10   USER-LED INNOVATION IN CALL CENTER KNOWLEDGE WORK: A Social Shaping Perspective

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Abstract   *So called "knowledge work" is seen as integral to post-industrial society and, for some, information and communications technologies (ICTs) are critical enablers of the associated practices. Many still propose the technologically deterministic route of rolling out ICTs and expecting that users will, and indeed can, "download" what they know into a system that can then be used in a number of ways. This approach is usually underpinned by the pre-dominant assumption that the system will be developed by one group (developers) and used by another group (users). In this paper, we report on an exploratory case study of the enactment of ICT supported knowledge work in a human resources contact center which illustrates the negotiable boundary between the developer and user in local level innovation processes. Drawing upon ideas from the social shaping of technology, we examine how discussions regarding producer-user relations in innovation processes require a degree of greater sophistication as we show how users often develop (or produce) technologies and work practices in situ—in this case, to enable knowledge work practices and contribute to the project of constructing the knowledge component of professional identity. Much has been made of contextualizing the user; further work is required to contextualize the developer as a user and understand the social actors in ICT innovation environments who straddle both domains.*

1   INTRODUCTION

So called *knowledge work* has been held up as integral to innovation efforts in the global knowledge economy, and call centers have become a key feature of this. Inbound call centers typically take the form of aircraft hanger style offices, populated with information and communications technologies (ICTs) and operatives that deal with a multitude of customer queries. The use of call centers has risen tremendously over the past 20 years, predominantly in response to the needs for globalization, the potential they offer for improving organizational efficiency, and the desire to become more customer facing in the light of the business hype surrounding customer relationship management (CRM) (Light 2003; Richardson and Richardson 2002). Call center workers often perform roles that, in more traditional organizational settings, would be performed by a number of people. Indeed, where outsourcing companies operate call centers, the workloads of employees can be distributed over a multi-organizational customer base so that they are most efficiently utilized. In order to further maximize the efficiencies to be had from the call center model, ICT-enabled surveillance is used extensively to monitor performance. For example, the automatic call distribution software used to allocate calls to agents is also used to measure performance in terms of length of time taken to answer calls, calls lost, revenue generated, and client data analysis (Taylor et al. 2002). Conventional call center agents have little or no officially sanctioned autonomy; scripts are built into ICTs to guide them through their interactions in an efficient and standardized fashion. Indeed, call centers could be seen as part of the trend toward "McDonaldization" (Ritzer 2004), the process by which the principles of the fast-food restaurant are coming to dominate aspects of work organizations and society because the dimensions of this phenomena resonate so highly with them: efficiency, calculability, predictability, and control. Call center workers are not supposed to be innovative.

In this study, we explore the ICT-related innovation processes in a call center environment, which we shall call CarePoint. At CarePoint, complex forms of knowledge and processes for the construction of knowledge are required to deliver the service in question. We look at the how a group of staff tailor and maintain an important knowledge artefact and how this facilitates its appropriation into the everyday practices in the call center. In doing this we are able to shed light on the links between the complimentary development and maintenance of an ICT innovation, different forms of knowledge, and the roles of users as developers in this environment. Our aim is to illustrate the negotiable boundary between development and use, and thus the arbitrary naming of developers and users in innovation efforts. In order to accomplish this, we lay out our theoretical basis in the next two sections. In the first section, we discuss perspectives on knowledge and knowledge making. In the second section, we introduce a social shaping lens, arguably an underused theory in studies of ICT innovation within information systems. We use this to highlight the negotiable boundary between development and use, and developers and users in innovation efforts. Following this, we introduce our approach to the field study and then we provide an interpretation of our findings. From this, we provide summary conclusions and some implications for research and practice as related to ICT facilitated knowledge work, user-developer relations, and the study of innovations from a social shaping of technology (SST) perspective.

2 KNOWLEDGE AND KNOWLEDGE WORK

Although there are those who privilege ICTs as *the* mechanism for capturing, storing, and disseminating knowledge, this approach has been challenged as lacking insight into different kinds of knowledge and its provisional situated nature (Blackler 1995; Fleck 1997; Marshall and Brady 2001; Sutton 2001). For example, knowledge may be

- contingent, relevant to a particular context, widely distributed, shared, trivial, or accidentally acquired (Fleck 1997)
- embodied, knowledge about how to do something, gained through doing
- embedded, where routine arrangements are deployed
- embrained, akin to the holding of conceptual skills and cognitive abilities
- encultured, rooted in shared understandings
- encoded, conveyed by signs and symbols (Blackler 1995)

Indeed, it has been further argued that greater insights can be gained by studying the processes of knowledge construction, rather than focusing upon describing and defining the different forms. Knowledge is mediated by various things, situated in a given time and place, provisional in that it is socially constructed, pragmatic in that it is purposive and object oriented, and contested as it has links with power and politics (Blackler 1995). Knowledge work also involves the distinct but interdependent process of knowledge creation, storage, retrieval, transfer, and application (Alavi and Leidner 2001). Blackler (1995), therefore, recommends that we focus upon the systems through which people achieve their knowing, on the changes that are occurring within such systems, and on the process through which new knowledge may be generated. The social shaping perspective we adopt here to study such knowledge seems particularly appropriate given its genealogy in the sociology of scientific knowledge (SSK). SSK proponents claim that the "natural world has a small or non-existent role in the construction of scientific knowledge" (Collins 1981, p. 3) and considers social influences on science and "while traditional sociology of knowledge asked how, and to what extent 'social factors' might influence the products of the mind, SSK sought to show that knowledge was constitutively social" (Shapin 1995, p. 289). The theories of SSK argue that *all knowledge* encased in science and technology studies is a social concept (Bijker et al. 1989).

The challenge is thus to show how particular practices and discourses sustain networks of power-knowledge relations (Knights et al. 1993). For example, historically, task-continuous status organizations were prevalent where functional and hierarchical differentiation coincided. In this environment, positions were defined by greater mastery of rules, ability, knowledge, and experience in production (Offe 1976). But modern organizations are said to exhibit more of a task-discontinuation structuring of status and the function of work performed (Hardy and Clegg 1996). The question, therefore, is how do these shifts occur and why? This all points to the need to go beyond simplistic notions of knowledge as a commodity to be extracted and transferred (Walsham 2001). Any sharing of knowledge has a political dimension. For example, it may be used in innovation appropriation processes to provide access to other relevant knowledge and artefacts and as a political tool in support of particular interests (Hislop et al. 2000). Knowledge informs and justifies how we act; when it is taken as "truth," especially when it is under-

stood as neutral and authoritative, then it is powerful (Alvesson and Willmott 1996). As mentioned earlier, knowledge is situated and therefore it is necessary to understand that knowledge construction is somewhat predetermined by the fact of "growing up" in a society (Mannheim 2004), or indeed, in our case, an organization. Thus we have to be careful to avoid an excessively voluntaristic account of knowledge work in which actors are depicted as autonomous agents who possess sufficient resources to make their network a reality (Knights et al. 1993). Knowledge work is a complex, nonlinear, process involving a broad range of actors and intermediaries (Knights et al. 1993). The utilization and integration of "new" knowledge and artefacts with existing arrangements is an important aspect of the appropriation of innovations and thus this makes the control or possession of relevant knowledge important (Hislop et al. 2000).

Given this context, how might ICT-enabled knowledge working be performed in a call center environment that is often organized and managed according to a unitary organizational frame of reference? Moreover, given it has recently been argued that most ICT-based systems are still currently developed as static entities whose purpose is to model a dynamic world (Kanellis and Paul 2005) and that knowledge is provisional, then the implication is that innovation with ICTs in knowledge-intensive environments needs further investigation in terms of the role of users and developers in making such systems work in practice. In the next, section we introduce an SST lens to assist with this.

3   USER RELATIONS IN INNOVATION
PROCESSES: A VIEW FROM SST

SST rejects technologically deterministic accounts of the construction and appropriation of technologies and recognizes the mutually constitutive nature, and negotiable boundary between, society and technology (for overviews, see Bijker and Law 1994; Mackenzie and Wajcman 1999; Pinch and Bijker 1987; Sørensen 2002 Williams and Edge 1996). From this perspective, technology applications do not have predictable, universal out-comes. Instead, technologies are conceptualized as being shaped as they are designed and used depending upon who is, and is not, involved along the way. Therefore, while they may change situations, the technologies themselves may be subject to change, resulting in intended and unintended consequences for that deemed the technology and that deemed the social arrangements with which it is meshed. However, as mentioned earlier, systems are often reported as being delivered as complete solutions, which are sufficiently specified *a priori*. The consequence of this is that many systems still fail and user involvement in the specification of systems is common practice even though, with this involvement, systems are still deemed to fail (Cavaye 1995). This has been termed the *design fallacy*, the presumption that the primary solution to meeting user needs is to build ever more extensive knowledge about the specific context and purposes of various users into technology design (Stewart and Williams 2005). Stewart and Williams argue that the problem with this thinking is that it privileges prior design, it is unrealistic and unduly simplistic, it may not be effective in enhancing design or use, and it overlooks opportunities for intervention. Indeed, it has been argued that the reality of the situation is that organizational features are products of constant social negotiation and consensus building and this means we need to rethink how ICTs are developed (Truex et al. 1999).

A further issue is that users are often not considered in their context and instead are often thought of, in systems development and use, as using a given ICT in isolation from other things (Lamb and Kling 2003). Developers, too, have often been seen as objective experts whose sole aim in life is to build the best system possible for an undifferentiated group of users. However, it is now increasingly recognized that such views are simplistic and that development and use is loaded with power and politics on both sides (Franz and Robey 1984; Markus 1983; Markus and Bjørn-Andersen 1987; Yourdon 1986). Yet, the two sides of users and developers in ICT efforts are still a key feature of IS research. We understand that power is exercised by developers over users (Markus and Bjørn-Andersen 1987), and that certain users may exercise power over developers (Howcroft and Light 2006), but users as developers exercising power has received minimal attention. Even the long tradition of end-user computing still predominantly refers to users, not as developers, but as users who happen to develop ICT-based systems. Users are rarely discussed in terms of any role they may have as a developer and developers are similarly usually not seen as users (Friedman and Cornford 1989), this despite case studies of users as developers and their valuable role in product development (Holmström 2001). Consequently, there are questions about whom users and developers are. We believe this is inextricably linked with the artificial distinction made between the social and the technical often seen in IS, when such distinctions are clearly socially constructed and negotiable (Bloomfield and Vurdubakis 1994).

Drawing upon SST, we would like to expand upon this in terms of the roles associated with work deemed social and technical. In sum, we think the boundary between the usage and production (or development) of that deemed social and technical, the socio-technical, is also negotiable (Rohracher 2005). Therefore, although discussions of producer-user relations have yielded many interesting and valuable insights, we think it might also be useful to emphasize the ongoing work that users put into socio-technical systems *in situ* (Fleck 1994; Rohracher 2005; Stewart and Williams 2005). Not only do they use such systems, they produce them in use too, as is the case here. This idea of innovation in use is well known within the social shaping of technology school. Such concepts include *innofusion* (innovation in the process of diffusion), *domestication* (the process by which artefacts are made to work *in situ*), and the *innovation journey*, or *innovation biographies* (the acknowledgment of nonlinearity and branching in such processes, potentially leading to radical deviations from original conceptualizations) (Fleck 1994; Rohracher 2005; Sørensen 2002; Stewart and Williams 2005). However, the distinction between users and developers usually remains. In this study, we focus upon how a group of users use and develop the scripts. In this case, we refer to the electronically codified content, processes, and procedures regarding human resource policies that are inscribed into a component of a call center information system. In the next section, we provide details of our approach to undertaking the fieldwork.

4   RESEARCH APPROACH

This study is part of a program of work that is exploring the deployment of ICTs in professionally populated environments. The findings are based on primary and secondary data drawn from one of the cases in the research program. The research approach is

interpretive and qualitative through case study. The case study research method is largely acknowledged and is frequently used to conduct qualitative data informed research (Klein and Myers 1999; Orlikowski 1996; Walsham 1993, 1995). A range of techniques associated with the case study method were used given our concern for the social influence of ICTs within the company rather than solely those deemed *technical* (Myers 1997). CarePoint, the human resources contact center we have studied, employs 78 staff, only five of whom are male. The average age of the staff is 34 years. On arrival at the company, we were issued with identification badges and we were given authorized unaccompanied open access to CarePoint. A cross section of 14 members of staff, namely CarePoint's manager, policy makers, case workers, and a range of HR advisors, were interviewed and observed over a number of sessions during a 6-month period. At the start of each interview the study's purpose was explained and we made the participants aware that we intended to publish our findings and assured them that they and their comments would be annonymized. Our aim was to gain an overall picture of how the contact center operated focusing on several aspects concerning contact center work. This included various areas such as professional identity; the design, implementation and management of the IT system; surveillance issues related to the technology and general working practices and ergonomic arrangements. As a central feature of traditional call center work is the use of scripts, one aspect that we focus on in our study, our attention therefore turned to the use and development of scripts in an environment where workers were highly skilled and working in an area that could not always be dealt with in an expedient, straightforward fashion. Thus, questions related to the design, use, and housekeeping of the scripting artefact were asked accordingly. Questions from the initial interview protocol are shown in Table 1. From this point, we then branched off into other areas as the interview progressed, in the light of the interviewee's responses and our increasing familiarity with the area, empirically and theoretically. No one declined to be interviewed, and everyone was happy to have their thoughts shared with their colleagues.

The interviews were semi-structured with each interviewee encouraged to be candid and open. The time scale of individual interviews varied between 30 and 90 minutes; they were recorded and subsequently transcribed, providing 81 pages of transcription. Additionally, documentary evidence such as CarePoint policies were referred to as neces-

Table 1. **Initial Interview Protocol: Selected Questions**

- Please tell me about your role.
- How does your role sit with other roles in the contact center?
- Would you class yourself as working in a professional occupation?
- Please tell me about the IT systems you use.
- Can you give me some examples of how you use the IT systems?
- When might you not use the IT systems?
- How were the IT systems built?
- Who uses them?
- How do you maintain the IT systems?
- Given what we have talked about, is there anything else you think we should know about or anyone else we could talk to?

sary, which were collected from the company intranet and given to us by various employees during the process of our investigation. We also drew upon numerous sessions of nonparticipant overt observation and photographic evidence that was collected. Analysis and data collection were simultaneously carried out. This began with the aim of discovering the nature of the contact center agent's professional identity, their background, and their working environment. Data was then collected guided by Johnson's (2001) conceptual map of the characteristics of professions combined with a literature review of ICT use in organizations. The collected data was coded in relation to the literature and the features of the professions framework, and finally a subset of this related to knowledge was further unpacked, eventually leading to the identification of the analysis reported here.

5   CONSTRUCTING KNOWLEDGE AT CAREPOINT

CarePoint is an internal human resources contact center within an international health care product firm. The staff prefer CarePoint to be referred to as a contact center as opposed to a call center so as to get away from the traditional portrayal of a call center. This decision transpired because staff do more than deal with calls, the calls turn into transactions covering all human resource issues; therefore, contact center was chosen as a generic term to refer to phone calls that triggered transactions.

The contact center's function is to provide human resource support and advice to the 55,000 employees of the company. This work is undertaken by human resource professionals and involves advising on complex issues such as maternity leave, retirement policy, and staff recruitment. Employees will telephone the staff with a query, and it is their role to resolve it, escalating the caller to different levels of contact center workers as necessary. The center was set up in July 2003, with most of the staff recruited from within existing human resource roles throughout the company. However, two staff with experience of call routing and working in a call center environment were also recruited from elsewhere in the company. In both cases, the existing knowledge base of the staff was seen as crucial to the creation of this new organizational function. The majority of the staff within CarePoint are Chartered Institute of Personnel and Development qualified or are undergoing one of their programs of education. They regard themselves as professionals and consider human resources to be a profession.

The ICT-based system supporting the function was created from pieces of software from systems already in place throughout the wider organization. The system comprises a generic help desk application, a call logging system based on a customer relationship management package module, and a custom-developed staff scheduling system written in Microsoft Excel. In addition, call scripts are created in Microsoft Word using hyper linking and these are integrated with the customer relationship management module.

5.1   Users and Usage of the Development

CarePoint staff are the first obvious group of users within our case. They operate the ICT-based systems to provide advice to the employees who contact them for guidance. Such knowledge-based interactions mediate a number of things. A key artefact is the call

flow model as shown in Figure 1 and it can be seen that Level 0 introduces another set of primary users, the employees and managers of CarePoint services. Level 0 is "self help," where line managers can solve minor problems and queries themselves by referring to the HR operating manual, Storenet, and other toolkits such as *Breakfast News* (a daily bulletin) via the intranet. CarePoint advisors then are organized across the remaining levels. Level 1, the advisory service, is split into two sections: Level 1a comprises a team of frontline advisors who should be able to answer a broad range of questions and initially take the calls. Level 1b comprises a team of senior advisors who have the ability to give more expert advice; a call that is referred to this level of staff should take no longer than 20 minutes to complete. The customer is put through a series of security checks, they are asked for their staff number and name, their details are then brought up and they are then asked to confirm their date of birth so as to ensure the advisor is speaking to the right person. If a call is more complex and exceeds 20 minutes, the customer is routed to the next level of agent, Level 2, comprising a team of case workers. Case workers deal with cases that exceed 20 minutes that need to be discussed in more detail, such as issues regarding discrimination or bullying. They make the choice on how to best support the line manager and if necessary they visit the customer on site. Case workers also go out on site and deal with any new or extra business as it arises, the formation of new sites of operations, for example. They also have particular respon- sibility for the development of the service; they look at how things can be done better. Level 3 hosts a team of policy owners; they deal with legal issues, set out various policies, are responsive to the needs of the business, and are accountable for the com- munication of changes in policy.
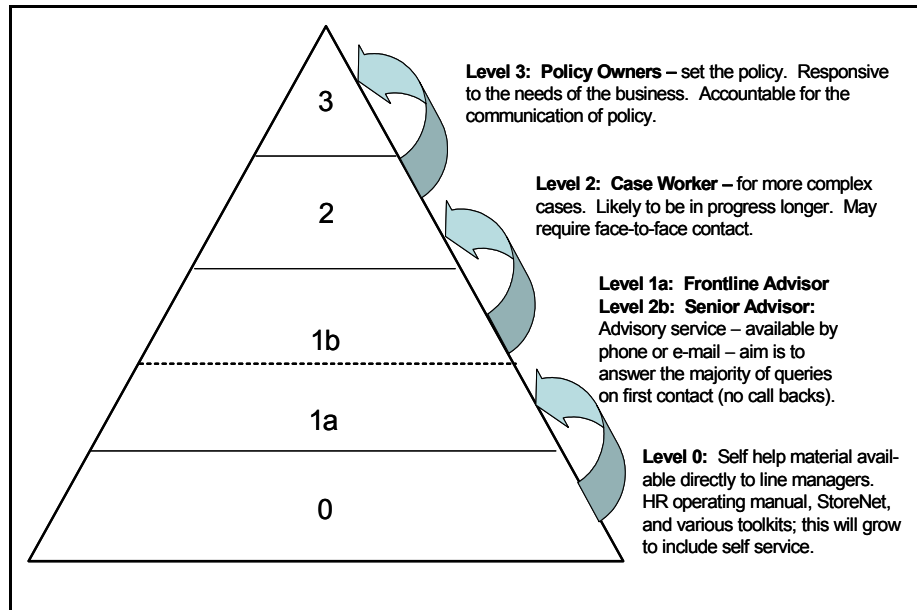
Figure 1. **CarePoint Conceptual Operating Model**

However, despite the internal structure of the contact center appearing to be task-continuous, in this case the staff's relationship to other members of departments is quite discontinuous. Level 1 staff may deal with high ranking managers throughout the organization based on their specialist encultured and embedded knowledge and by drawing upon the script as an encoded knowledge artefact. This means that when the call center was set up, working arrangements had to be altered bearing this in mind, as one employee explained.

We came from HR, which could be very complicated and we needed to give them the benefit of our experience, so 15 minutes for the average call, and Janet wanted it cut to 3 minutes and that's all you'll have and we had this ongoing debate, you know there's no way we can share our marvelous knowledge in 3 minutes and if you look at the call stats now we actually do it in 7 minutes. (Adriana, Case Worker)

Indeed, the use of the knowledge component of the system, the scripts, is also optional. Cathy, a senior advisor, informed us that

It would generally be the advisors that would use the scripts, the stuff in scripts is fairly basic where a case is black or white, if it's a bit more grey and a bit more in depth then a bit more knowledge is needed.

Even Level 1 advisors informed us that the scripts were used at their discretion.

I used the script regularly for the first 2 weeks while training, and sometimes I do still have to use them, but I have only been here 3 months, but because I come from an HR background I have prior knowledge of some issues, so that helps. (Peter, Junior Advisor)

If the caller is a staff member, then advisors stick rigidly to company policy on what is discussed, referring the caller to the encoded knowledge in the scripts as necessary. However, if line managers call, advisors tend to draw upon encultured and embedded knowledge not recordable in the ICT-based scripts so they can give a more rounded discussion on the policy. The system is, therefore, used by more established members of staff in a supporting role if they are dealing with an unfamiliar case, with trainee staff using scripts in a supporting role, particularly in the first 2 weeks of training, and if they are new to the HR function. Case workers use the system to coach and develop advisors on legal issues and telephone manner and style, to learn from escalated and tribunal cases, and to probe the case issues and give guidance and advice. In addition, all advisors are encouraged to use the system in their spare time to further enhance their knowledge and skills on the various issues with which they have yet to deal.

5.2 Developers and Development in Use

So far, we have focused upon the users in our study. We now move on to consider the developers of a particular part of it, which the users think is the most important part.

Therefore, we focus upon the ICT-based scripts that underpin the contact center's operations. A central feature of traditional call center working is the use of scripts for the purposes of maximizing efficiency and reducing the need for skilled workers by imposing a standardized, prescriptive, innovation curtailing approach. Traditionally, third party companies or in-house developers throughout the requirements gathering process of the development cycle, or in response to user needs, produce call center scripts. At CarePoint, however, advisors take responsibility for constructing, modifying, and maintaining the scripts. From the outset, the scripts have been "built onto" as the need arises or as the need is identified by the users of the system, in order to reflect best practice and accommodate new pieces of legislation. This enables all users to "sing from the same hymn sheet," which is paramount as different advisors may interpret different situations and queries in different ways and, as CarePoint support the whole of the company with HR issues, some simple and some more complex and sensitive, it is important that the most accurate and best advice is given. Jane, a senior advisor, told us that

> *Senior ER advisors construct the scripting; we have to think about how the questions will be asked in various ways, and look at how these can be answered. The HR manual is also reconstructed as and when necessary. When the script is written it goes to the case workers to check their interpretation of the Q and A to make sure it is all done properly, then it is saved.*

In this case, users are also developers. As they are dealing with provisional knowledge, there is a need to constantly revise and sustain the scripts to build the base of encoded knowledge. It is a team effort to determine whether this happens or it just becomes encultured or embedded. As Helen, a team manager, commented,

> *It's a team effort though, we have meetings and if issues are raised regarding the scripts and they need to be altered, maybe a new query has been brought to light that we have no answer to, or maybe the answer to the question needed to be put into a different context, then it would be amended or written.*

However, the professional identity of the group is also seen as something to be maintained. All codifiable forms of knowledge do not end up being encoded into the scripts. Case workers have monthly meetings where they share their learning and decide with whom this will be further shared and how. The system may also not be developed further because of the temporally situated nature of the knowledge. For example, Heather, a junior HR advisor, informed us that

> *A useful tool we use is the Breakfast News that is communication between the teams about anything that needs to be shared...for instance we've got the Pope's funeral on Friday and we're starting to get calls about that, so everybody needs to give the same information....It doesn't go on the scripting because it's a one-off and it's not in the HR manual. People are querying the one-minute silence. It's a lot easier to update people this way than to update the scripting.*

Staff knowledge and expertise is a crucial element of working at CarePoint. Their professional identity is not only recognized by qualifications but in the main by an individual's knowledge and expertise. Jenny, the talent management administrator, told us that

> *There are a lot of people who have worked here for a long time and they've got a lot of knowledge about a lot of things and that's professional expertise, there are people here like that, their knowledge is so invaluable, so professional.*

Such knowledge constructed through dealing with various cases is shared by pulling out "key learning" from the cases, selectively sharing the findings in regular meetings, deciding if there is anything they need to share with other staff (formally and informally), and recording it, if necessary, in the scripts. One advisor described the system as a "time saving tool," another as a "learning tool." This process of selectively sharing and encoding knowledge is also a powerful political tool. Advisors unanimously agreed that the system enhances their professionalism, finding out information via the intranet is easier, it makes it possible for individuals to have a broader span of what information is available concerning the various issues they are dealing with as Melanie, a senior advisor, stated,

> *The system can pull up some wonderful information; it can tell you every minute of what's happening with a case…if you think about the responsibility we have got here, we support the whole of the company with HR issues, we are very powerful, the technology aids our power and knowledge...it enhances our professionalism, you know you could actually say that the technology in a way is your buddy because the system holds all the answers for you to enable you to do your job properly.*

Critically, though, the staff of the contact center control and enact the development of the scripts on their own terms, within the parameters of their role, of course. In doing this, they are able to present certain knowledge in an encoded format and label it as fairly basic, the black and white issues that lay people might be able to understand if they write it correctly and if support is there from them to interpret it as necessary. However, they also get to choose which knowledge remains embedded and encultured and in turn this mystifies their professional position. Ironically, the ICTs that the staff value so much are also distanced in some circumstances, even though they have developed them. They are badged as "not being capable of doing what they do," even though they have developed them, as part of the process of securing their professional identity.

6   CONCLUSIONS

SST affords a view of the differences of technological artefacts and offers a non-deterministic picture of the trajectory of a diffusion of innovations. Innovations do not have predictable, universal outcomes; as we show in our case, the adoption of the call center scripts is unpredictable. This is because products are appropriated in use through processes of domestication and innofusion. In our case, the sound, predefined arrange-

ments of the contact center are domesticated by the employees and innofusion occurs. Moreover the trajectory is also ambiguous because of the differing relevant social groups involved in the appropriation of the artefact. The groups may flexibly interpret the artefact in question and provide differing levels of input into shaping the trajectory. For example, in our case, we see the relevant social groups of call center management; the HR professional groupings (as a group and as distinguished by the CarePoint operating model) and new employees have all taken differing perspectives of the technology and appropriated these in different ways.

In this paper we shed light on a group of users, who are also a group of developers, and how they get a knowledge artefact to work for them *in situ* through processes of innofusion and domestication. We also get insights into a different call center working "biography," which rejects ICT, process, and socio-geographic configurations based on typical arrangements. In our case, users develop a knowledge artefact for use by themselves, and others, in a variety of ways, and as with other innovation processes, this is political. Although, ICTs have been noted as heightening professional identities (Lamb and Kling 2003), and we see this in our case, it is also clear that considerable work goes into development *in situ* to fend off any encroachment such systems might enable. Lamb and Kling (2003) also state that, at the individual level, social actors exercise limited discretion in ICT choice and use, since, in organizational contexts, they articulate the preferences of a collection of actors. However, while we accept that this may be the case, we also show that individuals can have a high level of discretion as to whether they use particular features of an ICT: scripts are optional and often downplayed. Although it has been argued that larger systems might have more political support than smaller ones (Swanson and Dans 2000), our case affirms that smaller systems such as the one containing the script artefact can have a very high degree of political support, in this case, because of the desire to protect the professional identity of the group in question.

This study is more than a case of innovation in end-user computing and knowledge work though. Our findings have implications for user-developer relations more broadly. In Orlikowski and Gash's (1994) study, for example, it was found that *technologists* and *users* held different assessments of the value and function of a system. While we would certainly agree with this finding, our study suggests we need to think about user-developer relations a little more. In our study, the users were the developers too. The question is, when does one become the other, and vice versa? Our case is not isolated in this respect, work on innofusion, processes of innovation of the local level, implies users further developing a technology in use (Fleck 1994). In an ICT context, this is becoming ever more clear in the literatures on system workarounds (Rohracher 2005; Wagner and Newell 2006; Wagner et al. 2006; Wilson 2002) and packaged software customization where users have developed standalone applications to extract data from inflexible, enterprise-wide systems (Light 2001, 2005). The implication of this for research and practice is the need to consider the ongoing work, and actors who undertake this upon ICTs *in situ*. As Truex et al. (1999) state, systems need to be optimized for high maintenance effort. We would add this might be undertaken by users as developers rather than straight developers. Moreover, greater attention needs to be paid to the role of developers as users in the diffusion of innovations. Given the rise of social software, open source communities, and the packaged software industry, a broader consideration of ICT developers, as users is required. In each of these scenarios, developers may use the software as an application, but also as an artefact to fulfil a particular need—to sell

to make a living, for example. Much has been made of contextualizing the user; further work is required to contextualize the developer as a user and understand the social actors in ICT innovation environments who straddle both domains.

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