Pollock and Williams (2008) implementation studies can be categorised into success stories, failed implementations, and suggestions for best practices (also known as critical success factors).

In terms of user-product influence, typically this strand of literature lies at one of the two ends of the spectrum by emphasising the generic application's impact on the business or by stressing the user organisation's adaptation of the standard application to meet its local needs. For instance, in the latter body of work, Scott and Wagner (2003) illustrate how the standard design of the ERP application was modified to a significantly different 'local information system' as a result of user resistance to change. Light (2001) similarly points out that when users cannot adopt the standard offerings of packages they attempt to customise the application. Other scholars such as Kremers and Dissel (2000), Markus et al., (2000) and Soh et al., (2000), also discuss their findings on the consequences of adapting ERP systems and modifying them to meet the local requirements. In contrast, studies such as those by Brehm et al., (2001), Willcocks and Sykes (2000), Davenport (1998) and Foremski (1998) focus on how organisations change their processes to fit the standard system. Finally, even those literatures that try to reconcile these positions through explaining the mutual alignment of software and organisation have a tendency to stress one side or the other. For example Hanseth and Braa (2001, p. 261) primarily reconceptualise ERP as purposeful actor in reforming local practice to fit the design, but continue to point out the localisation necessities:

> The idea of the universal standard is an illusion just like the treasure at the end of the rainbow. Each time one has defined a standard which is believed to be complete and coherent, during implementation one discovers that there are elements lacking or incompletely specified while others have to be changed to make the standard work […] The universal aspects disappear during implementation, just as the rainbow moves away from us as we try to catch it.

The implementation phase studies are still growing in the field of enterprise systems, with their main focus being the impact of the application on users and user organisations. For instance scholars examine the impact of ERP adoption on user job satisfaction (e.g. Morris & Venkatesh, 2010), productivity and firm performance (e.g. Kallunki et al., 2011; Beheshti & Beheshti, 2010), and long-term performance

enhancements (Cao et al., 2013). This highlights the limitations of studies on possible influences of users on the ERP products.

While a large body of literature exists around the issues of ERP product-organisation influences in the implementation phase, the mainstream studies on the impact of users' actions are largely explained within the boundaries of their firms at a particular point of time (implementation and use of the system), without much elaboration on the longer term outcomes. Reviewing the literature on ERP systems reveals that, despite the numerous ERP related studies over the past two decades, there is a substantial lack of coverage around some of the other phases and contexts of ERP evolutions (Koch, 2011; Pollock & Williams, 2008). Stressing on one way impact of organisation on technology due to local domestications, or in contrast, focusing the impact of technology on organisations due to the standard nature of the application, ignores the complex interplay between the different elements of an ERP project. In order to overcome this and achieve a richer understanding, Howcroft et al., (2004) suggest focussing on bi-directional evolution of social and technical elements through use of different levels of analysis and by employing a 'processual perspective' in examining their design and use over time, is essential in the study of such complex packages. Williams and Pollock (2009) also expand this view by stating that we need to go beyond an actor-centred analysis which has its focus predominately on local interactions and choices.

Overall, four concluding points can be made on the studies of complex enterprise systems which will be investigated in this thesis. First of all, the majority of studies report exclusion of user inputs in system definition. Only very few studies attempt to show the involvement of users in influencing the technology at the early stages of design, and those that do so only demonstrate it through vendor-controlled links. Secondly, there are a range of studies that report on the dominant influence of standard applications on organisations and pay little attention to user choices in the implementation of such systems. Thirdly, another body of literature emphasises the user's role in the localisation and domestication of such systems, but only go as far as to explain this in the local settings of the user organisation. Such research tends to disregard long-term and multi-locale influences of modifications. Finally, there are

yet a range of underexplored locales, such as user communities, around enterprise applications, which may have an influence on the socio-technical elements of such complex systems.

Thus to set the stage for addressing the aforementioned points in this thesis, in the next two sections I will look at two different strands of literature which concern the role of users in the shaping of technology. First, in section 2.3, I will review the literature on user innovation which mainly focuses on the findings of quantitative examination of users' involvement in shaping technological products. Then in section 2.4, I will present a review on the studies of science and technology which report on the findings on user engagement in technology design and use through a qualitative lens.

## 2.3 Studies of User Innovation and User Communities

For long it has been known that an understanding of user requirements is essential for the development of successful products (Achilladelis et al., 1971, Rothwell et al., 1974). Studies have shown, however, that not all manufacturers make use of consumers' knowledge in the design of technologies (Greenberg et al., 1977, Feldman & Page, 1984). The traditional literature on innovation assumed that manufacturers played the dominant role in identifying users' needs, hence they were the sources of innovative knowledge. More recently however, there have been major discussions on the significance of users as sources of technological innovations. Indeed, successful innovation has been proven to be the result of users' involvement in design (Rothwell et al., 1974; von Hippel, 1976, 1977).

In the 1970s Von Hippel, was one of the pioneers who drew attention to the role of users in the innovation of industrial products. His research shows that users are innovators of 77% of scientific instruments (1976) and 67% of semiconductors and printed circuit boards (1977). This trend continues as other scholars also shed light on user innovations in other industries (for instance Pultrusion Processing by Lionetta in 1977, Industrial Gas Equipment and Thermoplastics Equipment by Vanderwerf in 1984, and Medical Equipment by Shaw, 1985). Foxall (1986) then demonstrates that user initiated innovations are best described in continuity. Then in his book in 1988, Von Hippel discusses sources of innovation by describing a range

of studies that illustrate the diversity of sources of innovation in different fields. In his study he shows that in some disciplines users are the main sources of innovation while in others, suppliers are the major innovators of components and in still some other fields, product manufacturers are the typical sources of innovation knowledge. Riggs and von Hippel (1992) then suggest that innovations with high scientific significance are likely to be developed by users while products of high commercial value have a tendency of being innovated by manufacturers. More recently, Baldwin et al., (2006) explain how user innovations become commercial products and von Hippel et al., (2011) propose a new innovation paradigm in which user innovations become products of big market players. He argues that any definition of need or problem includes implicit or explicit information about some form of expected solution (von Hippel, 1978). For instance, many customers provide functional specifications for their desired product which could indeed hold valuable information about its design and development. Similarly, he proposes a three phase user innovation process model which states 'With respect to Phase one of the innovation process […] - initial need awareness, product design, prototyping and use testing - consumers should realise that they are important developers of really novel products and services' (Von Hippel et al., 2011). The user innovation studies also state that user innovation goes beyond product development. For instance, Oliveira and von Hippel (2011) show the high capabilities of users as service innovators in banking.

Another area which has attracted much attention is 'why users innovate'. Bogers et al., (2010) categorise the research in this area into two groups: reasons related to costs and reasons related to benefits. Cost associated purposes are mostly addressed through what von Hippel (1994) refers to as 'sticky information' which addresses the cost of transfer of innovation knowledge. Research on information stickiness typically describes the locus of innovation (Bogers, et al., 2010). Other cost related reasons discussed in the literature are the amount of knowledge required to innovate (von Hippel, 2005), the extent of experience in using products (Lüthje, 2004) and the misalignment of users' and producers' interests (von Hippel, 2005). Benefit related reasons for user innovation are mainly discussed in terms of incentives for users to innovate and freely reveal their innovations. Motivations such as personal satisfaction (Shah, 2000; Lakhani & Wolf, 2006; Jeppesen & Frederiksen, 2006), and

gaining recognition (Jeppesen & Frederiksen, 2006) are amongst the most widely discussed factors. Roberts et al., (2006) go one step further and show how different motivations for user innovators are interrelated and have an impact on their participation and performance.

The studies of user innovation also widely discuss the concept of 'lead users', users of products or services that experience a need ahead of the majority of users in their populations with respect to important market trends and highly benefit from innovating a solution to the needs they have encountered (von Hippel, 1986). Von Hippel (2005) argues that the majority of user-developed products (novel or modifications) are designed by such lead users. Evidence of this theory is provided by scholars in both hardware (e.g. scientific instruments, and sports) and software (e.g. library software) products and services (see for example Urban & von Hippel, 1988; Morrison et al., 2000; Franke & Shah, 2003; Lüthje, 2003; Franke et al., 2006; Schreier et al., 2007). These studies have in turn led to a more recent strand of research on the identification of lead users for successful user innovation (see for instance Luthje & Herstatt, 2003; Bilgram et al., 2008; Spann et al., 2009; Mahr & Lievens, 2012).

Another relevant strand of user innovation studies broadly discussed by scholars is the role of user groups, communities and networks in innovation and diffusion of innovative ideas. The literature on innovation communities shows that collaborative innovation by users in communities brings out institutional forms that have the ability of to modify the producer-centred innovation. Von Hippel (2005, Pp. 95-6) notes that it is likely that product innovation is a widely distributed task amongst a range of different users, and claims that '…the practical value of the freely revealed innovation commons these users collectively offer will be increased if their information is somehow made conveniently accessible. This is one of the important functions of innovation communities.' Studies show that user communities are able to outcompete producer designs (Baldwin et al., 2006). The literature in this field discusses both informal user-to-user cooperation as well as organised modes of cooperation, such as formal user groups. Von Hippel (2005, p. 96) defined user communities as:

> Meaning nodes consisting of individuals or firms interconnected by information transfer links which may involve face-to-face, electronic, or other communication. These can, but need not, exist within the boundaries of a membership group.'

The studies show different natures of communities with respect to the types of relationships between members involved. In this respect, one strand of studies focuses on user innovation communities entailing actors that lack a common organisational affiliation (West & Lakhani, 2008). In contrast, Dahlander and Wallin (2006) argue that individuals with affiliations to firms are more active due to their deeper and wider access to knowledge resources. There are also two different types of communities in terms of form: online communities (see for instance studies of Lerner & Tirole, 2002; Lakhani & von Hippel, 2003; von Krogh et al., 2003; von Krogh & von Hippel, 2003; Holmström, 2006; Jeppesen & Friederiksen, 2006; Heiskanen et al., 2010) and face-to-face communities (for instance studies of Tomes et al., 1996; Shah, 2000; Luthje, 2003; Frank & Shah, 2003; Heiskanen et al., 2010).

Software communities are amongst the most widely discussed user innovation communities in the literature. For instance, von Hippel (2005) refers to them as the 'invisible arm of software producers', Dahlander and Wallin (2006) address them as 'complementary assets' of firms, and Tomes et al., (1996) assert that user groups in the software industry are a medium of design. Some scholars go as far as to suggest that user communities may be the key determinants of a project's success rather than the product itself (O'Reilly, 1999). However, the majority of studies have a tendency to discuss OSS. For instance von Hippel (2001) identifies the conditions that favour user innovation in OSS and examines how they evolve into commercial product; Lakhani and von Hippel (2000) suggest that OSS products are the leading edge of user innovation, and von Krogh et al., (2003) discuss the strategies and processes employed by users to join and contribute to OSS communities. Bagozzi and Dholakia (2006) go one step further and conceptualise user participation in OSS user groups in terms of 'cognitive', 'affective' and 'social' determinants.

Although many studies of software user groups are formed around OSS communities and how users act in a communitarian manner by freely revealing their innovations, more recently a limited number of studies discuss the non-community aspect of some

of the user groups. Von Hippel (2007, p. 294) argues that some user innovation networks may not have all the ‘qualities of user communities’. Interestingly, this paper differs from the mainstream studies, as von Hippel (2007) states that only ‘some users innovate’ and only ‘some users freely reveal’, and as he highlights how they may differ from ‘communities’ he calls them ‘horizontal innovation networks’. In a more general way, West and Lakhani (2008) review the definitions of user communities utilised within user innovation agenda and argue over the importance of understanding their differences while studying this phenomena. However, despite the importance of their findings, there is very limited research that delves into the consequences of having a wider lens on user communities.

While the studies of user innovations offer an invaluable account on the importance of user knowledge in the design and development of products, and the vital role of user communities in the expansion and diffusion of innovation, they tend to express quantitative results. Hence, although their importance is evident, particularly in some industries more than others, only a partial understanding of the processes involved in user community innovation are defined. As a result, apart from the knowledge that user communities are sources of innovation, their roles and functions remain unexplored. This is perhaps the underlying issue behind the questions posed by Bogers et al., (2010, p. 864): ‘How can a producer retrieve the knowledge about the user’s improvements (innovations)? How do these improvements (innovations) flow to other users (competitors)? How can a producer enable users’ improvements (innovations)?’.

Furthermore, most studies in the field of user innovation only focus on a short period of time, particularly on successful results, and also tend to be performed at a distance from the process. One of the limitations of this approach is that it hinders the ability of the researcher to analyse the detailed characteristics of the process. Moreover, these studies do not explain possible alternative outcomes and pathways of innovation, so the studies only provide what might be thought of as a ‘snapshot’ of the innovation, with very limited understanding of their evolution or indeed of the community that generates it.

Additionally, user innovation studies tend to focus on particular technologies, especially in the field of software, where the majority of studies look into various aspects of OSS, hardly considering other types of software and information systems. One question that needs to be asked is whether the apparent tendency for users to innovate in OSS is also found within commercial software applications, particularly those that are used as organisational information systems. This same point is made by Bogers et al., (2010), who note that research on user innovation emphasises the user innovations in some industries and not in others.

## 2.4 Science and Technology Studies

Recently there has been increasing interest in the implications of social and economic factors on new technologies from Science and Technology Studies (STS). Recent developments in this field challenge the traditional linear models of innovation. As technological artefacts become more complex in terms of technical development and societal use, new models are suggested by scholars indicating the need for a more sophisticated and in-depth understanding of the technology-society relationship. STS offers a range of analytical models for identifying these relationships and provides methodological guidelines for conducting research in this field. At this stage I will outline the dominant literature relevant to this thesis, which will be elaborated upon in the empirical chapters as required.

STS was principally established as a field of systematic study in the 1980s through the formulation of several models for exploring innovation within different traditions (Williams & Edge, 1996). One widely-used approach initiated by MacKenzie and Wajcman (1985) is the Social Shaping of Technology (SST). SST critiques linear models of innovation and technological determinism and emphasises the influence of social and technological contexts in tandem. In a similar vein, Williams and Edge (1996) emphasise the presence of material and human choices in design and the trajectory of growth for complex artefacts, suggesting that the relationship between technology and society is of a 'mutual shaping' nature. As a result they suggest that the innovation processes go beyond the research and development lab into spaces where technology is implemented and used by different actors.

Another widely used approach is the ‘Actor Network Theory’ (ANT) (Latour, 1987) which explains social outcomes in terms of the employment of strategies by innovation actors to draw the support of others. This view criticises the social science theories that explain the outcomes as a result of power in existing social structures (Callon & Law, 1982). The ANT approach suggests that power is not a cause but a result of the achievement of actors in enrolling and organising others in their project (Pollock & Williams, 2008). It encourages the researcher to ‘follow the actors’ (Latour, 1987) to see how such enrolments occur. Unlike the SST perspective, which examines technology and society in tandem, ANT’s focus on the actor tends to black-box the technology. Thus, although ANT throws light on the outcomes of the actors’ power, it has a tendency to disregard other possible explanations resulting from interaction with other actor spaces. In this manner, ANT together with the Social Construction of Technology (SCOT) model (Pinch & Bijker, 1984) have been criticised for their mere concentration on local innovation actors and disregard of other influences (Russell, 1986; Russell & Williams, 2002; Pollock & Williams, 2008). Pinch and Bijker (1984) (in explaining ‘social groups’ in SCOT) and more recently Latour (2005) (in explaining the reassembling of the social associations) have responded to some of the critiques, particularly to those concerning ‘which actors’ to account for. Hughes and Pinch (1987), Collins (1987), Woolgar (1985), and Wynne (1988) are amongst other scholars that use a similar perspective to show how social actors form meanings around a technology. Another critique of ANT is presented by Orlikowski and Baroudi (1991) who argue that such approaches tend to disregard the ‘material and structural’ dimensions of working with technology. Hence what we see as a drawback of such perspectives is lack of adequate understanding of socio-technical bi-effects.

The term ‘Social Learning’ has been offered as an extension of the SST approach in order to take into account an extended range of actors and locales in the innovation process (Williams et al., 2005; Stewart & Williams, 2005; Russell & Williams 2002a). This perspective discovers, analyses, and gives meaning to placing artefacts into a network of cultures, machines, systems and existing routines through processes of 'learning by doing' and 'learning by interacting' (Williams et al., 2005). The learning by doing phenomenon (Arrow, 1962) provides an important source of

information for technology design whereas learning by interacting (Gilfillan, 1970) addresses the challenging situations which exist for the use of mass produced goods, due to a lack of direct relationship between users and vendors as the source of learning consumers' needs. This interaction could take place between the vendor and any of the following actors: customer, intermediate user (Akrich, 1992), competing supplier and vendors of complementary products (Collinson, 1993). Innovation can therefore be seen as an interactive process between users and developers over a period of time. In this way, Oudshoorn and Pinch (2003) highlight the interdependence of design and use. Rohracher (2005) also argues about the active participation of users in the design of technologies. Williams et al., (2005) refer to this as 'Social Learning in Technological Innovation' (SLTI) and explain that this approach explores learning economy as a process of negotiation amongst actors of different cultures, abilities, commitments, and contexts. In this way they provide a 'dynamic model' of innovation that reflects an interactive and iterative process.

Some of the antecedents for the social learning model come from earlier work on the 'appropriation' model: this includes the 'innofusion' (Fleck 1988b; Fleck et al., 1990) and 'domestication' (Silverstone et al., 1992) perspectives, which are then expanded by the SLTI model (Williams et al., 2005).

The innofusion model considers users as 'active' within the implementation process. In doing so, Fleck (1988) questions the distinction between technology innovation and the diffusion process. He argues that in 'configurable' technologies (such as ERP) no clear boundary can be set between the processes of design and implementation. Thus, 'innofusion' is defined as the process of discovering users' requirements and incorporating them in packages with the purpose of making technology more useful by 'technological design, trial and exploration'. In this manner, technological development is considered a non-linear process characterised by diversity of options and choices which call upon negotiations. Fleck (1988) states that technology trajectories are influenced by tensions during product implementations. Hence, as Williams et al., (2005) put it, innofusion is the erosion of the boundaries between technology development and use, resulting in the

implementation arena becoming an important innovation site and users becoming active in system design.

Similarly, Sørensen (1994, 1996) draws upon the concept of 'domestication' to describe users' activities in incorporating artefacts into their social and organisational routines. The domestication perspective stresses the role of the user in adapting standard systems to the needs of adopter organisations. Sørensen et al., (2000) further expand this framework by explaining practical learning which involves patterns of use, symbolic learning concerning construction of meaning, and cognitive knowledge of artefacts. After which Williams et al., (2005) offer an overview of these strategic perspectives by examining the following concepts: user-centred design, appropriation, the evolutionary model, and the 'pick and mix' model. Figure 2-1, adapted from Williams et al., (2005), is an illustration of each of these perspectives. As can be seen in the figure, the user-centred model focuses on the role of user requirements as inputs into the initial stages of design. Then, the appropriation perspective consists of two models: innofusion and domestication. In these models, which were based on the industrial automation, the implementation arena is seen as the site of innovation and the models highlight the possibility of feedback for future designs. But at the same time they highlight the issue of user-vendor distance as a barrier to progression of users' innovations between different settings. Rohracher (2006, P. 6) also discusses the appropriation of technology by explaining situations 'where users do not just submit themselves to the scripts or preferred readings of a technology, but actively define their way of usage.'

The evolutionary model is seen as another approach in which design is influenced by feedback from trial usage, which points to the development of technology and user market in tandem. Finally the 'pick and mix' approach emphasises users' local choices in knitting together particular technology configurations. In this way Williams et al., (2005) offer a range of 'paths' to technological innovation. Although these models offer a detailed perspective on possible strategic paths and the diversity of actors involved, they do not give an in-depth view of the collective actions of heterogeneous actors participating in interlocking context. This issue will be discussed in more detail in Chapter 7.

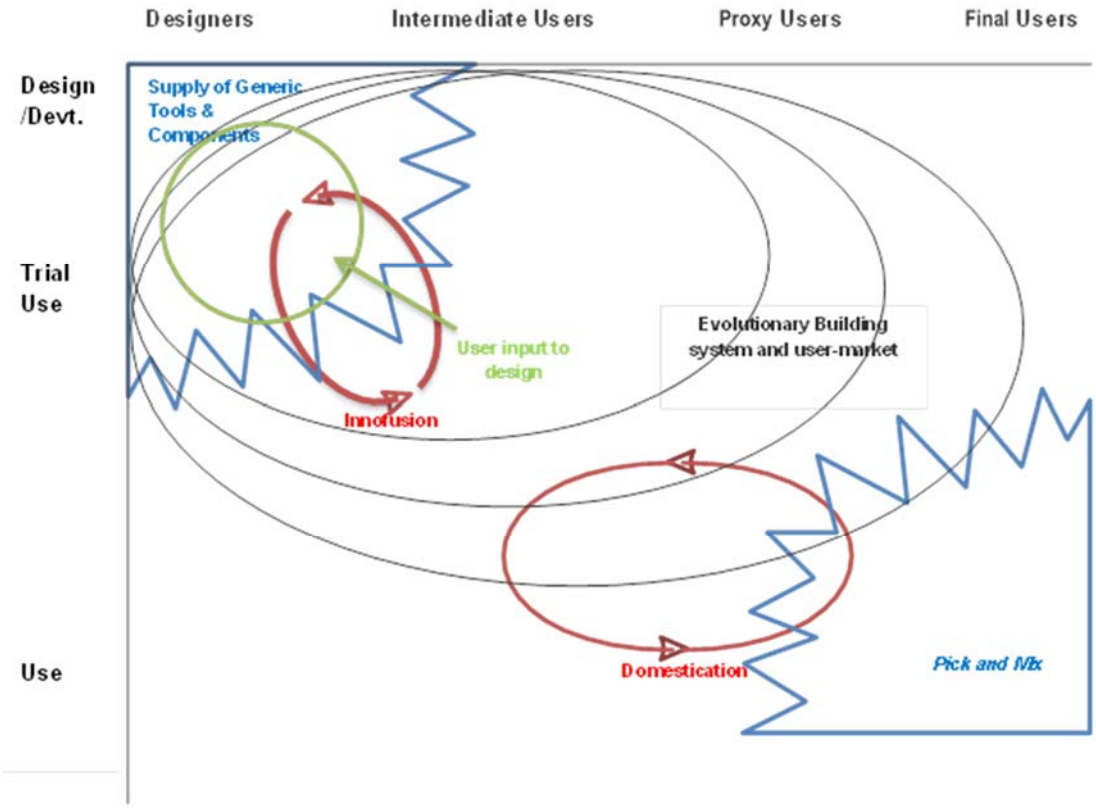


**Figure 2-1 Social Learning Perspectives, adapted from Williams et al., (2005)**

So, in general the SST approach draws attention to how innovation continues as technology moves in cycles of implementation and use (Williams et al., 2005). In this manner 'domestication', 'innofusion' and 'appropriation' are seen as strategic options by which user organisations adapt technology to meet their local needs (Fleck et al., 1990, Williams & Edge 1996, Fleck 1998, Sørensen & Williams, 2002 in Russel & Williams, 2002a). Such findings call for investigation of multiple locales over longer timeframes. Hence scholars have introduced more advanced modes of research to capture the multifaceted settings in the evolution of enterprise systems. Unlike approaches used in innovation studies discussed in section 2.3 which provide numerical and factual findings about users role in innovation, the new approaches offer a more in-depth analysis of the trajectory of technological change. In this manner scholars suggest going beyond 'local narratives' (Carlsson, 2003; Kallinikos, 2004) that ignore what could occur in longer timeframes (Karasti et al., 2010). In the

same way, Koch (2005, p. 43) whose emphasis on enterprise systems as 'heterogeneous assemblages of human and material elements', suggests the use of better 'spatial metaphors' by moving away from single site studies and instead analysing ERP as a 'community' where technology is experienced by the supplier, customers, and other actors with different organisational settings (Koch, 2005, 2007). Similarly, Sawyer and Southwick (2002) call for a longer temporal lens in analysing complex information systems. Scott and Wagner (2003) also follow by emphasising the need for multiple timeframes in the study of enterprise systems. In what follows, Pollock and Williams' (2008) BoA framework suggests following the trajectory of technological artefacts as they move across multiple locales over longer periods of time. Pollock and Williams (2012) go on to criticise the 'localist' view of technology and instead offer a conceptualised way of accounting for diverse time, space, actors and technological fields.

Although the STS approaches and the BoA framework aim to provide a holistic view of the technology, there are yet some spaces which have not been examined in detail. User communities are amongst the locales of high significance for user innovation (Rohracher, 2006; Stewart & Hyysalo, 2008; Hyysalo, 2010; Pollock & Williams, 2012) which have not been attended deeply by scholars. Although the studies of user innovation, as discussed in the previous section, illustrate important findings from such spaces, STS studies have not had an examination of their processes or their role in shaping of technology.

## 2.5 Conclusion

The recent decades have shown a shift towards a more all-encompassing mode of the shaping of technologies. Research in different disciplines criticises linear models of innovation that begin from inventions in research and development labs, then transform into technical innovations and finally diffuse into the market. In this chapter, I have looked at two diverse but yet concurring strands of studies that emphasise the role of users in the innovation process: user innovation studies and science and technology studies. The two streams are similar in that they focus on the existence of societal inputs, particularly those of technology users in shaping and

reshaping of products. However, they differ in their approach to studying the phenomena and hence the findings diverge in a number of ways.

While the majority of user innovation studies are quantitative, focusing on the motivations of innovators and the output products, the STS literature uses a qualitative lens to describe actors and their actions. Additionally, although a considerable part of the user innovation studies highlight the importance of user communities in innovation, they still tend to black-box the interrelating engagement of actors with one another as well as with the technology, hence they neglect 'the community'. This leads to a somewhat partial understanding of the phenomena and demonstrates, as I wish to argue, a tendency towards showing only 'successful' innovation outcomes. In this way the user innovation literature indicates that (lead) users (with varying motivations - mainly personal) may or may not use a number of innovation tools to produce successful products. So the question remains as to whether all users with such abilities innovate and how far (with respect to distance and time) their innovations travel. More importantly we can problematize user innovation studies in their explanation of innovation communities. In doing so, we observe that the user innovation literature offers detailed explanations of individual innovative acts within a community; However, it falls short of answering the question of how the community (as a whole consisting of actors from different spaces and technology) acts as an innovation actor.

On a separate note, STS studies use more in-depth approaches, such as following the actor or following the biography of technology as they move over space (and time). Some of these approaches throw light on the technological artefacts and their trajectories of evolution. Despite this, although more recently they have highlighted the importance of collective actions of diverse actors in the shaping of technologies, there are yet no detailed studies of user communities nor their role in the lifespan of artefacts.

Hence, in this research I will take an STS approach to delve into the details of user communities in order to open the black-box of community as an assemblage of actors and technology in the user innovation process. Moreover, this study will look at user groups attached to enterprise packaged applications, which, rather surprisingly, given

their acknowledged prominence in the adoption process, have still not been scrutinised either in user innovation or in information system studies. Also, even though the literature on enterprise systems goes back over two decades, it is very raw in showing the role of users in shaping such artefacts. Thus this study attempts to explore a much uncharted space which exists in tandem with technology at different stages of its lifecycle.

In the chapters 4, 5, 6, and 7, these strands of studies will be discussed in more detail to show how each chapter fills a gap or responds to the existing literature in each school of thought.

# 3 Research Methods

## 3.1 Introduction

In this chapter I will present the epistemological position as the foundation for this study and describe the approach and methodologies used to conduct the research project. This study, in alignment with a long established tradition in IS research, has adopted an interpretive epistemology designed to underline the role of language in the construction of knowledge. The study uses a wide longitudinal lens, taking into account several spaces in collecting and analysing the data to avoid a partial understanding of the situation. In accordance with principles suggested by Yin (2009) to safeguard the quality of the research, data collection is carried out in multiple integrated and interconnected stages. The main fieldwork, carried out between May 2010 and April 2013, was built on a pilot study performed from 2004 to 2008. In accordance with the interpretive epistemology, I used a range of observations, interviews, and collections of documents (electronic and paper based), to inform the narrative approach.

In the remaining part of this chapter I will initially give an overview of the research questions with respect to their answers in each of the empirical chapters (section 3.2). This will be followed by a philosophical perspective and an overview of the research strategy (section 3.3), in which I will show how the interpretivist perspective used in this chapter is situated within the broader interpretive IS tradition (section 3.3.1). Then in section 3.4, I will explicate the research design including data collection, presentation and analysis techniques. Subsequently a brief outline of the field of study will be given in section 3.5. Finally in this chapter I will illustrate a personal insight into the research process (section 3.6). More details on the research design will be provided later on, in each of the empirical chapters.

## 3.2 Overview of Research Questions

As discussed in Chapter 1, the aim of this research is to explore the detailed role of the user groups in the technology innovation processes. In this section, I have used a table (Table 3-1) to show how each of the defined questions will be answered by this dissertation.

| Research Questions | Chapters Coverage |
|---|---|
| 1. *How do the technology user groups operate and how are they organised? What are some of the major roles and functions played within these groups?* | Chapter 4 |
| 2. *How might we study the evolution of technology user groups across time? How should we conceive the mutual influences of the community and the technology?* | Chapter 5 |
| 3. *How do online user communities enable support and how can we theorise the cross organisational help that occurs in such settings?* | Chapter 6 |
| 4. *How can we theoretically understand the process and paths of user innovation and how do we conceptualise their outputs?* | Chapter 7 |

**Table 3-1 Mapping of Research Questions**

## 3.3 Research Philosophy and Approach

### *3.3.1. Ontological and Epistemological Views*

Prior to defining the choice of methodology, ontological and epistemological assumptions must be defined (Guba & Lincoln, 1994). Hence in this section I will start by explicating my philosophical position regarding this study. To explain the ontological position, one needs to address this question: 'What is the form and nature of reality and, therefore, what is there that can be known about it?' (Guba & Lincoln, 1994, p. 108). I believe that social reality is locally constructed (Guba & Lincoln, 1994) based on people's definition of it (Neuman, 1997) through their action and interaction (Orlikowski & Baroudi, 1991).

This shows that I recognise the world as bounded to its context rather than as an objective world. Therefore to clarify the epistemological assumption as the guide to the research (Myers, 1997), in consistency with my ontological positioning, I believe that to understand social reality, one needs a comprehension of the way 'practices and meanings are formed and informed by the language and tacit norms shared by humans working towards some shared goal' (Orlikowski & Baroudi, 1991, p. 14). Hence we can say that findings are shaped during the investigation (Guba & Lincoln, 1994, p. 111).

So to position myself in one of the epistemological categories (defined by Orlikowski & Baroudi in 1991, as either positivist, interpretive or critical), I adopt an interpretivist perspective. In this section, I will give a brief overview of these perspectives and underline the appropriateness of the interpretivist position for the qualitative narrative approach underpinning this field of study.

'Positivists generally assume that reality is objectively given and can be described by measurable properties which are independent of the observer (researcher) and his or her instruments' (Myers, 1997, p. 241). To gain an understanding of the phenomenon under investigation, they tend to test hypothesis and measure properties (Myers & Avison, 2002). IS research is thusly classified as positivist if propositions are to be made and variables are measured quantitatively (Orlikowski & Baroudi, 1991).

In the second perspective, critical researchers assume that social reality is historically created and recreated by people (Myers, 1997). They state that people's ability to change social and economic circumstances is restrained by social, cultural and political factors (*ibid*). Critical researchers pay particular attention to conflicts and contradictions in modern society, and intend to remove the causes of alienations (Orlikowski & Baroudi, 1991).

The third perspective, interpretive research, assumes that reality is socially constructed through language, consciousness, shared meanings and artefacts (Myers, 1997; Klein & Myers, 1999). The interpretivist stance takes the ontological position that reality is socially constructed and aims to expand understanding of the phenomena within its context and natural settings as seen by the participants (Orlikowski & Baroudi, 1991). In contrast to the positivist studies which have an 'objective' and 'factual' understanding of the phenomena, interpretive researches search for a relativistic, although shared, understanding of the situation (*ibid*).

Interpretive studies typically try to recognise phenomena through people's assigned meanings (Myers, 1997). So as Walsham (1993) states, this subjective construction of reality can be reached by means of participants' articulations and researchers' sense-making. Thus, through an interpretive epistemology we comprehend the situations as they are articulated by the groups and individuals (Scott, 2000). Finally

it is worth noting that in doing interpretive studies, the research is not seeking to generalise from the findings to a wider population; instead the aim is to gain an in-depth understanding of the phenomenon under investigation in order to inform other settings (Orlikowski & Baroudi, 1991).

Walsham (2005) argues that there is increasing attention given to interpretive research in the IS field than was observed by Orlikowski and Baroudi in early 1990s. In the same vein, he argues that the importance of having an appropriate design for fieldwork in conducting interpretive studies and asserts that the epistemological stance should inform the design of the fieldwork as it influences both the nature of the data collection and the findings obtained (Walsham, 2005). In this respect, in the next section, I will give an overview of qualitative research methods and explain why I have selected ethnography as the main method for doing this research.

### *3.3.2. Research Strategy*

A major critique of traditional interpretive qualitative studies is that they often provide 'local narratives' (Carlsson, 2003) and focus on immediate action (Kallinikos, 2004) that ignores what could occur in longer timeframes (Karasti et al., 2010). This leads to a lack of adequate understanding of the evolution of a technology and how it is shaped as its moves over time and space (Pollock & Williams, 2009). This calls for the careful design of research which requires moving away from before and after 'snapshot' studies, which aim to show success in new technology implementations from a managerial perspective. Similarly, Pollock and Williams, (2009) explain that too much focus on implementation studies which emphasise failures or classify 'critical success factors' offers a restricted or partial view, as the timeframes for the studies may not illustrate the longer term outcomes; additionally too much concentration on a single selected site may result in a partial image of reality. They also add that 'black boxing' the technology and treating the vendor as 'other' can also lead to a partial understanding of the settings. These three mentioned issues call for more nuanced ways of designing research around complex workplace technologies.

Thus, concurring with the views of multi-sited ethnography that offer a better understanding of complex situations (Hine, 2007), and encountering multiple locales

and moments of technological change (Kallinikos, 2004; Pollock & Williams, 2009), I will adapt the BoA framework which suggests following the artefact as it evolves over time and space (Pollock & Williams, 2009). In their BoA framework Pollock and Williams (2009) offer 'strategic ethnography' as a flexible research approach that is applicable to different contexts, through the involvement of multiple spaces, using multiple methods informed by the research questions. Moreover, this framework will enable me to take into consideration extended timeframes through a complex temporal design that includes on-site longitudinal observations, follow-up interviews, document analysis, and historical investigations simultaneously. However, as the aim of this research is to look into details of user groups around technological artefacts, rather than only the artefact, this framework will be adapted to take into account the community and artefact in tandem. This will be discussed in detail in Chapter 5.

## 3.4 Research Design

Qualitative methods are employed by researchers with interpretive agendas. Through the use of qualitative strategies, researchers provoke views and observe the actions of actors involved in the study's context (Kaplan & Maxwell, 2005), thus gaining an in-depth understanding of the social context as seen by its constructors (Myers, 1997; Kaplan & Maxwell, 2005). So instead of quantifying and testing hypothesis, qualitative methods provide a detailed understanding of the research environment (Walsham, 1993) by offering insight into the connections between contexts, contents and processes (Pettigrew, 1990).

The aim of qualitative data analysis is to understand the coherence and order of actions, and to develop an interpretation of 'what is going on here' (Kaplan & Maxwell, 2005). This requires an iterative course of understanding collected data, further data collection and analysis until a sufficiently comprehensible interpretation is achieved (Huberman & Miles, 2002; Patton, 2002). Thus qualitative data analysis tends to have a cyclical nature (Kaplan & Maxwell, 2005).

In order to adhere to the needs of qualitative methods, researchers within the social science tradition have developed a range of methods, such as case study, action research, ethnography and grounded theory as tools for investigating the research

context through the eye of the inhabitant. These methods are used by researchers with different agendas. For instance, action research aims to explore the practical concerns of people in an 'immediate problematic situation' and, at the same time, contributes to the objectives of social science through collaborative actions 'within a mutually acceptable ethical framework' (Rapoport, 1970, p. 499). Instead, the case study research aims to understand phenomena within its real-world context, particularly when there are no clear boundaries between phenomenon and context (Yin, 2009). Although this method can be used by researchers with different epistemological views, it is most widely used by positivist researchers (Myers, 1997). Then again, when an in-depth analysis of the field of study is required, ethnography is used as a common method in which the researcher spends a considerable amount of time immersing his or herself in the field, i.e. the social lives of the people (Lewis, 1985). Ethnography became popular in the IS field in the 1980s after ground-breaking work by Wynn (1979), Suchman (1987) and Zuboff (1988), and has been widely used to explore development and use of information systems in organisations (Hughes et al., 1992; Orlikowski, 1991), as well as management of information technologies (Davies & Nielsen, 1992). Such research methods are generally deployed together with interpretivist philosophies (Walsham, 2005). Finally, grounded theory is another widely used method in the study of information systems, and it differs mainly by its theory building: defined as an inductive methodology which allows for continuous interplay between data collection and analysis which leads to theory building (Myers, 1997).

The existence of multiple research approaches in the field of IS makes it very important purposefully to design a study that is appropriate for achieving the goal of the research. The aim of this thesis is to investigate the underexplored enterprise applications user groups and to show the involvement of users, individually and collectively, in (re)shaping standard enterprise applications. In order to address this goal, qualitative approaches were employed to facilitate a comprehensive understanding of the processes and meanings held by the actors involved in the actions. Adopting a qualitative strategy equips us for capturing the perspective of social actors to develop a deep interpretation of their world (Denzin & Lincoln, 1998; Kaplan & Maxwell, 2005).

Ethnography has been selected to obtain a detailed understanding of an unexplored arena: user communities attached to technological artefacts. The key difference between ethnography and case study is the degree of engagement within the life of the social group under investigation (Myers, 1999). While case study typically uses interviews and documents as key sources of data, ethnography adds to this by collecting data through time spent in the field and observation of details as they occur (Yin, 2009).

Conducting ethnographic research thusly allows a researcher to gain depth understanding and accounting for all the diverse range of players, considering what they do, and listening to what they say. This provides a detailed view of the field and the broader context in which the field belongs (Myers, 1999). This method also allows the fieldworker to develop a close familiarity with the 'dilemmas', 'frustrations', 'routines', 'relationships', and 'risks' of the settings (Grills, 1998).

As Myers (1999) argues, ethnography is the most 'in-depth' or 'intensive' research method available in IS research and thus I will use this method to gain a comprehensive understanding of the unexplored phenomena in packaged technological user groups and their roles (if any) in the growth of their technological contents. In this way I will be able to capture the community, its social constructs as well as its technological contents.

### *3.4.1 Using Strategic Ethnography Approach*

This section gives a justification of the use of ethnography and particularly strategic ethnography approach in this study and how the research was designed within that. Ethnography is understanding the setting 'from the native point of view' (Spradley, 1979; MacDonald, 2001) which addresses a vital issue in qualitative research: people's perspective (Grills, 1998) which is unlikely to be obtained using other research approaches (Liamputtong, 2009). They are used in order to develop in-depth understanding of the context of study and their evolution over time (Marvasti, 2004; Gobo, 2008). Consequently, an ethnographic approach enables this research in exploring of the technology user communities and their evolution.

Further to this, Pollock and Williams (2010, p. 521) introduce the 'Strategic Ethnography' approach which emphasises on 'theoretically-informed, multi-site and longitudinal' ethnographic study when examining complex technological artefacts. This approach which underlines the importance of choice of settings and scope of the study is informed by provisional empirical and theoretical understanding of the locales under investigation (Pollock & Williams, 2010). Thus as the aim of this research is to understand the role of user communities in shaping of enterprise systems, it makes this approach relevant for this study. Another reason for suitability of this approach for my study is that it suggests engagement with multiple sites of innovation and looking at several temporal moments in the process. Hence as this study intends to find and follow user innovations, this approach allows me to explore various spaces as technology is reshaped by its users (and possible other actors) in different actor spaces over time.

This approach has been most beneficial in chapter 7, in which we selected PSHCM customer forum as the main site of study, only after gaining an initial understanding of the functions and practices of various user communities within the UKOUG. This choice was made because I was looking for user innovation, as informed by theory that user innovation occurs in communities. Then after studying this site for a year, I found the need to expand the scope of the study to unconnected user organisations. So data collected from 2004 to 2008 were analysed for user-initiated innovation, and new interviews were carried out with users from these unconnected organisations to be able to follow innovation at various levels.

### *3.4.2 Data Collection*

As described by Denzin (1978, p. 183), ethnography is the 'blending of methodological techniques'. This, combined with a biographical perspective, calls for the engagement of multiple sites studied at different timeframes using various methodologies (Pollock & Williams, 2010). In my research, I address this challenge in a number of ways: these include studying the technology implementation and use within a single organisation as well as investigating its presence as it becomes a point of interest for several user groups at different stages of its lifecycle.

In this thesis, I focus specifically on the role of user communities around Oracle products. This is an attempt to understand the different functions of such groups on technological evolution. The BoA approach suggests deploying multiple studies in different sites around the technology, which guides us to compile data obtained from several settings. The greater part of the data in this thesis is obtained from my access to the UK Oracle User Group (UKOUG) and its various subgroups. This includes special interest groups, customer forums, user conferences, and online mailing lists, which allowed me to obtain unmediated data from various sources and settings. In conducting research in these settings I was able to collect data from actions and interactions of users, vendors and other intermediary companies. I also conducted interviews with different actors ranging from organisational users to Oracle employees. Additionally, being a member of the mailing lists allowed me to keep up to date with events and issues as they arose, which helped to focus observations and interviews on rising matters.

These data sets were further informed by my earlier study of several user organisations in the process of implementing and using Oracle ERP applications. This was necessary as I revisited these organisations for examining user innovations as they grew over time. Table 3-2 provides an overview of data collection methods for all chapters.

| Method | Data Period | Description | Mapping Across Chapters |
|---|---|---|---|
| **Observations** | May 2010 to April 2013 | Observation of user group meetings including special interest groups and customer forums (over 150 hours over a 3 year period) | Chapters 4, 5, and 7 |
| | | Observation of user conferences (5 conferences over a 3 year period - 13 full days) | Chapters 4 and 5 |
| | | Observation of user group management meetings (attended 2 meetings) | Chapter 4 |
| | 2004 to 2008 | Analysis of data collected from observation of events in user organisations (approximately 120 hours of observations) including individual users, inter-organisational meetings and intra-organisational meetings | Chapter 7 |
| **Interviews** | May 2010 to April 2013 | 15 semi-structured interviews (ranging from 30 minutes to 2 hours) with community organisers and vendor employees | Chapters 4, 5, and 7 |
| | | Over 50 informal short interviews (less than 30 minutes) with attendees of meetings (including organisational users, vendor employees, intermediaries and freelance consultants) | Chapters 4, 5, and 6 |
| | | 7 semi-structured interviews with user organisations | Chapter 7 |
| **Access to email discussions** | 2007-2010 (access to archive) 2010-2013 (member of the mailing list) | Full access to over 6 years of archived messages in the Public Sector Human Capital Management Forum (three and half years of archived data and 3 years as a member of the mailing list) | Chapters 4, 6, and 7 |
| | | Member of the UKOUG mailing list since July 2010 | Chapters 4 and 5 |
| **Collection of various other data sources** | May 2010 to April 2013 | Different types of online documents, event programs, presentations and news articles from UKOUG website | All Chapters |
| | | Project documents including minutes of meeting and Oracle methodology documents from 4 user organisations. | Chapter 7 |

**Table 3-2 Overview of Data Collection**

Figure 3-1 presents a schematic view of data collection sites for this study. While chapters 4, 5, and 6 collect data from the UKOUG and interviews with the vendor,

chapter 7 broadens the research and in addition to the UKOUG and the vendor inerview, it reports on data collected from four user organisations (SteelCo, HygB, HygC, and HygD).

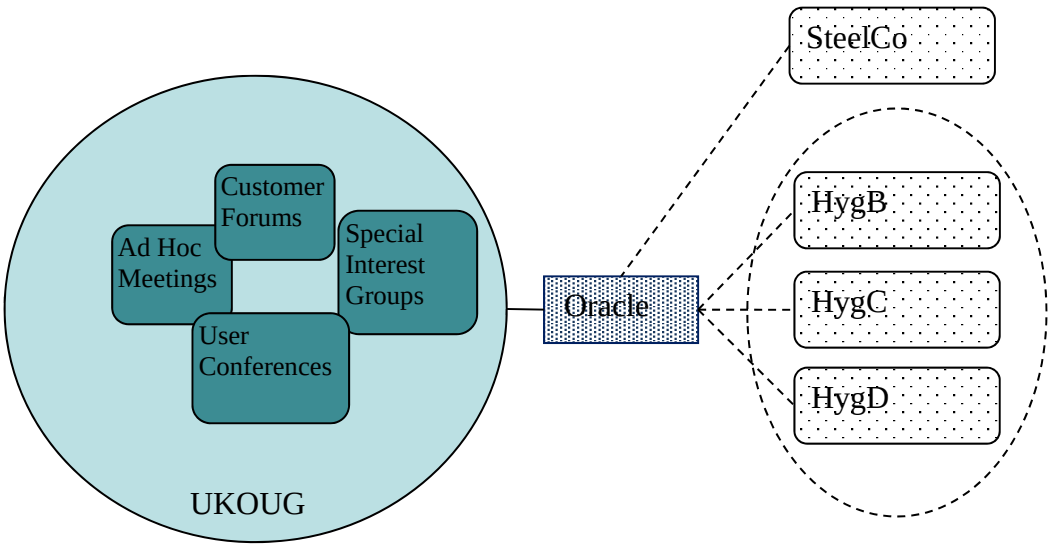


**Figure 3-1 Schematic View of Data Collection Sites**

The strategic ethnography approach concurs with purposive sampling strategies which involve deliberate selection of sites or settings which provide crucial information for the study (Carpenter & Suto, 2008; Padgett, 2008). Hence the sampling in this study was done bearing in mind the need for 'information rich cases' (Patton, 2002, p. 230) to collect in depth data in response to each of the question sets for each chapter.

To achieve this, the data collection started with attending various events as they took place overtime in 2010. At this stage of the data collection my aim was to attend a few events with a particular technology or application focus (e.g. JD Edwards as a different application, Quick Start Master Class for Fusion Development as a technical SIG, and Financials SIG as a functional event) and a few events from each setting (i.e. Special Interest Groups, Customer Forums, and User Conferences). This stage continued in an 'opportunistic sampling' manner in which I allowed the themes to 'unfold as they unfold' (Patton, 2002, p. 240) to obtain in-depth data around the functions and tensions within user groups to be presented in chapter 4. After this

stage data collection took a 'theoretical sampling' rout, combined with other techniques due to complexity of research (Liamputtong, 2009), to contribute to development of various theories (Carpenter & Suto, 2008) in chapter 5, 6, and 7.

In chapter 5, the aim was to study the technology and its user community as they evolved over time. Hence this chapter was informed and contributed to the 'Biography of Artefact' (Pollock and Williams, 2008) framework. To achieve this, from the sites studied for chapter 4, six settings were selected to be studies further over time (details give in Table 3-3). The reasons for the selection of these sites were primarily to have an understanding of the evolution in both public sector and private sector user communities (e.g. PSHCM Versus Financial SIG), secondly to study both very active and less active settings (e.g. Financial SIG versus JD Edwards SIG), thirdly to scrutinise communities at different stages of their lifecycle (e.g. SPSUG as a newly formed community versus other long existing SIGs), and finally to gain in-depth data about various types of settings (e.g. SIGs, Customer Forums, and User Conferences).

| Event Name | Date | Location | Event Duration | Mode of Data Collection |
|---|---|---|---|---|
| Financials SIG | October 2010 | London | 9:00 – 17:00 | Observation and Short Interview |
| Financials SIG | February 2011 | London | 9:15 – 16:30 | Observation and Short Interview |
| Financials SIG | May 2011 | London | 9:15 – 16:30 | Document Search and Short Interview |
| Financials SIG | September 2011 | London | 9:15 – 16:30 | Observation and Short Interview |
| Financials SIG | March 2012 | London | 9:30 – 17:00 | Document Search |
| Financials SIG | May 2012 | Manchester | 9:15 – 17:00 | Document Search and Short Interview |
| Financials SIG | September 2012 | London | 9:00 – 16:00 | Document Search and Short Interview |
| Quick Start Master class for Fusion Development with JDeveloper and Oracle ADF | October 2010 | Edinburgh | 9:30 – 16:00 | Observation and Short Interview |
| SPSUG Customer Forum | March 2011 | Linlithgow | 9:30 – 16:00 | Observation, Short Interview, and Document Search |
| PSHCM Customer Forum | September 2010 | Birmingham | 9:30 – 16:30 | Observation, Short Interview, and Document Search |
| PSHCM Customer Forum | February 2011 | Solihull | 9:30 – 16:30 | Observation, Short Interview, and Document Search |

| | | | | |
|---|---|---|---|---|
| PSHCM Customer Forum | May 2011 | Solihull | 9:00 – 15:30 | Interview and Document Search |
| PSHCM Customer Forum | September 2011 | Solihull | 9:00 – 15:30 | Interview, and Document Search |
| PSHCM Customer Forum | February 2012 | Solihull | 9:00 – 15:30 | Observation, Short Interview, and Document Search |
| PSHCM Customer Forum | May 2012 | Solihull | 9:00 – 17:00 | Interview, and Document Search |
| PSHCM Customer Forum | September 2012 | Solihull | 9:00 – 17:00 | Observation, Short Interview, and Document Search |
| PSHCM Customer Forum | February 2013 | Solihull | 9:00 -15:30 | Interview, and Document Search |
| JD Edwards SIG | July, 2010 | London | 9:15 – 15:00 | Observation and Short Interview |
| JD Edwards SIG | March 2011 | Solihull | 9:30 – 15:00 | Document Search and Short Interview |
| JD Edwards SIG | June 2011 | London | 9:30 – 16:00 | Observation and Short Interview |
| JD Edwards SIG | March 2012 | Solihull | 9:30 – 16:30 | Document Search and Short Interview |
| UKOUG Conference Series Technology and E-Business Suite 2009 | December 2009 | Birmingham | 3 Full days 9:00 – 18:00 | Observation, Short Interview, and Document Search |
| UKOUG Conference Series Technology and E-Business Suite 2010 | December 2010 | Birmingham | 3 Full days 9:00 – 18:00 | Observation, Short Interview, and Document Search |
| UKOUG Conference Series Technology and E-Business Suite 2011 | December 2011 | Birmingham | 3 Full days 9:00 – 18:00 | Observation, Short Interview, and Document Search |
| UKOUG Conference Series Technology and E-Business Suite 2012 | December 2012 | Birmingham | 3 Full days 9:00 – 18:00 | Observation, Short Interview, and Document Search |

**Table 3-3 Data Sources for Chapter 5**

For the purpose of data collection in chapter 6, data was collected in multiple levels from the PSHCM customer forum mailing list (PSHCM-LS). The choice of PSHCM-LS forum as the study case was made due to this group being a self-established, self-organised community. This allowed investigation of a voluntary online community whose functions and interactions were independent from vendors or other third party organisations. To obtain an in-depth understanding of its actions and possible changes over the years of its formation, a historical study of communications in PSHCM-LS was carried out. This study looked into the forum threads from January 2007 to December 2012. Over this period, the forum had received more than 1700 threads ranging from single message threads to threads with up to 26 follow-up

messages. The data collection was done in three levels: 1) macro level collection of thread subjects over the period of six years to obtain an overall image of the forum and find out the main modes and themes of the conversations; 2) micro level data collection of detailed message exchanges for a duration of six months (between January 2011 and June 2011 – the choice of time was based on 'typical case sampling' as the macro level analysis showed that this duration is not 'atypical, extreme, deviant, or intensely unusual (Patton, 2002, p. 236) and our aim was to investigate the typical actions of an online community. This duration was also convenient as I also had collected data on the same duration from the face-to-face meetings of the PSHCM community. This enabled me to correlate between the findings of the online setting and face-to-face actions, where necessary; 3) Follow-up interviews with nine participants in the exchanges to explore the processes involved in use of data after the online exchange. Selection of participants for the interviews also was done as a purposive sampling in which users who had received one or several responses to their questions were approached. However amongst those individuals who had received answers, the selection was done based on 'convenience sampling' strategies as I collected data from participants who were 'available' in the meetings and were 'willing' to participate in the interviews (Hesse-Biber & Leavy, 2005).

The primary aim of Chapter 7 was to find and follow innovation, hence a more complicated data collection strategy. To achieve this, data for this chapter was obtained through three main methods from four sources. Table 3-4 shows sources and methods of data collection for this chapter. For the purpose of clarity I have divided the sources into four groups based on the type of interaction between the users and technology: 1) individual application users; 2) inter-organisational groups; 3) intra-organisational groups; and 4) user groups. The individual application users are those working in an organisation, with the system or around different dynamics of the systems. They range from senior organisational managers, who take decisions about different aspects of the system and its implementation, to end-users who perform their daily activities using the system or even an output of the system. The second source of data, inter-organisational groups, are the permanent or temporary groups formed around an aspect of the application within a company, and make

decisions as a result of a collective action within the organisation. An example is the 'Inventory Coding Group', which consists of members from the inventory department, the finance department and the manufacturing department who decide on the attributes of every new item (from raw material to finished products) in a firm. Meetings are held by these groups to take decisions about the technology and work processes in implementation and use phases. The third source of data, intra-organisational groups, are the ad-hoc meetings taking place between different organisations that have implemented or are in the process of implanting the same technology. These meetings are held on an occasional basis as two (or more parties) sense the need for intra-organisational discussion or collaboration. Finally the fourth source of data, the user groups, are formally existing communities of user organisations who meet at planned intervals and have an officially existing identity. These user communities are independently managed groups, who perform a wider range of functions and collective action is the basis of their existence.

| **Data Source Category** | 1: Individual Application User | 2: Inter-Org Groups | 3: Intra-Org Meetings | 4: UKOUG Community |
|---|---|---|---|---|
| **Method 1: Observation** | 2 Projects, 8 users<br>64 Hours | 4 Projects<br>47 hours | 4 meetings<br>8 hours | 42 Hours |
| **Method 2: Interviews** | Short (approx. 30 minute) interview, 16 hours | 7 in-depth interviews, 90 Minutes each | none | Interviews:<br>10 interviews,<br>Range from 30 minutes to 2 hours; |
| **Method 3: Document Analysis** | user notes | Minutes of meeting, user notes | none | online mailing list, on-line user group library |

**Table 3-4 Summary of Data Collection Methods for Chapter 7**

Three main data collection methods were used to gather data from these four sources of data. Participant observation was the primary mode of data collection. The observations were carried out on all four sources of data. In the case of individual application users and inter-organisational groups, various actions of users (from two organisations – SteelCo and HygB) and their internal groups and meetings (from four

organisations – SteelCo, HygB, HygC, and HygD) were observed for a period of three years. Also four intra-organisational meetings between HygB, HygC and HygD were observed. Finally, in the case of user communities, observations of activities of a user group and one of its sub-groups were carried out for a period of three years.

The second method of data collection was interviews. These were carried out mainly with the users as members of user community as well as seven in-depth interviews with the inter-organisational user groups. Informants of the interviews were also selected strategically based on their participation in the innovation processes. Additionally 16 hours of informal interactions with individual users were carried out on an unscheduled basis. The selection of interviewees and informal interactions was informed by the data collected and analysed from the observations with the aim of following the complete path of innovation (or anything that had happened in the process).

Finally a third data collection method was gathering the related documents (on-line and off-line) from all four settings. This included user notes and minutes of meetings from the first two data sources and e-mails from the community's mailing list.

### *3.4.3 Data Analysis*

Two main approaches have been used in this thesis for analysing and representing the data: primarily grounded theory coding (particularly in chapters 4, 5, and 6 in which the unit of analysis is the user community) and secondly narrative analysis (particularly in chapter 7 in which the unit of analysis is the user-initiated innovation).

#### 3.4.3.1 Analysis using Grounded Theory Coding

As described in section 3.4.1 ethnography as the main data collection method results in a complex and large quantity of data to be analysed. For the main part of this thesis the great amount of data is analysed using grounded theory coding as a data analysis method. Grounded theory in this respect study is used as a coding method to take the messy ethnographic data to a higher level of granularity.

In grounded theory, one begins with content analysis which is reading the collected data and categorising them into concepts as unfolded by data rather than theories

(Orlikowski, 1993). This process known as ‘open coding’ (Glaser & Strauss, 1967), with a similar version of it being called ‘initial coding’ by Charmaz (2006), is followed by a second process which identifies recurring sub-categories and categories to turn codes into themes.

In this study, initially grounded theory was used, to categorise the data obtained from observation of various user community events into detailed groups of ‘acts by actors’. This process was followed by categorising the codes based on the meanings of the acts, because as Miles and Huberman (1994, p. 56) state ‘it is not the words themselves but their *meaning* that matters’. In conjunction with the coding process, I noted analytic memos to facilitate development of theoretical ideas around the identified codes (Urquhart, 2001; Charmaz, 2006; Glaser, 1992; Strauss & Corbin, 1990). At this stage instead of word-by-word or sentence-by-sentence coding, I identified codes after obtaining more complete ideas or concepts within each event. In other words, I analysed the transcripts on a case-by-case basis to be fully immersed into the context and contents while examining the data. This involved breaking each event into sub-events to be analysed in details to produce the codes. Table 3-5 is an example of coding of one session. Subsequent to the completion of the initial coding, I moved up to the next stage by building the sub-categories and categories which were represented as typologies of functions and tensions in chapter 4 and as evolution of different communities in chapter 5. This needed putting back together the fragmented codes by finding variations in patterns (Glaser, 1978), and comparing and finding relation (Urquhart, 2012). I continued collecting data and analysing simultaneously until data saturation was reached. It is worth mentioning that the found themes were reported back to the community by myself as a voluntary member of the group (which shows my engagement in the community as a participant ethnographer, rather than a researcher in a case study) in various ways (through publication in their magazine, OracleScene, presentation in a conference, and presentation in a customer forum) and refined several times based on written and verbal feedback from the community members followed by detailed (agreeing or opposing) discussions with.

| **Overview:**<br>OUG Scotland – 6 October 2011<br>Talk 3: jQuery<br>45 minutes presentation, 15 minutes Q&A<br>Presentation by a third party organisation<br>Approximately 20 attendees, mostly from user organisations but also from Oracle as well as freelancers | |
|---|---|
| **'Quotes' or [Observations]** | **Analysis Codes** |
| 'My name is … and I have 14 years of experience with Oracle Technology' | Self-Induction<br>Affiliation with technology |
| 'How can we integrate jQuery with Apex' | Session Opening<br>What is it about |
| [An explanation of jQuery:]<br>- 'A layer on top of Java Script'<br>- 'Install it in your application' | Session Opening<br>Technical placement |
| 'Why would we want to use jQuery:'<br>- 'Very easy to use' | Staging the Ease |
| Show some samples of the code:<br>'<!—Document Ready? →<br><script type = "text /java script"><br>$ (document).ready(function())<br>//do some query!<br>)); </script>'<br>[Begins with simple codes and explains his code] | Technical Details<br>Technical Progression |
| [Adds new code and explains line by line and runs the code] | Technical Details<br>Technical Progression |
| [Explaining detail on what each part does. This explanation is detailed enough for a technical person having basic knowledge of Java] | Technical Detail<br>Instructing |
| [He keeps on emphasising the ease] | Staging the Ease |
| [He further shows sample codes available on the website and how they can be used with details] | Technical Details<br>Technical Progression |
| [Again explaining the ease and flexibility] | Staging the Ease |
| [To emphasise ease, he used jQuery for his presentation instead of Power Point and shows how] | Staging the Ease<br>Staging the Applications |
| [Throughout the session detailed questions asked by participants]<br>'what if our parameters are coming from an external database' | Needs Proposed<br>Technical Details |

**Table 3-5 Initial Coding of OUG Scotland Event – Talk 3**

In the case of chapter 6, again grounded theory coding and categorisation was used with two main differences. The first difference was the more rigid strategy of coding message-by-message, and the second being the dual purposes of the analysis which were: 1) to identify themes of discussion; and 2) to examine the exchange process. Two achieve the first aim, contents of each message were analysed in terms of technical meanings to form the primary codes and then categorised into four themes based on being about the product or process and also the innovativeness of the exchange. Table is an illustration of examples of these codes and categories. To achieve the second aim, the content of each message was analysed with respect to the

exchange of information (as can be seen in Figure 3-2) and then turned into sub-categories. These categories were then grouped into three practices (informed by Clark and Pinch theory on 'street markets'): 1) Building an audience and demonstrating the case; 2) Obtaining collective responses; and 3) local selection and reconstruction of solutions.

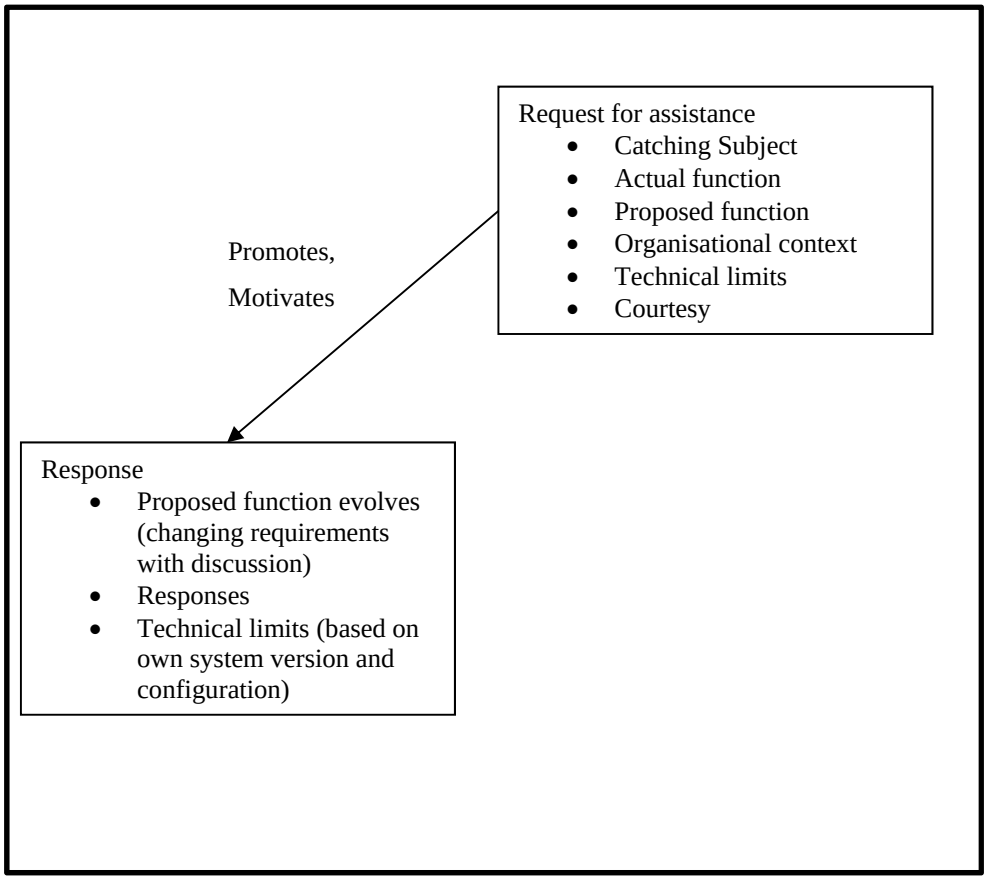


**Figure 3-2 'Case 6 - Retropay by Element' Thread Analysis**

| Codes | Categories |
|---|---|
| - Need for available standard functionality to perform tasks | Sharing Knowledge about Standard System Functionality |
| - Need for experience in implementing new modules<br>- Need for experience in implementing new features | |
| - Seeking Advice about performing actions | |
| - Need to know where to find certain information | |
| - Need to know how to fill in certain information | |
| - Seeking advice on running processes<br>- Seeking advice on running standard functionality | |
| - Need for custom developments<br>- Need for workaround to perform tasks | Sharing Knowledge user generated solutions |
| - Need for experience in implementing new modules<br>- Need for experience in implementing new features | |

| | |
|---|---|
| - Seeking Advice about performing actions<br>- Need for advice on designing processes | |
| - Request to gain insight into the benefits and drawbacks in implementing, using and maintaining features<br>- Need for advice about pit falls in the process<br>- Seeking guidance on pros and cons of adopting a specific case amongst a number of available | Sharing Knowledge about Processes |
| - Seeking review on current processes adopted by organisation | |
| - Finding out about commonalities and differences | |
| - Need for advice in scoping the requirements | |
| - Request ideas on possible critical issues and experiences in upgrading<br>- Request for 'Do's and Don't' | |
| - Request for project Issue log | |
| - Seeking advice on the stance taken in response to vendor | |
| - Seeking experience is facing error<br>- Seeking experience is | Sharing Knowledge about Errors |
| - Updates on Service Requests<br>- Announcement of issue | |
| - Does any change in the process or a setting lead to any issues | |
| -What is the stance taken about a particular problem | |
| - Updates on available bug solutions | |
| - Finding out whether this is a bug or a standard functionality | |
| - Offering error solution | |

**Table 3-6 Sample of PSHCM-LS Codes and Categories - Aim 1**

#### 3.4.3.2 Narrative Analysis

Narrative analysis approach has been identified as a powerful tool in the study of organisation and technology (Bartis & Mitev, 2008). This approach enables the researcher to gain in-depth insight into the stories of the field as they provide a tool that explains the multiple views that exist around software artefacts (Bartis & Mitev, 2008; Alvarez & Urla, 2002).

Narrative analysis involves analysing and retelling stories of study participants in a sensible framework for the reader (Cresswell, 2007; Gibbs, 2007). This process entails examining the stories obtained from the data for some key elements such as time, place or plot (Liamputtong, 2009). Narrative analysis turns ‘non-chronological’ data (Gibbs, 2007) into a consecutive arrangement (Ollerenshaw & Creswell, 2002).

In chapter 7 of this study, which aims to capture the multiplicity of views of different actors in technology innovation, narrative analysis approach was used to tell several stories of user-initiated innovations by giving voice to conflicts (as described by Liamputtong, 2009). The narrative approach facilitates making sense of the connections of perspectives from different actors involved in the processes and allows the construction of multiple interpretations of reality (Brown, 1998). This

offers a subjective rather than objective understanding of reality within the field. In this manner, the narrative approach can be seen as a rhetorical device through which meaning is created (Bruner, 1990). It also shows continuity of innovation over time by various actors and its movement within and across spaces. This is what Clandinin and Connely (2000) refer to as a three-dimensional narrative enquiry. The stories can then be analysed by forming themes and identifying the connection between them (Gibbs, 2007).

In practical sense this was a complicated task as the first aim of this chapter was to find innovation and the second was to trace it and present a full story of its growth (and obsolescence or even death). Hence several steps similar to those suggested by Gibbs (2007) were taken to enable this analysis process: 1) Getting familiarised with the context and contents of the community by reading the transcripts several times. In this process I first looked for an answer to 'where is innovation?'. Subsequent to its emergence (primarily as a vague process rather than a clear output), I went into the depth of the related 'events', 'accounts and explanations' and 'narrates of the actors' about the innovation; 2) Writing short summaries of the key elements from beginning to end; 3) (After finding user-initiated innovation in the community) moving back to data collected during 2004 and 2008 and performing steps one and two for this new set of data; 4) Writing thematical ideas and structural points (such as intensive idea development versus graveyards – see Table 3-7); 5) Coding thematic ideas based on levels of innovation transfer across settings; 6) Comparison of different cases (i.e. innovation in the unconnected user organisations to innovation in user communities) to identify similar and diverse transitions and outcomes in the process; 7) Discussing the findings in light of theory to further develop theory.

Step 3 (analysing data collected from 2004 to 2008) was informed by the strategic ethnography approach. By this time I could see community initiated or developed innovations, however what was missing from this picture was what had happened prior to these collective acts of innovation in individual organisations, and what would be outcome if such communities did not existed. Hence I analysed the data collected earlier from unconnected user organisations to offer a more comprehensive picture of user and community innovation.

| Example | Narrative | Thematical ideas/ structural points |
|---|---|---|
| **Sub-inventory allocation** | The immensity of the inventory in SteelCo and the large number of store keepers, led to the need for the sub-inventory transactions to be allocated to particular individuals. This had effects both on the Inventory and Manufacturing Modules. Hence the power users of the manufacturing department and inventory departments held numerous meetings which led to customisation of all forms with sub-inventory field (soft customisation). This solution also involved the creation of a new form and table that capture the information on which store keepers (based on their employee record) can issue items from which sub-inventory (hard customisation). The sub-inventory transfer form and move order forms were customised to take these allocations into account. | - Collaborative design of new functionality<br>- Internal development<br>- No expansion beyond user organisation<br>- Hard customisation |
| **Letter of Credit and Bank Guarantee** | There was a need for capturing LC information for the imports and exports of good which was not supported by the application. This led to a customised form developed to enter the LC information by Purchasing department. The LC Number was to be entered in the Descriptive flexfields of Purchase Order Form. The LC details were to be captured in the customised form at the time of supplier payments. A customised report was also designed to provide the list of LC's released or expired and the details of outstanding LC details. Although the development was carried out and used by purchasing department for several month it was not welcomed by the Finance department as they stated it does not meet all their requirements. | - Design by a single department<br>- Internal development<br>- No expansion or use beyond the user department<br>- Hard customisation<br>- Obsolete after a year<br>- Graveyard? |

**Table 3-7 Example of Narratives**

## 3.5 A Historical Overview of the User Group

As the primary focus of this research is to explain the role of user groups in the evolution of technology, in this section I intend to draw a brief historical overview of the main field of study: the UKOUG. While this overview aims to set the initial scene for the study, further elaborations upon the field as well as descriptions of user organisation sites will be provided in the empirical chapters.

'The UK Oracle User Group is one of the largest and most active independent user groups around Oracle products' (Interview, Vendor). Oracle is one of the two largest suppliers of packaged enterprise-wide systems in the world. It started to release software packages in the early 1980s with Oracle Financial Package being its first widely used software application. During that time, users from various organisations met informally to discuss issues surrounding Oracle products. Then in 1984, as

Oracle products were more widely used by UK organisations, Oracle formed a user group to create a unique point of interaction with its wider user base, known as the UKOUG, in an attempt to coordinate the activities of widespread informal user groups. Then in 1988 as Oracle released its first enterprise-wide integrated application, called the Oracle Accounting System, the user group adopted a membership model and became an independent non-for-profit organisation run and organised by user volunteers. By the early 1990s the vendor released the Oracle E-Business Suite (EBS) ERP application, which engendered a considerable growth of the UKOUG. The user group which once consisted of a small number of SIGs concerned with the technical aspects of Oracle, expanded to more than 20 SIGs concerned with technical and functional issues. Oracle continued production of new versions of the EBS, and by the year 2000, EBS 11i was released, which is currently the most widely used Oracle ERP application. Then by the mid 2010s the new line of Oracle ERP application, The Fusion, was released. This was after the UKOUG had faced a drop in member numbers (in late 2000s), and had undergone a restructuring of its organisation.

The UKOUG organises its events in various forms. The most common forms are SIGs which are shaped and function around a particular Oracle product. Participation in these SIGs is voluntary and is open to all members of the UKOUG. These SIGs are generally product specific, focusing on their functionality, e.g. Financial SIG and SCM SIG; there are also SIGs which focus on technical aspects such as the Development SIG; and a number of location-based SIGs around some of the products (e.g. Ireland Human Capital Management SIG). ‘Customer forums’ are another type of setting for user community meetings. These forums are closed groups and attendance in the forums takes place by invitation only, e.g. Public Sector Human Capital Management (PSHCM) customer forum. In the case of customer forums, interested users need to contact the forum committee to be ‘approved’ before joining the group.

Apart from these events which run on a regular basis, the UKOUG organises a number of special events over the years which focus on a particular topic of interest. These sessions are also open to all members of the UKOUG (e.g. Security Special

Event). In addition to these, the vendor also organises some ad hoc events throughout the year which are presented by Oracle in collaboration with other user organisations. These events are on special topics such as the Oracle Business Analytics Summit. User organised ‘conferences’ are yet another type of setting organised and run by the UKOUG with particular aims. Finally the community maintains a number of on-line mailing lists in particular areas. PSHCM list-server and archive are examples of the on-line settings in use by the group members.

The organising structure of the UKOUG has recently undergone changes (in 2011). The group is managed through having three pillars for its business model: governance, influence and commercial. To support these three pillars, the management of the UKOUG is conducted by three bodies: 1) council; 2) board of directors, also known as ‘the board’; and 3) Executive. The main responsibility of the council is to recognise and balance the needs of every sub-community. The council represents the members of the community and is in charge of influencing and communicating with Oracle. The objectives of the council are to make available a multi-directional communication and influence channel between Oracle and the group or as it is called by the UKOUG, the ‘Oracle world’. The council is also responsible for fulfilling the needs of existing members and attracting new ones. Moreover it encourages the sharing of knowledge and experience by its members. As a result the council identifies the needs of the members and feeds these into the products and services offered by the community. There are 16 council members who work on a voluntary basis (restricted to one per company) and are elected by members for three year terms. Each sub-community within the UKOUG is expected to have a representative in the council, and the elected members then have the authority to co-opt additional members. Each council member should commit one day per month to UKOUG business and be able to attend meetings four times a year. The Council is led by a President and a Vice President who are elected by the council members: the President is accountable for the external relationships of the group and will be known as the leading person of the UKOUG by the members and Oracle; the Vice-President takes on internal roles, focusing on interrelations and chairing the council.

The second body, the board, is the ultimate authority for UKOUG matters. It is the legal entity with accountability for the governance of the company, and is responsible for securing a sustainable organisation through sound strategic planning. Its main objective is to drive the community forward. The composition of the board is confirmed by the council and is made up of 3 council and 3 executive members. In turn the board is led by a chairman chosen by its members.

Finally the Executive body is responsible for ensuring the effectiveness of the UKOUG business including planning, budgeting and delivery. Its main objective is to ensure that structures, processes and values are put in place to drive UKOUG forward are effective. The executive directors are appointed by the council from a list of candidates prepared by a nominations panel. All the 3 Executive directors are on the board, and should be prepared to commit one day per week to UKOUG business. Figure 3-3 shows an overview of the UKOUG governance structure.

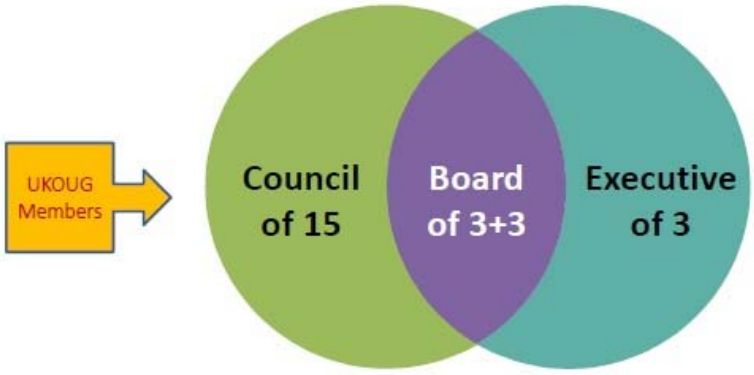


**Figure 3-3 UKOUG Governance, 5th July 2011, Adapted from The UKOUG Website**

## 3.6 Conducting a Multi Spatial – Multi Temporal Study

While previous sections provided an overview of the empirical data sources (which will be elaborated upon in more detail in each empirical chapter), this section will provide a personal insight into the research process (Van Maanen,1988) including how I as the researcher interacted with the object of the study (Klein & Myers, 1999). The research questions, the complexity of the artefacts and the social aspects involved in encountering the artefact required a radical model of how the study should be undertaken, as well as detailed attention. These were: following the actors' actions as well as technological evolution in discrete and connected settings;

following user involvement in technological evolution; observing the consequence of time on user-generated outcomes; taking account of the changing of user group natures; and many more multifaceted issues, all required a detailed attention in my study. In what follows I will explain the journey taken during the research and the choices I made in conducting this study.

Prior to starting this thesis I conducted a pilot study looking at implementation and use of an ERP system in a large organisation. The aim of this study was to find out how a standard application is configured in a non-standard organisation. I began my observations a month after the implementation stage of the project started, taking note of the daily activities and discussions in the project when user-generated solutions started to emerge. In following the implementation and use of the ERP systems in this organisation, I developed an understanding of the collaborative work required between the implementation consultants and the users (I will refer to their joint nature as the implementation team) to generate solutions. In particular, when a solution went beyond merely setting up and configuring the features of the system, the implementation team entered into detailed conversations. Similar observations were also carried out on another organisation with a different business model. In the first case the observations continued over one year after the system went live, whereas in the second case, the first round of observations ended just before the go-live.

The preliminary finding showed a variation of modifications to the standard system, ranging from adding fields to forms, to the development of extended modules. At the same time I conducted two sets of interviews with two other firms and found out that although many similar needs exist between these organisations, each and every one of them did their own development of a solution, hence a reinvention of the wheel. I realised that my findings from the implementation and use phases tell the story of user-initiated solutions which do not go beyond their organisations. This led me into sensing the need to examine other types of settings and as my findings showed replication of solution generations in every firm, I was particularly interested in settings where user organisations are somehow connected and encounter technology together. Simultaneously I started conducting a literature review on user-led

innovation and the users' role in the shaping of technology. Consequently, for the purpose of this thesis, I started looking for spaces (if any) where user organisations are connected. In late 2009, I decided to look into the ERP user groups. However, this introduced a new hurdle: gaining access to user groups. As the studies of such communities are very limited, I was not even sure whether I would find what I was looking for in examining a user group. Bearing this in mind, I understood that I might have to modify my research focus, so I started seeking access to a user group, preferably around the same technology. As Walsham (2006) outlines, gaining access does not occur at a single point of time, rather it is a continuous process needing to be maintained over at least the period of study. After two unsuccessful attempts, in February 2010, I was introduced to a person who once had been in touch with a public sector group of users around the particular technology. Following a chain of contacts, initiating from this person, I was connected to a senior manager of the largest Oracle user group in the UK who welcomed me by saying: 'I think we would be delighted to help… It is a great story… In return, we would wish a copy of your thesis plus the ability to refer to it (with appropriate credit)... This would be of great use to all User Groups…'. So as I was granted access to this large user group, I encountered a new focal point to explore: what is an ERP user group and what does it do?

In April 2010, I had my first meeting with another senior organiser of the user group who asked me about my research and my knowledge of the underlying technology. Consequently I was given a complimentary 'Gold Corporate membership' which meant that I could attend different sub-group events for a period of one year. Hence I started attending both technical and Functional sub-groups, with at least three cases from various types (which will be explained in the next section). For some types of meetings, special arrangements were needed (not all meetings were open for attendance by all members). I was also granted access to the mailing list of some sub-groups, which provided another rich source of data. My membership has been freely renewed twice (in 2011 and 2012) and in return, I reported back my findings to the user group through different formats, e.g. Oracle Scene Magazine, presentations in conferences, and reports to organising committees.

While I had extensive access to various user group events, I required specific access to certain settings which were not open to members. For instance observing the internal committee meetings or on a more distinctive spaces, the User Experience Feedback Sessions. Gaining access to these new locales was invaluable to my research, and permission to observe these new sites was tightly related to trust and recognition of the importance of my research. In some of these cases, not only the user group committees, but also the vendor organisations had to give permission. This made it very challenging, however, with the support of the user group, the vendor also agreed to allow observation of some of its events and participate in interviews.

In this manner the UKOUG was observed for a period of three years, the discussions in the mailing list were analysed and online documents from the members' library were accessible. During these years, as one of the observed functions of the user community was design and diffusion of user-initiated solutions (as will be seen in Chapter 4), I also got back my initial focus, so by the end of the research two types of data were collected: 1) a detailed analysis of user groups and 2) user innovation, from individual user firms to the evolution and diffusion of collective solutions.

As for the second focus (user innovation), to gain a better understanding of the user-initiated innovations in the unconnected user firms I had to go back to the initial organisations and collect more data. Thus in mid-2010 and mid-2012, I conducted a new set of interviews with the two firms to find out what had happened to their earlier generated solutions.

Data analysis is a lengthy and challenging process which requires making sense of the large amount of data collected and then relating them back to the existing theories. As a former implementation consultant of the vendor's application, I had a good knowledge of the 'language' spoken by the actors in different spaces. I could understand the 'technical' terms and I was familiar with the 'functionalities' of the application. I also had a good knowledge of the 'slogans' and specific 'terms' used by those involved in the community. This enabled me to quickly grasp the discussion and actions in progress. Without this understanding, I would have missed out on the details of what was a user invented solution compared to a standard configuration.

My knowledge as an engineer with experience of system design and development, as well as my skills and expertise in the field of ERP systems[3] made it possible to examine the contents of the technology as it was (re)shaped by the actors involved in the study. If it was not for this detailed knowledge of such a complex technology, I would have only been able to produce another black-boxed view of the technology.

Analysing the large amount of data collected for this research was also a challenging process that involved continuous evaluation of the findings, collecting further data and re-evaluating the results. As there were several aspects to the findings of this research, the results and their respective data and analysis are presented in four separate but related empirical chapters, which are then combined into a concluding chapter.

[3] I, as the researcher, have been trained as a Software Engineer. I have two years of software design and development experience followed by five years of Oracle ERP implementation experience.

# 4 An Integration of Heterogeneous Spaces: A Multi-Spatial Study of User Groups

*'User Innovation Communities Shouldn't Exist, But They Do.' (von Hippel, 2001)*

## 4.1 Introduction

There has been considerable interest in the study of user communities. Scholars have shown that some of the best ideas for product innovation have come from those who use the technology, particularly those who have come together to organise themselves in communities (Finch, 1999; von Hippel, 1986, 2005). Communities provide the means for users (and vendors) to openly and freely communicate with one another (Franke & Shah, 2003; Schulz & Wagner, 2008). A wide range of conceptualisations have been offered to explain such user groups, for instance 'communities of knowing' (Boland & Tenkasi, 1995), 'communities of practice' (Wenger, 1999; 2000), 'community of practitioners' (Gherardi, 2009), 'networks of practice' (Brown & Duguid, 1991), 'consumption communities' (Boorstin, 1973), or 'virtual communities' (Amin & Robert, 2008). What is clear from this diversity is, communities come in different spatial forms (Amin & Roberts, 2008).

Looking more specifically at software user group studies, the list becomes more limited. Studies of software user communities discuss user groups around different informational goods, such as open source software (for instance studies of Lakhani & von Hippel, 2003; Lee & Cole, 2003; Dahlander & Magnusson, 2005), music instruments and video games (Jeppensen & Frederiksen, 2006; West & Gallagher, 2006; Aoyama & Izushi, 2008), and packaged applications (Holmstrom, 2004). In the majority of cases, the communities under investigation have been 'virtual groups' in which online forms of interaction are the predominant nature of communication in the community. There are limited studies of software user groups that go beyond 'online' groups and where the members of communities have 'physical' co-presence. In a rare study of software user groups, Akera (2001) offers a historical narrative of how different IBM product users intentionally joined into the collaborative 'Share' community to develop programs of common interest. Unlike mainstream user

community studies which focus on a single moment, Akera (2001) goes into details of the points of 'excitement' as well as 'tension' as they developed over time. He also notes the shaping of a 'bureaucracy and rationalised organisational structure' (p. 721) after a few years of the community's operation. This historical study of Share revealed unexplored angles into the nature of user groups as they evolve over the years.

Examining much of this literature reveals how the studies of such 'user communities' or 'user groups' focus on the aspects of knowledge formation and the underlying social interactions, relations and motivations of participant actions. Although insightful, such studies do not give a clear account of the association of the community and its technological contents. These ways of conceptualisation either provide a rich image of practices in knowledge formations (e.g. studies by Boland & Tenkasi, 1995; Gherardi, 2006; Amin & Robert, 2008) or offer quantitative results on the outcomes of the community work (e.g. studies by Lakhani & von Hippel, 2003; von Hippel, 2005). While the first group of studies leads to a loss of focus on the original object of the community formation, the software artefact, the second strand only accounts for final innovation without going into depth for the other possible activities around the information systems in such communities. This inadequacy is more concerning when one is examining user communities around complex enterprise-wide systems in which actors have organisational affiliations and technology has multi-dimensional aspects. Black-boxing the technological artefacts of a community have led to a number of limitations in understanding the information systems user group:

- First of all, these studies do not discuss the community in fine grain detail. They mainly overlook the internal dynamics of a community and its diversity. Instead for the most part they either talk about the actors' relations and interactions, their motivations, and the final outcomes – generally innovation – without paying attention to other operations and their consequences. This leaves the communities as a black box yet to be scrutinised.

- Secondly, as a result of the previous point, the studies fail to notice the differences between the communities. Hence communities appear to be treated

the same in the majority of the IS studies. However, the homogenisation of communities is unhelpful (Amin & Roberts, 2008) for it not only suppresses insights into their variety but also blunts how these heterogeneities are managed.

- Thirdly, nor do the studies investigate the evolution of the community in relation to the technology. In particular studies tend to disregard the technological content within the community and how the community advances and changes over time as a result of the evolution of its technological contents.

- Finally, despite scholars' emphasis on the importance of community development over time (Lave & Wenger, 1991), extant studies rarely take into account the effect of time in investigations and hence never consider the possibility of how communities might evolve over their lifespan. Hence the question of community 'existence and survival' remains unanswered (Franke & Shah, 2003).

Because of the failure to investigate the communities' relationships with its technological contents, mainstream studies provide what might be thought of as a 'localist' and 'snapshot' view of the communities, which means they develop only a limited understanding of their diversity and evolution particularly with respect to their technical contents. In this chapter and the next, I go beyond a homogeneous explanation of the software user communities by foregrounding how there may be a 'diversity' of community roles and functions with regard to the underlying technology. While this chapter intends to go beyond the 'localist' view and examine user communities as multiple 'spatial' settings, the next chapter will move past 'snapshot' perspectives and explore communities as 'temporal' locales.

The aim of this chapter is to offer an initial insight into the underlying functions of an unexplored space around complex packaged applications and identify the role of this space in the evolution of the technology. This study also intends to uncover some of the key tensions involved in responding to the different and sometimes conflicting demands of the diverse range of actors surrounding these applications. Hence this chapter will initially address the question of 'Is it possible to create a typology of some of the major roles and functions played by these groups?', and it will then

attend to answer the questions of ‘How can we theorise the notion of complex package technologies user groups?’ and ‘How can we theoretically understand the functions of the group in relation to shaping of technology?’ Finally the chapter aims to explain the management of these groups by answering the questions of ‘How do the user groups operate?’ and ‘How are they organised?’

The remainder of the chapter is organised as follows. Section 4.2 gives a brief overview of research methods. Then sections 4.3 to 4.5 illustrate the fieldwork by initially describing the actors involved in user groups, then exploring into the role and purposes of these groups and offering a typology of functions (in section 4.4), followed by an explanation of some of the main challenges faced in such complex settings. Section 4.6 then discusses the findings by explaining the management practices of these groups, where the concepts of ‘collective diversity’ and ‘orchestration’ are introduced. In this manner while the notion of ‘collective diversity’ refers to collaborative acts of users with diverse needs and interests, the concept of ‘orchestration’ addresses the management of the needs of different types of actors through the act of organisers of the community conducting rather than controlling. Finally this section will also revisit the debate of complex enterprise packaged applications to encounter the mediating role that user groups play in creating a long-lasting space for contribution of diverse actors and actor spaces.

## 4.2 Methods

This study uses ethnographic observations to raise an understanding of the actors and their demands and at the same time uncovers the community functions performed in various spaces. Ethnography will provide a broad view of the different user groups and their diversity of happenings. Semi-structured interviews with community actors have also been carried out with the aim of accomplishing a better understanding of the history of the groups and also, as Marshall and Rossman (2010) suggest, obtaining a better realisation of the meaning people hold for their actions.

This chapter draws on over 150 hours of observation of events organised by the UKOUG over a period of three years, as well as 15 semi-structured interviews with the governing body of the group, attendees of events and the vendor employees, and additionally from group’s e-mail conversations and the UKOUG document library.

## 4.3 Who are the Actors?

The multi-locale approach used in this research allows us to identify and capture a diverse range of formative actors involved in the community. Examination of the community events showed that there were three different types of actors attending the meetings: organisational users, vendor employees and intermediaries. Members of the three classes engaged in the actions in distinct ways due to their particular sets of interests and viewpoints, drawing on different areas of authority and expertise as they participated in different events.

**Organisational Users**: The main body of the user group is made up of users and decision makers from adopting firms. I will refer to both as organisational users who encounter vendor's products and technologies in different ways in their day-to-day organisational activities. They play different roles and have diverse occupations and responsibilities in their own organisations. This differentiation makes particular products more relevant for some members than for others; not only that but also this diversity has led to different uses and types of interest in the same products. An example is the interest of functional users versus technical users; they may both be interested in finance module, However, the functional users tend to attend the application SIGs whereas the technical users take part in technology events. Organisational users are the key players in the community. They build the main body of the events and in most cases are the foremost addressees of the actions.

**Vendor**: There are often a number of vendor employees attending meetings and performing acts in the user community. These actors attend the events on behalf of the vendor company. They play different roles in different groups. For instance in some groups they act as presenters of material on technology, in some other groups they take note of user discussions and solutions, and yet in others they lobby for user participation in offering inputs into future products.

**Intermediaries**: In some of the user groups there can also be a significant number of 'external' actors (as defined by organisational users) or intermediaries. They encompass market makers such as industry analyst groups, freelance consultants, or individuals representing a third party organisation offering products, services or tools related to Oracle's products. These organisations or individuals, who are independent

from the main technology vendor, are again very diverse in nature and aims. For instance they include organisations offering consultancy in various phases of technology uptake ranging from pre-implementation, to implementation and post-implementation, or they offer universal product rankings. There are also those vendors who offer ‘complement-products’ related to the core Oracle products.

## 4.4 Typologies of Functions

The UKOUG community constitutes a wide range of events and resources including but not limited to the following settings:

- Functional SIGs and Customer Forums: focusing on a set of modules and typically has several events over each year;
- User group meetings on acquired products: focusing on a product family, both on technical and functional aspects, and approximately has one event per year;
- Conference series: a series of conferences run by UKOUG based on product family and geographical location categories;
- Technology SIGs: focusing on a particular technological or database administration topic and typically has one event per year;
- Virtual communities: there are several types of virtual communities ranging from membership in social networking sites, mostly focusing on news updates, to mailing lists with different functionalities;
- Ad hoc meetings: organised on need basis, by the UKOUG, the vendor, or the approved partners.

In the study of the UKOUG community, I identified six types of functions performed by the community in response to the wide range of interests. In particular, I found that the UKOUG serves its attendees by providing a platform to be seen by the vendor (i.e. closing the gap which has been caused by mass production of the application), exchanging information with other users (i.e. feeling of sympathy as much as sharing solutions with others), shaping new solutions (i.e. share ideas to come up with ‘collective solutions’ to their existing requirements), learning what is

new (i.e. finding out about the most up-to-date news about vendors technology and strategies as well as complementing technologies), being trained by the experts (i.e. being instructed and guided through different processes and most prominent parts of technology by those who have direct links with the developers of the technology), and networking (i.e. joining new networks of knowledge or merely finding new contacts for future opportunities). The study shows that these six types of functions offer to UKOUG members flexible and varied benefits. However, these gains were not achieved without costs. After defining the six functions, I will explain the main tensions as highlighted by the participants.

### *4.4.1 Community as an Arena of Power*

One of the main challenges faced by standard applications is the lack of a direct link between the users and the vendor (Soh et al., 2000). This separation leads to deprived communication and interaction between the two actors which in turn results in an asymmetry between users and vendors. In this respect many scholars highlight the suppliers' autonomy and 'technical exercise of power' (Regnell et al., 2001).

In contrast, I observed that the community has the potential to 'empower' users. In this manner, the user groups shorten the distance between the users and suppliers. Given this widely discussed 'detachment' in literature, the organisational users of the UKOUG typically express the primary reason for attending community meetings as being a way to create proximity between them and the vendor organisations, leading them to be seen and heard by the vendor and ultimately to get on their radar, so to speak. The users believed that without the attendance in the community they will be just one among many Oracle customers. A user describes this as follows:

> […] we became a member since 2005. Until then we had no say, we were just one among many and of course Oracle was too busy to notice us. But since we've become a regular attendee in the meetings we feel much more connected. Not just to the Oracle world [i.e. other customers] but also to the vendor […] We now have impact […] (Field note, short interview, user)

In all meetings at least one user expressed their 'impact' through what they call 'a common voice', 'a louder say' or 'a collective word'. The consequence of this common voice was seen to influence the vendor's products or strategies. In this sense

the community functions as a shared space where users express needs and urge for their acceptance by the vendor. In some occasions, this goes as far as primarily promoting the mutual but under-spoken needs among peers to draw the attention of other users to an implicit requirement. This is then taken forward to be lobbied with the vendor.

This is described by users as 'influencing' vendors' products or strategies, which is said to be the ultimate goal of engaging with the community. A range of cases on this regard have been observed in the study of the UKOUG. Two cases with different levels of 'influence' and at different levels of granularity are presented here. Case 1 is wielding influence on vendors' strategy on the complete set of products grouped under the Oracle 10 version, and case 2 is influencing a particular Oracle product.

A typical case of getting on the vendor's radar and imposing a need has been the exercise of the power of the community on the license de-support dates. In this case, Oracle user communities have been acting as the main point of contact between the vendor and the users. One case was the end of support for Oracle E-Business Suite 10. This turned into a major area of concern for the Oracle users, driving long discussions around difficulties faced by many users due to termination of the support. Hence the user community conducted a survey presenting its results to Oracle which eventually led to major extensions of the de-support dates. Cases such as this have a large effect on the entire product timeline and hence the wider community of users. One organising member of the community explains:

> Through this common voice, we were finally heard by Oracle. This wouldn't have been possible without the collective action of the UKOUG. If the user group hadn't done this, every single organisation using Oracle 10 would have been affected. So we did this for the larger Oracle family. This is a great achievement by the community, by users, for users. (Interview, organiser)

Similar surveys on users' experience of Oracle applications and technologies have been conducted by the UKOUG over the past few years and the results are reported back to the vendor for further actions. These surveys are now adopted by some other Oracle user groups around the world.

Unlike the bespoke information systems where the system is designed based on specific needs of user organisation, ERP packages are designed based on generic requirements so that they can be used by various customers to cater for different organisations with dissimilar needs, cultures and practices. Therefore, unlike traditional systems where close links were said to be essential between users and developers (Sawyer, 2001), such bonds does not exist in the case of ERP packages. As a result, it has been noted that 'misfit' or 'misalignment' may arise in implementation of such systems due to diversity of user organisation requirements and what the product has to offer (Soh et al., 2000). This is known as one of the main drawbacks of using standard packages. However, this is one of the main places where a user community has played an important role. The study of the user community shows that when users have requirements, the user community plays an important role in making sure that user voices are heard by the vendor as well as users of similar interest. This leads to the formation of a collective case (problem or solution) to be presented to the vendor. My study of the UKOUG shows that the community plays an important role in influencing a product based on the collective requirements of distant users. The role of the forum here has been to extract the needs of the users and prioritise them based on user precedence and present this prioritisation for development to the vendor company. The following case demonstrates how the user community comes up with a prioritised list of requirements to be implemented by the vendor.

The PSHCM top ten priority list is an example of the exertion of user community influence on Oracle's Human Capital Management (HCM) modules. PSHCM is the public sector customer forum, which has been running for more than 20 years. In PSHCM customer forums the top requirements of user organisations are extracted through discussions of its committee and its members. The discussions are formed around the requirements negotiated in previous meetings or topics of interest being discussed in the on-line forum. Then on a regular basis the customer forum calls for a survey to identify the 'top ten priorities' of user organisations. The list is updated periodically to identify new priorities and verify that the top three on the list have remained the same. These are then presented to the vendor for further developments. On a regular basis PSHCM updates the current status of development, the trend since

last update, the position of the development, and the actions required from forum members and Oracle.

The following is an update from the PSHCM mailing list on the agreement with Oracle announced in May 2011 [functionalities have been renamed for the purpose of anonymity]:

> One of the main highlights was […] to potentially deliver the following enhancements, subject to feedback from the Forum: VDE, EDI, CSMA, AC[4].
>
> It is anticipated that the first opportunity to target delivery of these features will be the latter half of calendar year 2012 [...] Oracle have asked for feedback on the priority order of these solutions […] This is obviously very welcome news [...] It is another sign of how Oracle have come to understand the value of their relationship with the Forum and how we can help play a proactive role in taking forward product development for the benefit of not only the Public Sector but the wider UK customer base. We have already re-stated to Oracle that VDE has to be given top priority […] In terms of the VDE solution we had volunteers put forward immediately after the meeting from [name of 7 public sector organisations] to be part of our sub group for taking forward this solution with Development and will keep members updated with progress […] (Document Analysis, Customer Forum)

This case shows how primarily the vendor has agreed to develop a sector-specific requirement. It also indicates how further action is required from the customer forum for development of the functionality. The customer forum has a twofold role in such situations: to follow up the development process with the vendor, and to form and manage user subgroups to take the development forward with the vendor.

Cases such as this, where users wield influence on products through collective action, are numerous. Another similar case, yet different in its approach by users, has been when the vendor released the PAE[5] patch. In this case, users circulated an e-mail discussing what they called a ‘big functionality gap’. Through this e-mail, the user organisations reached a consensus that this was a common ‘expectation’ from the standard system which has then been presented to the vendor. The vendor accepted this as a bug request which was then put into development.

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[4] System Function Anonyms
[5] System Function Anonym

The results of such ‘influences’ are ‘planned for future release’ or ‘ad hoc patches’ development of product features through collective action by the vendor and the user community. Users refer to these requirements for change using terms such as ‘must be done developments’, ‘compulsory standard solutions’ or ‘standard functionality expectations’ in which case they ‘pressure’ the vendor to provide a resolution – either through a collective action with customers (which will be discussed later on in this chapter) or by the vendor itself.

These presented cases, both at high levels of influencing vendors’ strategy or fine grained details of product enhancement, show how the user community may function as an arena of power by imposing ‘collective pressure’ on the vendor. The influence in all observed cases has been a result of collective action by attendees of the user community events. Through constant interaction amongst user organisations, both within the sub-groups and between the different user groups, user organisations were able to identify common needs and effectively liaise with the vendor regarding an appropriate solution. So the actors in the community ‘construct a transition path’ not only based on their current knowledge, techniques and tools (as defined by Kemp et al., 1998), but also based on their ‘collectively selected solution’.

### *4.4.2 Community as a User-User Exchange Medium*

User communities form and maintain user-vendor links in packaged applications, but also importantly they develop user-user bonds. This user-user relationship drives information and knowledge exchange which is also amongst the highest motivations for attending the meetings. In this respect users explain their interest in the user group as a locale for ‘sharing the story’, ‘hearing other’s experiences’ or as more commonly stated ‘exchanging knowledge’. Therefore the community functions as a medium for user-user knowledge and information sharing. While the community functions as a channel for user knowledge exchange, being a mere ‘participant’ who takes in information, or an active ‘contributor’ who presents their knowledge, is very evident in the mode of user attendance at events (this will be discussed in more detail in the section on ‘tensions’).

There are different types of information and knowledge which are exchanged in the community. They include system knowledge, process knowledge, implementation

knowledge and accomplishments. The system knowledge refers to the knowledge gained by users throughout their experience of the application. This includes configuring and setting up the system, designing workarounds or customising the application. This knowledge is directly linked to the application and the business dynamics. Discussions on this topic are around the 'use of new features/modules', 'how to get the most out of a module' and 'tips and tricks in configuring/ localising/customising features'.

Process knowledge is the most common type of user-user exchange in the user group. This type of knowledge is a result of processes employed by users in response to the requirements of systems in their pre-implementation, implementation and post-implementation phases. This consists of stories of applying to standard processes, adaptation and appropriating of the standard processes based on business requirement, or in many cases creative processes that describe how to integrate the system into business practices. As one user described it thusly: 'ERP systems are generic applications but creativity is a must in their implementation… a standard application to be developed successfully seeks more than standard procedures.' The core themes discussed on this topic are 'roadmaps to success', 'things to do/not to do in the pre-implementation/implementation/post-implementation phase', and 'the steps in re-implementation/upgrade'.

The third topic also widely discussed by users is with regard to their accomplishments and challenges in implementation. In this respect users disclose their experiences, typically their successes followed by challenges and difficulties and how they have overcome them. They talk about the 'lessons learnt' from their experiences and how others could benefit from them. They provide real-time examples of the challenges and suggest ways to 'avoid' or 'overcome' them. However, failure stories are typically discussed only when they are followed by successes. This conforms with findings of (Fincham, 2002) who explains that narratives of failure and success are being employed simultaneously and success is constructed out of failure.

UKOUG Financial SIG is one of the leading user groups that functions as a user-user exchange medium. At the time of the study, the SIG had been operating for over 20

years with over 50 participants attending every event. The events were very lively both during the presentation times and the breaks. The earlier observations of the meetings in 2010 showed that users were enthusiastic about sharing their ideas, and as they described it ‘our reasons for going to SIGs is more about giving…’. However, later, as they were faced with new challenges (explained later) they did not formally present their thoughts and experiences. Yet again, as they managed to overcome some of the challenges, the number of formal user presentations increased. The financial events were not only about one-directional presentations, rather there were a lot of interactions and sharing of ideas and solutions occurring in each presentation, be it by other users or the vendor.

By functioning as a user-user knowledge exchange medium, the user group moves beyond sharing knowledge and experience by ‘democratizing negotiations’. Users are more open to talk in user groups not only about their knowledge and experiences, but also about their views and feelings about certain aspects of products and the vendor. This is seen in some formal presentations but more frequently in the informal discussions of the users during the events. They freely reveal their views on the products, features and the services provided by the vendor. Users also disclose their stance and experience about the intermediaries’ products and services. These typical informal discussions take place during the breaks between the sessions, and in this way users provide recommendations to each other.

The revealed information is not necessarily interpreted and utilised in the same way by all recipients. This is more evident in the events where all three types of actors are present, as each type benefits from the acquired information in a certain way. As these user-user exchanges are based on experience rather than written procedures and standards, it is observed that the element of interpretation and making use of acquired data is of higher significance than in the cases of presentations by the vendor company.

Finally, the user-user exchanges of experience and feelings could go beyond a business interest. It could also involve sharing a tacit feeling amongst the users, driving a sense of sympathetic understanding about the challenges and difficulties of dealing with the application. In all cases the community is usually a starting point for

the exchange. The study shows that many of the discussions are followed up by users afterwards through the exchange of business information, telephone calls, e-mails and occasionally in person at the users' sites.

### *4.4.3 Community as a Place of Innovation*

The links developed by the community between users transcends mere knowledge of 'how to perform standard actions' in the existing system. The intersection of user requirements and ideas in the community brings about incremental changes to the standard products and their perceived uses. As the users strive to find solutions for their needs, the user group grants them a space for sharing innovative ideas and turning them into functional solutions. In this respect the community is acting as a mediating point between the different actors in the processes of innovation. Basically there are two routes leading to innovation in the community. The primary means to innovation is a result of users explaining their requirements to the community and negotiating around possible solutions; secondly, innovation occurs as some users voluntarily present a new piece of work which is of interest to the wider community. In both cases the ideas are put forward to the community as an initiation point and users then start making sense of them and adding to them based on their expertise and skills. The user groups function as a locale where innovative ideas and inventions are collected and turned into operational pieces of functionality which could be taken up by the users or, in more particular cases, can make their way into the product through the link that the community develops between the users and the vendor. In the former case, different solutions may end up being used by different organisations, whereas in the latter case the dominant designs are selected to be turned into product features. An example of the sharing of innovations is described by one of the users as follows:

> It's an opportunity for us to meet face-to face and discuss Oracle's experience […] its also a chance to talk to Oracle and tell them what we want and how we want it […] sometimes Oracle has the requirement but does not recognise our need of a specific solution […] through these meetings […] we examine how we do things and hence inform Oracle about our desired solution […] whether Oracle implements it or not is a different issue […] I've had a number of open talks with other users which have resulted in using their solutions to solve our problems, and vice versa of course […] an example has been in our SCM module.

> During one of the SCM SIGs, we discussed this round of deliveries that we had struggled with for a long time, finally we found a solution that was implemented by one of our peers […] (Field note, short interview, user)

On a more effectual basis, are the innovations and solutions which find their way into the standard application. In this regard, UKOUG has been very proactive and has written a number of white papers which offer solutions for long existing user requirements. These white papers which define detailed requirements and possible solutions are presented to the vendor to be incorporated in the Fusion applications, the new series of packaged information systems recently released by Oracle. In such cases, the UKOUG produces a questionnaire for gathering the requirements of the wider community. Then, based on the results, a white paper is written by a smaller group within the user group and is sent to the vendor for development. An example of this is the financial module white paper, in which the Fusion User Group highlighted a requirement on 'Commitment Control' which had been outstanding for a long period of time. The vendor welcomed the paper and called for further collaboration of the user group members to develop a solution.

> In strategy we received the UKOUG Fusion Council Financials / Projects - analysis and interpretation of survey results in April 2006 [...] We noticed that the Commitment Control functionality was deemed weak for both the Oracle EBS and PeopleSoft Enterprise products […] We'd like to ask your user community about the reasons behind the Commitment Control response […] It is anticipated that the first opportunity to target delivery of these features will be the latter half of calendar year 2012 [...] Oracle have asked for feedback on the priority order of these solutions […] (Document Analysis, e-mails)

They then asked the community to respond to a survey in order to reveal current weaknesses. Subsequent to this and after further discussions with a selected number of users, a solution was designed and incorporated into the Fusion applications. Another example was the Human Resource and Payroll module, for instance. The user group spent several weeks compiling a questionnaire that would represent the user base appropriately. The survey was generally released in November 2005 and the data were collected within approximately one month. After substantial analysis by the committee a final white paper was produced and sent to Oracle in April 2006. In three months, Oracle invited the UKOUG Human Resource and Payroll group to

take part in the Oracle Customer Review Program which then enabled them to take part in the overall development process.

In the International Oracle User Community (IOUC) meeting, the vendor announced that

> […] We appreciate the effort that the UKOUG Fusion Focus groups have invested in the white papers that have been submitted to Oracle. It's obvious that the participating customers devoted considerable time to write these papers. This type of detailed input is extremely valuable and timely, as we finalise requirements and begin designing Oracle Fusion. (Document Analysis, e-mails)

This was then followed up by what a member of the UKOUG describes as 'sessions for detailed solution design on encumbrance accounting' (Interview, Organiser) where the details of proposed solutions are negotiated between a small number of users and the vendor.

On a smaller scale, is the effort of the user group members in designing solutions for industry or sector specific requirements. Such efforts take place in sub-groups. PSHCM has been an effective user group in developing solutions for the UK public sector user organisations. The examples given in the previous section show a collaborative solution design by the user group members.

The user group is a space for the initiation of ideas and stabilisation of solutions. When a common need is expressed, a brainstorming session could lead to the generation of new thoughts to be examined and developed into solutions. This occurs a lot in technical communities, where initial hints are given by members – or presenters in the case of training sessions – which will then be examined and turned into solutions by individual attendees. In the case of functional communities, ideas are more widely discussed within the community and in many cases solutions are developed and stabilised as a result of collective action. Below is an example of solution generation in the PSHCM forum in response to an issue raised by one of the users:

> The initial seeded Oracle config won't support using the configurations rules. Config level allows only one of default pension scheme at moment [...]

> I have put some thoughts on alternative solution.
>
> Alternative solution -
>
> Create two information elements (Pension EE, Pension ER). Config these two elements in the current Oracle configuration values (Pen auto enrolment config at BG level & payroll level). Write two new Fast formulas (PEN_EE_ELIG, PEN_ER_ELIG). In these formula build the logic to identify which pension scheme (LGPS/Teach/NHS…etc.) employee is eligible based on people group/etc. Using assignment details as criteria and returns the same. Configure formula results:
>
> a. Pension EE info element return indirect result to the actual Pension EE deduction element (no return to Pay Value input)
>
> b. Pension ER info element return indirect result to the actual Pension ER deduction element (no return to Pay Value input)
>
> […] This solution is high level design and requires actual build and testing […]. (Document Analysis, Customer Forum)

Other users also commented on this solution and amended it further to come to a finalised solution. For instance a user suggested 'Rather than the process looking at element link level I'm wondering whether it could look at the element entry itself' (Document Analysis, Customer Forum).

Solution development and diffusion does not occur in all user groups. They are more common in cases where a sense of collaboration is superior to competition (discussed further below in tensions). Yet again as some communities are acting stages of all the three types of actors – users, intermediaries and vendors - the innovative ideas discussed within the community could go through different routes. Therefore apart from the diffusion of innovation amongst the user organisations or into the vendor product, some solutions could be developed into complementary products taken up by intermediaries. This leads to the development of new third party products which are then put up for sale as complements to the vendor's existing products.

The innovations and expansions of the application taking place in the user group, show that the design of complex enterprise applications is not an isolated task, but instead a continuous series of solutions (Karasti et al., 2010) engaging various participants from different locales. The collective design process put into action by the users is based on their existing body of knowledge and experiences. So the

‘technological change’ that follows is a result of this expertise (Kemp et al., 1998). Furthermore, as this innovation takes place as a collective act, and the results are shared amongst the group, the outcomes of the innovative process becomes public goods (Capello, 1999).

### *4.4.4 Community as an Up-to-Date Informant*

Gaining knowledge about the new products, tools, technologies and future plans and strategies of the vendor is another motive for attending the events. Learning about related partner products and services offered by Oracle partners to complement the vendor’s product is a further attraction for the users. Often users refer to this as ‘keeping up-to-date’, ‘finding out about the hottest offers’, ‘knowing what’s on the horizon’ and ‘identifying where the technology is moving’.

In this respect the community functions as a source of the latest information about the vendor’s products and strategies as well as the third party products and services offered to enhance the vendor’s solutions. The UKOUG acts as a disseminator of this information to its wider audience. In this manner not only the users are informed about the most recent news, but also the vendor gets to know about its partner organisations and in the same way the intermediaries find out about the vendor. The information presented for this purpose includes: new features, new modules, process updates, licensing and support strategies, patch updates, future products, and future roadmaps.

This function of the community involves a marketing and sales aspect as well which was not welcomed by some of the users. This was typically the case when a partner organisation introduces a new product to the users particularly while the requirement had not come from the user community. While this function of the community was constructive in cases where the gaps in the Oracle products were fulfilled by innovative solutions of third party companies, such as various General Ledger reporting and Accounts Payable scanning solutions, there were also aspects of direct marketing and stories tainted by obvious commercials from some of these firms. For instance, a session on a new product that was said to improve use of the User Productivity Kit (UPK) for training purposes was not well received by many of the audience, as it was said to be ‘just a sales pitch’ for ‘making own profit’. However,

whilst this issue had been problematic, the users still welcomed the presentations of the other users regarding the known third party products. They believed this type of knowledge and experience to be beneficial while the majority of the presentation by the partners about the new products tends just to be a 'sales pitch' to persuade the buying of new products. However, in general this sense of 'pushing to buy', as described by community members, was often felt about new third party products and not the previously used product enhancements of more successfully implemented features. In this way, the community is not only a community around Oracle's products, but it also acts as a community where users discuss related products of other vendors.

The vendor used this function of the community to keep in regular contact with its customer base and the creation of loyalty to it products. The frequent updating of customers on what is going on and the future plans and aims develops a sense of bond and trust for the users. This was described by a user as follows:

> It's good to know what they [Oracle] are doing, they tell us what's going on […] our business is running on their application so we ought to know about its future […] I believe the community is doing a good job in this by creating a bidirectional benefit to us and them. They tell us about their plans we tell them about our needs […] we get to know what's new before the crowd and have an option to choose […] (Field note, short interview, user)

The users also talk about keeping up-to-date as a productive way to assist them in making better decisions. Their main discourse on this surrounds three main factors: primarily learning about what the road ahead will be for Oracle products, secondly getting updates about other user organisations and their plans, and finally informing their own path by the occurrences and plans of their environment. The following is an explanation of one of the users in this regard:

> We are informed about the most recent news ahead of the crowd, thus we have time to take in what's necessary and process it as it is happening […] this leads to improved decisions. (Field note, short interview, user)

Also another user talks about how keeping up-to-date with the product and other user statuses leads to taking actions on the right time:

> […] last week [in a community event] everyone was talking about release 12, but we have no plans […] we feel we are stable with the current version and we don't need any upgrades, but two things frighten us, one is losing Oracle support, which is being mentioned by Oracle in every SIG, and secondly falling back from the crowd […] but our managers don't see the reason why we should move to a newer version […] we attend the meetings to find out whether we should really be thinking of moving to R12 and if so, being able to convince top management about it […] we know what's going on so we can plan in advance. (Field note, short interview, user)

This comment also reveals how the community events act as a platform for selling vendors' products. Such cases are more prevalent in user conferences.

The vendor also takes advantage of this function by keeping up-to-date with customers' needs and hence defines future goals and strategies based on the response it receives on its presentations. In many meetings where there was a presentation by an Oracle presenter, there was also at least another member of Oracle in the meeting who took note of all the questions and responses from the customer. This included suggestions by users on how to improve the system in case of new features, or questions on whether functionality is available in the current or the next release. This is described by an Oracle liaison as follows:

> UKOUG is an invaluable source of information for us about our customers and their actions [...] customer actions are vital in setting our plans. We need to know about them to be able to meet their needs [...] made short, customers are vital and UKOUG is where we get to know about them. (Interview, Vendor)

The same is valid for the intermediaries. They too keep up-to-date with customers and their requirements through participation in UKOUG events. The following is a quote by one of Oracle's partners:

> Our business success rests on customer satisfaction. In these meetings we listen to the latest requirements of Oracle's customers to provide them with the best solutions [...] (Field note, short interview, Intermediary)

Another quote by a third party consultant also suggests that UKOUG functions as a source of useful information about the most recent changes in the customers' position:

> […] the events give us a good opportunity to talk to the users and understand their stance and thus discover the trends in the market [...] (Field note, short interview, Intermediary)

### *4.4.5 Community as a Training Locale*

Being trained by experts on new products is the next incentive for participation in events. There is a high tendency of users to want to increase knowledge of new technologies, which is one of the main drives for some users' willingness to travel long distances to attend these meetings. This aspiration is typically met by the vendor presenters, who give presentations on how to do a detailed set-up for a particular functionality or how a certain process works in the system through real examples and live demos. This was described by one of the users as follows:

> […] Today we had a day of training and real-time problem solving discussions for Finance1 module. An exciting programme of how to set-up the system and use it effectively. (Field note, short interview, User)

These sessions went beyond knowledge exchange sessions, to what can be termed as 'training' sessions where a particular process or a particular configuration was presented by a professional person from the vendor organisation. So these meetings create the means for the users to meet the experts. As a user describes:

> […] this session has been truly good […] we received direct information from elites […] in my experience, having the expertise and the experience in one place is the best way of receiving the best answers […] (Field note, short interview, User)

In this excerpt, another user highlights these events as an initiating point for new solution generations:

> […] I really get a kick out when we receive these instructions from experts […] I always start trying out new things after these sessions […] (Field note, short interview, User)

In these meetings users ask questions regarding set-up options specifically based on their requirements. The events could take one of two shapes. Primarily they can be on 'how to' do something within already known systems, such as an event on setting up the business groups and operating units in Oracle E-Business Suite version R12, and the influence of each configuration option on finance and manufacturing modules. Such events delve into details of the available options for configuring each

field, whether on set-up screens or on functional forms. They also touch on aspects of workflows and how they can be configured to meet user needs. Secondly a smaller portion of the training events focus on new or future releases. In such cases the users' attitude toward the meeting changes from problem solving with a focus on 'how to's of setup', which is more evident for the first case, to a curiosity stance driving the questions to be on 'how to's of the performing functions'. In the first case the functions are shown as a result of setup, whereas in the second case, functions are the main point of discussion. Additionally in the second case the presentations typically portray a process while the first case is not necessarily a process. In fact in some cases (of the first set of events) it could even take the shape of a 'surgery' event where users ask particular questions not necessarily following a process or a flow of actions. When asked about these events from an Oracle representative, the response was as follows:

> In these events we have the opportunity of taking the customers through a complete process and directly responding to user questions. We show them live demos of how to perform tasks and how to set up the system. We've always had positive feedback on these sessions. (Field note, short interview, Vendor)

What is very evident in these sessions is that Oracle presenters reference official documents available to users. At the same time, a large number of users take note throughout the session. Furthermore, for the most part, user questions are answered by Oracle, however, there exist some occasions where the question is not directly answered in the meeting and is noted down by Oracle to be answered later (after further consultations within Oracle). In such cases, Oracle tends to get in direct touch with the users and send them the answer or a relevant document in the following days.

Finally, although in the majority of cases these events function as a training locale, sometimes some parts of the sessions can turn into a knowledge exchange session, or even innovative idea generations, where users talk about their own solutions or experiences of a particular case of configuration. The learning process stemmed from such continual interactive training, which involves innovative additions from users, is of a collective nature.

### 4.4.6 Community as a Networking Site

Meeting and interacting with others is yet another reason for some users to attend the meetings. In this way the UKOUG creates a locale for networking amongst the users. Although this is not the only reason to attend meetings, but nevertheless the majority of users refer to this as an important motivation. 'Meeting up with old friends', 'making new connections' and 'networking opportunities' are the widely used terms in this regard. As a result, the UKOUG functions as a site for networking primarily amongst users and secondly between users and other actors in the Oracle world, and beyond. The events provide an arena for different actors to meet up and interact on any subject of interest. These opportunities are provided in two ways: first the networking opportunities during breaks between different events during a day of meetings and the second are more structured networking events called 'speed networking'.

Speed networking is a type of formally organised networking event where a committee chair and his or her colleagues act as directors and controllers in setting up and running a networking event. The director and the controllers arrange a setting for event participants to meet in pairs and discuss a few points during a short (2 to 5 minute) period. For example: A short introduction of who the person is and which organisation he represents, what is the current status of Oracle applications in their organisation, and a memorable piece of information about the person for future recollection. These sessions involve exchanging information and business cards, and finding similarities and differences in using the application. Some typical topics of discussion during the speed networking are: current versions of the application and the installed modules, plans for upgrades or new implementations, difficulties with modules and features, current customisations and workarounds and implementation or maintenance consultants. In many cases, these quick introductions lead to future knowledge exchange talks.

Another reason for such networking, as defined by the actors (both users and intermediaries) involved in the community, is that the UKOUG could function as a 'projection board' for their future: a point to be recognised for future reputation plans. Many actors, and in particular users, crave recognition from other actors. This

could be with respect to recognition by peers from the same organisation or more importantly recognition by actors from other organisations and in particular the vendor company. In this respect the UKOUG becomes a space for building 'professional identity and position' (Pollock & Hyysalo, 2013) in which actors make their knowledge and skills visible to others and produce highly 'tradable' expertise (Fleck, 1998).

The evidence from the presentations indicates that the knowledge shared by users is highly valued by others. Typically, the presenter attaches his or her identity to the presentation by giving an introduction to his or her experience with Oracle or ERP application in general. This is then followed by showcasing the real-time experience of the presenter and publicising the knowledge that he or she acquired through the journey of working with the system. In this way they make themselves known to others so as to build a reputation. In such cases the UKOUG acts as a stepping stone for these actors. This is described by users and intermediaries through terms such as 'presenting for professional development' and 'a springboard to build future reputation'. In doing so, users (and sometimes intermediaries) who assist and perhaps 'cajole' other actors (particularly the vendor) may achieve praise and enhanced organisational independence (McLaughlin et al., 1999, Pollock & Hyysalo, 2013) by trading their knowledge and skills in a potential job market.

### *4.4.7 User Communities' Functional Diversity*

The roles played by the UKOUG are in response to diverse motivations of various actors participating in events. The motivations for attendance in meetings are a mixture of individual-motives and organisational-purposes. Table 4-1 shows an overview of how each function meets the needs of each of the actors involved in the community. This table is obtained from analysis of interviews and informal talks with each type of actor in the user group meetings. This table does not offer a complete list. Instead, it reveals how a variety of acts are performed in response to diversity of needs and interests. That said, this study would be the first to admit that the user communities are multi-functional spaces. Hence the typology is a heuristic, not a comprehensive classification.

| Function | User Organisation | Vendor | Intermediary |
|---|---|---|---|
| **Community as an Arena of Power** | • Getting on the vendor's radar<br>• Influence vendor product/ strategy | | |
| **Community as a User-User Exchange Medium** | • Express knowledge / skills<br>• Self-promotion/ recognition<br>• Sharing the story / feeling<br>• Gain knowledge | • Gain up-to-date knowledge about customer base<br>• Requirement gathering | • Express knowledge / skills<br>• Self-promotion/ Recognition<br>• Sharing the story / feeling<br>• Gain knowledge |
| **Community as a Place of Innovation** | • Influence vendor product/ strategy<br>• Express knowledge / skills<br>• Self-promotion/ recognition<br>• Solution generation<br>• Solution generalisation<br>• Solution stabilisation<br>• Solution diffusion<br>• Sharing the story / feeling<br>• Find solution | • Acquire user knowledge and innovation<br>• Participate user in design and development<br>• Idea/solution generation | • Express knowledge / skills<br>• Self-promotion/ recognition<br>• Idea/solution generation<br>• Find solution |
| **Community as an up-to-date informant** | • Influence vendor product/ strategy<br>• Increase awareness of new technologies<br>• Learning | • Create market for new technologies<br>• Predict product impact<br>• Gain up-to-date knowledge about customer base<br>• Gain up-to-date knowledge about complementary products<br>• Maintain customer | • Increase awareness of new technologies<br>• Learning<br>• Marketing and sale |

| | | | |
|---|---|---|---|
| | | bond and loyalty | |
| **Community as a Training Locale** | • Influence vendor product/ strategy<br>• Increase awareness of new technologies<br>• Learning | • Solve customer issues<br>• Maintain customer bond and loyalty<br>• Create market<br>• Gather user requirements<br>• Predict product impact | • Increase awareness of new technologies<br>• Learning<br>• Marketing and sale |
| **Community as a Networking Site** | • Meeting old connections<br>• making new connections<br>• Self-promotion<br>• Future development | • Create and maintain customer bond | • Meeting old connections<br>• Making new connections<br>• Marketing and sale<br>• Future development |

**Table 4-1 Typology of Functions in Response to Actors' Motivations**

This research illustrates differences in the structure of the user groups and shows how each community can function in one or several of the above mentioned areas to serve the needs of the various actors, but at the same time placing the needs of user organisations at the forefront. The research shows that in constitution of these user groups, with different orientations, tensions may arise as a result of conflict of interest. The next part of the chapter focuses on the most evident tensions in the community.

## 4.5 Tensions within User Groups

The identification of tensions is described as the outcome of 'user' participants' and organisers' orientations as they perform in the community and how they articulate the challenges in performing in the community. The main concerns of users and organisers recur in four different areas: 1) Participation versus contribution; 2) Free revealing versus commercialisation; 3) Competition versus collaboration; and 4) Core versus complementary.

**Type1: Participation versus Contribution**

The attendance of the actors in the meetings typically takes one of two forms: participation or contribution. 'Participating' and 'contributing' are two different phenomena within the boundaries of the user group. Participants are 'silent actors' whose main acts are 'taking away' from the group. The prime intention of these actors is to acquire some type of knowledge from other actors without any devotion to contributing back to the community. Participants in this mode are more attracted to the group by the element of 'take' (Hall & Graham, 2004). In contrast, 'contributors' play the role of 'giver' as much as a 'taker'. In this manner, actors either share their knowledge through giving full presentations or in less intense cases offering input to discussions.

On one end of the scale there are a large number of actors who attend several meetings per year but do not contribute, neither presenting their ideas, knowledge or experience formally nor informally. And on the other end of the scale are contributors who formally present their ideas in various meetings throughout the year. These users willingly communicate their ideas and seek input from other actors be they users, vendors or occasionally intermediaries.

This issue is one of the greatest challenges faced by the user group. As one organising member of the UKOUG says:

> […] the success of these communities relies on a balance of actors in their committee, those who drive the community. Too often we have a user need but not the right volunteers to step up. (Interview, organiser)

This issue has been brought up in most of the interviews with the organising body of the user groups. As the events are run by the volunteers, lack of effective contribution can cause problems such as attendee dissatisfaction or even in some cases cancellation of the event. Hence a major fraction of the time spent by organisers of user groups involves lobbying with other actors to contribute back to the group. This in turn may be problematic as the organisers are volunteers who have to spend time away from their key duties in their own organisations to persuade this contribution.

**Type 2: Free Revealing versus Commercialisation**

The central theme in this chapter has been to show the diversity of typologies of functions of user groups which in the majority of cases involves free revealing of user knowledge. This raised a concern about the actual receivers of the user-revealed knowledge. Hence I observed a growing body of complaint surrounding certain third party organisations attending the meetings. In numerous cases, user organisations objected (in formal meetings as well as informal chats) about the attendance of particular third party organisations in meetings in which user presentations on problems and solutions took place. The main criticisms were around the fact that some third party organisations take user-generated solutions, develop them into commercial products and sell them back to the users. Also some user organisations stated that they do not give presentations owing to the same fear of their presented ideas being taken by the third parties. In such cases, the user organisations were suspicious about the presence of some of the third party companies. Hence in those user groups in which a sense of sharing was high amongst users, it was preferred to only have particular third party companies as invited guests.

**Type 3: Competition versus Collaboration**

A primary goal of user groups is to develop a collaborative environment that will serve the needs of user organisations and help foster communication and collaboration across organisational boundaries. For example, a financial special interest group serves a wide range of companies in similar or different markets. In practice, however, some of these companies may be competitors. Hence participants express tensions between work that will benefit their organisation, and work that may threaten their organisational competitiveness. This was evident in some groups more than in others. For instance the sense of collaboration and sharing of in-depth organisational knowledge and experience in user groups dedicated to public sector organisations was much higher than in other groups.

In spite of this, it was observed that in some groups, as the community became more mature, there was a shift from a sense of competition to collaboration over time. We could see this as a result of building trust and confidence about continuity, as

described by Karasti and Baker (2008). These changes in such communities led into participants becoming givers rather than merely takers. This evolution over time resolved the challenge of competition; However, it was typically a very time-consuming process. An instance of this was very evident in the Financials User Group. As the group became more mature over time, the sense of trust and collaboration grew in the group, leading into more in-depth user experience exchanges.

**Type 4: Core versus Complementary**

A clear separation between core and complementary functions was not defined by the actors. However, discussions exist around events being of high importance as opposed to other events being just peripheral. While the community organisers called for participation and collaboration in the events, some contributions were not positively received by user organisations. This was mainly the case in presentations given by certain third party organisations on complementary products. While the user organisations insisted on having the key functions of user exchange, and vendor updates on future products, the third party products were less of interest to the majority of the audience.

Table 4-2 summarises the intensity of tensions faced by each type of actor in performing various functions. We can see from the table, type 4 tension (core versus complementary) was seen as a concern of all three types of actors. The main reason behind this tension was diversity of interest of different types of actors, i.e. Suppliers had their own priorities in performing certain functions which in some cases differed to the priorities of intermediaries and users. This type of tension was seen at its highest between the intermediaries and users. In the majority of cases intermediaries' aims were to market their products (for sale) while users' aims were to receive free knowledge and solutions for their problems. Type 1 and type 3 tensions could only be seen amongst the users. While in the case of type 1 the main factors causing the tension were individuals' preferences, in the case of type 3, they had their roots in organisational intentions. Finally type 2 tensions were largely experienced by users as they revealed their knowledge in the presence of intermediaries who had the ability to convert that knowledge into commercial innovations. A small number of

intermediaries also highlighted a few concerns in revealing the information about their future products amongst other intermediaries.

| Concern of / Over | Supplier | Intermediaries | Users |
|---|---|---|---|
| Supplier | ● | Type 4 | Type 4 |
| Intermediaries | Type 4 | Type 2 | Type 4<br>Type 2 |
| Users | Type 4 | Type 4 | Type 1<br>Type 3 |

**Table 4-2 Tensions Amongst Actor Types**

## 4.6 Discussions: Integration of Heterogeneous Spaces

The findings of this study reveal that examination of a particular locale narrates a confined view of that single space. This was made apparent as the study of each user group disclosed a particular range of functions within that community. Hence, as a result of examination of several user groups, an improved understanding of the complex situation was achieved. This study shows how user groups of diverse spaces join and collaborate to perform various functions. In this section I will discuss how these differences are managed and how such heterogeneous settings enable the endurance of 'the long now' (Ribes & Finholt, 2009) of complex technologies.

### *4.6.1 Collective Diversity: Collaborative Approaches to User Heterogeneities*

The groups under examination in this study, consist of technology users who were geographically dispersed, whose main responsibilities and interests were to serve their own local firms. User groups have created spaces where these diverse users with varied interests in technology can practice alignment with the high level purposes of the community while also acting to serve their own organisational needs.

The user community has given rise to collaborative approaches for jointly pursuing a shared goal while appreciating local aims and applying home-grown knowledge. In this way, local heterogeneities are regarded as strength, and are used in forming collective knowledge and actions.

The user groups' approach has been to respect this diversity and cater for this wide spectrum of demand from various user organisations from different market sectors. I refer to this approach as 'collective diversity' which signifies the communal and joint action of users of diverse knowledge for meeting varied local demands. The increase of collective diversity refers to the rise of functions performed collaboratively by users to serve their heterogeneous demands resulting from a combination of market, organisational and personal factors. The more diverse the demands and motivations of user participants, the higher the degree of collective diversity required to achieve the shared goals.

The degree of collective diversity in place in each user group directly affects the intensity of tensions as sensed by users. Collective diversity can be seen as an approach that lessens types 1, 2, and 3 tensions. The adoption of the concept of collective diversity by users contributes to the understanding of various local differences between them, but at the same time highlights the opportunities for utilising the user group space as a mediator or utilising differences to achieve a higher goal.

This study shows how the users' collective diversity can be dynamic and contingent even within the same community. While some users were more pro-active in performing collaboratively, others were not.

### *4.6.2 Orchestration: Reciprocated Approaches to Heterogeneities of Actor Types*

Prior to the formation of these formal meetings, some informal user groups existed where users exchanged their experiences and made different attempts at bridging the gap between themselves and the supplier. So the vendor initially established this space to give the distributed groups a uniformed shape that could get in touch with the vendor in a unified manner. This indicates that, to increase value creation, there is

a tendency for vendor companies to try to control community activities, which could result in a conflict of interest for others, particularly the users in the group (Dahlander & Magnusson, 2005).

In this study, instead of a controlling role, I observed an orchestrating role performed by actors who were collated from different spaces. The term ‘orchestration’ was primarily used by Drucker (2002) as he described modern management as conducting an orchestra. He explains that in orchestration, the conductor does not need to be aware of the detailed technicalities of all the instruments. He should choose the music, set the pace, ensure that all the musicians are playing together but leave the details to the players (Drucker, 2002). In this manner, the vendor played an orchestrating role, which meant creating an overall uniformity which at the same time allowed for heterogeneity.

Gradually users demanded ownership over planning the events of the user group. So as the users joined the organising board, there was a gradual change of the structure of the community until it became an independent organisation. The restructuring of the group from a vendor-controlled body to a user-organised community, led to new opportunities for user organisations in extending the activities of the group to meet more of their own demands, while also allowing the vendor to meet its own goals. The user organisations aimed to use the group to create a collective voice (through what I described as collective diversity) that could lead to a closer proximity with the supplier. Simultaneously, the vendor experienced a better understanding of its customers as they became more involved in the activities. As the users grew in numbers and the system expanded into new markets, the user group also grew and new players became active in this arena. Third party organisations offering complementary solutions (e.g. financial reporting) and services (e.g. implementation consultancy and training) also became active participants in some groups. They presented their products and services in user group meetings. However, different types of actors meant heterogeneous interests and demands.

To manage these diversities and simultaneously respect their heterogeneities a board was formed for driving the community forward. This board had the orchestrating role by respecting the particular interests of each actor organisations, and ensuring that

the diversities were harmonised in a way that meant all actors could act together. At the same time, each community had a number of volunteers whose responsibility was to facilitate performance of various functions by recognising and balancing the needs of every sub-community. So what we see here is by no means vendors 'configuring' the user in the mechanistic way that Woolgar (1991) suggests. Instead we see a mutual configuration of the functions and hence an on-going relationship between heterogeneous parties. The orchestration, which was initially an effort introduced by the vendor then taken up by collaborative efforts of all actors, benefited users and the vendor by lowering the tensions of the vendor-controlled relationships throughout different stages of the product's lifecycle. This strategy helped to lower type 2 and type 4 tensions.

In the long term orchestrating the community led into development of various kinds of spaces within the community. For instance special interest groups and customer forums were the original types of spaces that existed even prior to the formation of the UKOUG, although in a different form and with other initial purposes. Then after a number of years, the community set up the user conferences. User organisations tend to have more authority in shaping and influencing the meetings (SIGs and Customer Forums). Conversely, the vendor organisations and other third party suppliers tend to be the dominant shapers and funders of the user conferences (discussed in more details in Chapter 5). However, once again they did not control the conferences, instead in these events they entered into an orchestrating role with other actors and tried to cater for those user needs while also achieving their own priorities.

### *4.6.3 Implications of the Biographical Approach on Study of Complex Enterprise Application*

Scholars have drawn attention to the increasing scope of enterprise packaged systems. Such systems are defined as networks, software and hardware systems on which codified information are stored and accessed with a wide range of diverse users and purposes (Monteiro & Hanseth, 1996; Hanseth et al., 1996). They are described as systems with interconnections between numerous modules and sub-systems evolving around existing systems and practices (Monteiro et al., 2012). They

have a wide reach of scope open to numerous users across different spaces and over long periods (*ibid*), and have been referred to as 'heterogeneous assemblages', which addresses the diversity of actors and their visions, beliefs, and practices in development, implementation, and use of systems (Koch, 2005; Suchman, 2007).

Likewise, we see an understanding around the numerous actors involved in the development of complex applications. There is a great deal of intricacy involved in collaborative actions required for the growth of such systems. This complexity of actions by diverse actors calls for moving beyond a single site view while examining such infrastructures (e.g. Kallinikos, 2004; Pollock & Williams, 2008; Monteiro et al., 2012). The current study has continued this line of thought by investigating an underexplored arena around these systems: user groups. The information system user groups are spaces that exist at various stages of an applications' lifecycle where different types of actors meet to perform various actions with similar or diverse intentions.

The findings of this chapter have drawn a fine grained picture of the inside story of a worldwide enterprise system user group. The study shows an initial typology of functions as a response to demand for communities' participating actors. The typology shows a range of actions, from merely receiving information from the vendor and its partners on their current and future products and services, to as far as influencing the products by diffusing the solutions amongst the members of the community, or by pursuing the vendor to incorporate them into the future technologies. On both ends of the scale the user groups cover a long period of what Karasti et al., (2010) refers to as 'infrastructure time'.

To develop these ideas further, I draw on the perspective of 'the long now' introduced by Stuart Brand and his team when building the Millennium Clock, and recently taken up in the studies of infrastructures by Ribes and Finholt (in 2009). I explain how user communities enable the 'growth' (Edward et al., 2007) of complex information systems and how their functions form a *collective bridge* between the present demands and the future visions to enable smooth transition within 'the long now'. Ribes and Finholt (2009) draw on the term 'the long now' to explain how today's design enacts with future outcomes. As they note (2009, p. 393):

> ‘The long now is a conceptualisation of time that demands that sustainability becomes today’s consideration […] Infrastructure development is an occasion for the long now […]’

In their study the concept is used as an ‘organising principle’ for analysing the preparation of infrastructures for long endurance. They suggest that the long now considers how ‘today’s planning will effect tomorrow’s technologies’. This is derived from the basic principles of ‘the long now clock’ by Brand stating five different characteristics to be incorporated into the design: 1) *Longevity*; 2) *Maintainability*; 3) *Transparency*; 4) *Evolvability*; and 5) *Scalability*.

I believe that the concept of the long now could be used to understand how user communities act to serve the long term aspect of complex enterprise systems’ ‘infrastructure time’. I propose the practices of empowering users, enabling user-user exchanges, enabling user innovation, updating on the latest, training, and networking offered by user group can enable the longevity, maintainability, transparency, evolvability, and scalability of complex technologies. I also propose that the heterogeneous nature of the communities can act as an environment for technology growth. Such an environment, can enable linking ‘the past to the present and the present to the future’ (Karasti & Baker, 2008) and can facilitate a collective evolving locale around changing artefacts. Table 4-3 is an illustration of how user group practices connect the present needs of actors to their future images.

An infrastructure emerges when technology moves beyond a single temporal scale (Star & Ruhleder, 1996) and tensions between short-term and long-term are resolved (Karasti et al., 2010). This implies working with short and long timeframes which can lead to defining the infrastructure lifespan as ‘the long now’. Findings from this study show that the user groups are informants (community as an up-to-date informant) and enablers (community as a user-user exchange medium and community as a place of innovation) of these short-term solutions and long-term capabilities. They facilitate the resolution of immediate user needs, and ensure information is available to them and to the providers of technology, while they also anticipate future requirements and provide information for its formation. Anticipating the time ahead and influencing it through today’s actions, facilitates the longevity characteristic of information systems. For example, the community as an

arena of power enables users to influence vendors' products through a collective voice, which in turn leads to shaping of future technologies based not only on the inventions of its producers, but also on the expectations of its ultimate users. Furthermore, the user groups enable taking the past and the present into consideration for the plans and actions of the future. The status of the user organisations, with regard to the technology version, and their rate of uptake influencing the change of de-support dates are examples of such cases where actions performed here-and-now have affected a future strategy. Another example is the case of 'Commitment Control' designed by users to be incorporated into the Fusion applications. In this case, it is not only the future strategies which are affected, but also the product that is being influenced and co-shaped by users.

| Function | Actions (Actor) | Consequences | Characteristics Enabled by Community |
|---|---|---|---|
| **Community as an Arena of Power** | • Forcing quick solutions to urgent needs (U)<br>• Coercing incorporation of solution in future products (U)<br>• Urging for actions on past products (U) | • Change of current and past products/ practices<br>• Influence on future products/ practices | • Longevity<br>• Evolvability |
| **Community as a User-User Exchange Medium** | • Making solutions available to others (U)<br>• Rendering knowledge visible to the community(U)<br>• Making experience visible for other (U)<br>• Reusing solutions (U)<br>• Collectively exposing needs (U) | • Transparency of information and ideas<br>• Ease of maintenance<br>• Facilitating speed to solution generation<br>• Facilitating decision making<br>• Empowering users<br>• Building reputation<br>• Experience-based learning environment | • Evolvability<br>• Scalability<br>• Maintainability |
| **Community as a Place of Innovation** | • Rendering inventions visible to | • Transforming inventions into | • Longevity<br>• Evolvability |

| | | | |
|---|---|---|---|
| | the community(U)<br>• Making solutions available to others(U)<br>• Juxtaposing existing solutions of various users (U/V/I)<br>• Shaping new solutions (U/V/I) | innovation<br>• Facilitating innovation diffusion<br>• Influencing current and future products | • Scalability<br>• Maintainability |
| **Community as an up-to-date informant** | • Updating on current status (U/V/I)<br>• Informing on future products/ services/ plans (U/V/I) | • Creating an image of the future<br>• Refreshing Technology Usage<br>• Market creation for new technologies<br>• Market prediction<br>• Facilitating user awareness | • Longevity<br>• Maintainability |
| **Community as a Training Locale** | • Training on product (V/I)<br>• Training on processes (V/I)<br>• Offering solutions to detailed needs and explaining their influence on large scale technology (V/I) | • Refreshing Technology Usage<br>• Creation of long-term learning environment | • Longevity |
| **Community as a Networking Site** | • Connecting and reconnecting to individuals/firms (U/V/I) | • Maintaining customer bond and loyalty<br>• Advancing reputation | • Maintainability |

**Table 4-3 Enacting User Community Functions as Bridges of the Long Now (U-Users, V-Vendors, I-Intermediaries)**

These user solutions are not only used for shaping of future products but also for the enhancement of current technologies (such as patches and new features), or even the diffusion amongst community members to meet the immediate needs of peers. The short or long term influence on products, through collective action, show how the community has enabled the evolvability of the system. This is discussed in more detail in Chapter 7, as levels of the shaping and reshaping of artefacts: the product

level, the community level, the organisational level, and the user level. In each of these levels there is a certain degree of improvement upon technology, either at the local, community or technology level. Moving between these levels requires short-term steps, but the effect may lead to short, medium or long term solutions.

The user community provides a platform for users to juxtapose their solutions and form prototype solutions (scalability) to be analysed and tested by various actors before turning them into a finalised solution. These ‘test’ solutions in the form of ‘customisations’ or ‘patches’ are usually tested on non-live environments, and the results of the test are fed back to the community for further actions. This prototype version of the solution does not only belong to user solutions, but also more commonly to test the information provided at training sessions in community events. In such cases, many users take home what has been taught during the sessions and experiment with them on their non-live systems. The results are further discussed at later events in the community until a confidence point is reached, to be implemented on the live system.

In all the cases there is a need for transparency by actors in disclosing and making accessible their knowledge and experience to others. This has been seen as a tension in some of the groups, however for those groups which have overcome this issue, the collaborative action has led to more influential outcomes. Yet it's the promise of future outcomes and advances in reputation which is used as an encouragement for actors to freely reveal their knowledge.

Finally, there is a constant flow of people joining the user groups. The study of the UKOUG shows that current members of the community recommend other organisations to join the group. This leads to continuation of the community and the formation of new generations. Additionally, many organisations send new members to the events while keeping some of the old participants the same. In this way the old generation of the community meets the new and knowledge and experience of technology are transferred while new ideas are brought in. Recognising the existing knowledge and combining it with the new, leads to advancing the ability of community members to enhance the functionality of the technology (maintainability).

To summarise, we see how user communities enable technology sustainability at present use by offering a wide range of functions that satisfy both the short term need and the long term goals.

# 5 The Biography of Community: A Multi-Temporal Study of User Groups

*'The power of context – spatial and temporal- should be placed at the centre of any theorisation of knowledge formation' (Amin and Cohendet, 2004, P. 86)*

## 5.1 Introduction

There has been an increase in spatial awareness in studies of knowledge communities through notions such as spaces of knowing, spatial proximity, localised learning, and knowledge spaces (Maskell, 2001; Amin & Cohendet, 2004; Malmberg & Maskell, 2006; Matthiesen, 2013). The importance of space has also been a central theme in collaborative work studies (e.g. Olson & Olson, 2000). However, 'time also matters' Redy et al., (2006). Despite its importance, the 'time' dimension has remained relatively undertheorised. Activities unfold over time and therefore temporal aspects must remain the central theme in examination of collaborative knowledge practices (Redy et al., 2006; Karasti et al., 2010). Hence while in the previous chapter, the focus was on 'multi-spatial' dimensions of technology user communities, this chapter will concentrate on the time dimension and examine 'multi-temporal' facets of such settings.

Chapter 2 presented an overview of studies of technology user communities. Chapter 4 problematized the extant studies as hardly considering the evolution of the community in relation to its technological contents. In particular scholars rarely take into consideration the role of time in investigations of user groups attached to complex technological artefacts. Hence while it is understood that technologies evolve, there is no systematic attention to how the communities attached to the technology might develop and evolve also.

A review of the complex enterprise systems literature on time reveals an emphasis on short-term studies. Pollock and Williams (2009) refer to these as snapshot implementation studies. Such studies form the bulk of research into organisational technologies such as ERP. Examining the ERP literature (example reviews done by

Esteves & Pastor in 2001, Moon in 2007 and Eden et al., in 2012) shows that the majority of studies focus on the implementation phase of the system lifecycle. Albeit their useful insights, snapshot studies offer a partial view of the system in that they see ‘use’ detached from ‘development’.

To move beyond this focus on particular temporal moments in the study of user groups attached to complex enterprise systems, in this chapter I aim to examine the community through multiple time-frames. In doing so, this chapter intends to investigate how a richer understanding of communities can be obtained by taking into consideration the interplay between the progress of the community’s technological contents and the community itself as it evolves over time. Hence this chapter will address the questions of ‘How might we study the evolution of technology user groups across time, and how should we conceive the mutual influences of the community and the technology?’. As a result it will offer a framework for studying user communities around complex enterprise technologies.

As the aim of this chapter is to investigate user communities around complex technological artefacts which involve multi-temporal and multi-spatial aspects, I will be drawing on the ‘Biography of Artefacts’(Pollock & Williams, 2008) framework to examine the interplay between technology and the attached community. In this way, I argue that community development, besides expanding in spatial scope and complexity of functions (as discussed in Chapter 4), occurs in terms of its technological contents growth and de-growth. This chapter foregrounds the often neglected issue of long-term in technology user communities by revealing the existence of multiple temporalities. This is done with the aid of the multi-spatiality aspects discussed in the previous chapter. I conclude by underlining that an appreciation of multiple locales and multiple timeframes is needed to enrich the exploration of technologies and communities.

## 5.2 An Analytical Framework in Studying Complex Enterprise Applications

Information systems are complex artefacts. They are characterised as ‘heterogeneous assemblages of human and material elements’ penetrated by ‘soft elements’ (Koch 2005, p. 43). This is particularly the case for packaged enterprise systems such as

ERP applications. These systems have more complex dynamics than traditional bespoke software (Light & Sawyer, 2007). However, studies of these systems typically emphasise the core element: 'the IT artefact' (Orlikowski & Iacono, 2001, p. 121) at a particular locale and time. This approach has presented a rich picture of the immediate state of these systems; however it is weak in terms of assessing the long-term outcomes derived by organisational users (Pollock & Williams, 2009). For instance in the case of ERP, the majority of studies have focused on implementation or use of these systems in user organisations. Examples are studies that address cultural issues (Soh et al., 2000; Hong & Kim, 2002; Soh & Sia, 2004) fits and miss-fits (Moton & Hu, 2008), ERP benefits (Holsapple & Sena, 2005; Markus & Tanis, 2000) and critical success factors (Akkermans & Helden, 2002). These studies use the same approach of focussing solely on the place and time where users encounter the system. Grabot and Botta-Genoulaz (2005) refers to them as 'impact studies' which focuses on their consequences on the user organisation. The limited number of studies that focus on the development of these technologies, have been carried out in isolation of implementation and use (MacKay et al., 2000). This shows a separation of supply of technology from its adoption and use (Pollock & Williams, 2010). This separation leads to an incomplete picture of technological lifecycle. Such studies are often short-term and do not follow the technology as it matures in design or use.

Although valuable, studies that are short in duration and focus on one phase only tend to disregard long term consequences. They fail to give a temporal understanding of the system. Immediate pictures do not give a comprehensive representation of the complex technology, what influences it and its consequences. Pollock and Williams (2008) argue that single site implementation studies only provide a partial approach to obtaining an understanding of information technologies. This is similar to what Clausen and Koch (1999) refer to as study of 'occasions'. In explaining this, Clausen and Koch (1999) address the influence of the social choices made during technology design and then highlight that the technology is also customisable based on user organisations requirements at the time of implementation. However, the examination of one of these 'occasions', would only provide a fractional view of the system. Therefore they argue that following technology over its lifecycle is essential to a better understanding of its growth. In similar veins Pollock and Williams (2010)

suggest that rather than studying technology in particular locales or moments, they should be 'followed through space and time'. This chimes well with similar ideas presented by other scholars such as Fleck (1988), Marcus (1995), Koch (2007), and Leonardi and Barley (2008) who also place emphasis on the significance of the 'time' element.

### *5.2.1 The Biography of Artefacts*

In attempting to provide better templates for analysing technology over time and location, Pollock and Williams (2008) introduce the BoA approach. In their framework, Pollock and Williams (2009) assert 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, P. 417-418): '…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 '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 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 ERP solutions, 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.

Pollock and Williams (2009) argue 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. Hyysalo’s (2010) shows this in his studies of healthcare information systems by exploring different locales in different timeframes over an extended period of time. 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 & Pinch, 2005), BoA also places technology at the core of 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 chapter, by placing the community (an assemblage of different actor types and artefacts) at the centre of analysis, I aim to extend the BoA approach to offer a better understanding of growth and evolution of technology and its community in tandem. In doing so, I will also attempt to offer a more structured way of applying a biographical approach in the study of complex artefacts by introducing a phased-wise model of analysis.

## 5.3 Methods

This chapter draws on 150 hours of observations of various user group events followed by 15 formal interviews with the governing body of the group, attendees of the event and the vendor employees. The observations were carried out on 24 events (including more than 85 sub-events) over a period of 3 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.

## 5.4 The Evolution of UKOUG Events

My 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 communities with each group comprising of volunteers from user organisations, the vendor, and intermediaries. This diversity of actors involved in the group, conforms to the first characteristic of 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, I 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.

For the purpose of clarity I have initially divided the findings into two groups: the Oracle Family Products and the Oracle JDEdwards Products. The first group is then divided into further sub-groups based on the nature of the user groups operating within this family of products.

### *5.4.1 Oracle Family Products*

Oracle is one of the two largest suppliers of packaged enterprise-wide systems worldwide. Oracle started to release software packages in the early 1980's with

Oracle Financial Package being its first widely used software application. At that time, users from various organisations met informally to discuss their issues around oracle products. Then in 1984, as Oracle products were more widely used by the UK organisations, Oracle formed a user group to create a unique point of interaction with its wider user base. The user group, known as the UKOUG, was an attempt to coordinate the activities of the widespread informal user groups. Then in 1988 as Oracle released its first enterprise-wide integrated application, called Oracle Accounting System, the user group adopted a membership model and became an independent not-for-profit organisation which was run and organised by user volunteers. By the early 1990s the vendor released the EBS ERP application. This led to a considerable growth of the UKOUG. The user group which once consisted of a small number of SIGs around technical aspects of Oracle, expanded to more than 20 SIGs around technical and functional issues. Oracle continued production of new versions of the EBS, and by the year 2000, EBS 11i was released which is currently (by late 2012) the most widely used Oracle ERP application. Then by Mid 2010 the new line of Oracle ERP application, The Fusion, was released. At the same time the UKOUG, which had faced a drop in member numbers in late 2000's, restructured its organisation. Table 5-1 shows the evolution of the Oracle products and the UKOUG.

Users from adopting firms make up the bulk of participants in the user group meetings. These are the key players in the communities around which many of the interactions occur. Vendor employees too attend events on behalf of the vendor corporation. In some SIGs, due to mergers and acquisitions, members from companies acquired by the vendor also participate in events. In addition to the main participants, there may also be those from third party organisations that offer tools, products and services to complement Oracle's products. Also intermediary organisations as well as freelance consultants with experience of the vendor technologies attend some of the events.

| Year | Oracle Product Development | UKOUG History and Number of Members |
|---|---|---|
| Early 1980's | Oracle Financial Package | - |
| Mid 1980's | | Formation of the UKOUG by Oracle<br>- Only Technical SIG's<br>- 300 corporate members |
| Late 1980's | Oracle Accounting System | The UKOUG became an independent user group<br>- 300 corporate members |
| Early 1990's | Oracle EBS (ERP) | The UKOUG started to grow in size and functionality<br>- Functional SIG's formed<br>- 300 corporate members |
| Late 1990's | Oracle EBS 11 | The UKOUG experienced its largest growth<br>- More than 30 active SIG's<br>- Approx. 1700 corporate members |
| 2000 | Oracle EBS 11*i*<br><br>(The most widely used Oracle ERP Product at the time of this research) | The growth slowed down<br>- Approx. 1700 corporate members |
| Late 2000's | Oracle E-Business Suite R12 (The latest release of EBS) | Drop of memberships, but same functionality<br>- Approx. 1500 corporate members |
| 2010 | Launch of Fusion Applications | Further drop of memberships<br>- Approx. 1150 corporate members |
| 2011 | Public Release of Fusion Applications | Change of User Group Structure |
| 2012 | Early Implementations of Fusion Applications in the UK | Re-growth of membership<br>- Approx. 1350 corporate members (8000 individuals) |

**Table 5-1 Evolution of the Oracle products and the UK Oracle User Group (data last updated in April 2013)**

Here I will narrate the details of three specific user groups (Financial Special Interest Group, Public Sector Human Capital Management Customer Forum, and Scottish Public Sector Oracle User Group) followed by an overview of a range of other user group meetings.

**Public Sector Human Capital Management Customer Forum**
The PSHCM community was studied from September 2010 to February 2013.

My first observation of the PSHCM user group meeting took place in September 2010 in Birmingham. The meeting had four main sessions. The first session was on a user experience with R12. In this session the presenter explained how they carried out the implementation of the R12 HCM module and described the issues and problems they faced in the new version. In the second session the functionalities of self-service were presented through a real implementation. This case turned into an interactive talk in which users expressed their concerns and further needs which were not covered in the current version.

The third session was on specific issues around Oracle R12. This talk started by the question 'Why you should move to R12?'. This was followed by explanations about the Oracle E-business Suite upgraded features and changes in HCM module[6] with the presenter emphasising the fact that all the new functionalities are requested by the community.

The fourth session was on requirements and new developments on 'academies' functionality. In this interactive talk, the presenter (from a user organisation), started with a short explanation of a problem they faced by the roll out of the system in schools in their region. This theme was developed by other users also explaining their current situation and the difficulties they faced. In this way while each user organisation stated their requirement, other users offered possible solutions which included configurations, workarounds and customisations. They then talked about the cons and pros of each solution. In some cases the discussions were followed up after the meeting by users exchanging contact details for further details such as customisation documents. The presenter took note of the issues, and at the end of the session he concluded by pointing out that the feedback will be finalised and sent to the vendor.

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[6] Human Capital Management (HCM) module consists of a range of sub-modules which can be implemented independently in the host organisation. The sub-modules include, but are not limited to Human Resource Management, Payroll, and Self Service.

> […] we will sum up the Academy Template, so send the final feedbacks to Geoff (committee chair) by the end of October so that we can have an updated template by the end of November. And get it signed off in the next customer forum in February. (Field note, presentation by user)

He also mentioned that they could discuss further issues and questions in the forums mailing list.

The next forum meeting was held in February 2011. The topics discussed in this meeting were broader than those discussed in September of the previous year. The meeting started with a presentation of the Self Service Absence Planner product and its integration with Oracle as a follow up on the enhancements requested in the previous meeting. This presentation used a case study to demonstrate how the planner works in real-time. In contrast to the meeting in September where the majority of talks were on high level needs, in this session users asked more specific questions on the details of system configuration to meet specific needs. Finally in this session users expressed that they were more satisfied with the new enhancements compared to the one presented last time. The vendor also took note of the new requests to be assessed for development in future releases. Then in the next session an Oracle senior representative in UK gave an update on Fusion applications. This was followed up by another talk by Oracle on the Human Resource Analytics product and its benefits. The next two sessions were on two of the most prominent issues of the public sector organisations: academies and school force census. This included an update on the academies solution followed up from the meeting in September, and then an update on the status of School Workforce Census solution (a requirement by PSHCM user community). As it was explained by Oracle this functionality was designed based on the specifications provided by users. New configurations for implementation of the functionality and the new concurrent processes were explained in details. Then a high level description of the setup process was presented. In this session Oracle also asked user organisations about why they had not yet sent back their test results on the N2G[7] functionality that they

[7] Functionality Anonym

have been asking for such a long time. The session ended by Oracle encouraging users to test this functionality.

In the meetings held in May and September 2011 the format was similar: Users expressed their needs and solutions and asked Oracle for enhancements. In February 2012 an update on the enhancements requested by the community was given. The central topic of discussion was around two particular needs: Self Service Batch Element Entry (SSBEE) and Multiple Payroll Solution. These issues had been prioritised by the user community as needing 'definite' and 'prompt' solutions by the vendor. The meeting also involved user stories, e.g. implementation of Oracle Absence through Self-service functionality including the configurations, custom absence formula, the logic which overrides Oracle's seeded formula, and the implications of the custom parts and their relation to the standard application. There were also a number of talks by Oracle representatives on real-time information (RTI) functionality and its availability in different versions of EBS, updated support timelines, and Oracle's solution for teacher pensions. The last topic created a large debate between the users and Oracle which led to a change of the planned schedule for the afternoon sessions. The afternoon session started with Oracle explaining their teacher pension solution which was interrupted by a user explaining that what Oracle was offering did not meet their requirement and explained details of their needs. Then this led into an interactive session where users explained what they expected Oracle to develop to meet their needs. The discussion continued on some possible solutions and customisations developed by different users.

In the meetings that followed in May and September 2012 and February 2013, I observed the large extent of user involvement. Sharing of stories as well as participating in solutions generation and exerting power on the vendor to incorporate their needs were amongst the most evident functionalities of the PSHCM user community. Over the months as the 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 Oracle,

known as the Public Sector Financials Customer Forum (PSFCF) with its first meeting held in October 2012.

**Financials Special Interest Group**

Sessions from Financial SIG were studied 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-involved' sessions. Below I will report on the evolution of this community over the two years.

In October 2010 the community acted as a place where users were informed about the latest features and functionalities of the system and were trained on how to set-up and work with the system. There were detailed presentations on multi-organisational architecture, its benefits, how it works and differences between versions 11i and R12 with real examples of setups. There were also explanations on how to use custom extensions with multi-organisational settings through presentation of real case examples and with demonstrations of the setup options. There were also a few cases of user knowledge and experience sharing. For instance some users explained the workarounds they used in multi-organisation set-ups. This was then followed by a presentation on the functionality of Interface Data Transformer and how it had been used to meet some complex consolidation mapping requirements of the UK's Government Department for Work and Pensions. In this session the presenter explained details of setup with screenshots of the system. The session then continued on Business Intelligence as an evolving 'silver bullet', term used by participants, explanation of extended support and the sustaining support and introduction of Fusion application and customer choices. The session finally ended in an open forum discussion of users who moved to R12 and their experiences.

Overall, as users talked about their problems and requirements other users tried to give solutions. During one of the sessions one of the users (Jillian) made a very sharp comment on the presence of third party suppliers in the meeting:

> […] we don't want third parties or consultants talking about functionalities which are not really required… we want more user-driven stories […] (Field note, Comment by User)

This was then followed by more comments from other users against some of the third party presentations. Later Jillian added:

> […] they [third parties] come and listen and in the next meeting present to us what we already gave as a solution and want to sell that back to us […] I just want to present to other users. I don't want to present to third parties […] I don't want to be told by consultants that we can do it better […] (Field note, Comment by User)

This comment was supported by other users as they requested 'pure user meetings' where they can talk openly and share their ideas. Then Peter, as a user who had participated in the user group meetings for a long time, pointed to the deviation of the current focus from the initial needs:

> […] when we look back on why we initially joined the group, we wanted open user discussions […] the last few meetings there's been a huge influx of consultants who are concerned about marketing their products […] focus on user communication is fading […] (Field note, Comment by User)

However, these types of comments that grew in this meeting contrasted to what third parties explained as the reason for their actions:

> […] We only want to deliver what they [users] have asked for, so that the feedback we get is consistent… no sales pitch in this community […] only solutions […] (Field note, Short Interview, Intermediary)

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'.

Finally in this meeting the committee elections (which meant two years of volunteering to organise the events) took place. The committee needed four members out of which 3 members volunteered. After a short debate, a number of users suggested that Jillian should be the fourth person on the committee board. Initially she refused and argued that this will take up a lot of her time, and she was not sure what would be expected from her. However, with the encouragement of peer users

she agreed to come on board with the aim of changing the events into what they called ‘more user-driven’ meetings.

The next meeting, held in February 2011, was very different to the previous financial SIG meeting. The most evident difference was that there was only one exhibitor organisation compared to 19 exhibitors in October 2010. The second change was the number and contents of user stories which had grown significantly. In this meeting, users openly talked about their experience with Oracle products in formal presentations. Thirdly, the focus had shifted from Oracle version 11i to R12 and issues around the new version. The users talked about their R12 implementation processes, their Oracle roadmaps and their experience with particular modules. These sessions were then followed up by users asking specific questions about the processes or setup options.

The event also had a ‘Surgery’ event for ‘cash management’ system. The surgery event started with an Oracle member announcing that this was a free talk about ‘how to’s’ of the cash management system. In this session again users discussed their problems and requirements while 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. Besides these sessions which formed the main part of the event, Oracle gave a 15 minute presentation about the current implementation updates requested by the user community. They also asked for volunteers who would be willing to participate in design and test activity for a future version of the product.

Overall, in the February meeting the discussions between users had a significant rise compared to the previous Financial SIG. Users talked much more freely about their requirements as well as solutions. Many even offered further meetings or telephone calls to follow up specific cases, on how they had developed a solution through innovative configurations, workarounds, customisations and reports.

In meetings that followed in May 2011 and September 2011, the contents were much similar to the February meeting, many user stories and noticeable 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, similar to the settings of ‘reference sites’ (Pollock & Hyysalo, 2013). 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 this initiative, Oracle aimed to call for participation of R12 users in the European, Middle-Eastern, and Asian region to take part in interviews and workshops, share their issues and requirements, recommend actions, and develop a plan for delivering solutions. These plans were developed separately for EBS R12 and Fusion, hence different functionalities were promised for each of the products. Two of the main ‘pain points’, as described by the community, identified in 2011 were ‘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 and were discussed in more details in March 2012 and May 2012 meetings. Then in September 2012, the first introductory workshops on the solutions for these two issues were presented to the users, which received a lot of input from the audience.

Taken as a whole, the user group underwent a significant change over this period. Two types of change were observed. Firstly and more evidently, between 2010 to 2011, there was a noticeable change on the aims and structure of meetings. In this period the user group evolved considerably by expanding 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. From mid-2011, as discussions moved away from version 11i to version R12 and in occasional cases to Fusion applications, the change was more evident in the technological content of the community.

**Scottish Public Sector Oracle User Group**

The first formal Scottish Public Sector User Group (SPSUG) was held on March 2011. This group was shaped as a result of conversations that took place in an event on Oracle R12 five months prior to this meeting. In October 2010, 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[8.] This event organised by the umbrella community offered an overview of the Fusion applications, middleware and architecture and how this tool can be used to build code on Oracle applications. During the break times, one of the users from a Scottish Public Sector Organisation (who I will refer to as 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. The planning took six month, 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 approved 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 oracle users. This discussion went into details of their requirements and

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[8]Oracle Application Development Framework - an end-to-end Java EE framework for easier application development. This framework offers Oracle users ready-made infrastructure services that can be used and through visual and declarative development means.

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. While a small number of users believed that their communitarian actions could lead into Scottish solution generations which could be incorporated into Oracle products, the majority of the crowd were doubtful about it. 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'.

**Other Oracle User Group Meetings**

In this study I also looked at some other user groups in the Oracle product family. Similar trends were observed in these meetings: 1) Users formed communities to reach a common aim, this included exchange of solutions, getting in direct contact with the vendor, etc.; 2) different actors ranging from senior managers, end users, or technical staff from user organisations, vendor employees, third party organisations, freelance consultants, and intermediaries joined the communities; 3) The communities underwent several iterations of change in functions as a result of diversity of interests of different actors and as a result of evolution of technologies; 4) and in cases where 'users' as the primary actors of the community lost interest, the community life came to an end.

This last stage was found in a number of interviews held with the council members of the UKOUG. In one case a member described this as follows:

> […] we have seen very few cases of SIGs discontinuation […] this occurs as a natural process, just like their formation. Users lose interest in the topics, they stop attending the meetings […] we always try to find ways to prevent this from happening, but if there is insufficient interest, the committee cancels the meeting […] eventually if there are several consequent cancellations we stop organising the event […] sometimes this means merging one SIG with another […] (Interview, Organiser)

Lack of interest develops mainly due to discontinuation of the product use. However, it is worth noting that the process from community formation to discontinuation is not a straightforward process. It involves a wide range of actors with dissimilar interests and an underlying complex technology that evolves over time. I will look into this in more detail after reporting the findings on a different product. In the next case, I will demonstrate the findings on another ERP product, however with a much smaller market in the UK and less complexity due to the nature of the application and the size of the adopting companies.

### *5.4.2 Oracle JDEdwards Products*

Oracle's JD Edwards is an ERP solution with over 80 application modules to support a diverse set of business processes. The product was developed by J.D. Edwards World Solution Company founded in March 1977 in Denver, Colorado. The company was then purchased by PeopleSoft Inc. in 2003 which was in turn, purchased by Oracle Corporation in 2005. JD Edwards ERP application, primarily known as JD Edwards WorldSoftware, was developed in mid the 1980s. In 1998 a redesigned version of the application known as OneWorld was offered to the market which gave the company the opportunity of four-folding its customers on the new application to over 600 by 2001. JD Edwards then released a new and more stable version of its ERP application known as OneWorldXe in 2002.

During those years, JD Edward customers formed the Quest International Users Group, also known as Quest, with the support of one of the JD Edwards founders as a place to share their stories. The user group was formed in 1995 with the aim of not being only a place for users to express their ‘frustrations’ but also a place for them to give inputs to the application developers.

In June 2003, JD Edwards Company was acquired by one of its competitors, PeopleSoft, which led to adding OneWorld applications to PeopleSoft’s software line, including its flagship ERP product, EnterpriseOne. Then in 2005, PeopleSoft was acquired by Oracle Corporation. Oracle kept the OneWorld product line to cater for the needs of medium-sized companies in which Oracle’s e-Business Suite application and PeopleSoft EnterpriseOne product did not have a considerable market. By mid-2009, 79% of EnterpriseOne and OneWorld customers were on the

latest versions of the products. Figure 5-1 shows the JD Edwards products release history.

Since its acquisition by Oracle, the Quest user group has also gone through change to fit with Oracle's user group model. By 2013, Quest continued to support JD Edwards's customers, but in countries outside the region of North America, the JD Edwards User Groups have become a part of the regional user groups. Hence since 2006, JD Edward user group in the UK has been functioning under the orchestration of the UKOUG by organising events in the shape of JDEdwards SIGs that run a few times per year, the annual JD Edwards conferences, and JD Edwards module-wise webcasts.

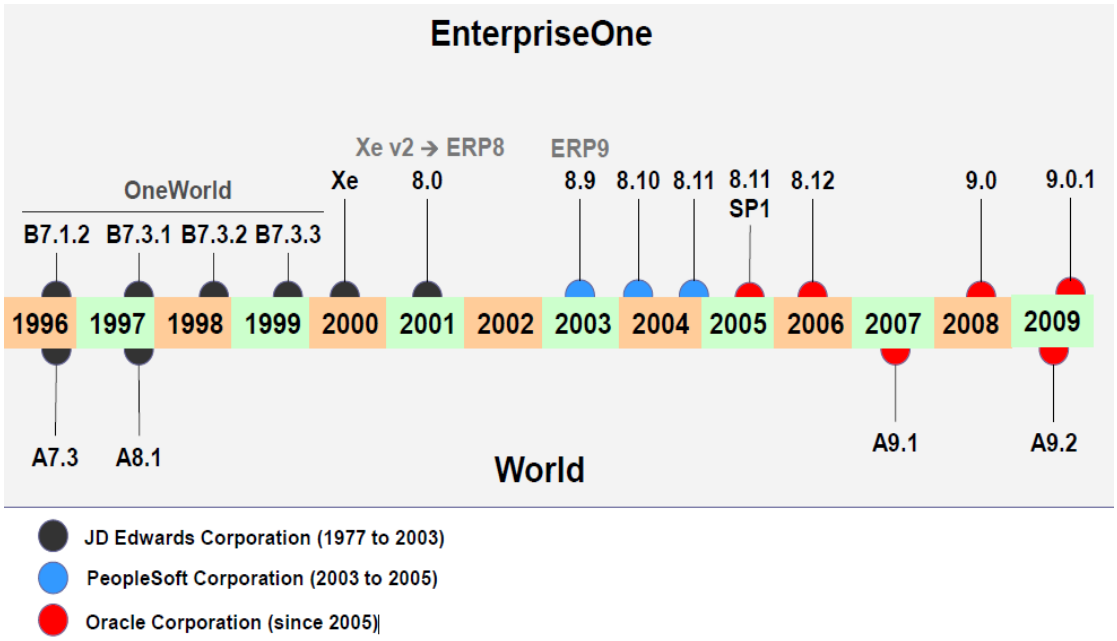


**Figure 5-1 JD Edwards Products Release History, Oracle Presentation Slides, March 2010, UKOUG Website**

My first observation of the JDEdwards SIG took place in July 2010 in London. This was to a large extent a technical meeting with all presentations around the technicalities of the application. The meeting consisted of three main topics: The first one was an introduction to Business Intelligence Publisher, an application that offered pre-built analytic tools for financial data, with explanations on features, advantages, and some real examples, followed by why businesses should buy this

tool. In this session the costs involved and the skills required for use of the application were also discussed. There was also a complete demonstration of the integration of Oracle BI and JDEdwards applications. The second topic of discussion was a demonstration of a real case of how to put Enterprise 2.0 tools in the flow of JDEdwards features. Finally the third strand of discussions consisted of presentations given by Oracle partners on their complementary products. In these presentations, the integration of the new complementary technology and what it adds to the Oracle's product were the main topic of conversations. At the end of the meeting one of the committee members explained that the previous JDEdwards SIG was cancelled because of low interest. When interviewed further he stated that:

> […] sometimes if the sessions are not interesting enough people lose interest. We've had other SIG's cancelled for several times until we realised that there is no more a need for that user community. However sometimes it's only a matter of requirement for different topics […] (Interview, Organiser)

The next user group meeting took place 8 month later in March 2011 with Oracle giving an overview of its next generation ERP applications, the Fusion, followed by four talks by Oracle partner companies. These talks focused on how Oracle is moving away from other infrastructures, such as IBM and Crystal Reports, in its JDEdwards products to Oracle Infrastructures, methods of integrating JDEdwards with other products, and 'dos and don'ts' in implementing JDEdwards in small organisations. Similar to the previous meeting, the nature of all the talks in this meeting was informative and the flow of information took place predominantly from Oracle and its partners to the user organisations. In the next user group meetings that followed in June 2011 and March 2012, similar trends of sessions which mainly constituted of informing users about the latest products and features and giving trainings on specific modules and tools, were observed. Unlike the Oracle EBS applications SIGs which were specific to each module or groups of related modules, the JDEdwards user groups were formed around different topics on all modules of the applications with only several cases of module specific webcast events in 2010.

### 5.4.3 UKOUG Conference Series

UKOUG has been offering its members a range of conference series that covers technology and application topics for over two decades. The structure of the series has changed several times. For instance in UKOUG's early days, there was only an annual conference that covered all different applications and technologies. As the community and the products grew in numbers and diversity, the conference became a conference series with different product and geographical focal points. By 2009, the series had seven different events per year: UKOUG Conference Series Technology and E-Business Suite (TEBS), UKOUG Conference Series Ireland, UKOUG Conference Series PeopleSoft, UKOUG Conference Series Scotland, UKOUG Conference Series Hyperion, UKOUG Conference Series Siebel, UKOUG Conference Series JD Edwards. By 2012 the Siebel conference had been changed to CRM conference and a new event was added for Primavera applications. Finally in 2013, the largest event, Technology and E-Business Suite conference, which was conventionally run as a three day conference, was divided into two separate events, each running for three days separately on technology and application.

For the purpose of this chapter, I will focus on the conference series from 2009 to 2012. Similar to conventional conference settings, prior to the conference a call for papers was announced by the UKOUG council, who would then review the abstracts and make decisions on their relevance to the conference themes. Presentations in the conferences were given by Oracle representatives, intermediaries, partner organisations, consultants and user companies. The TEBS conferences typically started with a number of keynote talks by the UKOUG chair and co-chair and senior managers from Oracle. These opening talks concentrated on the future plans for the community as well as road maps of the products.

In a closer look at each event, I observed two types of evolution, first on the technological content and second on the arrangement of the sessions. In 2009 Oracle's general manager offered the first public demonstration of Fusion Application outside the US. This was done as a result of the lifting of the non-disclosure restrictions on the new technology. This was followed by more sessions about Fusion applications. Overall, amongst the 250 tracks, six presentations were

given on the new technology, while the majority were on functional aspect of different versions of EBS. In 2010, while the number of EBS functional sessions remained almost the same, the number of sessions on Fusion rose to 15. The main message of the sessions on the TEBS 2010 conference was to take action on moving to version R12 of the EBS. Therefore a large number of presentations on EBS were about R12. A new aspect of this year's conference was an event called the 'Willow Table' in which the audience had the opportunity of asking any technical question of the most prominent expert in the field and receive practical support on the most challenging issues. Furthermore, this setting enabled the technology designers and developers to grasp the most demanding and not yet fulfilled requirements of the users. Another new feature of 2010's conference was sessions called 'Meet the Speaker' in which speakers were available in the speaker's lounge to meet up with their audience and answer their questions.

After the 2010 TEBS conference, in October 2011, Oracle's chief executive officer had confirmed general availability of Fusion applications at the OpenWorld conference in San Francisco. At the same time he had unveiled the Oracle Exalogic Elastic Cloud[9]. As a result in TEBS 2011 conference, held in December 2011, 'cloud' was used as a new buzzword in sessions. This gave a rise to the talks around Fusion as a platform for ERP on Cloud. The Fusion sessions also became more specific by drawing lines between Fusion middleware and the Fusion applications. While the talks on Fusion and Cloud gained momentum, there was no decline in attention given in the session to the current technology, the EBS. The main message of the conference was to 'perform better with R12'. A new feature of this year's conference was the 'un-conference' sessions, less formal sessions for participants, and particularly other users, to present their cases. Finally in 2012, an on-going stream of sessions around Fusion applications with more in depth details of their functionality and configurability was presented over the course of the two days of the conference.

[9] Oracle Exalogic Elastic Cloud is an integrated system combining servers, storage, networking and software.

In summary, observations of the user conferences showed that although conferences were spaces where similar functions as user groups meetings were offered, they had two main contrasting points. Firstly, while there was a tendency to discuss future or new versions of artefacts in the conferences, the main artefacts discussed in the user group meetings were usually those in use (current used versions). This means while the SIGs and customer forums focused on the existing products and product versions (EBS) with the aim of offering solutions to the everyday issues of users, the conferences focused on forming a 'vision' of the future products. This led to the second difference: the content of presentations by Oracle and other suppliers in conferences differed to that of user group meetings. In contrast to the users' collective authority which was observed in some of the user group meetings, the conferences were spaces which enabled the vendor and other suppliers to showcase their future roadmaps.

## 5.5 Discussion: The Biography of Community

My fieldwork 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 & Pollock, 2011, p. 13) when investigating user communities and their actions with respect to a particular object. So the object of analysis is not a standalone community, instead it is an entity (i.e. the ERP user community) which functions predominantly in response to a second entity (i.e. the ERP artefact).

Therefore multiple intertwined timeframes exist which need multi-levels of analysis. Table 5-2 shows a possible division for the age of community and age of products proposed by this study. This categorisation of ages, which I have adapted from

Utterback and Abernathy's dynamic model of innovation (Utterback & Abernathy, 1975; Abernathy, 1978; Abernathy & 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, I am not conveying anything with regard to the technological evolution and the inputs to design and development. Rather I am using this categorisation to show a stage-wise nature in the lifecycle, both for technology and its surrounding user groups.

In the categorisation offered in this chapter, 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 enterprise-wide packages systems, I 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 I 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 to be implemented in organisations. 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. I 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. I refer to this period as the 'discontinuity' phase of the product age.

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

**Table 5-2 - Community/ Product Age Characteristics**

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 a high uncertainty in the details of the events. As a result of this,

diverse needs are negotiated and new events are emerging. An example of negotiation about the needs is done through an e-mail sent prior to the first meeting of the SPSUG:

> […] For those attending, please could you let me know what topics you may like to see a presentation on. Some feedback so far: cash management, AR etc…Also, could you let me know what questions you are likely to raise during the Oracle slot or at the discussion session. This will give Oracle some time to prepare an answer. I will try to massage times in order to allow more discussion. (Document Analysis, E-Mail)

The events of these communities are not yet set into routines and the community members meet on a need basis. For instance there was much debate on how and when to have the second SPSUG meeting. One of the ending comments of the first SPSUG meeting was:

> […] I will send you an e-mail in a few months to schedule the next meeting. Meanwhile send in your suggestions for the topics. (Field note, Comment by Organiser)

Communities in their transitional phase are usually under two years old. There are also communities stemming from existing communities and following similar forms which have a more structured launch. PSFCF was an example of such community. However, yet again they are more flexible in their agenda and negotiate on needs and plans.

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 which are taken into consideration by the organising committee. An example of these occurred in the Financial SIG in October 2010 in which a number of users argued about having too many third party organisations in the meetings who would listen to users innovative ideas, take them away and come back in the future meetings to sell them back to the users. This led to significant change in the Financial SIG 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.

To illustrate the possible environments and spatial metaphors with respect to product lifespan and community maturity, a two dimensional figure is shown below (Figure 5-2). This figure illustrates how the community may evolve from one phase to the next in either direction.

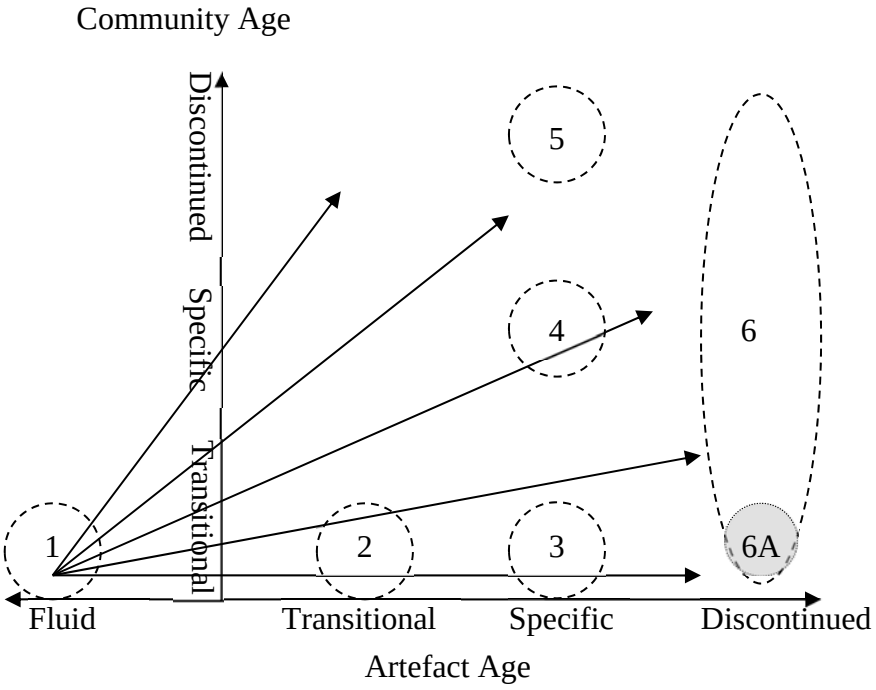


**Figure 5-2 Biography Stages**

As can be seen in figure 5-2 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 get based on its maturity. The numbers on the graph illustrate some possible points of time of the biography of the community. Area 1 shows the communities in the process of formation or newly formed communities (less than two years old) around unreleased products – this

includes products under development and test. In our empirical case, examples of such communities could be seen around Fusion application. Before the release of the new application the UKOUG, as the umbrella community, formed temporary user groups such as HRMS Fusion Group and Financial Fusion Group with the aim of discovering the best processes as well as deficiencies of other existing products including EBS, JD Edwards, and PeopleSoft. They also held a number of different ad hoc meetings on Fusion which were not bound to any special interest groups or forums. 'Fusion Apps Early Adopters Program' was one of these events. This event was organised to provide an overview of Fusion and customers uses of Fusion Early Adopter Program (EAP) for the prospective users. The EAP was an invitation only program for selected customers, sponsored by the product development department of Oracle Corporation specifically for the UKOUG community.

Area 2 illustrates the communities under formation or newly formed communities around products which are newly released by the vendor. Newly released products are those which the majority of users are not live on the product, and in many cases users are yet to decide whether they intend to adopt the new product. Examples of such communities have been observed on various events in the UKOUG 2012 conference series a year after Fusion applications was publically launched, without yet having been fully implemented in any UK organisation. In the user conference, a series of Fusion specific sessions were held over the three day period and a community of interested users formed the main body of the audience in most of the events. In this case, I observed a group of individuals that followed the Fusion stream in over the days of the conference.

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. Communities in area 3 are yet to be formed or recently formed communities due to emergence of new requirements. The Scottish SPSUG and PSFCF are examples of communities fitting into area 3. These

communities were formed in 2011 and 2012 respectively due to long existing needs of public sector organisations.

Communities in area 4 have an established form and are amongst the most widely existing and broadly functioning communities. Examples are the Financial SIG and PSHCM Customer Forum which have been running for several years. These communities have several meetings per year. The meetings take place at regular intervals with a proposed agenda long in advance of the meetings. The meetings are usually the largest in numbers compared to other types of communities defined in the figure.

Next are the communities that fall into area 5 which have not been active for over one year. This is when a community starts to diminish because the users have lost interest in attending the meetings. In this process the events are cancelled frequently due to lack of user registration or an inadequate number of programs in the event. In such cases the community committee strives to keep the community live, until a point when there is only a small number of people interested in its continuation. Finally communities in area 6 are functioning around products which are no longer supported by the vendor. They may range from those in transitional (formation) stage, to their discontinued (old) stages. Those in their formation stage are created due to users having requirements which are no longer supported by the vendor; the members of these communities are generally those organisations who are stable in the use of the de-supported versions and have long-term plans to stay on this version. In the study of the UKOUG communities, creation of such communities was discussed as the vendor had announced its de-support dates for version 11i of its products.

Figure 5-2 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. Figure 5-3 illustrates an example of the spiral movement. This occurs as a community centred around 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 Financial SIG 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. This was explained by one of the committee members as follows:

> […] Nowadays our hot topic is R12, but we still have some sessions on 11i. By the time 11i is discontinued and the majority of our users move on to 12, those interested in 11i may have to form a different group, maybe an informal one […] however this is not going to happen in the near future […] (Interview, Organiser)

In such cases instead of having a spiral move on the Y axis, a new community is formed. This is shown in Figure 5-2, in area 6A.

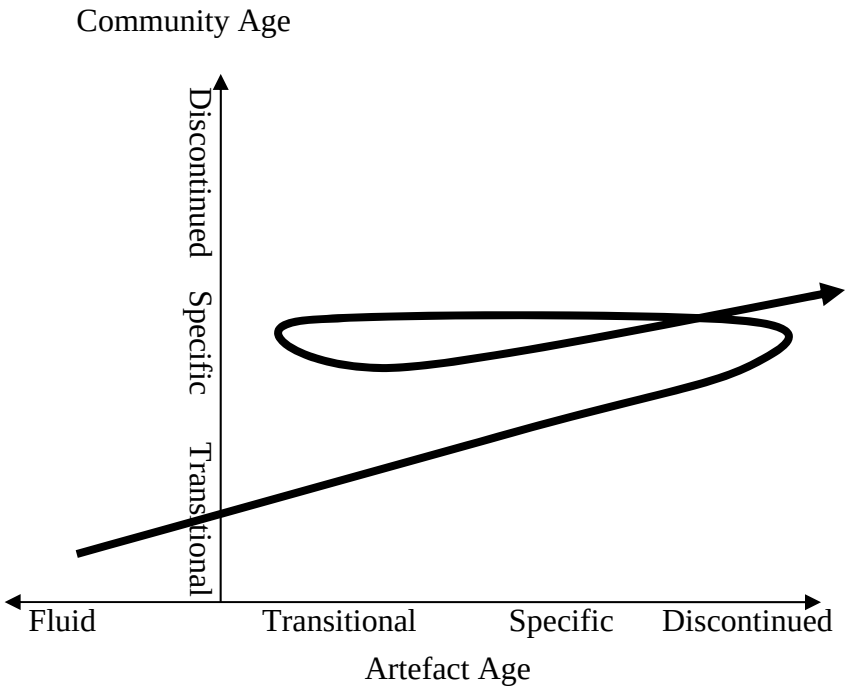


**Figure 5-3 A Possible Spiral Movement on Biography**

In general, different areas on the figure represent the multi-temporal aspect of the community. It can be seen that it is not only the technology which is evolving but also the community attached to it. Coupling the study of various communities, which are all functioning under the umbrella of a single organisation, the UKOUG, facilitated the application of the biography concept over a shorter timescale.

The second aspect of the biography approach, study of multi-locales, was achieved by various settings such as user group meetings, conferences and mailing lists organised by the umbrella community, UKOUG. These spaces provide locations where actors originating from diverse organisations meet and hence 'conflicting local actor worlds collide' (Williams & Pollock, 2011). As a result the undesired exclusion of actors was minimised.

### *5.5.1 Implications of the Biographical Approach on the Study of Technology User Groups*

In this chapter I have produced a multi temporal study of user communities. In this way, I 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 I 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 centred 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 I observed was a bi-directional influence as the technology shaped the community and, in turn, how the community shaped the technological artefact. For instance in the case of the Financial SIG, I observed a change of community activities as the new versions of products were released, and in the case of the Fusion user groups I observed user influences on vendor's products.

So in general, the study showed an on-going flow of knowledge exchange between supplier and user organisations at all phases of product development, adoption and use. This stream of knowledge has bidirectional effects on vendor decisions and user

actions. While in the case of vendor decisions we could see the influence of the user groups on design and development of products and strategies, in the case of user actions, there were evident signs of the influence of the vendor on user choices concerning the use of current systems and orientation towards new systems.

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 & Williams, 2009). In this manner, 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 I could see that the diverse range of actors are performing differently in each setting. For instance while the vendor representatives acted as presenters of products in some groups, they sat silently in other groups and took note of user requirements and ideas. 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.

So overall in contrast to the mainstream studies around information systems user groups which refer to user communities as merely an ‘innovation community’ (e.g. Lakhani & von Hippel, 2003; von Hippel, 2005) or studies that only focus on communities knowledge practices such as ‘communities of practice’ (Wenger, 1999; 2000), 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 software 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 ERP products from the same vendor - can be studied at the same time to capture different characteristics of varying spatial and temporal aspects. Once more this shows the necessity to bring to light the interiors of a community by examining it closely.

# 6 Collaborative Knowledge Markets

*'Community without unity […] is to celebrate both community and difference.' (Corlett, 1993)*

## 6.1 Introduction

In Chapter 4 and 5, the aim was to gain an understanding of user communities with physical presence. This chapter takes a different perspective by analysing the knowledge practices in online user groups based around technological artefacts.

Online communities have attracted much attention from scholars and practitioners. They enable collaboration across geographical distances. They have changed the way people interact and transform the contents of these interactions (Brandtzaeg & Heim, 2007; Wunsch-Vincent & Vickery, 2006). Shared goals and interests, experiences and needs, supportive relationships, a feeling of belonging and the sense of a shared identity are said to be the primary cause for the existence of these communities (Diker, 2004; Rheingold, 2000; Waterson, 2006; Holmstrom, 2004). Armstrong and Hagel (2000) categorise these communities into four groups: communities of transaction (communities which facilitate selling and buying of goods and services), communities of interest (communities of individuals with a shared interest), communities of fantasy (allowing individuals to form new personalities, environments or fantasy stories), and communities of relationships (to facilitate exchange of personal experience while allowing anonymity). More recently other typologies have also been negotiated, for instance learning communities (Palloff & Pratt, 2007), thematic groups (Prusak & Cohen, 2001), collaborative knowledge networks (King, 2011), virtual communities of practice (Hibbert & Rich, 2006), and electronic networks of practice (Wasko & Faraj, 2005). A notable amount of literature has been published on motivations for participation in this diverse range of groups. Expectation of generalised exchange, enhancing reputation, increasing sense of self-efficacy, altruism, gaining visibility, and receiving feedback are amongst the widely discussed motivational factors in online communities (Kollock, 1998; Kim, 2000; Diker, 200; Wasko & Faraj, 2005).

One type of online community which is formed by organisational users of technological artefacts is known as the 'user group'. User groups provide a heterogeneous array of customers with the opportunity to interact with one another as well as with the vendor company (Armstrong & Hagel, 2000). User groups based around software technologies have been amongst the widely discussed user groups in this arena. The study of software user communities goes back many years by examining the users' involvement in software development through communities (Lakhani & von Hippel, 2003; Tomes et al., 1996; Holmstrom, 2004; Jeppesen & Frederiksen, 2006). While the importance of virtual software user communities has been highlighted by scholars, these studies predominantly discuss open source software (OSS) groups. Studies on OSS focus on the lead users and the role of communities in bringing together the innovations of users to develop products. In these communities, geographically distant users share information and through a collective process of innovation, they develop applications (Feller & Fitzgerald, 2002). In this way, the group provides a platform for the sharing of ideas and information. Membership in these communities is voluntary and collaboration in development is out of personal motivation (Ye & Kishida, 2003). Similar to other studies of online communities, the research on the software user groups elaborates on the motivations for participation in such settings (see for example Raymond, 1999; Ye & Kishida, 2003). While most scholars emphasise the outputs of these communities as software development, only a few look at user-user 'support' groups. A widely cited study carried out by Lakhani and von Hippel (2003) argues that users provide 'free' user-user assistance in such communities. Similarly other studies of online forums refer to 'kindness of strangers' (Constant et al., 1996) and 'relationships' (Wasko & Faraj, 2005) as enablers of such open knowledge exchanges.

Whilst the studies of online software user groups have gained momentum, they gloss over the functioning of these groups and present them in rather romantic terms: as open and pluralistic groups where knowledge is freely shared. This has led to a number of limitations in understanding and conceptualisation of online user groups:

- First of all, the extant literature does not give a picture of the broad possible types of knowledge exchanged in these groups. In overlooking the detail they mainly refer to the exchange object as an 'innovation' (i.e., the innovative product that results from these exchanges). This leaves the question of whether this is the only type of exchange occurring in such communities, or are there other types of knowledge being shared and interaction being created.

- Secondly the existing studies tend to pay no attention to explaining the details of these exchange processes. In particular they do not examine how participants in these groups solicit attention, how respondents present their knowledge, and how the exchanged knowledge is used by the requestors.

- Finally, as a result of disregarding the details, scholarship fails to conceptualise the form of exchange (and predominantly refers to the activities as demonstrating a communitarian form of sharing). However, this raises the question of whether there are alternative ways – other than through communitarian forms of analysis – of analysing these groups and exchanges.

This chapter thus aims to address the following question: how does the sharing of technical knowledge occur in user groups and how can we characterise the cross organisational swapping of information? Hence, in contrast to the extant studies I draw on the idea of a trading zone (Galison, 1997) to show how communities of actors from heterogeneous spaces work together to achieve their goals. In this way we appreciate both community and differences. Added to this I begin to think of how such a trading zone might work through introducing a three part analysis based on the workings of an actual market (Clark & Pinch, 1995).

To do this, I will examine a mailing list which serves as the communication channel of heterogeneous organisations, using different versions of a common set of ERP modules. So, primarily, I intend to draw a finer grained picture of the types of exchanges within 'online' user groups, which facilitate cross organisational information sharing and knowledge generation practices. Then I show how this collaboration is enabled in such organisationally diverse and geographically distant settings.

I use an inductive approach in describing the findings of this chapter (Section 6.2). I will present the data and findings of the study of the user forum in section 6.3. Finally, following development of the findings around the 'types' of shared knowledge and the 'practices' involved, I will discuss my findings with respect to the literature on cross organisational knowledge collaborations (section 6.4). This will illustrate how a community acts as a collaborative knowledge market which entails a hybrid of 'collaboration' and 'trading' characteristics.

## 6.2 Methods

Data for this chapter was collected in multiple levels and it was analysed qualitatively through an iterative process of examining the data, coding and categorisation (Strauss & Corbin, 1990) as explained in chapter 3.

## 6.3 Findings

### *6.3.1 Initial Demographic Findings*

The preliminary findings of the study are shown in Table 6-1. The table summarises data collected over the period of six years. Over this period the total number of threads created was more than 1700 with an average of 285 threads per year. While some threads contained only a single message from a requester, with no replies from other users, other threads contained as many as 27 message exchanges. It is apparent from this table that December and January are the months with the least number of threads exchanged, except for December 2012, which in fact, together with November of the same year, had the highest number of threads. Interestingly, the maximum number of messages in each thread was also observed in December 2012. The low number of threads in December and January of 2007 to 2011 was a result of a lower number of system transactions during this period due to national holidays and leaves of absence. However, the contradiction of the results in December 2012 can be explained due to two main reasons. Initially it can be explained due to the application of new governmental laws and legislation at this time which required a significant change to the systems in use by many organisations. The second and more evident explanation was the implementation of two new features in response to the required governmental changes. Also the results obtained from analysis of data in

other periods showed direct correlation between implementation of new features and increase in number of threads.

| Year | Total Number of Threads | Month with Minimum number of Threads | Month with Maximum number of Threads | Maximum number of messages in each thread |
|---|---|---|---|---|
| **2007** | 286 | December, 15 | February, 32 | 10 |
| **2008** | 257 | January, August, December, 15 | October, 35 | 25 |
| **2009** | 303 | December, 10 | May, 41 | 17 |
| **2010** | 264 | December, 13 | October, 34 | 21 |
| **2011** | 255 | December, 12 | March, February, June, 29 | 12 |
| **2012** | 325 | January, 14 | November, December, 43 | 27 |

**Table 6-1 Demographic Data on the PSHCM-LS Threads from January 2007 to December 2012**

After gaining a basic understating of the demographic data, the questions were who are the users and how often do they participate in these exchanges? Do all requests get answered? Are some users more successful in getting answers? Are there some users who participate as responders in more active manners? Do all users act as both requesters and responders?

To answer these questions a detailed graph of the exchange of messages for the first six month of 2011 was drawn. Figure 6-1 presents the messages (edges) exchanged between the organisational users (nodes). Overall the figure shows 77 participants, with a total of 224 message exchanges (threads with responses) and 44 threads without responses. The figure also illustrates 39 self-loops which indicates a user responding back to his/her own initiated message.

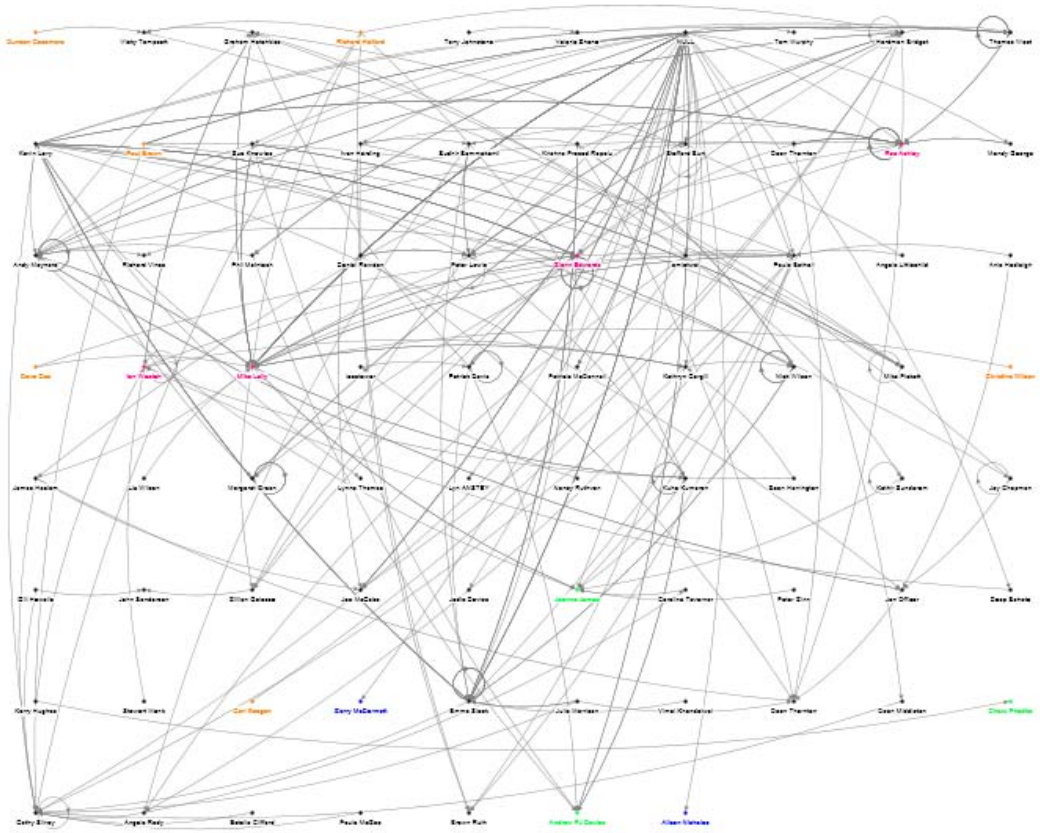

**Figure 6-1 Network of Communications over a 6 Months Period**

The figure shows four types of nodes (examples highlighted by colours): 1) users who participate in bi-directional exchanges, who initiate threads as well as respond to threads initiated by others (pink nodes); 2) users who have not sent an enquiry to the group for six month but have replied to threads initiated by others (orange nodes); 3) users who have initiated a thread and received replies from others, but have not contributed back to the group (green nodes); and 4) users who have initiated a thread but have not had any responses over the six month period (blue nodes).

By examining this graph in more depth[10], we could see that users act in various ways. Some users ask more questions and tend to receive a significantly higher number of

[10] This was done in various ways including 1) differentiating the threads in terms of number of replies, 2) differentiating threads based on the requester, 3) distinguishing the participants in terms of number

replies, while others only asked a few questions and did not received many answers. Also some participants played significant roles in responding to the threads, while others were only receivers of a response without contributing back to the group.

The network of communications in Figure 6-1 illustrates a range of actions formed to serve the needs of different organisations in working with a technological artefact. This graph is used as the basis for analysing data in relation to the questions 'what is being exchanged?', 'how does the exchange process occur?', and 'how can we conceptualise the actions?'

### *6.3.2 What is exchanged?*

The data collected from the forum was initially analysed in terms of its content. Table 6-2 depicts the emergent data structure. The first column in the table shows the categories of the initiating messages in each thread. These categories are extracted from the quotes in the threads. I refer to this as the thread enquiry category. In the majority of the cases, the enquiry constituted a request for some sort of information. However, there are also instances where the enquiry is in the form of an update or information. The second column categorises the different types of responses for each thread. As can be seen in the table each 'enquiry category' may receive a range of different types of responses based on what the responder has experienced in their own organisation. Finally the concepts in the third column show the assembly of the categories into analytical themes.

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of questions over the selected period, 4) characterizing the participants in terms of responding to threads.

| Enquiry category | Response categories | Theme |
|---|---|---|
| **Functionality Specific Needs:**<br>- **Need for solutions to perform actions**<br>- **Seeking guidance on pros and cons of adopting a specific case amongst available alternatives** | • Description of solution on similar cases including system configuration options, available forms and reports etc. | System Functionality Knowledge Exchange |
| | • Description of workarounds<br>• Description of customisations or extensions developed to meet the need | Innovation Knowledge Exchange |
| | • Description of errors faced in performing the action<br>• Description of patch fixes | Error Knowledge Exchange |
| **Feature Specific Needs:**<br>- **Need for experience in implementing new modules**<br>- **Need for experience in implementing new features**<br>- **Seek insight into the benefits and drawbacks of implementing, maintaining and using features** | • Description of standard functionalities/features of the module implemented in the responders organisation<br>• Description of challenges faced in implementing the new module/features | System Functionality Knowledge Exchange |
| | • Description of customisations, workarounds, extensions needed to make the module/feature work in the organisations' particular context | Innovation Knowledge Exchange |
| **Data Specific Needs:**<br>- **Need to know where to find certain information**<br>- **Need to know how to fill certain fields or how to perform an action** | • Description of solution on similar cases including system configuration options, available forms and reports etc. | System Functionality Knowledge Exchange |
| **System Process Specific Needs:**<br>- **Seek advice on running processes**<br>- **Need for advice on designing new processes** | • Description of solution on similar cases including standard workflows, system configuration options etc. | System Functionality Knowledge Exchange |
| | • Description of newly designed processes<br>• Description of modifications to standard workflows | Innovation Knowledge Exchange |
| | • Description of errors faced in running the processes<br>• Description of patch fixes | Error Knowledge Exchange |
| **System Issue Needs:**<br>- **Seek experience in handling errors**<br>- **Seek experience in facing performance issues**<br>- **Seek advice on stance** | • Description of solution on similar cases including and offer experience of change of configuration to solve issue<br>• Description of standard functionality | System Functionality Knowledge Exchange |

| | | |
|---|---|---|
| **taken about a particular error**<br>- **Seek updates on Service Requests**<br>- **Finding out whether something is a bug or a standard functionality** | • Describe possible fixes through introduction of patches and how to apply them<br>• Describe similar cases and actions taken to resolve the issue, or to approach/respond to the vendor<br>• Describe vendor provided solutions and status<br>• Describe updates on Service Request status | Error Knowledge Exchange |
| | • Describe workarounds to overcome issue | Innovation Knowledge Exchange |
| **System Issue Updates:**<br>- **Announcement of issue discovery**<br>- **Updates on patches and bug solutions** | • Enquiries about the details<br>• Description of similar issues<br>• Description of possible resolution | Error Knowledge Exchange |
| **Cost Benefit Enquiries:**<br>- **Request for 'Do's and Don'ts in an activity'**<br>- **Request ideas on possible critical issues and experiences in upgrading / re-implementing**<br>- **Seeking guidance on pros and cons of performing an action, e.g. consultant selection** | • Explanation of best practices<br>• Explanation of challenges faced in performing actions<br>• Explaining processes adopted | Practice Knowledge Exchange |
| **Practice Enquiries:**<br>- **Need advice about pit falls in the processes**<br>- **Finding out about practice commonalities and differences** | • Explaining processes adopted<br>• Providing comparisons<br>• Offering project strategy documents | Practice Knowledge Exchange |
| **Review Enquiry:**<br>- **Seeking review on current processes adopted by organisation**<br>- **Need for advice in scoping the requirements**<br>- **Seeking advice on the stance taken in response to vendor actions** | • Offering insights into actions | Practice Knowledge Exchange |

**Table 6-2 Emergent Data Structure and Themes in Forum Exchanges**

The table shows four main themes: System functionality knowledge exchange, innovation knowledge exchange, error knowledge exchange, and practice knowledge exchange. These themes differ in terms of intensity of knowledge creation,

appropriateness of the responses to the enquiries, and finally in terms of being product versus process related. The intensity of knowledge creation addresses the extent to which this exchange of knowledge results in new knowledge formation. This differs from one case to another, as in some cases only the existing knowledge (typically explicit knowledge) is being transferred from one organisation to the next whereas in other cases the exchange leads to the creation of new knowledge both in cumulative or discrete manners. For instance, system functionality knowledge exchange, which refers to the knowledge and experience held by individuals about the standard functionality of the system, tends not to involve much new knowledge creation at the point of exchange. An example is the following message from a user where she refers to an existing functionality as a solution for the enquiry:

> There is a standard functionality called Mass Assignment Update – see Metalink note ID 214799.1. (Field note, E-mail exchange)

Conversely the case of innovation knowledge exchange has a tendency to create knowledge as various new ideas are put forward and in many cases mixed and matched to fit the needs of the requesting organisation. This is how a user explained this:

> […] two solutions were offered to me, a custom report and a customisation validation on the fields […] since we did not want to go down the customisation path, we only changed the report to match our needs […] (Interview, User)

The relevance of the response to the enquiry is also likely to vary amongst different knowledge exchange themes. In the case of error knowledge exchange I could see a high tendency that the responses match closely with the requester's demand. Here is an example of a case where an organisation needs advice on an error:

> We are trying to reverse a termination for an employee with 2 assignments both of which have been terminated as the termination was carried out through the End Employment screen. The system is hanging therefore we are unable to reverse the termination.
>
> We would be grateful for any help regarding this problem? (Field note, E-mail exchange)

After a round of discussions around the issue and explanation of other organisations in facing the same error, one responder sends the following message, informing the requester about a patch which resolves the issue:

> The patch no. is 10157179. We have signed off in our test system and will be applying the patch to Production tonight. I was just waiting for the final check in the live environment on Monday before I sent confirmation round the listserver. (Field note, E-mail exchange)

However, in system functionality and innovation knowledge exchange, there was a high fluctuation of whether the response could be directly applied to the requester's demand or if it would need further modifications to be able to fit the enquiry, if at all. An example is when a user asked for some input in implementing Enhanced Retro Pay functionality and she received the following response, which indirectly explains an alternative that could facilitate in implementing the functionality:

> We are not yet on Enhanced Retropay but went to the 'old' Retro-Notifications Report some time ago as an interim measure. The way we got around this issue of multiple re-calculations was to run the Retro-Notifications Report to clear out all the existing data, this will create an assignment set with a huge number of records, but then just don't run the retropay process on these. Then any subsequent backdated changes will get picked up on the next Retro-Notifications run. You have to get the timing right though i.e. run this clear-out Retro-Notifications Report just after you have finished with the pay run but before you have let users back into the system. In theory this approach should also work for going straight from Retropay by Element to Enhanced Retropay. (Field note, E-mail exchange)

Finally, the Practice Knowledge Exchange theme differed from the other three in that while these directly addressed the technological content of the online user community (the product), the practice knowledge exchange focused on processes or issues around working with the product or managing relationships with other actors concerned with the product, for example the vendor or third party implementation consultants. Here is an example case:

> At [user organisation name], we are now, seriously, looking at setting up the OSP and OMP[11] functionality onto our system. As a result, we are looking to engage consultants to set up these schemes for us.
>
> Can anyone, that has been through the tender exercise, for OSP and OMP, give us any advice, while scoping the requirements, of any pit falls to look out for […] (Field note, E-mail exchange)

### 6.3.3 The Exchange Process

Exchange in the PSHCM-LS was shaped by temporal and technological conditions that arose during the everyday activities of the user organisations. The HCM module was the backbone of many activities performed within user organisations. It was a tool to run not only the internal activities of an organisation, but as importantly a system for delivering services to external clients (e.g. payrolls for schools) or legal entities (e.g. tax reports to treasury). These user organisations relied on the system as their core source of information. At the same time, both their internal and external activities where highly reliant on the laws and regulations imposed by higher governmental authorities. Hence as new rules were applied by the authorities the organisations were obliged to change their processes, outputs, or data to conform to the new instructions. This could mean a need for change in the HCM system, and being a standard system the change could either be applied through reconfiguration or there was a need for customisation.

Moreover, being a computerised system, there were also cases of data or process errors leading to exceptional conditions in the system. Typically, such situations required quick responses. However, the distance between the vendor and user organisations, could lead to a time consuming process for provision of the appropriate solution by the vendor company. Receiving the right solution from the vendor sometimes involved numerous exchanges of e-mails, firstly for the vendor to find out what the exact conditions and context are, and secondly for the requester to carry out the procedures given by the vendor, one at a time. This often involved a time consuming process involving the requester organisation asking a question, receiving a response from the vendor, responding back to that response and repeating

[11] OSP and OMP are system anonyms.

this loop until a resolution was achieved. This could also lead to what Pollock et al., (2008) refers to as the 'Ping-Pong' practice, the unwanted passing of technical problem messages in the vendor's support sites. This process was not appreciated by the users.

Additionally, the evolving standard application and evolving needs of the user organisations in tandem encouraged the organisations to seek knowledge particularly around adopting new features, modules and software versions. Therefore expertise and experience, apart from those written in books and specification documents, were required to gain an understanding of how to perform actions and understand their consequences.

Taken together, these work conditions, external forces and internal demands, required consultation from other user organisations with similar demands or prior practices. User organisations needed access to information to be able to meet expectations. In such circumstances, PSHCM-LS was a primary platform for the exchange of knowledge. As one forum member described it:

> In [Organisation Name] whenever we face an issue in our HRM system, the first point of contact outside our organisation is the forum. We send our questions and we know that if there is an answer, at least one member of the forum will respond… for a system that is running a company's daily activities, the system MUST work and if there is an error then prompt solutions are required… forum is the place where we receive that timely reply, because people are not worried about whether their solution is the perfect fit, they just share what they believe is relevant and for the most part it solves your problem, at least for the time-being. So you are back on the track on time […] (Interview, User)

After analysing the thousands of messages in the forum, the next question was how to make sense of the requests and the kinds of replies they invoke. There is a myriad of messages and responses without any seeming order, but, in fact, through analysis, it seemed that these exchanges follow a pattern that can be described as follows: 'building an audience and describing the case', 'obtaining collective responses', 'local selection and reconstruction' (Terms adapted from Clark and Pinch's book 'The Hard Sell').

**Building an Audience and Demonstrating the Case**

As described earlier in this chapter, we observed that while some requesters received numerous responses to their requests, others did not receive any replies. So the first act we saw was attracting viewers to open the messages and persuading them to respond. Getting people to read the request is not, in itself, sufficient to receive their knowledge. The reader has to be constantly worked on by the requester in order to be prepared to respond.

Given the diversity of the technology versions and the wide range of options for configuring the system, each user organisation typically had a distinct way of setting up the product as well as the option of implementing and using different features and modules. Hence, to discuss the issues, users from different organisations, had to make their particular choices and their consequences visible to others. To do this the users who initiated threads started by giving an explanation of the state-of-the art situation on technology in their business. As an example a user explains:

> […] We are on R12.0.6 and it appears in this version the copying functionality has been locked down to prevent copying from one Business Group to another […] (Field note, E-mail exchange)

Such statements provided the base for forming correspondences between the implemented systems as well as highlighting the possibility of discrepancies in the consequences arising from actions. These explanations were then followed by an issue statement, which went into the details of what the issue to be discussed is and how it is affecting their business. Here is an example of a problem statement:

> One of our schools has just transferred to academy status and one of the employees who is transferring over to the new academy is currently off work on a period of maternity leave. There is still some of the Statutory Maternity Pay to be processed & we are struggling with finding a way to only process the remaining SMP which is due to be paid. So far we have tried the following options in a testing environment but so far we haven't had any success [technical details given] If anyone has had a similar experience or possible solutions I would be very grateful if you would be able to help me out of this fix. (Field note, E-mail exchange)

In some cases the requester also defined what type of response is expected. For instance, they stated whether a custom solution is feasible or only standard functionality solutions were desirable.

So in general it was not only a matter of making the case visible, but also making it attractive and interesting for the responder to reply. Such ways of building audience and demonstrating their case allowed users of the same product group, but dissimilar versions or configurations to negotiate and exchange information. For example a case made around version R12 was responded to by users of R12 as well as 11i. It also allowed a single channel of communication between the diverse range of users. In such cases, one user did not have to use the exact artefact version to be able to be a part of the community. Instead users with dissimilar settings and versions could collaborate through the same channel by acknowledging the differences as well as similarities.

**Obtaining Collective Response**

Subsequent to demonstrating the case, those requesters who have attracted an audience start receiving answers. Users with knowledge or experience, whether it was directly related or even barely allied with the case, represented their responses. In this way they made their knowledge visible to others in the community. The responders shared their experience of a similar case which they perceived to be relevant to the rest of the forum.

> We use 260's I believe because we don’t pay people to work weekends or if we do then they get over time. Or we break everything down to an hourly rate which gives a more consistent answer with other calculations. See below [Technical Details Given]
>
> Here I believe is a strong argument for 260's but It will I guess vary on contract types and work patterns. Years ago we worked on 365's but made a switch at some point. I've always been confused as to why there is no clear legislation on how to do this. (Field Note, E-mail exchange)

Figure 6-2 shows the two different characteristics of response: Preciseness of the solution and the intensity of interchange between the parties. Preciseness of the solutions refers to whether the response given fits exactly with the problem statement. The left hand side of the scale shows responses which are direct solutions

offered by responders on an identical case they have experienced in their own organisations. An example is when a requester asked how to record half day sickness for employees and he received a direct answer:

> We enter absence days as decimals (e.g. 0.5 days) where appropriate. The only issue is that corrections to the default value can only be entered for a confirmed absence. As this is not widely known we believe there is a lot of over recording. (Field Note, E-mail exchange)

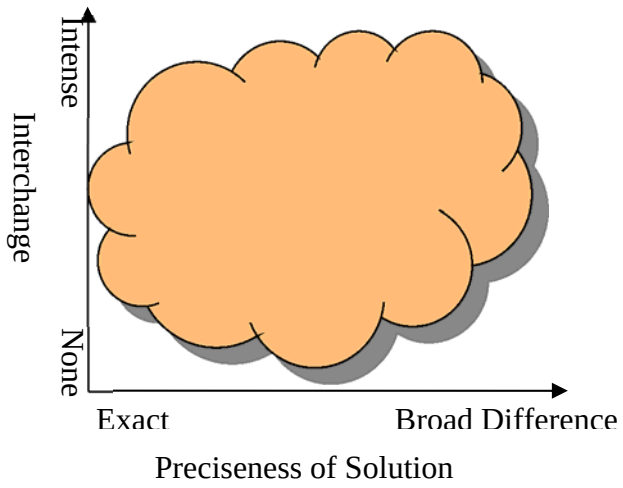


**Figure 6-2 Characteristics of Response**

Conversely, the right hand side of the scale, illustrates the responses for dissimilar cases which the responder has conceived as being useful for the requester. An example in which a user asks how to use 'Authorized Delegate Responsibility' to give permission to staff to complete timecards for staff in a different 'organisation' is as follows:

> We use OTL[12] but I have not heard of this responsibility. We use 'OTL Super Timekeeper' to manually create groups and assign individuals from any part of the organisation to them. (Field Note, E-mail exchange)

[12] System anonym

As can be seen in the example the responder is not offering a solution for use of ‘Authorized Delegate Responsibility’. Instead he presents a solution that they use to record timecards in different organisations.

The vertical axis shows the intensity of discussions around a problem statement. On the bottom of the axis we see that no discussions have been formed around the problem statement (the 44 threads in my case). However, as we move up the axis, the intensity of discussions and the interchange of information between the parties grow. The intensity may arise due to discussions formed between one responder and the requester, or between a number of different responders and the requester. These responses could lead to collective solutions. The more we move up this axis the higher the number of messages exchanged in one thread.

The response representation does not involve translation which entails constructing shared meaning across communities. Also, although it involves the same product group, the versions and configurations in responders’ organisations may vary. Hence, in some cases, the response representation is not necessarily formed to fit the exact artefact. Instead, the representation of the work requires stating the response in a way readable to the requester organisation. So in general while the responder may not have the experience of the same version and configuration of the product, while he clarifies this in his response, nonetheless he provides information that he perceives to be relevant to the issue. This leads to an assemblage of responds to be analysed and used by the requester.

**Local Selection and Reconstruction**

At this stage the requester is faced with various related or unrelated responses and needs to make sense of the assembly of responses. The requester takes the represented responses back to their organisations and initiates a reconstruction process which transforms the response into usable action for their own organisation. This involves recompilation of the received responses, combinations of the loosely linked ideas and coming up with a final solution usable by the requester’s organisation. Below is an example which shows how a user recombines and reconstructs a solution to meet his own purpose from various responses.

> Requester: When setting up a Payroll there is a field called Unique ID. Does anyone know where to get this number from? We have rang the Tax office and they did not seem to know anything about it. (Field Note, E-mail Exchange)

In this case three distinct responses were sent to the forum as follows.

> Responder1: I'm not sure where it comes from but our Unique ID is the same for all our payrolls (Field Note, E-mail Exchange)
>
> Responder2: Unique Id can be any value to differentiate the Payroll while running the end of year process (considering all payrolls are using the same tax reference). Scenario Example: Tax Ref: 099/KP12345, Payroll1 using the Tax Ref: 099/KP12345 Unique Id 111111, Payroll2 using the Tax Ref: 099/KP12345 Unique Id111112. So End of Year process can be run individually for payrolls by selecting the unique Id entered against the Payroll Definitions. (Field Note, E-mail Exchange)
>
> Responder3: We had exactly the same query and below is what we finally managed to dig out of the HMRC website. Basically you make up your own unique id(s) as long as it follows the rules below[rules given]. We use the ID for differentiation but for groups of payrolls not individuals. (Field Note, E-mail Exchange)

In an interview with a user in a similar situation, he explains how they have formed their final solution by use of a combination of two responses:

> We are now following the validation rules provided by [Responder3] and setting up our own Unique ID. We use it to differentiate our payrolls [as suggested by Responder2] (Interview, User)

The results of such cases, where the requester organisation reconstructs the solution to meet the exact need of their own organisations, are generally not reported back to the forum. In general only cases which are reported as a collective outstanding problem for many members and which are solved during the period of discussions are notified back to the forum. Such cases are typically formed around error knowledge exchange cases.

Table 6-3 shows four cases from my analysis of the data to show the practices involved and the results obtained in the knowledge collaboration activities.

| Case | Building and Audience and Demonstrating the Case | Obtaining Collective Responses | Local Selection and Reconstruction | Type | Remarks |
|---|---|---|---|---|---|
| **Manager Self Service view of employee assignment** | Version Defined<br>Detail Given<br>Question Asked | Two responses directing the requester to check profile options | | System Functionality Knowledge Exchange | Direct response and application to the case |
| **Online Payslips** | Version Defined<br>Detail Given<br>Question Asked | | | | No response |
| **Mass moves of assignment** | Process Defined<br>Detail Given<br>Question Asked<br>Type of solution desired defined | Resp1: Metalink note ID of standard functionality forwarded. Also highlighted there are some issues.<br>Resp2: Own organisation MD075 document (from 2 years ago) sent for requester. This included a custom SQL.<br>Resp3: Also highlights there are no standard functionality for certain cases and explain their own solution. | Uses the standard 'Mass Assignment update' and configures base on own requirements. | System Functionality Knowledge Exchange<br><br>Innovation Knowledge Exchange | Options given from users with different experience and situations. The best match is selected and reconstructed to meet user organisation's needs. |
| **Unable to Reverse Termination** | Error Explained<br>SR number given | Resp1: Explains having the same error and waiting for the result of an SR (including SR number)<br>Resp1: informs others about the coming patch<br>Resp2: asks for patch number<br>Resp1: gives patch number and explains they have successfully applied it | Each user organisation with the same issue applies the patch. | Error Knowledge Exchange | A requester highlights an error that also exists in other organisations, a responder highlights a patch. Many user organisations apply the patch. |

**Table 6-3 Examples of PSHCM-LS Data**

As can be seen in the example given in Table 6-3, not all messages sent by requesters receive an answer. Figure 6-3 illustrates a large number of requests which have been

left un-responded to (highlighted in Red in Figure 6-3a). Moreover, not all participants take part in responding to the messages (Figure 6-3b) instead they only send enquiries and take back the responses without necessarily contributing back to the group. Such users tend to be involved in only some of the practices. In contrast, we see users who engage in the forum on an on-going basis. They are involved in all the three practices, by initiating enquiries, representing their own knowledge in response to enquiries of others and reconstructing solutions based on their own needs.

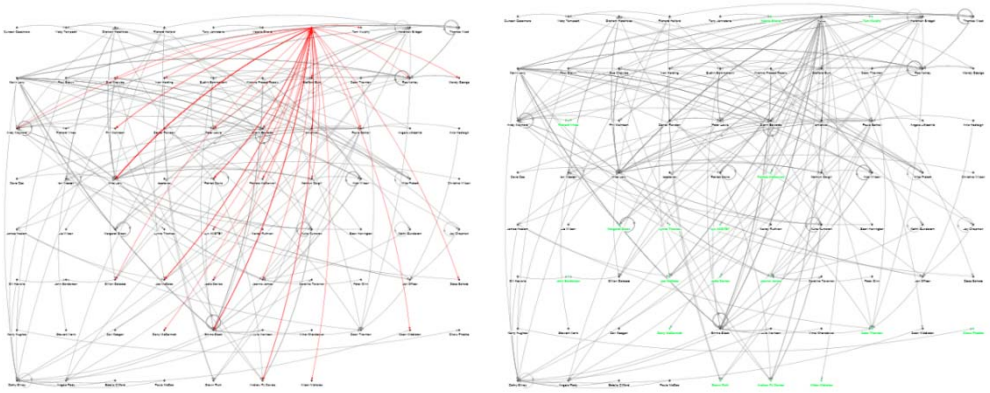

**Figure 6-3 Examples of (a) Un-Responded Messages and (b) Non-Responding Users**

Interestingly, there were also those members who played a continuous role in keeping the group functioning. Traces of their actions could be seen in many threads. Not only did they respond to enquiries from others, but also they maintained momentum in the group by sending updates about the technology and coordinating actions amongst the user organisations.

Hence the findings show a diversity of ways in which users participate in the forum. Finally when interviewed about their intentions, users offered different but comparable views which can be grouped into the three terms as defined by users: ‘exchanging to empower’, ‘sharing despite dissimilarities to enhance use’, ‘quick for us, useful for others’. These drivers for contribution, together with practices involved in coordinating the exchange, enabled the knowledge collaborations in everyday activities of the organisations. The urgency to find answers to their needs, and

obtaining experiences of other users prior to acting, helped to keep the actions going in the forum.

To sum up, Table 6-4 shows a summary of the practices involved in knowledge collaboration across organisations. These practices show codification of knowledge as an exchangeable product to be exchanged between the parties. So despite the differences in system configurations and use contexts, as well as diversities in individuals' skills and knowledge, I observed patterns of knowledge codification and abstraction by both requesters and responders. This was followed by re-application of this codified and abstracted knowledge by requesters.

| Practice | Description |
|---|---|
| **Building an Audience and Demonstrating the Case** | Posing the problem to catch attention - Making problems clear, interesting and of a general nature<br>This is done in various degrees of granularity based on the type of request. The most important activity in this step is to portray the problem statement in a 'legible and interesting form' for other members. Ambiguity of problems statement may lead to receipt of no response. |
| **Obtaining Collective Responses** | Assembled audience offer a range of related or unrelated response. Some collective acts and some individuals.<br>In this practice the responder's knowledge is made accessible to others without having commitment to offer a direct reply. |
| **Local Selection and Reconstruction** | This practice involves recompilation of the represented ideas. In this step a 'collage' of loosely linked ideas is formed by the requester. This may involve re-interpretation of given solutions. The final activity here is solution generation. |

**Table 6-4 Exchange Process Practices**

## 6.4 Discussion

To evaluate these findings in light of the literature, I examined the literature on cross organisational knowledge collaborations. Prior studies shed light on important aspects of horizontal collaboration in such settings by suggesting a mixture of mechanisms to transfer, translate and (re)form knowledge (for instance see Dougherty, 1992; Adler, 1995; Carlile, 2002; Bechky, 2003; Pawlowsky & Robey, 2004; Kellogg et al., 2006; Amin & Robert, 2008). In Table 6-5 I have summarised the differences between four main perspectives in this field (Spender, 1996;

Tsoukas,1996; Brown & Duguid, 1998; Orlikowski, 2002; Carlile, 2004; Kellogg et al., 2006). These perspectives are formed around information processing orientation, communities of practice, knowledge in practice orientation, and trading zones.

In all these forms of cross-organisational collaboration forms, the main arguments are built around knowledge sharing for product development. In the syntactical approach, communities of individuals are formed based on a strategic choice (Kellog et al., 2006). This perspective uses concepts such as 'knowledge transfer' (Kogut & Zander, 1993; Nonaka, 1994) to explain the exchange of explicit knowledge between people and settings through capturing, storing, retrieving and transferring it. In such settings knowledge sharing is enabled through creation and use of a shared lexicon (Carlile, 2004). The knowledge sharing behaviour in this perspective is similar to that of the pragmatic approach, which is based on calculation of cost and benefits. However, what differs in the pragmatic approach, (e.g. occupational communities, Bechky, 2003), is that it typically involves joint transformation of accumulated knowledge of individuals resulting in what is known as 'common knowledge' (Carlile, 2004). The trading zone view also has a cost-benefit approach but in contrast to the other two approaches, in that it involves representing the knowledge in a 'shared form' (Kellogg et al., 2006). Finally the semantic perspective has a more diverse approach in the sharing of knowledge. It is predominantly seen in the literature on Community of Practice (CoP). In this case knowledge is embedded within members' experiences and is used in a particular context of action (Gherardi & Nicolini, 2000; Brown & Diguid, 1991, Lave & Wenger, 1999; Lave, 1988). However, due to the diversities in meanings, and context, co-ordination is difficult in these communities (Carlile, 2004). Therefore they need to acquire a shared language (Bechky, 2003).

| | Knowledge Sharing Behaviour | Nature of Knowledge | Challenges | Knowledge sharing Mechanisms |
|---|---|---|---|---|
| Syntactical Approach: Information Processing Orientation | Strategic choice and a result of cost-benefit outcomes | Explicit which can be codified, captures, stored, retrieved and transferred between people and settings | 'Problem of syntax': Incompatibility of code, routines or protocols.<br>Challenge increases when novelty increases | Creation and use of common lexicon and standard procedures |
| Semantic Approach: Communities of Practice | Occupational conceptions and understanding | Tacit, situated, and experimental. Knowledge in action hence not easily codified. | Problem of semantic: differences in meanings, assumptions and context. Challenge increases when interests differ. | Use of shared language, shared meanings, collective stories, common artefacts. Differences negotiated through translation and interpretation |
| Pragmatic Boundary Approach: knowledge-in-practice | Dependence on each other's<br>consequences | Accumulated experience and know-how of members | Problem of pragmatic: need to modify existing knowledge bound to individuals interests and context | Current knowledge is negotiated and transformed to new knowledge. Knowledge sharing involves changing one's existing knowledge (joint transformation). Common knowledge and Common ground |
| Trading Zones View | Interdependent production | Explicit, rendered to legible forms for future assemblage. | Problem of valuation:<br>Challenges increase due to distinctive values. | Displaying knowledge rather than sharing. Representation through 'shared forms' and templates. |

**Table 6-5 Comparison of Cross Organisational Knowledge Collaborations**

The actions in user groups differ very much from the syntactical approach and the pragmatic boundary approach in that they do not need to create a shared lexicon or

standard procedures of exchange. Nor are they dependant on each other's work outcomes or joint transformation of knowledge. They also differ from CoP in that they do not occur in the communitarian forms described by this strand of studies. As Wenger (1999) describes, in the user groups we can see the fast setup of problems to be discussed through use of a shared language. We can also observe a rapid flow of information through shared ways of engaging in the forum. However, the strong social ties that exist in the CoP do not necessarily endure in online forums. The observations of the PSHCM-LS made clear that the exchanges that occur in an online user group of heterogeneous actors cannot be explained by a 'community of loyalty' (Adler & Heckscher, 2006), a characteristic of many studies on communities of practice which entails long-term commitment. So these user groups are not like CoP, which are about loyalty and communitarian forms of actions.

Instead the type of cross organisational knowledge exchange that occurs in such user groups is impermanent collaborations of professionally focused players to act to achieve a common target in a constrained time environment. This was a type of trust that was formed between the users from different organisations participating in the PSHCM-LS forum. With the common target of finding a solution to their needs, actors engaged in activities of the group. However, due to existence of each individual's own organisational priorities, too much contribution to the group could conflict with one's own responsibilities. Hence in such groups, individuals contribute to the achievements of others by performing non-committed actions beyond the mandates defined by their own organisation, and at the same time accomplish solutions to their organisational needs. The distinct priorities imposed by the actors' organisations can be seen through Galison's perspective in aligning diverse interests. Galison (1997) shows how different communities within physics work together and align their heterogeneous activities to achieve their goals. He proposes the 'trading zone' metaphor to underline how local actions and ideas are coordinated despite differences in norms, meanings, and community purposes. He highlights that it does not require stability or an enduring of relations. Instead, collaboration only demands an understanding from all sides that the continuation of exchange is a must to their survival.

We agree with Galison and want to take forward his analysis but find it hard to implement this in the context of online communities. Thus I draw upon analysis of another form of trading where there already is a ready language for some of the negotiations and interactions at play here. Clark and Pinch (1995) discusses market traders emphasising how they **create an audience** through well practiced spiels. Once an audience has been constructed they **assemble and respond** to the prompts provided. Not all people are there to buy so part of the work of selling is to **sift and select** buyers. In a similar manner, in an online user group, we see requesters act as pitchers demonstrating their problem, attracting an audience and opening up interactions. Again similar to pitchers, they 'thank the audience for moving forward before they have started to do so' (Clark & Pinch, 1995, P. 23). This is how users attract attention in a busy organisational space and secure help. In respond, some of the readers of messages assemble and send non-committed responses. Then the requester goes through the responses and separates the useful from the non-useful (trading off audience responses) and combines the 'selected' to construct the final solution to the problem.

So in general, what we observed in this online forum was a collaborative trading of knowledge where users shared their experiences and knowledge, however at the same time had a higher intention of progression in technological use. I refer to such a space as a 'collaborative knowledge market'. The practices of 'building the audience and demonstrating the case', 'obtaining collective responses' and 'local selection and reconstruction' formed the knowledge and enacted this type of exchange. Particularly in cases where there was a wide gap between the responses offered and the problem statement (as can be seen on the right side of the X axis in Figure 6-1), the practice of local selection and reconstruction enabled users to generate knowledge locally from what was offered in the forum. In such cases requesters of the community coordinated their actions temporarily and locally, by construction of a solution to their need.

Similar to the application of a trading zone, as described by Kellogg et al., (2006), engaging in a collaborative knowledge market indicates that dissimilar groups can interact across boundaries if they can agree on the overall reason of survival and

processes for exchange, even if they reconstruct the knowledge locally. In this way the participants did not have to make deep-rooted and long-term commitments to creation of a shared meaning (unlike CoP's). They only had to make their knowledge accessible and render their ideas in a legible form to be re-applied by others.

This type of communication and exchange is beneficial in cases where knowledge is held not only explicitly, but also formed as the consequence of users' experiences. Furthermore, such communications are useful when time is short and rapid circulation of knowledge is required. In such situations, although some names become known to many members, many others stay barely recognised. Nevertheless their responses are taken up by the requesters and adapted to local needs. The online user group enabled respondents to share their knowledge without needing them to devote long time for adapting them to the exact case of the requester. It then allowed for rearranging and recombining of ideas by the requesters.

# 7 Artification: A Detailed Perspective from User Invention to Innovation

*'Attributions of 'success' and 'failure' can be regarded as conjoined narratives...' Finchman, 2002*

## 7.1 Introduction

Products developed by user communities 'compete head-to-head against products developed by manufacturers' (von Hippel, 2001, p. 84). This is a quote by von Hippel published in an essay in 2001 where he argues about the important role of user communities in technological growth. This has accelerated a large body of debates by economists about the significance of such settings; however, despite their importance, the underlying course of innovation by means of such groups is yet to be explicitly described. Studies of user innovations by economists, in particular, emphasise the successful outcomes and disregard the complexities and challenges, competitions and collaboration, and perhaps the wide range of outcomes of the innovation process. Although economists elaborate various aspects of user innovation, they only offer a glossed view of the community which fails to describe the possible routes of the innovative acts of users. By not doing justice to the details, they also fail to account for other actors involved in the process and hence they neglect the tensions and conflicts arising from such heterogeneities. Additionally, there are dozens of examples of technologies named by user innovation studies, when describing democratisation of innovation. Yet, there is a contradiction that there is very limited understanding of the technical details. This deficiency in appreciation of the technicalities is perhaps another reason for not appreciating the wide range of possible outcomes. This issue becomes even more unexplored and problematic in the case of complex 'generic' (Pollock & Williams, 2009) applications designed to cater for the diverse needs of different organisations. As shown in Chapter 2, there are currently no studies of user innovations by economists on enterprise packaged applications. More generally there is very limited understanding of innovation by communities. Instead the extant literature focuses on

distribution of user innovative outcomes through communities rather than community-initiated innovation.

To respond to this somehow partial understanding of user innovation, a science and technology studies (STS) lens will be used to explore the innovation within the user communities. There is a large body of literature, in the field of STS, which explains some of the different routes of innovation in such complex settings. The STS research defines concepts such as 'innofusion' (Fleck, 1988), 'domestication' (Sørensen, 1994) and 'social learning of technological innovation' (Williams et al., 2005) to assert the non-linearity of innovation by showing the wide range of actors involved in technological growth. While valuable in showing the different inputs and cycles of innovation, the majority of studies tend to offer an 'asymmetrical' perspective (Pinch & Bijker, 1984; Callon, 1986) which does not present a balanced insight on successful and failed outcomes.

Hence, in this chapter, by presenting a symmetrical explanation through the lens of STS, I aim to examine details of innovation in user groups. In the previous chapters, I showed some of the different roles of such communities in the evolution of complex enterprise packaged applications. In this chapter, I will change the analysis lens and follow, not the community, but innovations through the community. Hence this chapter intends to offer insights into the detailed role of user communities on evolution of complex enterprise technologies by answering the following questions: How do organisational users act as sources of innovation when faced with generic enterprise systems? How far do user-initiated solutions travel and what routes can they take? In what ways can they influence technological outcomes? How does user innovation occur within the user groups and what are the challenges involved in the process? Are all user-initiated solutions successful? And finally, in what forms can we conceptualise the outputs and paths of user innovation?

This chapter aims to answer these questions by conducting a multi-level study of user innovation over an extended period of time. In doing so, primarily I will show various pathways of innovation. I will also illustrate how varying practices of different actors involved in different stages of the technology lifecycle lead to temporal successful and failed outcomes. In this respect, in response to largely

neglected details of user innovation, I introduce the notion of 'Artification' which attempts to explain the outputs arriving from user-initiated solution generation in complex enterprise technologies. This conceptualisation aims to emphasise the temporality of innovation and relativeness of its success. The chapter will finally refer back to the Social Learning in Technological Innovation theory to address the importance of user groups in the innovation and its diffusion process.

## 7.2 A 'Symmetrical' Lens in Analysing the 'Biography of Artefacts'

As described earlier, user innovation studies have a tendency to focus on only the 'successful' outcomes of technology. This has resulted in an 'asymmetrical' (Pinch & Bijker, 1984; Callon, 1986) perspective on the evolution of technology which contradicts the complex nature of technology. Technological growth is not to be considered as a linear process in which iterations of success lead into functional outcomes. Rather a symmetrical explanation which treats success and failure of artefacts in an equal manner and elaborates conflicting viewpoints in similar terms is required (Pinch & Bijker, 1984; Callon, 1986). Pinch and Bijker (1984) and Callon (1986) argue that the 'successful' outcomes in the development are anything but the 'only' outcomes.

Hence in this study, I intend to use an approach that takes into account multi-directional characteristics of technological innovation. This means one that views a functional technology as a consequence of multiple complex successful and unsuccessful innovation attempts, as viewed differently by the actors involved, with the reasons behind it being both 'technical' and 'social'. As a result, primarily I will use the principles of 'generalised symmetry' (Callon, 1986) to discuss the uncertainties involved in a number of user- initiated innovations and show how each of them may take a different route in their lifespan. This approach suggests maintaining symmetry in explaining success and failure by paying equal attention to various categories of actors.

However, in this study the aim is to take one step further and use the symmetrical perspective to study the contents of technology and the influence of the surrounding technical and social choices on its trajectory. To do this I take into consideration the

bodies of research on ‘the social shaping of technology’ (SST) (Williams & Edge, 1996; Sorensen & Williams, 2002). This approach calls for opening the black box of technology (as every technical artefact development involves a range of ‘social’ factors which influence the selection between a range of possible ‘technical’ choices) and examining the complexities within the process of innovation. Furthermore, the aim of this study is to investigate user-initiated innovation. This view of innovation suggests that the design of an artefact goes beyond the research and development labs and it takes place in multiple cycles of design, implementation and use. Hence, the ‘social learning’ (Williams et al., 2005) perspective on technological innovation will be used which opposes the idea of a ‘linear’ innovation process. This perspective takes into account cycles of ‘innofusion’, ‘domestication’ and ‘appropriation’ by users. This means appreciating the ability of ‘non-specialist users’ to fit evolving technologies to their purposes and make them suitable as they implement and use them.

One weakness to date of this approach is that in studying the innovation of a technology, scholars have tended to consider this in a single space and time (such as during a single site implementation study). Hence I will use the ‘Biography of Artefacts’ (BoA) (Pollock & Williams, 2009) to study the complex settings surrounding enterprise applications dispersed over several spaces. The idea of BoA stems from Brady et al.’s (1992) suggestion that packaged software artefacts have biographies, followed by Koch’s (2005) explanation of Enterprise Resource Planning (ERP) as a moving target that involves heterogeneous social and material elements in its development. It suggests that in the study of such complex solutions, ‘technology should be followed through space and time’ (Pollock & Williams, 2009). This framework asserts the need to move beyond a short timeframe, drawing attention to the changes occurring over time to the technology as a result of complex linkages that exist between different types of actors involved (i.e. users, vendors and intermediaries).

In this study instead of following the trajectory of the core technology, I will be tracking the branched-out user solution creations as they implement and use ERP application in their organisations (innofusion and domestication), their trajectory and

the choices they make (SST) and the routes that they take (in a symmetrical approach) as they move over multiple timeframes and locales (BoA). The biographical approach linked with a symmetrical perspective allows us to uncover the technological terrain as it transforms in a multi-directional manner over time. However, before going into the details of the study, there is a need to explain the characteristics of the technology under investigation. Hence in the next section I will briefly describe the technological content of this study.

## 7.3 An Overview of the Nature of Enterprise Resource Planning Systems

Whilst in Chapter 2 I discussed the general features of ERP, in this chapter I want to go further by looking at the strategies used to design these packages and their consequences in responding to user-specific needs.

ERP systems are known as fully integrated enterprise-wide software packages that automate business processes. These systems are designed as ‘generic’ (Fleck, 1993) applications which can provide a solution for a wide range of organisations. They can be ‘configured’ (*ibid*) in various ways to cater for the needs of different organisations. Design of generic applications differs from those of traditional software applications used for organisational purposes. The close link that was said to be essential between the users and the developers (Sawyer, 2001) does not exist in the case of ERP systems. Instead, vendors of generic applications have the strategy of keeping the users at a distance. In such systems, vendors are confronted with various customers, so the system should be designed to cater for different organisations with a wide range of needs and unknown users, cultures and practices. In an in-depth study of the development of ERP systems, Pollock & Williams (2009) explain how the system is primarily designed, based on the needs of a limited number of ‘pilot sites’, also known as 'proxy' organisations (Bansler & Havn 1996), and then it is redesigned to maintain the generic aspects demanded by the wider user base and coding out the specific features needed by particular organisations.

This approach in the design of generic packages allows the user organisations to perform various configurations to meet their business requirements (Gattiker & Goodhue, 2005). An example is the possibility of configuring the inventory module

to have different item coding structures, different levels of categorisation or various methods of inventory control (e.g. cycle-count versus physical inventory count). However, there are several levels of configurability of the application (Koch, 2001). When the highest extent of configurability for the system is reached, an option for the user organisation is to redesign its business processes to fit the system (Pollock & Williams, 2009). Depending on the point of view, this redesign is seen to either streamline what are seen to be the firms 'obsolete' business processes or produce a form of standardisation that is common across a sector or industry. Some scholars such as Davenport (2000) suggest that this can reduce the competitiveness of the organisation. In the latter case, user firms are reported to resist such changes which lead to the need to customise or extend the packages to fit the demands of the user organisation.

Hence user organisations, together with intermediary organisations like consultants involved in the projects, are active in domesticating the technology by developing 'work-arounds' (Pollock, 2005). They design and implement solutions to cater their specific needs. However, due to the nature of the system, intensive or extreme changes tend to be unwelcomed by the vendor organisation (Pollock & Williams, 2009). Typically the vendor organisation only supports the standard application, and those parts which are customised or extensions to the standard application tend to be outside support contracts. Pressure from the vendor can thus limit the number of user customisations *(ibid)*. However, despite this, and for different reasons, users, individually and/or collectively, invent solutions for their needs and in some cases diffuse the solution amongst other users. So this begs the question as to how (and how far) do these user-driven innovation travel, how long do they live, and in what ways can they be fed into the generic product?

## 7.4 Methods

To pursue this approach a multi-level explorative qualitative study was carried out. Data was obtained through observations, interviews and document search of four user organisations, their ad hoc meetings, as well as user community meetings. A narrative analysis of the diverse range of data collected is carried out and presented in this chapter.

## 7.5 User Inventions Travel on Different Paths

The fieldwork for this chapter is presented in two parts: a) story 1 describes the data collected from the first three sources where user organisations are not connected to one another; and b) story 2 portrays the data collected from the fourth source, the user groups.

### *7.5.1 Story 1: The Unconnected User Organisations*

#### 7.5.1.1 ERP Implementation in the Companies

SteelCo is a large steel production company established over 60 years ago. Over the years the company implemented various standalone applications in different departments. In the late 1990s SteelCo attempted to implement an organisational wide information system that linked the different departments into an integrated application. However, this attempt led to failure and the system was unable to go live. Then in 2004, there was a second attempt for implementation of an integrated information system. However, this time, the decision was to implement an ERP system: Oracle E-Business Suite. This implementation which was planned to take 13 months, included Supply Chain Management (SCM) modules, Discrete Manufacturing modules, Financial modules, Maintenance module and Human Resource Management System (HRMS) modules.

HygB, HygC, and HygD were three cosmetic and hygiene product manufacturers all attempting to implement Oracle E-Business Suite starting their implementation process at different times over one year. These three organisations were linked together at higher level through an overarching company which audited the financial reports, and unified their sales process. Apart from that, their operations and production were entirely distinct, and they each acted as a separate legal entity. The implementation modules in these companies were the same as the SteelCo Company, with an exception of not implementing the HRMS modules and having process production rather than discrete manufacturing.

Implementation of Oracle E-Business Suite in these four organisations was not without its challenges. The standard features of the application did not meet many of the local requirements of these organisations. Hence the companies took two types of

action. Initially, as the aim of all four firms was to move toward integrity and adopt what was known as the 'best practices', the first approach was to redesign their business processes to fit the system. However, this was only acceptable to a certain degree. The change was welcomed where it led to streamlining firms' obsolete business processes. However, not all changes to the current business processes were well received. Instead, in all the four organisations there were numerous cases in which the belief was that the changes will reduce the competitiveness of the organisation. Apart from that, there were other reasons, such as particularity of some laws and regulations, that were yet another drive for a need to modify the standard application.

Hence there was a call for changing the application to meet the user organisation's needs. Furthermore, as the users became more familiar with the system, they tried to invent ways to ease the use of system. Thus there were cases where end-users made a change in their own way of using the system (e.g. using TOAD[13] to develop software for faster data entry in case of large organisational data).

These changes to the system occurred during the implementation process and also after the systems were live and operational. The organisational users referred to these changes in different ways, such as workarounds (using a functionality designed for a particular purpose as a solution to a different need), soft customisations (modifying the existing forms, developing new reports, slight modifications to workflows, etc.) hard customisation (creating new database tables, considerable change of the standard workflow of the systems, extending the application by adding new functionalities, changing the background processes, etc.) and extensions (developing a new module and interfacing it with the standard application). In general I refer to them as 'extended solutions' (the term used by a senior IT manager in one of the user organisations): any software development that goes beyond configuring the standard system as it was intended by the vendor.

[13] Tool for Oracle Application Developers (TOAD) is a software application used for development and administration of various databases using SQL.

#### 7.5.1.2 The Case of SteelCo

During the implementation and one year post implementation phase SteelCo developed over 50 extended solutions. Table 7-1 shows some examples of these 'extended solutions' in different modules. In this study I focus on details of 3 implementations in the SCM module.

| Module | Example | Description | Type |
|---|---|---|---|
| Inventory | Sub-inventory allocation | Creation of a new form and a new table that allocates the responsibilities of each sub-inventory to a number of employees known as store keepers.<br>Change of sub-inventory transfer and move order forms. List of values of sub-inventories is filtered based on the sub-inventory allocations. | Hard Customisation |
| Purchasing and Order Management | Letter of Credit and Bank Guarantee | There is a need for capturing LC information for the imports and exports.<br>A customised form developed to enter the LC information. The LC Number will be entered in the Descriptive flexfields of Purchase Order Form. The LC details will be captured in the customised form at the time of supplier payments. A customised report is to be run which gives the lists of LC's released or expired and the details of outstanding LC details. | Soft Customisation |
| Purchasing | In transit Quantity Tracking | A customised solution developed to enter the shipment information on receipt through fax or any other communication channel. The Advance Shipment Notice (ASN) functionality is customised to accommodate the requirement.<br>This form will pick up data from the database against the Purchase Order number. User needs to enter the shipment details and on saving, the information is transferred to the interface tables and to the base tables. | Soft Customisation |
| Purchasing and Inventory | Tracking of wagon number during transfer of finished goods from rolling to FG warehouses. | The wagon numbers will be tracked by entering the appropriate wagon number in the move order lines descriptive flexfield. The wagon number will be captured in the move order pick slip against each line. Move order pick slip has to be customised. | Soft Customisation |
| Order Management | Item Baskets for TME | A new form developed to be used for defining sales baskets for the TME sales process. | Extension |
| Order Management | TME Offer | A new form is created to capture the TME agreements. This form uses the TME basket data. | Extension |
| Order Management | TME agreement | A new form is developed to capture the TME sales orders. This form uses the TME Offer data and basket data to automatically calculate the amount of sales of each item. | Extension |
| Order | TME | A new form customised to perform three | Extension and |

| | | | |
|---|---|---|---|
| Management | Automatic Scheduling | rounds of calculations for scheduling of orders. This is a very complex calculation which needs to be applied in exactly three stages and each time new values will be populated in customised tables. This data will then update the standard sales order lines in the sales order form and each line triggers a new customised workflow to be processed for shipping. | Hard Customisation |
| Order Management | Sales Credit Check | Customisation of a new function which calculate customers' credit from customers form, against the total amount on the sales order. If customer has enough credit the workflow can move on to the next step. Otherwise no change of status.<br>This requires a backend function and customisation of the standard workflow. | Hard Customisation |
| Shipping | Shipping Correction | Development of a concurrent program that takes in the corrected amount of shipping and performs a system return automatically which will then update all quantities and statuses in relevant standard forms and tables. | Hard Customisation |

**Table 7-1 Examples of 'Extended Solutions' in SteelCo**

The 'extended solution' activities began in mid-stages of implementation of the SCM module. Oracle's Application implementation methodology, known as AIM, consists of six different stages: definition, operations analysis, solution design, build, transition, and production. During the second phase (the operations analysis phase) after identification of business requirements, gaps are identified by evaluating the level of fit between the business requirements and the application. Then, in the next phase (the solution design phase), detailed designs to meet the future business processes are defined. This is the stage in which new business processes are designed and system configurations are outlined. In SteelCo, at this stage, the project team (comprising of implementation consultants and a selected number of organisational users, known as 'power users') together with the business process owners re-designed the processes. The project teams' main approach was to convince the process owners to adapt their business processes to what was known as the 'best-practices'. However, as a process owner states bellow, some requirements were inevitable and the system had to be modified to meet the specific needs of the organisation:

> We would love our processes to be streamlined and compatible with the world-wide best of the breed practices, however these cases listed here,

> are essential for our competitiveness. Without them we cannot compete in the metal exchange market. We achieve customer satisfaction through the unique way that we deal with dispatch scheduling and shipments of our goods. Therefore we must maintain those unique processes. (Interview, User)

Hence in the build phase, development of those requirements, identified as 'critical', was started. The solutions designed at this stage were developed in close collaboration with the power users. Below are examples of developments for three cases.

**Item Basket – An implementation phase case**

One such development was the 'Item Basket' (a set of items defined at the time of sale in the metal exchange market) function, known as a critical requirement by the sales department. In response to this need, a power user, who was familiar with the Sales Order form suggested using a Basket Code instead of the item code and defining the contents of the basket in the Master Items form (a workaround). However, having a Basket Code in the sales form, meant that shipping could only be performed on the Basket, rather than on separate items, which was the requirement of the scheduling and shipping department. Also having the Basket Code in the Sales Order form would lead into problems in production planning module. Hence after various meetings and trying various solutions, as the firms main aim was to stay away from 'hard customisation' as much as possible, two of the users came up with the idea of creating the basket as an un-shippable item with the actual items being the promotional offer on this item. This meant using the 'modifiers' setup form and 'promotion' modifier type for a purpose that it was not designed for and then having a customised version of the workflow to close the sales orders when all lines except the Basket line are shipped. This idea of using the modifier form for a different purpose, led into fulfilling the business requirement through a workaround with minimal customisations of the Sale Order form workflow.

**Sub-Inventory Allocation – A post-implementation case**

In contrast to the above case, not all business requirements could be met by soft customisations or workarounds. Particularly as the system passed its transition and production phase and went live, and the actual end-users started working with the

system, they faced challenges that led into a whole new series of critical needs from the system. At this stage the users and particularly those who acted as power users during the implementation of the Oracle E-business suite became pro-active. Individual users, used other tools, such as 'TOAD' to ease the use of system. Such developments usually remained at the user level and were used by one or two individuals. However, as the 'critical needs' arose and particularly intra-departmental challenges were faced, inter-organisational groups came into action. In SteelCo many of these cases occurred as inventory transactions caused new financial traces, and integration of inventory and manufacturing modules became operational.

An example was the Sub-inventory allocation functionality. In the standard Oracle E-Business Suite, version 11i, all store keepers defined in an Inventory Organisation level have the option of transacting items between all the sub-inventories allocated to that specific Inventory Organisation. However, the immensity of the inventory in SteelCo and the large number of store keepers demanded the sub-inventory transactions to be allocated to particular individuals. This had effects both on the Inventory and Manufacturing Modules. Hence the power users of the manufacturing department and inventory departments held numerous meetings which led to customisation of all forms with sub-inventory field (soft customisation). This solution also involved the creation of a new form and table that capture the information on which store keepers (based on their employee record) can issue items from which sub-inventory (hard customisation). The sub-inventory transfer form and move order forms were customised to take these allocations into account.

**Raw Material Receipt – A post-implementation case**

There were many cases that needed further elaboration and discussion amongst several departments. Therefore, eight months after the start of the implementation process, SteelCo formed several internal workgroups to deal with intra-departmental issues. After a few months of functioning and learning different aspects of integration between different modules, these groups became proactive in designing solutions as well as 'extended solutions'. ICG (inventory coding group), which was initially formed to deal with new item codes but then expanded to deal with all inventory related issues, became one of the key groups which looked into almost

every problem where there was even a trace of item transaction involved. This included purchasing, manufacturing, sales, shipping, maintenance and all the financial transactions caused from such transactions. As and when required, the members of this workgroup organised meetings to give solutions to new requirements. Sometimes new temporary members (users who were not permanent members of the ICG) were invited to the meetings. At times contradictory views were expressed by different users coming from different departments. Whenever there were confusions and uncertainty about functionality, this group asked a consultant from their contracted intermediary organisation.

One example of inter-departmental collaboration in designing a solution was for the receipt of production raw material. The initial solution which was implemented by the implementation team and used for a couple months was to record a receipt for each truck and each wagon that brought batch raw material into the SteelCo premises. This meant entering thousands of line of receipt for production raw material every day. However, two months after system go-live, this process proved to be too complicated and resulted in a large number of incorrect receipts entered into the system. Subsequently the raw material quantities available for manufacturing planning became inaccurate and caused confusion in production departments. Moreover every receipt made in the inventory system created a financial transaction in the finance module. Correction of the quantities also created more financial records. So two months after go-live, SteelCo faced a big challenge of having hundreds of lines of erroneous inventory and financial transactions and had to take a decision on how to manage the receipt of such a large amount of raw materials. ICG (whose main members were from the inventory and the finance department) came into action and invited users from relevant production departments and the quality control department. They held long meetings to deal with this issue. Several solutions were suggested, implemented, tried and failed. The developed solutions were tested in the development environment and if successful were moved to the production environment. In two of these attempts the solutions were successful in the development environment and were moved to the live system. However, after functioning for a short period of time (three weeks in one case and two months in another case) caused new problems. After the two unsuccessful attempts, six more

meetings ranging from two to four hours, were held until a new solution was designed and developed. The final solution involved creation of two forms and a database table that aggregated the receipts based on criteria defined by the production and quality control departments and interfaced with the system on specific intervals to create a combined receipt that had all the properties required by all engaged departments: purchasing, inventory, production, finance and quality control.

**SteelCo's New Developments: Success or Failure?**

In the above cases we could see the implemented technology as a 'grey box' (Pollock, 2005) flexible enough to be re-shaped and customised by its users. Such customisations, can be referred to as 'workarounds'[14] (Gasser, 1986) which could fix 'misalignment' between the users' needs and the technology (Pollock, 2005). They lived over different periods of time. However, in spite of the fact that users encountered these as success, the organisation confronted a new challenge: the application modifications were not welcomed by the vendor organisation. Every time the system faced an error which required intervention of the vendor organisation (as maintenance contracts), the first question asked by the vendor team (on their online support website) was 'Is the system customised around this functionality?', and if the answer was positive, the first feedback from the vendor was that 'it is not a good practice to customise the system' followed by 'based on our support contract, if the error is caused by the customisation we cannot provide a solution'. So, what was seen as success for the user organisation, was not perceived in the same way by the vendor organisation.

#### 7.5.1.3 A Case in HygB, HygC and HygD (Intra-Organisational)

More than one year after the sub-inventory allocation case was up and running in SteelCo, users of HygB faced the same challenge: sub-inventory allocations to individuals were a must in their business. After a number of solutions, including use of reports to monitor unaccepted transactions in stores, the Inventory Manager who

[14] Intentional uses of technology in ways for which it is not designed

referred to this as ‘a must functionality’ came up with a similar solution. In HygB, the inventory manager suggested changing the business processes in a way that only the ‘Move Order’ form is accessed by store keepers. As a result of this new process only the Move Order form was to be customised (soft customisation). So, they also designed a table and form to hold the information on who has access to which sub-inventory (hard customisation). But rather than using individuals names, as was done in Steel co, HygB used ‘responsibility’ to create a connection between store and store keeper.

After two months, during the implementation of the system in HygC and HygD, they also faced a similar issue. However, four months later, in a meeting held between HygB, HygC and HygD to discuss implementation challenges the solution developed by HygB was offered to the other two firms. This saved them the effort of investigating for possible solutions.

#### 7.5.1.4 Revisiting the Cases

In all the above cases, and many more, the ‘extended solutions’ became operational after development. By mid-2007, after the system was live and running for over one year in SteelCo, there were 54 registered ‘extended solutions’ developed in the SCM module. Some in the form of workaround and use of existing functionality in a new manner, some in the form of customisation and others, particularly in the case of the sales department, major application extension. There was also a notable number of unregistered cases which were in use by individuals. Likewise, by the end of 2008, there were 23 ‘extended solutions’ in HygB out of which three had been also adopted by HygC and HygD. My observation of the four intra-organisational meetings showed that there were many challenges in transferring ‘extended solutions’ from one organisation to the other. The main cause as discussed in the meetings was the differences between the design of processes and lack of harmony between the implementations. Hence each organisation came up with its own solution to the requirements, and in one extreme case one organisation gave several solutions to the same requirement in different departments.

#### 7.5.1.5 The Graveyard of Inventions

After over 100 hours of observation of the first three sources of data and interviews with participants I noted that a significant number of user-initiated 'extended solutions' which made their way into the live system and were functional for a period of time became un-functional after several months (or years). However, as the data showed it was no trivial task to build a solution. In most of the cases a large amount of technical and functional effort was put in to the development of the solution. Long hours were spent discussing the various aspects in terms of the position of the solution in an integrated set of processes as well as technical requirements. For example, in the cases where the new functionalities were achieved by adding a new form, the process and its integration required close and timely considerations. Whereas in the cases where the change was an automatic calculation of an existing field based on a user-designed formula, the technical side could take days to implement. Moreover, in returning to the SteelCo case after three years (in 2010) I found that not only were some of the unregistered 'extended solutions' no longer working, but also 16 registered cases had stopped working for more than one year and five other cases also had some periods of un-functioning.

I found a similar trend in the HygB site. Some of the solutions had stopped functioning after a period of time. Amongst these, many solutions were replaced by an alternative solution while a few remained unresolved. So the question was why did use of certain new developments cease while others continued to function as a part of the standard system? Had they served their purpose? Or did they discontinue due to other reasons?

When asked about this various reasons were given by users. Two predominant explanations were either due to the excessive complexity to use the solution during the live running of the system or due to challenges faced in maintaining it (particularly because of the terms and conditions of the support contract with the vendor). There were also issues around organisational power dynamics that led to this discontinuation. An instance was a solution designed in the purchasing department. In this solution, which involved capturing the Letter of Credit information in a customised form, the design was not received well by the finance department. So six month after the functioning of this form, the finance department

called this solution to an end and introduced a new approach in capturing the required information. The new solution then was in place for several years.

No matter what the reason, the result was a ‘graveyard of user inventions’ (Hyysalo, 2010), of which some had failed to function only a short time after being implemented while others lasted for longer periods, even over a year, but yet again were discontinued. However, interestingly the ‘graveyard’ was not an end point for all these solutions. For instance, in the case of SteelCo, three solutions which had stopped functioning for over six months were re-developed into new functioning solutions. This graveyard of user inventions, when contrasted against those solutions which continued their existence and functioning as a permanent part of the system, showed two diverse results on how long a user-initiated solution can operate.

This raises the question of how far and for how long can the ‘extended solutions’ travel? What causes the transfer of these solutions from one location to another? Where and when does innovation occur? When can we consider an ‘extended solution’ as a functional innovation? What about those solutions which end up in a graveyard? How can we explain these moments in shaping and reshaping of artefacts?

To capture these dynamics we need to move our lens to a different setting where there are multiple instances of these dynamics. To do this, and before answering these questions, I will extend the study to a different setting where heterogeneous organisations are connected as formal user groups.

### *7.5.2 Story 2: The User Groups*

User groups have been known as important sources of innovation. So in the second part of this study, the UKOUG and one of its sub-groups, PSHCM were studied. As explained in previous chapters the UKOUG is one of the most active user groups around Oracle products in the world with over 30 sub-communities in the form of Special Interest Groups (SIGs) and Customer Forums (CFs). SIGs are product-specific user groups which are open for attendance by all members of the UKOUG whereas CFs are closed groups and attendance in these forums are by invite only. PSHCM is the oldest functioning CF in the UKOUG which joined the user group in

2002. Forum members meet three times a year and discuss Human Resource module issues for those working in the public sector. There is also a PSHCM Forum-Oracle Liaison Meeting that takes place around the same time as the main forum meeting in which the forum committee and Oracle representatives meet to discuss a range of issues around current and future development plans and joint work. Besides these meetings, the forum has an online e-mail server which is used by its members on a day-to-day basis.

I studied the UKOUG and its subgroups from May 2010 to April 2013. A range of observations of different meetings together with interviews with their members and committee was conducted over this period. I also studied the exchange of messages in the PSHCM mailing list.

#### 7.5.2.1 User-Initiated Innovations: The case of PSHCM

PSHCM customer forum meets three times a year. This customer forum is a mature community functioning around a mature product (as explained in Chapter 5). The 'typology of functions' (explained in Chapter 4) performed in this group cover a broad range. These were achieved through periodical face-to-face meetings, exchanges on the mailing list, and the surveys conducted by the committee members. These different approaches not only assisted members in solving their day-to-day issues occurring in their implemented systems (as discussed in Chapter 6), but also created an input for the committee members to exert power over the vendor and to influence its strategies and products. In this chapter I will explain three cases of solution exchange and solution generation amongst the community members.

**The Volume Data Entry Case**

Due to the nature of the standard Oracle applications for processing variable pay data, the majority of the forum members reported using various bespoke solutions developed internally by each organisation to handle this requirement. The solutions tended to be labour-intensive and complex to handle. This issue was brought to the top priority list (a list developed by the forum members about the most important requirements of the group) in April 2009. By June 2010 it was still the last item on the list and did not have much improvement in its status. By September 2010, the

issue drew further attention and moved up to the top three priorities and this meant that it needed serious consideration. By this time, it was named Volume Data Entry (VDE) which involved transforming the use of an electronic template for entry of variable pay data (e.g. as overtime, premium payments and expenses) with appropriate system validations and approvals. In February 2011 in the PSHCM Forum-Oracle Liaison meeting a 'robust but constructive' (as described by a committee member) discussion was formed around the significance of the VDE functionality. The importance of this requirement for the public sector and how it can result in significant savings for the members was the main point of the discussion. Hence it was decided to form a new sub-group, entailing members from six public sector organisations to deal with design of a solution together with the vendor.

The new VDE sub-group met in March 2011 to define the draft business requirement based on the forum's perspective to be given to Oracle to review and respond to. In this meeting a brief update from each user organisation was given on the current solutions deployed by each organisation for processing variable data. Each organisation also described what benefits they hoped to derive from the new VDE functionality. Then one of the organisations demonstrated their in-house solution called 'E-Forms' and one other user organisation highlighted the significant differences between their own solution and the E-forms. These two presentations provided a point of departure for the in-depth discussions that followed. The main discussions that followed were around the scope, the directions and the contents of the business requirements. Also the timescale for review and feedback by Oracle was outlined. At this stage the VDE group was to write a business requirements document on the requirements for design of the VDE to circulate amongst the wider forum community. The outputs from the VDE workshop were reviewed by the vendor. This meeting was followed by a number of conference calls between the sub-group and the vendor, to re-work the VDE solution and refine it to the point of approving the design. In the liaison meeting held in May 2011 the need for the Oracle Development to work closely with VDE subgroup was again stressed by the forum members.

In the customer forum meeting, held in September 2011, Oracle provided a brief update on progress with the plans for VDE solution. In their presentations the vendor explained the new features including the screens, consistency with other functionality (e.g. security, workflow approvals, element validation, etc.) and administrator and manager functions. They also explained the processes in creating and updating batches, as well as restricting, validating, transferring, and approvals functions. In his presentation they emphasised the fact that this decision is made by Oracle based on the outputs from the VDE sub-group meetings.

As the VDE group continued working with Oracle development for over 12 months, the product design was refined to fit with the other functionalities of the Oracle Self-Service Human Resource module. Table 7-2 shows two rows of a table prepared by one of the committee members which summarises the user inputs for design at later stages of the development. These types of inputs were generally followed by conference calls to clarify the details of the design.

| Question (from Email) | Forum Response | Additional Comments |
|---|---|---|
| How should the pre population list be determined? Will this be based on the HR security | HR Organisation rather than HR hierarchy. | Plus also consider previous claims (a memory!) but take account of moves and new starts. |
| What types of elements will be applicable? What mechanism is to be used for restricting the elements? Do we need to use element sets or do we need to derive on the basis of element links? | Use of element sets and links required | Suggest maximum configurable flexibility is considered here.<br>Use of links but Sets would allow further restrictions on what administrators/managers could input. |

**Table 7-2 Example of Inputs from Users for VDE Functionality**

Subsequent to development of the solution based on the user designs, the solution also expanded to capture the needs of commercial customers. Then as a result of these changes in March 2012, a committee member announced that the functionality was renamed to Self-Service Batch Element Entry (SSBEE). The meetings held between the VDE sub-group and the vendor were referred to as ‘participatory style’

in which users contributed in shaping the product. By mid-2012 as the development of the new functionality was in its final stages, the forum committee and the vendor continued to provide updates on the new developments as well as continuously reminding the members about the importance of uptake of this new solution. This was done through a mailing list as well as presentations in the forum meetings.

By this time the new patch on SSBEE became a part of the Oracle E-Business Suite product. In July 2012, it was ready to be implemented in a patch known as RUP5 and Oracle documents on its implementation were available on the Oracle Support website. By September 2012 there were a number of early adopters who started implementing the new solution. In January 2013, a committee member mentioned that the plans were to have at least one organisation live in the next six months (as in January 2013).

The above described case was initiated by a need from a number of users attending customer forum meeting. After a number of informal discussions in meetings and ad-hoc exchange of solutions between some members, the importance of having a generic solution was realised. This led to formation of a sub-group that initiated the solution design around one of the user solutions: E-forms. However, as the aim was to have an integrated solution which is a part of the standard Oracle system, the solution went through various changes. As the solution was developed it had to be implemented by the user organisations which meant a new set of configurations and in some cases adaptation to particular user requirements was needed. A member of the forum explained later in 2013 there were some delays in implementing the designed solution due to existence of other priorities.

**The Teachers Tiered Contributions Case**

In December 2010, a user brought to the attention of the customer forum a new regulation set by government, relating to changes to teachers' pension contributions, to be effective from April 2012. In his e-mail to the mailing list he stated: '…Clearly we need to keep our eye on this as a system solution will be required to keep track' (Field note, e-mail). This new requirement was added to the top priorities list. The issue remained fairly silent in the customer forum until the meeting held in

September 2011 when two invited speakers from the pension regulators body presented an introduction to the new duties and likely operational impacts within the payroll and Human Resource functions in public sector employers. During this period Oracle was working on a solution to meet the new regulations.

In late 2011, user organisations began having more concerns about the future solution offered by the vendor. Hence a small number of users looked at developing their own in-house solutions for the changes but most were still reliant on the standard solution being developed by the vendor. By February 2012, a number of exchanges of ideas and user designs started to occur in the customer forum. This included design documents and solution specifications and their perceived pros and cons.

Subsequent to these exchanges, a forum meeting was held as planned in February, and in this meeting the vendor presented a newly designed solution to the users. The solution was presented as a drawing on the board which explained functionalities of the solution. This included new forms, tables and data entry requirements. The presentation was interrupted by a user who pointed out what they 'really' needed rather than the vendors offered solution. This raised a large number of questions and concerns which did not seem to have been considered by the vendor. Discussions continued in the meeting between participants stating that the vendor's described solution 'over-simplifies' the case and does not cover their requirements. The vendor responded by stating that the offered design was based on the specification given earlier by the users and added that it did not include today's explained needs. The committee members who were displeased with the vendor's lack of attention to a more collaborative model with Forum members in design of this functionality called for a parallel 'plan B':

> […] we know that something needs to be done by Oracle and this is not acceptable. Having said that, I want to know what plan B is? If [name of two users] put their heads together they can get a piece of code by April for plan B. (Field note, Comment by User)

A few days after the meeting a committee member sent a message to the mailing list stating that there was a significant gap between the vendor's solution and users' requirements. He mentioned that this was a big risk for the members to face penalties

due to their inability to meet the new regulations and hence he indicated the need for the forum to take action. Two main points of action were to work with the vendor to agree on the next steps required to deliver full standard functionality and to simultaneously arrange for a draft solution document to be circulated for review and comment by members. He ended his message as follows:

> […] Once members have had the opportunity to review the draft Forum document […] they will need to take a view on which approach carries less risk for their organisation i.e. deliver in house based on the solution proposed from within the Forum community or rely on Oracle to deliver the full configuration in time for testing and application in April [...] (Field note, E-mail)

A day later, he sent out a draft solution paper written by their HCM consultant and asked for other users' review and feedback on the documents. Figure 7-1 shows a screenshot of a single page from the 14 page document. This led to a series of discussions in the forum around enhancements to the solution as well as responses to the new inputs from the regulatory bodies. They included technical and functional discussions. Also other solutions by members were shared to collaborate in the development of a comprehensive solution.

Update EE's Pension Deduction Formula

```
/* V1.6 */

if GROUP_KF_STAFF_TYPE = 'Teachers - Supply'
Then
(
lv_pensionable_salary =
to_char(GET_SALARY_VALUE(PAY_PROC_PERIOD_END_DATE))
lv_tpa_salary = to_num(lv_pensionable_salary)
)
Else
(
lv_pensionable_salary =
to_char(TPA_PENSIONABLE_PAY_BANDING_ASG_PROC_PTD * 12)
lv_tpa_salary = to_num(lv_pensionable_salary)
)

lv_ee_rate = to_number(GET_TABLE_VALUE(
                  'IBS_TPA_PENSIONABLE_PAY_RANGE',
                  'Employee Costs',
                  lv_pensionable_salary))

if ISNULL(lv_ee_rate) = 'Y'
then
  (message = 'Error retrieving Employees Pension Contribution Rate'
   RETURN message)

lv_tier_rate = to_number(GET_TABLE_VALUE(
                  'IBS_TPA_PENSIONABLE_PAY_RANGE',
                  'Pension Tier',
                  lv_pensionable_salary))
```

Y[redacted]ast\Teachers Pension Tiered Contribtions Changes v2.0.doc 10

**Figure 7-1 Example of User Developed Solution Document**

At the same time, the vendor was in the process of revising their solution in which they mentioned they have also taken input from the solutions suggested by the forum members. So two parallel approaches were in progression, one by the user group and the other by the vendor (with inputs from the user group). A telephone conference was then held in late February 2012 between the vendor and the forum members to discuss the requirements for the revised solution to be developed by the vendor.

By the end of February, the person who had written the primary document came up with an updated version of the solution, taking into consideration the feedback and discussion in the forum. The forum co-chair stated that:

> The document is only based on our interpretation of the requirements following research and discussion with other interested parties. It should not be viewed as the final definitive […] (Field note, E-mail)

Members were asked to review the different options available (the forum-generated solution, versus their in-house developed solution, versus the vendor's standard functionality – not yet released) and decide on how best to proceed to implement a solution in their organisation. On the same day the vendor announced the release dates for their solution as being mid-March and stated:

> Whilst we understand that customers cannot make a judgement call on which solution to go for without having the details of both the Oracle offering and the localised solution (which is in circulation already), we will endeavour to release the Oracle version very soon. (Field note, E-mail, vendor)

User organisations started their own internal reviews of the community-generated solution. In mid-March 2012 Oracle's solution was released as three patches (one for 11i and two for R12 versions) a few days after they originally announced their release dates. A week later, one user (the initiator of the community-generated solution) called for a re-cap on the vendors delivered patches. He attached an overview of the vendor's solution, mentioning that it is 'pretty much the same' as the community-generated solution and explained a summary of the components and requirements to enable solution using the seeded components. Further to this he sent their organisations the setup document to those user organisations who requested it.

In late May 2012, in the forum meeting, the vendor presented its solution to the forum members. After the release of the vendor's solution, which was developed with inputs from the forum generated solution, some organisations implemented the community designed solutions, while others went for the vendor's seeded option.

**The Annual Service Return Case**

Not all solutions by users, who participate in user groups, travel as far as the above described cases. They may not end up becoming a part of the standard system, but neither do they reach many different organisations (only managing to travel between a few organisations). An example is the Annual Service Return Case. After a change in legislations, a user sent the following question to the group:

> […] how you display the new SEN Allowance on the ASR since the change in Sep? How do you get the part time salary to appear on the ASR, how is it mapped? (Field Note, Mailing list archive, User)

In response to this she received various answers. One example response can be seen in Figure 7-2.

'we have set the SEN Allowance […] to display as part of the Supplement column on the ASR, in addition to reporting it as part of the Full-Time Salary figure.

The Part-Time Salary is reported via a balance that is fed by the Teacher's Pension elements. We've configured the following on the ASR (under Other Definitions > Table Values > PQP_GB_TP_TYPE1_EXTRACT_DEFINITIONS)

Attribute Location Qualifier 1

Superannuable Salary Balance = Teachers Superannuable Salary (the balance the Teachers Pension elements feed into)

Part Time Salary Paid - Enable Date Earned Mode = Y

Part Time Salary Paid - Enable Calendar Day Proration = Y

Attribute Location Type

Superannuable Salary Balance = Balance'

**Figure 7-2 Solution Response to SEN Allowance Issue**

This is a very common type of exchange in the customer forums, where users state their day-to-day requirements, and receive response from other users. The responses range from explaining different options in system configuration, to exchanging custom codes. The discussions around such cases are sometimes initiated in the group, but then continued on a one-to-one basis between the requesting organisation and responding organisations. In the study of the PSHCM, I followed 50 such cases of exchange over a period of six months and then revisited six cases in which the exchange was beyond a mere configuration option and had aspects of innovativeness involved. Out of the six innovative cases, four were still in use by the requester organisation, while one case was never actually picked up by the requester and one other case was tested and discontinued. A large number of these daily issues are discussed on the user group mailing list.

#### 7.5.2.2 User Initiated Designs: The case of the UKOUG

ERP vendors use various approaches for obtaining user inputs in the design of their products. A range of different methods used by Oracle is explained in Johnson and Mozaffar et al., (2013). UKOUG has been a source of user input for Oracle's future product lines. In 2005, just a year after Oracle announced its decision to develop a new product line Fusion, several focus groups were formed to identify the enhancements required by the users of the three main product lines (Oracle E-Business Suite, PeopleSoft and JD Edwards) while also highlighting the ideal existing functionalities. Human Resource Fusion Group and Financial Fusion Group were amongst the most active sub-groups in this area. These two user groups held several meetings in 2005 in which different functionalities from the three product lines were discussed. Both Human Resource and Financial Fusion user groups also conducted surveys to collect the viewpoints and needs of the UK Oracle user organisations. The results of these surveys were analysed by the Fusion focus groups committees and written as two white papers which were sent to Oracle in early 2006. In mid-2006 the following responses were received from Oracle.

Oracle response on Fusion Financial Focus Group white paper:

> […] We noticed that the Commitment Control functionality was deemed weak for both the Oracle EBS and PeopleSoft Enterprise products. It is

> not, however, possible for us to ascertain why the Commitment Control functionality was deemed weak.
>
> We'd like to ask your user community about the reasons behind the Commitment Control response and I thought I'd contact you first to see how to best go about this as I assume that in this case, being a UKOUG specific survey, [name] may not be the appropriate person to contact. I've created a simple survey here for Commitment Control clarification […] and I hope that perhaps you would encourage the UKOUG customers to respond to it […] (Field Note, Mailing list archive, Vendor)

Oracle response on Fusion Human Resource Focus Group white paper:

> […] This collective input from such a key customer base as the UK provides valuable reference data for validating development plans moving forward. It is hoped that throughout the Fusion Applications project that the UKOUG Fusion Focus Group will remain enthusiastic supporters of our plans and provide constructive feedback to both Strategy and Product Development […] Your Project Framework document and Priority Analysis has already been passed to key members of the strategy team. Once the detailed Business Requirements Documents are written there will be an opportunity for participation in product Focus Groups where your input will be invaluable in defining and validating these requirements […] (Field Note, Mailing list archive, Vendor)

However, both modules did not follow the same route in developing the solutions in the application. In the case of Financial modules detailed needs around the Commitment Control functionality (also known as Encumbrance Accounting) were initially obtained from the users of the three product lines. Then after analysis of the results, the design and development of the Commitment Control functionality was carried through close collaboration between a sub-group formed from of the UKOUG and the vendor organisation. In late 2009 a member of the UKOUG reports:

> […] These groups [the 5 fusion groups] had a set life of one year… and wrote white papers on what they found. The response from Oracle was mixed, the HCM white paper never seemed to find the right person in Oracle but the Financials Group were asked to comment further. They found that no existing product line had the right process for encumbrance accounting, and Oracle asked what the right process should be […] (Interview, Organiser)

As can be seen from the statement above, in the case of the Human Resource focus group the design of the Human Resource modules did not follow the same path and the white paper produced in this case did not turn into a functional output whereas

the Commitment Control functionality was reported to have been developed in the Fusion applications.

#### 7.5.2.3 User Groups On-Going Innovative Efforts

The above mentioned cases (UKOUG and PSHCM) showed several routes that innovation takes as it occurs within a user group. On a higher level, in the case of the UKOUG, I found two attempts to drive product shaping through user-initiated actions. Amongst these two, the Commitment Control solution was incorporated in the system to cater for a long-standing problem in the Financial modules. This solution, which was designed based on close collaboration with a sub-group derived from UKOUG, is now a part of the new product line which is in the early stages of adoption by a limited number of user organisations. However, in the case of the Human Resource functionality, the user-driven initiative did not turn into a part of the product through the user group.

Instead, by looking at the PSHCM sub-group we could see a closer collaboration between the vendor and the users. This type of collaboration in product design and user-initiated innovations are an on-going activity in this user group. In the majority of the cases, to cater for the top priorities on the common requirement list of the member organisations, a sub-group is formed committed to spending time on the solution and engaging closely with the vendor to design the new functionalities. The decisions made in this sub-group were periodically reported back to the wider user group and their feedback is sought for further action. In many cases the collaboration with the vendor involves a prior development of solution within user organisations or the user community. This is how one of the committee members described the process:

> […] generally speaking any organisation does development […] so initially we actually say this is our requirement, this is our scenario, here is a solution […] We have solution developed in-house. So the seeded functionality should do what our own designed solution does… and what Oracle does is developing the solution, but more generic. We can make something that is exactly what we want, they develop something that is more generic, and also something that is more upgradeable […] (Field note, Short Interview, User)

Hence we see a continuous effort by user organisations to primarily generate solutions for the forum's shared needs and secondly extend their designs beyond the user group boundaries and to the generic system. However, in contrast to this on-going effort, I also observed periods of slow uptake of solutions by users. For instance I observed a case of another user-initiated solution which had been developed into an incomplete artefact in need of input from the user organisations before moving on to the next stage of development. In this case unless this user input was available the solution could not be released as a ready-to-implement product. This had resulted in discontinuation of the development process, until in one of the meetings, one user asked for an update on the status of the functionality. In response the vendor announced that the product had been ready for testing, for several months, but no feedback was received from the forum. This resulted in reactivating the process. Thus I could see periods of activation and discontinuity during the lifecycle.

## 7.6 Discussion

The findings of this chapter will be discussed in three main themes: user innovation paths, spiral of innovation and a new dimension into SLTI framework.

### *7.6.1 Different Routes Branching from User Designs*

This study shows how user solutions can travel different routes, some resulting in successful functional outcomes while others may be suspended for a period, discontinue growth or terminate at different stages of their lifecycle. The findings conform with studies of social shaping of technologies showing that these acts are a consequence of a set of 'social choices' between different 'technical options' (Williams & Edge, 1996). Hence different routes may lead to a range of diverse technological outcomes. In the case of unconnected organisations, the 'workarounds' (Gasser,1986) could end up in a 'graveyard' (Hyysalo, 2010) of unused fragments of functionality. For instance a large number of developments in SteelCo ended in becoming discontinued outcomes. At one end of the spectrum were those which died in early stages of their development and never turned into working products or those developments which were once known as successful functionalities, but never lived enough to serve the entire process that they were designed for. And at the other end of the spectrum was a range of cases which turned into successful functionalities and

worked as a part of the system for many years. However, due to lack of communication between different organisations, the innovations did not go beyond the boundaries of user organisations. In such disconnected settings, when similar needs were observed in various user organisations, a solution had to be redesigned (hence the re-invention of the wheel).

Similar trends were seen as various user organisations shared their developments with other user firms in user group settings. As user organisations learned to enhance products to meet their needs and shared their solutions with other users, which could sometimes result in further enhancements of the solution in a collaborative manner, again the invention could take different routes. In the case of the PSHCM and the UKOUG, I observed cases which did not live for long or were suspended for a while. But at the same time there were various cases which developed into working products and were used by members of the user groups. Additionally, my observations showed how the solutions generated or shared in the user group can travel beyond the user community, and after a process of 'generification' (Pollock & Williams, 2008) by the vendor organisation, become a part of the standard product.

Hence, as can be seen in Figure 7-3, user-initiated solutions, in generic products, consists of a process of shaping and reshaping of artefacts that could occur at different levels: user level (i.e. inventions by individual users which are not recognised by the organisation), organisation level (i.e. inventions which are transformed into successfully developed products functioning within the boundaries of a single organisation), community level (i.e. inventions which are generated by user organisations or the community and are diffused and adopted by members of user groups but are not a part of the standard system) and product level (i.e. user-initiated or community-initiated innovations which are made 'generic' by the vendor organisation and have become an integrated part of the standard system.)

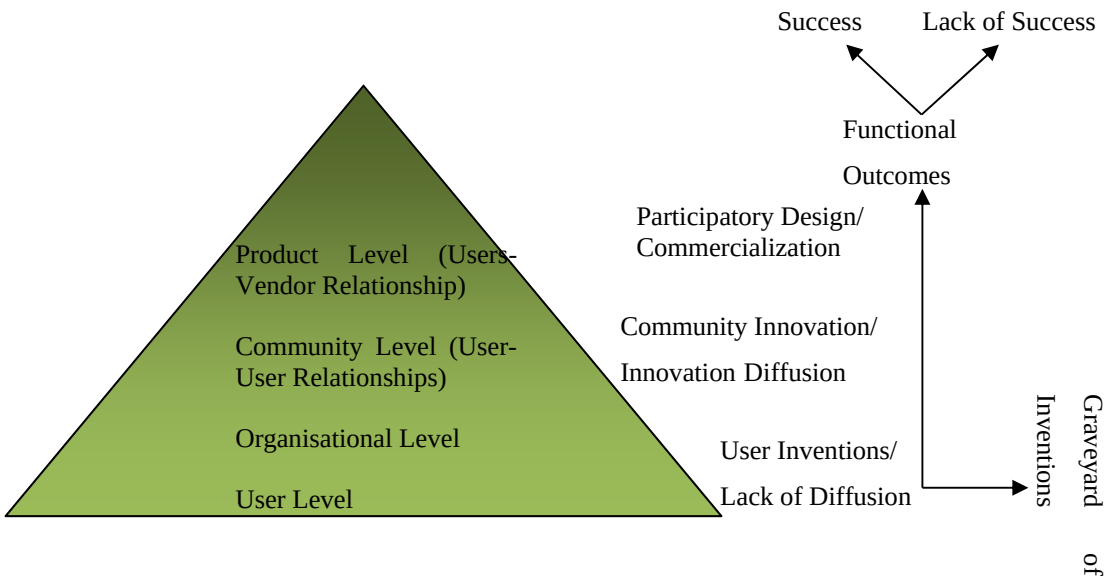


**Figure 7-3 Levels of User Innovation Distribution**

Figure 7-3 denotes while the outcomes of the innovation cycle may become functional products in various levels, they may also end up in the graveyard at any stage of their lifecycle. Hence unlike the extant user innovation studies (e.g. von Hippel, 2005) which show commercially successful innovations as the outcome of the process, the findings of this study shows that user inventions can follow various paths. They may 'die', 'be killed', 'ignored', 'remain hidden', 'disappear', have a 'short lifespan', or, in some cases become a fully-fledged user innovation at various levels. However, the innovation process is not a one-time short-lived process and therefore it requires a longer period of examination for full comprehension. Any of these statuses may be re-activated at a later point in time and again follow the various mentioned paths.

Figure 7-3 also brings us back to the concept of 'symmetry' (Callon, 1986). In looking at the functional outcomes, they may or may not be seen as success by various actors involved in the process. For instance what is seen as an effectively working innovation at a single organisation (e.g. the sub-inventory allocation), could be prohibited by the vendor. A contrasting example is a functional patch released by

the vendor to fulfil a requirement in the system, but not taken up by the user organisations as the users believed that the patch does not perform the necessary function. The conflicting viewpoints could occur between any levels and as a result we can see various meanings held by different players with respect to success of the outcomes. What I try to convey at this point is that all categories of actors are equally important in the innovation process, which moves us away from reflecting merely upon the innovations as successful commercial products. Conversely a much more complex notion of innovation should be foregrounded which allows an understanding of detailed outcomes throughout cycles of technology development and use. This requires analysis of the complex web of actions and interactions at different levels over longer periods of time.

### *7.6.2 Artification: Beyond a Successful Spiral of Innovation*

Generally speaking the theories from within the social shaping of technology criticise the conventional 'linear models' of innovation. They bring into attention aspects such as 'user contribution and feedback', 'interaction in innovation', 'implementation as a site of innovation', 'user's determinate processes of technological design, trial and exploration', 'further innovation in technology use', 'rounds of technological change', 'learning by struggling/ doing/ trying/interacting', 'local user knowledge' and 'learning, struggling and problem solving'(see for instance Fleck, 1993; Arrow, 1962; Beise-Zee & Rammer, 2006; Williams et al., 2005). Hence technological innovation is seen as not a rational problem solving process; rather it consists of contradictory and uncertain happenings. Williams et al., (2005) refer to this as a spiralling process that continues as technology is implemented and used. Williams and Edge (1996) underline the reciprocal interactions between different stages of technology formation, and the transformation that they experience from their initial conception to their eventual use. Fleck (1988) uses the concept of 'innofusion' (i.e. innovation in technology diffusion) to explain this by stating how products are modified and transformed by users to make them function in a useful way. Furthermore, as Williams et al., (2005) states the concept of 'domestication', which describes how artefacts are adapted into cultures and practices, cannot be separated from innofusion when talking about successful uptake of ICT products.

The findings of this chapter contribute to the studies of social shaping of technology, by taking one step forward and emphasising the importance of the diverse range of technological outcomes and conflicting viewpoints involved in the spiralling process of technology innovation. To do this, I introduce a new concept, 'Artification', which captures the 'technological outputs' in-between the two distinct phenomena of configuring and inventing, and the innovation itself. The term *artification* is used to refer to the state of becoming an artefact, rather than a fully-fledged commercial artefact in a conventional sense. This concept aims to describe the outputs before 'innovation' but after a process has occurred.

Although SST studies often use a wide lens in analysing technological innovation by starting from the design of an artefact, and taking the study forward to its implementation and use, there is a tendency to disregard a symmetrical examination of the technological outputs. This is in spite of the fact that shaping of technology is more than just a successful spiral of innovation. This preference for studying either the successful outcomes or failed projects as seen by a group of actors leads to a simplistic account of the technology shaping process. This is due to the existence of symmetrical moments before an innovation has occurred. Hence, the *artification* concept contributes to these studies by highlighting the need for a symmetrical account of the happening which treats successful and failed outcomes in an equal manner. Therefore, there is a need for 'symmetric biographical approaches' in studying innovation, which involves consideration of conflicting viewpoints from multiple spaces over longer periods of time. The biographical approach is required as the knowledge about the fate of the user innovations is not known prior to the beginning of the study. Nor is it likely to capture a comprehensive understanding of the longevity and value of outcomes in 'snapshot' studies (Pollock & Williams, 2008). This calls for a study that follows the trajectory of involvement of various actors from various locales in innovation. Moreover, alongside the biographical approach we need to keep our analytical lens open for reflecting upon diverse actors understanding of the situation. This means remaining faithful to all the successful outcomes as recognised by different actors involved for however long they exist(while some other actors do not perceive them as success). The 'symmetric

biographical approach' allows for a better understanding of the shaping of complex technologies.

### 7.6.3 An Enhanced Dimension into Social Learning in Technological Innovation

As can be seen from the previous section, *artifications* are the temporary outputs of the innovation process. Their temporality could vary from days to years. Some could become functional products used in different settings, while others could end up in the graveyard of inventions. Hence they can be seen as the 'outputs' involved in the 'spiral of innovation' (Williams, 1994) (Figure 7-4).

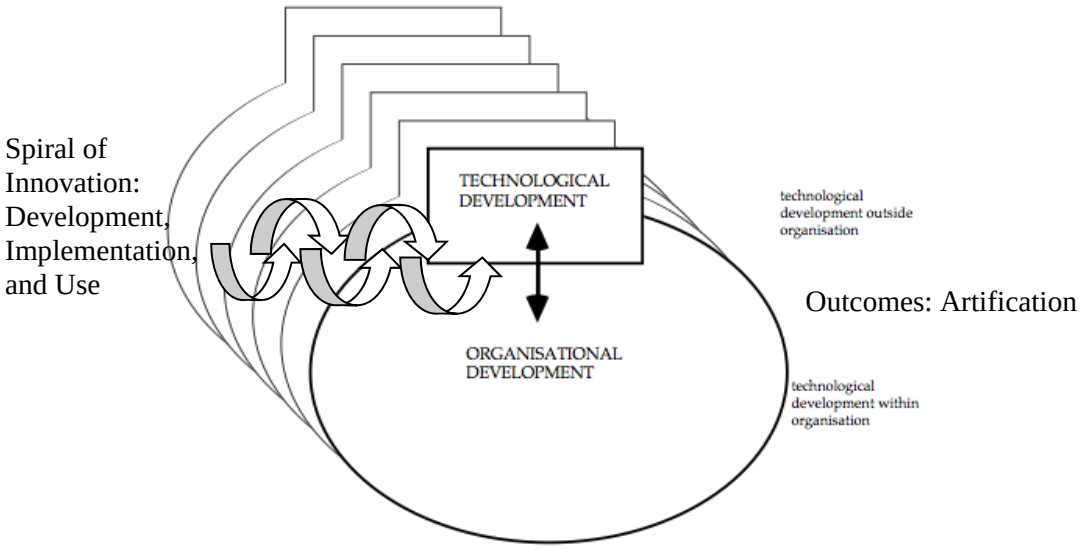


**Figure 7-4 Schematic Model: Artification and Spiral of Innovation between Technology Supply and Organisational Implementation (Adapted from Williams, 1994)**

However, the findings of this research show that the spiral goes beyond the user-vendor settings. The findings of this chapter reveal the significant role of user groups as spaces for the generation of collaborative solutions as well as their role as intermediaries for diffusions of innovation. This indicates a map of heterogeneous actors in technological innovation. The Social Learning in Technological innovation (SLTI) framework offers a broad map of this arena and places particular emphasis on multiple cycles of use and development. This approach shows that many settings and

actions which are not considered in the conventional innovation models are in effect important moments of technological innovations.

The SLTI framework explains innovations resulting from user-centred designs (involvement of 'proxy users' in the design process), evolutionary models of innovation (deliberate collaboration of a range of players such as government bodies, intermediate users and designers for shaping innovation), and innofusion and domestication models (shown in Figure 2-1). I have attempted to use the SLTI framework to model the findings of this study. Figure 7-5 depicts the case on the loosely connected organisations (story one). As can be seen from the figure, there is a high level of uni-directional innovation diffusion taking place from the vendor to the intermediate and final user organisations. There is also a possibility of innovation diffusion between the intermediate users and the final users. However, the extent of user-user solution exchange was only barely noticeable, if at all.

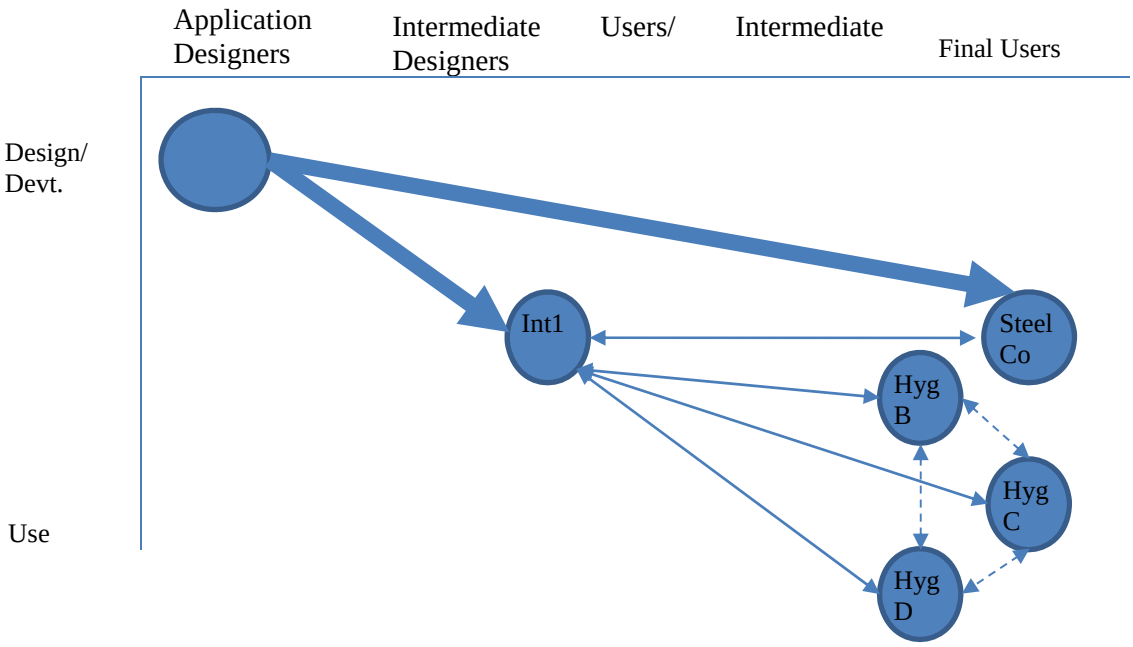


**Figure 7-5 Innovation Space for Individual User Organisations (Story 1)**

However, the SLTI framework cannot be immediately applied to the findings of the second story, the user groups, where there is a hybrid space constructed from collective actions of heterogeneous actors. User groups are not a type of intermediate user; rather, as explained earlier in this thesis, user groups are spaces where heterogeneous actors from different types of organisations meet. Therefore the findings of my study suggest that we can add a new element to the SLTI framework by portraying the role of user groups in the innovation process. The majority of actors are users, but these spaces also constitute intermediaries such as third party suppliers and consultants, as well as vendor representatives. They cover the full product lifecycle from design and development to use (Figure 7-6).

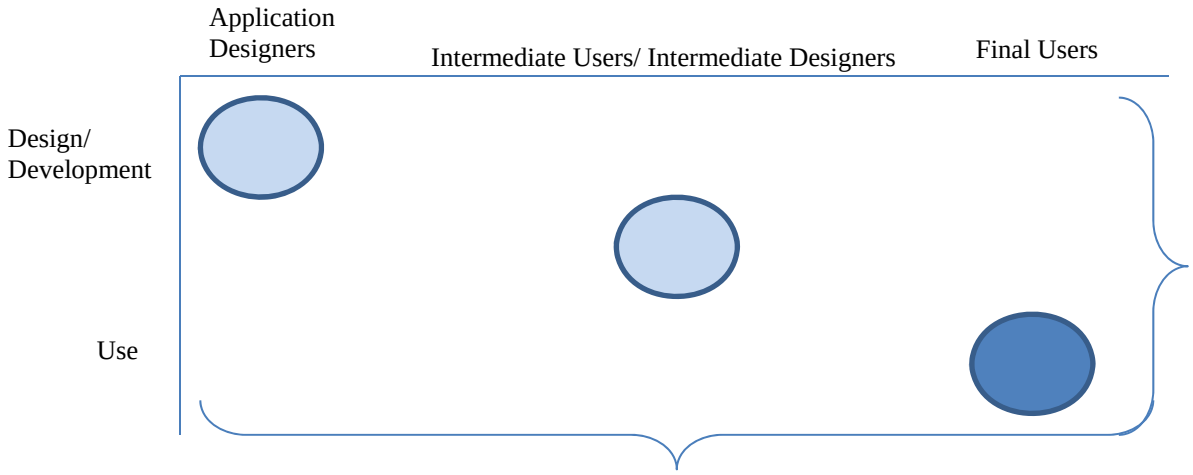


**Figure 7-6 'User Community' Space (Story 2)**

Figure 7-7 shows how user groups enable collective innovation and diffusion of user-initiated innovations. This model shows two types of user-initiated innovations driven by technology users. The first type initiates from individual user organisations and has the potential of growing and moving into user community level and eventually product level. In this scenario while innovation takes place in user environments, the interactions between networks of users is not steady. However, as the innovations go beyond the boundaries of the initiating user organisation and pass into the user groups, the interactions become more stabilised and the innovation become generalised. This allows for further possibilities of diffusion of the

innovation. The second type of innovation initiates in the user groups. The need for this may arise within individual organisations or the user group itself. But in either of the cases, the solutions are generated in the community. Nevertheless there are possibilities of back and forth movements of the solution between the group and the organisation. In such cases the interactions tend to be continuous.

This model can be seen as an extension of the appropriation model in which 'the boundary between technology development and implementation/use become eroded' (Williams et al., 2005, P. 69). Similar to the innofusion model we can see high involvement of users during implementation influencing the outputs of the technology. In this extended model, in addition to user involvement, we can see the user groups functioning as enablers and intermediaries for shaping and diffusion of innovations.

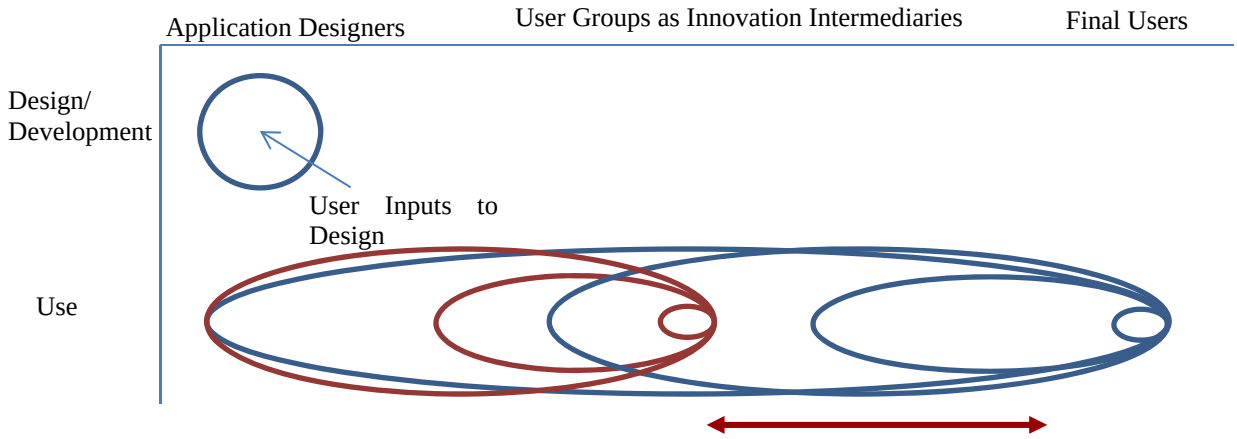


**Figure 7-7 Mapping the User community Space in the Shaping of Technologies, a New Layer on the SLTI Model**

Apart from having a new actor involved in the innovation, this model differs from the existing models in a number of ways. Primarily the model involves purposeful collaboration and co-ordination amongst actors. This is similar to the evolutionary model in which different actors, particularly the user organisations, collaborate to shape technology. This is not seen as such in the innofusion model. In the innofusion model, each user organisation engages in configuring the technology based on its own needs, whereas in this model, besides its own configuration, there is a

collaborative enhancement involved to meet the need of the wider community of users.

Secondly, the collaborative actions in the user groups, lead to cycles of '*unification*'-(re)configuration. By '*unification*' I refer to a modified meaning of what Pollock and Williams (2008) call 'generification'. The concept of 'generification' refers to the process by which designers of technology develop applications that embody features common to many users. The term 'unification', instead, addresses the process by which the users (rather than the designers), involved in the user community combine and amalgamate their related needs and hence design a combined solution in response to their joint needs. However, at the same time, due to variations in requirements the unified solution will need to have the ability to be configured to cater for the detailed demands. Hence this leads to cycles of unification (as users collaborate in the community) and (re)configuration as they perform within the boundaries of their own organisation.

The third divergence between the models, derives from user groups acting as arenas of power (Chapter 4). While in the innofusion model, scholars argue about users' ideas as 'possibility of feedback to future technological supply' (Williams et al., 2005, P. 69), in this model user groups create a direct link between the users and designers and act as a force to influence current and future products. Hence what we could see as a 'potential feedback' in that model becomes an 'active influence' through collaboration in user groups.

This active influence leads to a further dimension for this model. There are two main paths for innovations to influence at the product level. In some cases we see the further collaborations and co-ordinations between the user groups and designers leading into new applications features or patches, while in other cases the outcomes of the innovation process at community level, become inputs for user-centred design models. For instance the case of VDE can be seen as collaborative action, whereas the case of Commitment Control functionality is more of a user-centred design characteristic.

## 7.7 Conclusion

Many of the user solutions discussed in the chapter were not successful 'innovations' in the conventional sense (i.e. they did not diffuse outside the place of birth or endure for a significant period of time). Yet nor were they strictly speaking 'failures', in that they served an interim process. Some solutions had periods of 'silence', then become 're-activated' to serve for longer periods of time and sometimes leading into the undergrowth of innovation. This study supports the idea that user-initiated innovations have the potential of spreading at different levels and grow in various locales. Hence, as can be seen in this study innovation is not a single entity, nor does it occur at a single point of time or at a particular locale. Instead it has a biography that undergoes cycles of success and failure, and within this biography what is encountered as success to some actors may only be seen as a temporary workaround to others. I refer to these temporal outcomes as *artifications* which may or may not become a commercial product, nevertheless they serve users' demands.

The concept of *artification* is a response to broadly neglected challenges that exist in innovation communities. While there are continuous debates about users' contribution in the innovation process, user innovation research (by scholars such as von Hippel) disregard the difficulties caused by the heterogeneity of actors in the process and views the innovation communities as unproblematic spaces where all outputs are successful innovations. In contrast, this study offers insights into the details and complexities of the process and hence shows cycles of collaboration and competition, confrontation and agreement, and numerous attempts in balancing the power and aligning the interests of different actors all at the same time and space. So though appreciation and understanding of the *artifications*, we can offer a more effective conceptualisation of the innovation communities; one that explains innovation communities not as spaces for diffusion of user-innovation, but also as spaces where innovations take place – both individually and collectively – and grows.

This chapter also flags the role of user groups in collective innovation and diffusion of user-initiated solutions. They enable encapsulating users' knowledge and experiences and identifying those that can be widely used by others. The user groups

act as spaces for identification of common needs, collaboration in solution generation, unification of designs and expanding solutions to the generic system. The use of the SLTI framework in this study shows how a hybrid space of heterogeneous actors enables the diffusion of innovation in the case of standard enterprise technologies.

Furthermore, in contrast to the user innovation studies in open source software, in which users' development has the potential of directly becoming functional artefacts, in the case of generic applications, user innovations require more complex cycles of 'unification' and 'generification' and 'configuration' to become functional artefacts.

This research has thrown up many questions in need of further investigation. This study focuses on user-initiated innovation and community innovation, and how it evolves over time across different spaces. Although the research touches on the final user-intermediary interactions, further research might explore the detailed actions involved in the process. Also more research is needed to clarify yet another pathway of innovation: user inventions becoming commercial products of other intermediate users.

# 8 Conclusion

## 8.1 An Overview of the Thesis

This thesis has conducted a study of the role of user communities in producing and fostering innovation (particularly end user innovation). Whilst technology user groups are known as an important locus of innovation, and in recent years, there has been an increasing interest in explaining user innovation through fieldworkers participating in such settings, far too little attention has been paid to 'the community' aspect of user-innovation: the processes and possible successful or failed outcomes resulted from multi-directional linkage between heterogeneous actors. Instead, research to date, mainly conducted by economists (such as von Hippel 2005, 2008; Smith & Shah, 2013), has tended to focus on the eventual output products of such communities. This has led to a lack of understanding of the internal dynamics and various complexities and challenges found within these groups and the innovation process. In response to this broad issue, this thesis aimed to contribute to knowledge by offering a detailed understanding of 'community innovation' by exploring the roles of user groups in the evolution of standard enterprise applications.

This thesis constructs its primary theoretical framework by drawing from two disciplines that address the important role of users on product innovation: user innovation studies by economists and STS. However, despite the fact that both highlight the influence of users on technology, the two fields have only barely exploited the insights offered by the other (van Oost & Verhaegh, 2008).

As we observed in Chapter 2, while von Hippel, as the key author in user innovation studies, has a business-oriented perspective on the outcomes of innovation and hence tries to capture particular users as the lead in the process, the STS literature delves into socio-political aspects and aims to show the involvement of a wider range of social groups in shaping of technologies. Also, as user innovation studies tend to use quantitative methods and count the innovations and incentives for innovating, STS research employs qualitative approaches to offer in-depth descriptions and explanations of phenomena.

The approaches used by economists in studies of user innovation foreground user innovativeness as well as the importance of user communities as potential sites of innovation (von Hippel, 2001; von Hippel, 2005; Smith & Shah, 2013). However, while they propose a wealth of concepts and evidence on user innovation, they represent an imprecise way of characterising user innovations in complex technical artefact communities. They address such groups as spaces in which innovations are exchanged amongst users. This view, as discussed in the previous chapter, is problematic in a number of ways. Initially it implies that the only actors present in such spaces are innovator users who 'freely' (with no mention of tensions and conflicts) share ideas. Secondly it does not offer any insight into the collaborative (and possibly competitive) acts of innovation and community sustainability. Moreover, as the extant user innovation perspective only provides evidence on successful innovation outcomes, there is a tendency to ignore other likely products of community involvement. Finally, these innovation studies have a tendency to focus on specific times (van Oost et al., 2009) and as a result they neglect the possible biographical dynamics of user groups - such as the possibility of evolving nature and practices within these groups.

However, the findings in the STS field suggest a rather different view of user involvement in technology development. They reveal a wide range of players involved in the innovation process (see for instance Williams et al., 2005). Also they show the existence of collaborative practices aimed at the creation of new technologies and networks. Additionally STS studies offer longer term perspectives and biographical approaches in examining technologies, and suggest symmetrical analysis of findings. Together these characteristics advocate possibilities of change as we move between space and time, and they suggest that user innovation may follow different paths (i.e. there is much more to user innovation than merely successful outcomes).

In this thesis I used the insights offered by the STS tradition to initially delve into the under-explored dynamics of user communities as multi-spatial, multi-temporal spaces with heterogeneous actors with different aims and practices. Then I sought to explain the community innovation process in detail by showing the challenges that

result from the artefact (its complexities) and the actors surrounding it (their heterogeneity). Unlike extant research which merely focuses on the views of one type of actor (particularly users), I sought to use a symmetrical perspective which elicits multiple and conflicting viewpoints from a diverse range of actors, i.e. users, vendors, and intermediaries. As I used a biographical approach I did not stick to the boundaries of the community, but moved to other spaces as and where required. In searching for instances of user innovation I also investigated the actions of a range of non-members of the community to obtain a comprehensive picture of the process.

The findings of the study are presented as four separate self-contained but related chapters, with each chapter discussing its own findings. The first of these four chapters took a multi-spatial perspective in analysing the user groups by examining several face-to-face communities. In this chapter I proposed a possible typology of functions offered by such communities. Simultaneously the chapter threw light on the possible types of tensions in such heterogeneous spaces. These findings underlined details such as tensions, complexities, cooperation and competition, vendor strategies to manage the group, and user strategies to keep consultants at a distance.

Then in the second chapter, I developed a multi-temporal perspective into user communities. This chapter extends the Biography of Artefact (Pollock and Williams, 2009) framework into an approach that can be used over a shorter period of a PhD study for research into technology communities (rather than just technologies). The findings of this chapter revealed that such community settings undergo evolution as their technological artefacts change over time. The findings showed a detailed explanation on the maturity of various spaces as they undergo a multi-dimensional evolution as a result of technology change. Hence the findings of these two chapters together indicated that the technology and its surrounding communities are co-evolving.

Then the third empirical chapter delved into details of online user forums. Much of the extant literature in this field suggests communitarian forms of collaboration and support, and the free sharing of knowledge in such forums (for instance Lakhani & von Hippel, 2003; Palloff & Pratt, 2007). Through a detailed analysis of the message

exchanges in this study, I showed that whilst there is a sense of collaborative action in exchange involved in the forum, there is also a 'trading' (Galison, 1997) nature to the process in which the requesters market their need to receive an assemblage of responses and search their way through the responses to form the solution for their need.

Finally the fourth chapter changed the analytical lens from examining the community, to examining the community innovation process. In this chapter, by following user innovation over time and space, and keeping an eye on collaborations, competing interests, and conflict of views, the study indicated that there is a wide range of outputs developed during the process, each with varying temporal existences and different spatial significances. This is a response to both studies of user innovation by economists (such as von Hippel, 2005) who overlook 'the community' in the community innovation process, and to the predominant assumption of those in the field of information systems who ignore the role of users and their influence on packaged information systems.

In order to discuss the above mentioned matters in more detail in what follows, I will show how this study has responded to these issues by offering empirical, theoretical and practical contributions. Finally I will finish the thesis by explaining the limitations and offering recommendation for further research.

## 8.2 Contributions

This section is presented in two parts which together form the contributions of this thesis: theoretical contributions, methodological contributions, and implications for policy and practice. The initial framework used in this thesis, which allowed for exploration of several spaces and was devised using several levels of analysis, led to the development of several focal points. Hence the findings contribute to a range of fields explained below.

### *8.2.1 Theoretical Contributions*

The theoretical contributions of this thesis can be categorised into four fields. Initially the study contributes in different ways to the Science and Technology Studies discipline. Secondly, this study contributes to the studies of innovation

communities in the User Innovation field. Thirdly, the findings contribute to the field of Information Systems evolution. Finally is the contribution to the field of Cross Organisational Knowledge Practices.

**Science and Technology Studies**

The first contributions of this study are to the STS discipline. Initially this study contributes to STS field through interpretation and adaption of the Biography of Artefact framework to the study of technology user communities. This approach, which suggests following artefacts over time and space, is applied to an extensive field to study user communities around technological artefacts. The application of this multi-spatial and multi-temporal approach in the study of 'technology user communities' can be considered as a contribution to the field. This perspective is used to throw light on the unexplored details of user groups and their technological contents in tandem and investigate several settings as they evolve over time. This changes the research agenda from the predominant nature of studies on user communities which are outcome-based, to one that focuses on the details and diversity of functions leading to diverse range of evolving outcomes. In using the biographical approach to examine user communities, I identified two intertwined time dimensions in need of attention when examining such spaces around complex technological artefacts: the maturity of the community and the maturity of the artefacts attached to the community. In this biographical approach, rather than following the artefact (as suggested by Pollock and Williams, 2008), I have argued that the researcher should follow the community. This extends the BoA, by suggesting that rather than having an artefact-focused agenda, one should have a dual perspective that considers both the artefact and community. This expansion of the analytical lens leads not only to a better understanding of the role of the community, but also to the discovery of other (semi)constructed products along the innovation path which may not be recognisable when merely focussing on the artefact. In this way we can capture various possible outputs, partial or complete, or temporary, transient or enduring, which may remain otherwise hidden. So while Pollock and Williams (2008) prioritise the artefact in their BoA framework, the approach suggested in this thesis prioritises the community which enables the researcher to see

not only the artefact, but also all the other objects around it. Also, while the BoA has a tendency to offer a vendor's perspective on technology, the biography of community goes one step further, and as Koch (2005) suggests, sees such complex technologies as a 'community', and as a result offers the perspective of the diverse range of actors performing around the artefact. Table 8-1 shows a summary of how the approach offered in this thesis differs from the BoA framework to cover a broader agenda for technology research.

| | **Biography of Artefact** | **Biography of Community** |
|---|---|---|
| **Actor Perspective** | There is a tendency to offer the vendor's view of the artefact. | Presents the perspective of all actors around the technology. |
| **Focus** | Artefact | Community and its numerous technological contents |
| **Time** | Artefact time: birth and its evolution | Birth, evolution and death of all technological contents. The community is also seen as a multi-temporal setting. |
| **Space** | Multi-spatial including vendor spaces, user spaces, intermediary spaces | Multi-spatial including vendor spaces, user spaces, intermediary spaces. The community is also seen as a multi-spatial setting. |
| **Result** | Comprehensive understanding of evolution of artefact | 'Artification': understanding of various successful and unsuccessful outputs |

**Table 8-1 Comparison of Biography of Artefact with Biography of Community Framework**

This expansion of the analytical framework has led to one of the core contributions of this study to the STS field, which is the introduction of the concept of 'artification' stressing the need for consideration of temporal outcomes during the user innovation process, which despite serving users' demands, may or may not transform into commercial products. This was achieved by coupling the biographical approach with Callon's (1986) 'generalised symmetry' principle to examine the wide range of possible 'outcomes', both 'successful' and 'unsuccessful', in the process of user innovation. This study used this symmetrical perspective to examine the influence of the surrounding technical and social choices on the trajectory of

technology. In this respect the study contributes to the STS field by coupling the biographical approach with a symmetrical perspective to allow for uncovering technological terrain as it transforms in a multi-directional manner over time. Furthermore, the study contributes by introducing the concept of 'artification' which refers to the process of becoming an artefact by considering all the possible outcomes during the process of innovation. I also propose that by employing this concept in the study of technological evolution, we can see innovation as having multi-levels of influence. At the lowest level, we see user-generated innovations not reaching far beyond their own organisation, then in settings where users participate in communities, there are opportunities for innovation diffusion amongst community members, and finally some user-initiated innovations travel as far as becoming fully-fledged products (or a component of an existing technology).

This perspective also contributes to the field of STS as it offers an extension of the 'Social Learning in Technological Innovation' (Williams, et al., 2005) theory by throwing light on the role of user communities in the shaping of technology. The findings show that while the SLTI framework covers the wide range of actors in play around complex technological products, it fails to give a clear picture of the role of a hybrid space constructed from collective actions in the wide range of heterogeneous actors. Hence this study extends this framework by adding an element, the user group as an innovation actor, to this model. In this respect, this study is the first to examine technology user communities and their technical contents in tandem. The extension of the SLTI model highlights two paths for product level innovations: first the shaping of technologies by the community, and secondly, the creation of inputs for user-centred design models.

**User Innovation Studies**

Innovation studies have attracted much attention to the context of policy-orientated work on user-led innovation, however, with some exceptions, this has been focused on macro level aspects such as users' motivations for the free sharing of knowledge. In these studies scholars, have paid much attention to the role of user communities in innovation. Von Hippel (2005, P. 96) defines innovation communities as 'meaning nodes consisting of individuals or firms interconnected by information transfer links

which may involve face-to-face, electronic, or other communication…'. In describing these, von Hippel highlights the information exchange between (lead) users. However, the findings of this thesis revealed a wider range of activities by different actors in the community, central to which is the coordination of the heterogeneous interests of different actors from different actor spaces.

User innovation studies ignore these actions as they tend to focus on user-innovation rather than community-innovation. My analysis showed that the complexities involved in the community (including collaborations and competitions, and coordination and conflicts of diverse members of the community) lead to much more than 'free revealing' and 'exchange' of innovation. Through these various actions we see the 'collective formation' of innovation, through users' acts of 'unification', which means interrogating the diversities and amalgamating needs to design a combined solution. So in general we see that it is the heterogeneities of actors and activities revealed in this study which differ largely with the simplistic and singular views of user innovation studies.

The findings of this thesis also encountered another phenomenon that could not be described effectively by von Hippel's theoretical framework: the temporal outcomes of the innovation process which may or may not become fully fledged products (what I have described as 'artification'). Exploring the community as a hybrid of human actors and technical elements, led to the discovery of such innovative outcomes which were not appreciated by user innovation studies. This is one main characteristic of innovation communities: the human and the technical elements co-evolving and leading to not only a few successful products, but rather various successful and unsuccessful temporal outcomes. These sets of findings are not only applicable to enterprise systems, but more generally to various types of technologies user communities such as open source software in which users play important role in shaping of the products.

This study also goes beyond defining technology user communities as mere 'innovation communities' and suggest a range of different functions (and conflicts) exist within such settings which may enable or hinder innovation. In this manner it suggests that user communities are primarily arenas where users can talk to the

vendor (and possibly the wider community) through a collective voice. It is through this collective voice that they can wield influence on the technology and the vendor. Secondly, user communities are user-user exchange mediums in which users from diverse organisations can exchange and share knowledge. Thirdly, such collectiveness and exchange can lead to users groups becoming sites of innovation in which collective generation of knowledge (not only by users, but by collaborative acts of different actors) is performed. Fourthly, user groups may act as up-to-date informants, meaning that all actors in the communities receive updated information about one another. This includes knowledge and information about current and future products offered by the vendor, creating a vision for the future (Borup et al., 2006), the adoption status of users, and complementary products and services offered by third parties. Next is the community as a training locale function, indicating that users can meet experts in such spaces and be trained about current and future products. Finally, communities act as networking sites in which users build 'professional identity and position' (Pollock & Hyysalo, 2013), and 'trade' expertise (Fleck, 1998).

In general, this study made three key proposals to the field of innovation studies: 1) The importance of exploring user initiated innovation as diverse acts of communities (rather than an individual exchange) which results in accounting for collaborations and possible conflicts of users, vendors and intermediaries simultaneously; 2) The significance of studying the community and its technological contents in tandem, which allows for understanding the alignment acts of human and technical elements together; 3) Opening the black box of the community and examining the multiple technical contents within to encounter all possible outcomes.

Apart from the key contributions this research also added to this field by offering the following insights. User innovation studies around information (software) products typically highlight innovation community characteristics to be present in free and open source software programs (e.g. Lakhani & von Hippel, 2003; von Hippel, 2009; Crowston et al., 2012). My findings in this research contribute to these studies by showing that innovation community characteristics are not exclusive to free software, but they may also exist in the case of commercial off-the-shelf information products.

In other words, similar to the case of communities devoted to open source software, communities devoted to packaged enterprise applications can range from simple information and experience exchange sites, to infrastructures for user collaborations towards developing user solutions. The concept of 'unification' shows the collaborative actions of professional users (as opposed to 'hobbyists' – as defined in von Hippel's studies) amalgamating needs to innovate. Hence what I observed in this study was that the foundation for having an innovation community around software products is not simply having the characteristics of open source software, such as being 'free' or having the source code openly available. Rather, it is having knowledge and experience of the 'commercial' technology which enables user innovation. I also found that the motivations of participants in the solution generation process are different to those in open source software (e.g. enjoyment-based intrinsic motivation - Lakhani and Wolf 2006). Instead the observations showed that professional needs shared by different user organisations, confronted by vendor's strategies to prevent modification (apart from those of configuration), are the main drivers for taking part in innovative community actions. Hence rather than mere personal motivations for participation in exchange, we observed professional motives for exchange and collaboration.

I also observed that in some communities, tensions between different actors lead to a reduction of innovative functionality. For instance, in the private sector, the high degree of competition compared to the low level of collaboration in some groups (in contrast to high level of collaboration in public sector communities), led to limited exchange of user-generated knowledge. This shows that there are many parameters involved in having an innovation community nature, and research needs to explore these issues in a broader manner.

This study also contributes to the field of user innovation by offering new insights into what researchers refer to as 'necessary but mundane' and 'free user-user assistance' (Lakhani & von Hippel, 2003, P. 923) work. While in those studies scholars suggested that helping in a virtual community is 'always freely available', our findings show that not all calls for help are responded to. Instead, the findings suggest a form of 'collaborative market' in which trade of knowledge takes place,

rather than a ‘free’ assistance of users. In such settings ‘help’ needs to be ‘solicited’, and solutions need to be ‘re-constructed’ from an ‘assembly’ of related or un-related responds.

**Information Systems**

The ‘artification’ phenomenon indicates that the evolution of enterprise packaged application can be marked by cycles of change as imposed by different inputs from a wide range of actors (including users, vendors, and other intermediary organisations), rather than a sequence of pre-planned stages by the vendor organisation. This, in contrast to the mainstream IS studies around complex enterprise packaged applications, shows that users’ innovative system configurations and newly developed solutions can leverage the technology at different levels. These levels can range from the formation of transient constructs that may be used by several different user organisations, to the generation of an extended functionality that can be incorporated into future releases of the product.

Furthermore, this effort of users in reconfiguring products and generating solutions can be explained by Ciborra’s (1997) notion of ‘bricolage’, meaning tinkering through a combination of resources as one leaves the world of methodical organising to ‘… the murky world of informal, worldly, and everyday modes of operation and practice’ (Ciborra, 2006, P.21). In this manner, by understanding the outcomes of ‘artification’ (successes and failures) we see a resemblance of bricolage in which user-initiated products diverge from formalised and pre-planned outcomes of the technology, and can lead to the development of a temporal, valuable product – or its component – which was not sought for at the outset of technology design. So by the means of artification we can see what Ciborra (2006) referred to as marginalised outcomes unfolding in a small in scope manner, which may have remained otherwise invisible. In this way this thesis shows how users of complex enterprise applications explored possible solutions around existing applications, and how their solutions had varying timespans. Lanzara (1999) refers to this as an ‘innocent’ design activity which, in the long run, leads to the evolution of information systems.

Thus in this thesis we observed that the community offered a locale where local resources were put together to generate solutions when the standard technology was less effective. Accordingly, we were also able to observe short-lived as well as different types of long-term outcomes which could either have an evolving role on the enterprise application, or cater for the needs of a limited community of users. So in general, we saw how the community created a capacity for the integration of diverse and locally obtained ideas and user experiences by creating a driving force for leveraging the standard applications.

Furthermore, we observed that users juxtapose their ideas into an uncertain 'thing' and check how it works until a solution is obtained. This process is explained by (Turkle, 1997, P. 352) as the 'bricoleur style' in which '… the painter […] stands back between brushstrokes, looks at the canvas, and only after this contemplation, decides what to do next'. So we could see users' configurations transforming into (transient or permanent) products as they examined different solutions in a collective way. In this manner, every time a step in the design of a solution was taken, each user organisation tested it against its own needs and reported back to the community their findings. However, this did not result in a multiplicity of views. Instead, the users from different organisations entered into a further act of 'unification' to aggregate their differing needs. This is a modified version of the 'generification' (Pollock & Williams, 2008) concept, which refers to supplier strategies of making a software designed for a particular organisation to work for a wide range of organisations. The term 'unification' adds to this view by addressing the process by which users involved in the user community, rather than the suppliers (in 'generification'), unify their related needs and hence design a combined solution in response to their particular requirements. In this way the mutual configuration of the technology and user needs are obtained by the collective actions of users rather than merely by the power of suppliers. Through this we can conclude that enterprise software innovation is also a community achievement.

As mentioned in the previous section, these findings were made possible through the use of a biographical lens in this study. This approach also highlights the complexities of the relations between the vendor and the current and potential users

of complex packaged applications at various stages of the product lifecycle, from inception to replacement by new technologies. So, another contribution to the field of IS was the idea of 'orchestration', which was used as the managing strategy of these complexities. This term is adapted from the original used by Drucker (2002) as he described modern management as conducting an orchestra, where the conductor sets the pace and ensures that all actors are playing harmonically, rather than having a controlling role and entering into the details of the play. I used this phenomenon to show how the community was organised through the operation of different spaces with different concerns and commitments, allowing them to act together but at the same time leaving the details of interaction to be decided by the participants of each group. In this manner the act of 'orchestration' by volunteers working as conductors of events, enabled the continuity of the group with such diversity of interests. In this way different settings were sought to work together to form a harmonised organisation, but the details of the actions and how they were performed were driven by each groups' participants.

**Cross Organisational Knowledge Exchange**

The final set of contributions of this research is to the field of knowledge creation and sharing across organisational boundaries (e.g. Dougherty, 1992; Adler, 1995; Carlile, 2002; Bechky, 2003, Pawlowsky & Robey, 2004; Kellogg et al., 2006; Amin & Robert; 2008). This thesis enhances our understanding of the nature of exchange in virtual user forums, where a wide range of geographically dispersed organisational users use a mailing list to exchange knowledge on daily basis. In exploring virtual forms of cooperation, we observed three key practices performed by actors to enable this exchange. The practices are: building audience and demonstrating the case; obtaining collective responses; and local selection and reconstruction of the final solution. The first practice indicates that the relations in such settings need to be built swiftly but at the same time effectively by the requester of knowledge. This requires drawing the attention of the audience by demonstrating the problem in a legible, easy to follow and at the same time, attractive way. In response (the second practice), the audience have no obligation to offer related replies, nor are they expected to form enduring commitments. Instead they enter a fast collaboration in which they only

offer what they perceive as being related. In other words, when responding, there is no need to commit long hours to generate a solution. Instead, typically local solutions are offered. In the third practice, the requester shuffles through responses and tries to organise them into meaningful and useful knowledge bases for constructing the final solution based on his or her own local needs. This practice could involve combination and reconstruction of responses to form the final solution.

The findings suggested that to collaborate across organisational boundaries to find solutions for local needs, a market-like practice of 'trading' of knowledge is occurring. This builds on the notion of the 'trading zone' by Galison (1997), in which there is a contribution of professionals performing non-committed actions across organisations with different priorities. I refer to these groups as 'collaborative knowledge markets', which is not simply a community of practice in which all members act in favour of others out of mere understanding. It works instead in a similar manner to the practices of market traders (Clark & Pinch, 1995), in which an 'audience for help needs to be created', knowledge is 'shared without commitment and loyalty' (only with a collective intention of achieving the greater goal of enhanced technology use), and the responses need to be 'examined and modified' to achieve organisational benefit. The global commonalities and differences negotiated in such spaces enable local generation of knowledge.

### *8.2.2 Methodological Contributions*

I argue that communities are key spaces for studying complex technological artefacts as they provide what we can call 'technology configuring events' (TCE). This is a more technological orientation of Lampel and Meyer's (2008) conception of 'field configuring events' in which they suggest that conferences represent an important setting for the study of the emergence of fields such as technologies, markets, industries, and professions. In a similar vein, I argue that communities present unique spaces where the researcher can see all the actors in one place and can examine technology (or different technologies) at different stages of their lifecycles. Hence they present key spaces where the emergence and shaping of technologies by different actors can be studied.

In doing so, initially they offer not a single type of space, but different settings (e.g. special interest group face-to-face meetings, virtual user forums, user conferences, etc.) largely interconnected with other types of spaces (i.e. user organisations, the vendor organisation, and other intermediary organisations) due to their diversity of actors. This shifts the study lens from a 'localist' (Pollock & Williams, 2008) view to a lens that can capture an understanding of different actor spaces. Also their richness in terms of data and data types (presentations, user-generated solutions, performances, e-mail interactions, etc.), offers the researcher a less costly but more effective source of data produced in different spaces (i.e. data produced in the community as well as data produced in the actor's organisation and disseminated in the community).

Secondly, examining user communities as TCEs, offers a 'motion picture' (Lampel & Meyer, 2008) rather than presenting a 'snapshot study' (Pollock & Williams, 2008) that focuses on a single phase of technology. To obtain this picture, I used a biographical lens to gain an understanding of the trajectory of change to both the community and the attached technology. However, as biographical approaches tend to require longer periods of study, more than can be justified in a PhD study, I adapted the approach by examining several spaces in different stages of their lifecycle (as described in Chapter 5) at the same time, and then reconstructed the whole story to achieve a comprehensive understanding.

As mentioned earlier, FCEs offer spaces in which technology can be studied at different points of time. In this manner, it was fortunate that this research could be carried out at a strategic point of time with regard to the technologies involved in the communities. During the time of this study, Oracle EBS version R12 was being assessed and implemented by many user organisations, and at the same time a different product, the Fusion application, was being introduced into the market. So this research offered a comprehensive empirical case on technology in use (version 11i), technology in implementation (version R12), and technology in development and early days of publicity (Fusion). This is again another way in which studying TCEs allow researchers to go beyond the 'snapshot' and 'short-term' understandings

of technology (i.e., through studying particular disruptive episodes in the lifecycle of a technology).

Finally, TCEs make the process of data collection more comprehensive in terms of achieving a multi-perspective focus on the subject of study. In the study of Oracle user groups, I could examine the views not only of different types of actors (i.e. users, vendors and intermediaries) but also the competing views of similar types of actors (e.g. users from different organisations). Furthermore, similar to Lampel and Meyer's (2008) argument which suggests that participants in conferences are more approachable for data collection purposes, I observed that participants in community settings are also willing to share their views. This is due to the nature of their attendance in the community as they expect to be approached by strangers.

### *8.2.3 Implications for Practitioners and Policy*

In March 2008, the UK government published a white paper on the importance of innovation and the role of different actors in this process on the economic prosperity and quality of life of the nation. The paper argues that a failure to address the barriers to user-led innovation is likely to be of 'economic significance' (DIUS 2008, p. 36). This study has obvious connections with the UK policy ambition to help create the conditions for innovation to flourish. Thus, whilst this research primarily focuses at the level of user group practices and management, it then highlights barriers as well as potentials and the paths to successful user initiated innovation in enterprise settings. In doing so, while the findings of this research confirm the importance of user-initiated innovation and highlight the role of communities in the innovation process, they also show that this process is not without problems.

The thesis has identified several issues including artification, unification, user community tensions, user community functions, and online community practices. These findings have several implications for policy and practice which will be discussed below.

**Better management of these groups to foster collaboration**: Presence of competing actors with different organisational and personal knowledge and interests, though they have potential for enhanced outcomes, can also be a barrier to smooth

expansion and proliferation of innovations. Due to uneven distribution of actors across the groups, the issue of competition versus collaboration, and revealing versus commercialisation, are the most important matters in this regard. Although the private sector was capable of generating solutions, the majority of collaborations that led to a change of technology were those initiated by the public sector user groups. These movements, which are a result of a natural tendency to collaborate amongst certain groups and kinds of experts, can be exploited further and be built into government procurement policies and IT strategies. Competition is rife amongst other groups (private sector user organisations), hence user group organisers need better and more inventive strategies and practices for encouraging cooperation in such groups. Furthermore, strategies can be sought to facilitate the interchange of innovation expertise between the public and private sectors in the UK with the aim of achieving higher national goals in technological development.

**How suppliers might foster groups:** There are two main competing views concerning the management of these types of user groups: direct control by the supplier versus delegation of control to users. In the first instance the vendor organises the event and hence can manage what to offer in these events. The downside to this strategy is that the process is resource intensive and far less benefit can be gained from user inputs. The second, where users control the group, is more democratic and hence higher user collaboration can be achieved. However, a lack of engaging vendors could lead to an absence of support and hence fewer possibilities to influence the products. Hence this thesis suggests a co-management approach, by not only the users and vendors but also by other actors involved in such complex settings.

This strategy involves having various settings to cater for the different needs of various actors. This is shown in the study as we described some practical cases and their differences in terms of face-to-face meetings such as customer forums, special interest groups and conferences, and online forms of interaction such as support mailing lists. Whilst there were overlapping activities in each of these settings, they tended to be working in different ways based on their internal needs. As reported in this study, we could also see different strategies for encouraging users to engage in

the activities, such as sessions known as un-conferences, and games and competitions. This approach also involves managing diverse interests by ‘balancing’ the attendance of different types of actors and ‘aligning’ the function with actor interests.

A further strategy used in such co-management was having a ‘conducting’ rather than a ‘controlling’ approach in managing the groups. This requires a central working group at the top organising and planning the overall functions and making sure that the different settings are moving forward, but leaving the detailed actions of the each setting to be decided by its own members. Hence running the members as desired by the majority but at the same time trying to cater for a wide range of interests.

**Influencing product development:** Innovations initiated by users can improve vendors’ information and knowledge on users' needs and facilitate them in the development of more successful products. As shown in Chapter 7, users share their ‘needs’, ‘potential solutions’, and ‘drawbacks and benefits’ within the community. These discussions tend to lead into the formation of a unified understanding of the need, and sometimes go as far as design or development of a possible solution. As evidence shows, this can facilitate defining areas of uncertainty regarding needs, as well as the fact that it can show that market exists for a particular requirement. Also, as described in user community innovation, users aggregate their diverse needs into unified requirement documents or even designs in order to convince vendors to develop them into the system. This helps users to achieve a vendor supported solution to their needs, and aids vendors in the development of generic solutions because far less ‘generification’ to the designed solution is needed. Further to this, vendors can also comment on the needs and solutions of users and let them know what needs to be considered for the solution to be incorporated into the integrated system. In this way, rather than vendors or users taking autonomy for design, a collaborative solution (at least to a certain degree) is achieved which will facilitate its adoption by users.

## 8.3 Limitations and Future Research

This study, particularly the 'symmetrical' account and the introduction of the 'artification' concept has opened up new lines of research and thrown light on many new questions in need of further investigation. The first is whether our current lenses and frameworks in examining technologies offer an adequate understanding of the complexities of a phenomenon like the user group and its role in the shaping of technologies. Limiting research to particular settings or particular moments in time has been said to offer a partial view (Kallinikos, 2004; Grabot & Botta-Genoulaz, 2005; Pollock & Williams 2008, 2012; Monteiro et al., 2012). This research goes one step further and stresses the need for a community view on the technology which does not only follow the core artefact, but also other emerging and fading products of transient or permanent natures around this object or system. This calls for investigation into different innovation outcomes (i.e. artifications) and into short and long term consequences of such outcomes on technological evolution. In this respect, future studies could address the question of what the different types of artification in terms of temporal consequences both on the technology and the community are? To answer this question, the researcher would need to understand the different views of various groups of actors on the outcomes.

Another question that needs further investigation concerns new paths of innovation. This study focuses on user-initiated innovation and how they evolve over time across different spaces. In this study, our focus was on examples where the outcomes are either used within the community or go on to become part of the standard product offered by the vendor. Although this research touches on the existence of intermediaries as part of the community, further research is required in order to explore the user-initiated processes that end up in third party products. In other words, more research is needed to clarify other pathways of innovation; that is, user inventions becoming commercial products of other intermediaries. This has been observed as both an opportunity and as an obstacle in the community. But additional investigation is required in order to gain a well understanding of this and other paths that may emerge in the process.

The user communities around ERP products functioning in large organisations are but one type of packaged enterprise information system community to examine technology user groups; I cannot disregard the criticism that the results are idiosyncratic to this sector. I chose to focus on this field in order to obtain rich qualitative data which was missing from the mainstream research on technology user groups. Hence the research can primarily benefit from the exploration of other types of software user groups where suppliers are less dominant in the field. Here I argue that many similarities are expected as we are examining 'standard' applications in which users urge for catering their own needs. However by such an exploration, we could able to throw light on other possible functions, different types of influence on technology (and the community), and further forms of relationships and user group management strategies.

More generally, as mentioned earlier in this study, the typology of user community functions offered in this study is not a systematic typology. It is rather an initiating point for future research on detailed practices of technology user groups. Hence through further research the current typology can be strengthened and further functions may be discovered and added to the current work.

The UKOUG was a formally registered organisation with voluntary support and funding from different types of actors. Our understanding of user groups will be enhanced by looking into multiple types of user groups. So future studies could examine alternative models by looking at both vendor funded as well as informal user groups and understand how these settings are different from a formal organisation supported by users, vendors, and other intermediaries. This new line of research could throw light on the role of the vendor and their position in such groups. There may be differences in terms of user group management strategies, user group effectiveness and other types of tensions.

Although I conducted a multi-spatial and multi-temporal research project, I state that this research could benefit from a longer 'timeframe' and a consideration of more 'spaces'. The bulk of data for the research was collected over a period of three years. A larger time frame could bring into light other aspects of user groups as they evolve around a growing technology. For instance, during the time of this research, a new

product was introduced to the UK market. This product, which was a freshly developed ERP package to be implemented over new architectural infrastructures, such as the Cloud, was at the early stages of its adoption. In this respect, in the final year of the study, I could observe new activities unfolding around this application. Hence continuing this research as this technology is evolving could reveal a more comprehensive study of user communities at different stages of technology lifecycles. Moreover, the study spanned over several spaces including several user groups meetings, conferences, online forums, and user sites. The study could benefit from a more in-depth ethnographic observation of other spaces such as internal vendor meetings.

## 8.4 Concluding Thoughts

This study offers an in-depth view of user groups around complex enterprise-wide information systems and suggests that they play an important role in the growth of such systems. At the same time, the study shows that the user groups also evolved as a result of the evolution of their technological contents. Hence I argue that there is a co-evolution of technology and its surrounding spaces in which communities of heterogeneous actors socially influence technological transformation; in turn, technologies affect the evolution of such communities. This proposition suggests that the evolution of technologies over time influences the nature of such heterogeneous communities. As the vendor offers new products, the functions of the community tend to shift toward the new offerings. Simultaneously, the communities can accept, repress, or modify these technologies. However, we could also see that not all communities have the same degree of influence and the socio-political processes involved in each community affect their level of authority on technological change. So while some groups could have proactive roles on shaping and acceptance of technology or its components, other groups were mostly recipients of technological change.

I also present that such settings have particularly important roles in facilitating user innovation and knowledge exchange. I argue that the likelihood of user influence on such complex technologies increases when there is joint expression of needs as well as collaborative action in the design of user-initiated solutions. In this regard I

observed several levels of influence and various endurances for user-initiated solutions. This was only made possible by having a wide lens that allowed for the consideration of multiple spaces and timeframes and reflection on both success and failure. In this regard I argue that in examining technological innovations, there are multiple stories of multiple actors, and only by considering these multiple intertwined settings can we learn the details of technological innovations.

Finally, I conclude by strongly arguing that the study of such complex technological settings and the understanding of practices and the innovation processes would not have been possible without a proper understanding of the technology. In this study, unlike the extant innovation studies in which many researchers are unaware of the technicalities of the field and as a result fail to disclose the contents, I as the researcher had an in-depth knowledge of the technological contents as well as the different processes involved in its lifecycle. This enabled me not only to find innovation but also to distinguish between moments of new solution generation, configuration, and existing knowledge exchange. This knowledge also led to a strategic design for the research which allowed for movement between spaces and study lenses to capture a full comprehension of the phenomena.

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