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THE TECHNOLOGICAL STRANGULATION OF NON-CANONICAL COMMUNITIES OF PRACTICE: THE IMPACT OF GPS IN A DUBLIN TAXI FIRM

Theme: The Social Processes of OL and KM

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Abstract

This paper uses the concept of communities of practice to explore the impact of a new global positioning system (GPS) on the work practices and interactions of the taxi drivers in a Dublin taxi firm. The paper argues that prior to the introduction of the GPS system there were discernible but somewhat unlike communities of practice in evidence within the firm. It is argued here that a deliberate by-product of the new system and its associated communication and work distribution has been the elimination of many communal aspects of the taxi drivers' work. Under the new system the presence of communities of practice have largely disappeared but to no obvious detriment to the work process and in the face of continuing indifference of the taxi drivers themselves. While communal aspects of the work continue, its focus has moved from within the firm into one involving a constellation of practice or a more occupational community focus.

Introduction

This paper builds on two previous conference papers (Grampp et al, 2002a, 2002b). These papers outline much of the important detail concerning the nature of the GPS system, of the specific context of the Irish and Dublin taxi industry and of the case study firm, National Radio Cabs (NRC) . While this information will be synopsized here considerable descriptive and technical information remains in the two original papers. The firm (NRC) is one of the biggest taxi operations in Dublin and specialises in the provision of account taxi services, mostly for large corporations, institutions, government offices and companies, from a back office location.

While this study has a broad and diverse range of foci our concern here is with the impact of the system on existing communities of practice (CoPs) of taxi drivers within the firm and the implications of this impact on knowledge flows and learning/knowledge creation within the taxi drivers and the firm. In the case of NRC, it is our contention that the introduction of GPS technology has fundamentally redefined the organisation's knowledge system. From one perspective, the properties of GPS suggest significant potential to create greater organisational self-knowledge, increased operational efficiency and thus, increased 'informating' activity within NRC (Zuboff, 1988). An alternative angle presents a more sober image of disempowerment, automation and intense panopticism (Braverman, 1974). As academics we are interested in the outcome of this "battle" of good over evil, of efficiency over humanistic effectiveness, and offer interim views on this here. However, as academics we are also left pondering the more central issue as to whether the taxi men and women themselves really care.

The research objectives and methodology

The primary research objective of this study was to:

a) Examine the nature and importance of the communal context in learning, understanding and interpretation of taxi work in NRC before and after the introduction of GPS. In particular we wished to explore the extent to which learners need access to practitioners to become and remain successful at taxi work.

As the study progressed two further objective emerged:

b) To examine the impact of the deliberate dismantling or hindering of the communal aspects of work by the employer on the efficient and effective operation of the firm.
c) To explore the extent to which the drivers and dispatchers introduce new non-canonical practices to compensate for an increasingly canonical set of centralised work practices and procedures.

Finally, as the study reached it's conclusion a more subliminal objective of this study was to:

d) Consider the explanatory potential of the community of practice concept in a low skill, low innovation and largely individualised work system.

In relation to this latter objective most of the interest in the CoP concept has been in the context of "embrained" knowledge work (Blackler, 1995). Taxi drivers do not fit into this neat knowledge work stereotype. Their practices are not like the innovative micro-biologists and high energy physicists of Knorr Cetina (1999) or the highly skilled flute makers of Cook and Yannow (1993). Their practices are mundane, possibly unusual in terms of their ingenuity as to how to buck the system, and not concerned with pushing out the boundaries of innovation.

To meet these objectives a quasi-longitudinal case study approach was followed. The main data collection method consisted of a number of in-depth interviews with two members of the management team, a dispatcher, a tele-operator and a representative of the administration department. A number of interviews were also carried out with taxi drivers at the base. The interviews were held over a number of days and repeatedly addressed the same interviewees for data verification and elaboration on statements. In addition, thirty brief semi-structured interviews with taxi drivers were undertaken in the taxi companies base on a Thursday, the company's pay day on which almost every taxi driver of NRC calls into the base to collect the weekly cheque. Observations of the operations in the base as well as the taxi drivers' work were carried out for a limited period during that time. The first set of data was collected in the summer of 2001, six months after the introduction of the GPS dispatch system. A second series of interviews was undertaken approximately 14 months later.

A substantial amount of secondary source data on the Dublin taxi trade and taxi industry generally was also obtained from the governing body (Dublin Corporation), the taxi drivers' representation (NTDU – National Taxi Drivers Union), relatives of taxi drivers, internet sites on the taxi trade worldwide and any taxi driver who was encountered while engaging their services.

Theoretical frame of reference: Communities of Practice

The community of practice (CoP) literature needs little or no introduction. Since its popularisation by Lave and Wenger (1991), the concept has received wide academic attention. Within the organisational studies arena, work on this topic by Orr (1990b) and Brown and Duguid (1991; 1998; 2001) have made important contributions to our consideration of the situated, distributed and inherently social nature of knowing and learning within an organisational context. The concept has also directly and indirectly (Lesser and

Everest, 2001; Scarbrough et al, 1999) had a specific impact in the knowledge management literature.

Within the CoP literature there is general agreement, albeit somewhat vague in parts, over the nature and purpose of communities of practice. CoPs are presented as informal groups bound together by "shared expertise" and "passion for a joint enterprise" (Wenger and Snyder, 2000). They are nebuously defined by Lave and Wenger as "*set of relations among persons, activity and the world, over time and in relation with other tangential and overlapping communities of practice*" (1991:98). They tend to be self-selecting (with fluctuating membership), self-organising (but ideally focused on developing an organisation's core competencies), self-reinforcing and self-renewing (Wenger and Snyder, 2000:140; Lesser and Everest, 2001:39). They are seen as relationship based, attract members due to the sense of identity they convey and have a shared memory and knowledge base which, with encouragement by the strong value system, is openly distributed within and between communities. Within this subculture perspective organisations are seen as composed of a multiplicity of interacting communities that occasionally cross organisational boundaries (Brown and Duguid, 2001:202) but, in such a case, normally within the confines of a specific professional occupational grouping (Van Maanen and Barley, 1984). Wenger's (1998) work provides one of the more theoretical considerations of CoPs. Blending together issues of mutual engagement, joint enterprise and shared repertoire Wenger encapsulates the core nature of CoPs in the following quote:

> *They have a sustained history of mutual engagement. They negotiate with one another what they are doing there, how they should behave, their relation with the company and the meanings of the artefacts they use. They have developed local routines and artefacts to support their work together. They know who to ask when they need help. And they introduce into the community new trainees who want to become proficient at their practice* (Wenger, 1998:123).

Turning briefly to the espoused benefits of these CoPs one is almost embarrassed by their positive potential. Despite their denial that this is not a soft management fad Wenger and Snyder (2000:139) perhaps oversell the concept as the radical new frontier with huge potential to reinvent organisations. These CoPs drive business strategy, generating new lines of business and solving key problems as they spread knowledge, help develop professional skills and help retain and recruit new talent (Wenger and Snyder, 2000:140; Lesser and Everest, 2001:30). Brown and Duguid (2001) provide a more concise and realistic summary of the utility of the communities of practice concept in examining organisational knowledge:

- They provide a privileged site for examining the "…*tight effective loop of insight, problem identification, learning, and knowledge production*" (p.202).
- They are significant repositories for "…*the development, maintenance and reproduction of knowledge*" (p.202).
- They provide a valuable support structure for knowledge creation (p.203).
- Through their overlapping and dispersed nature, they can provide a valuable source of organisational adaptability (p.203).

A discernible feature of the CoP literature is the absence of a literature of critique or of considerations of the darker side of the concept. Of the key originators of the concept, Brown

and Duguid (2001:203) do highlight some limitations in the literature. They are critical of the way in which the popularisation of the concept has led to an excessive emphasis on "community" to the detriment of our understanding of "practice". Clearly part of the allure of the interest in community within the CoP concept has been the general tendency to consider the concept in historically nostalgic terms (Clark, 1973: 401). This historically dated sentimentalism involves a nostalgic hankering for a past warm and harmonious prior age, one leading to an unrealistic return to the medieval womb, the demonisation of industrialisation and an unbalanced evaluation of the impact of science and technology. While it may be easy to explain the popularity of community in an increasingly individualised and impersonal world (Etzioni, 1997) this popularity has not lead to any breakthrough in conceptual clarity over the concept. Within the CoP literature the communal dimension is typically narrowly illustrated in terms of distinctive subcultures (Brown and Duguid, 2001). Only recently has the downside of CoP received attention. Wenger et al (2002) recognize the existence of the darker side of communities, their ability to undermine the perceived benefits to the organization when unbalanced and ill-functioning. CoP might act in their own interests, against the organization, if there is a conflict of interests between the community and the organization overall (Breu and Hemingway, 2002).

Much of the managerialist literature on CoPs focuses on the problematical issue of the identification and fostering of these spontaneous entities (Wenger and Snyder, 2000; Lesser and Everest, 2001). Our concern here is somewhat different. We wish to explore how management in this case are effectively hindering the operation and development of these informal CoPs. Management see many of these informal practices as illegitimate and inefficient and feel fully justified in their attempts to kill them off. In this regard we wish to understand how an enforced change in the "rules of engagement" in an organisation composed loosely of a number of communities of practice impact on employee behaviour and ultimately organisational performance. In Breu and Hemingway's (2002) case, communities actively resisted change and the introduction of a new business model.

One final concern to be raised here, one central to our research, concerns the concept of "practice". Brown and Duguid (2001) seem to argue that to make sense of a culturally oriented perspective such as "community" then one needs to turn things around to focus on "practice". In their view a focus on work practice, defined by them as "*…undertaking or engaging fully in a task, job or profession*" (Brown and Duguid, 2001:203) will provide key insights into how such participation actually leads to identity and knowledge creation within specific subcultures. This focus on "subculture practice" gets around the assumed cultural homogeneity implicit in a community focus. Knowledge, Brown and Duguid (2001:190) assert, runs on the rails of practice, underpinning its circulation. Shared practice facilitates shared ideas both within and across communities.

One difficulty faced in following practice is to decide what it encompasses. Gourlay (1999), reviewing the work of Lave and Wenger (1991) and Wenger (1998), sees the term as in need of tighter theoretical definition. At one level "practice" appears to be equated with what people actually do in work. Efforts to narrow the scope down by talking about "worthy practice" (Lave and Wenger, 1991; Lave, 1991), those that are socially valued, would appear to require a stronger justification. Our focus here is with practice but it is practice that has a strong social and economic value to the individual CoPs themselves. It is also unworthy practice in that it regularly brings the interests of the CoPs in conflict with those of

management and the client. In this sense some of this practice verges on organizational misbehaviour (Ackroyd and Thompson, 1999).

This section has provided a brief overview of the CoP literature highlighting the generally agreed nature of these communities and some of the limited tensions within the literature. The next section will provide a brief description of the operations and taxi driver practice within NRC pre and post the introduction of GPS.

Taxi dispatching pre-GPS

Organisational Practices

Prior to the introduction of GPS into NRC a paper and radio system was used to dispatch a *pick-up* to a taxi vehicle. The tele-operators in the base noted fare requests on specially designed paper slips on which was entered the customer details (name, address, contact number), the time of the fare request, the pick-up location and destination and any additional request such as car requirements, pick-up round etc. The completed slips were sorted in pigeonholes – one for every 15 minutes, right through the twenty-four hour clock – and were then taken out by the dispatcher in due course and offered to drivers over the radio. The dispatcher gathered information on the drivers' location and availability over the radio and matched this information with customer requests.

The paper system was subsequently replaced with a computerised system involving the dispatcher viewing two screens. The first screen displayed information on incoming jobs inputted by the tele-operators. A second screen displayed the location and identity of "parked" vehicles (taxis awaiting a job and not moving). This information was inputted by the drivers themselves. This system provided the dispatcher with more time to actually dispatch jobs, as the communication channels were not blocked with parking requests. The new computer system also considerably improved the internal work processes within the firm eliminating the need for physical movement and minimizing paper flows.

The assignment of the jobs was influenced by the driver's situation. Fares were given out in order of the vehicles parked in the area closest to the pick-up location. Parked vehicles were treated with preference over free but moving taxis. Parking therefore secured the drivers' jobs outside the busy periods of the morning and early evening. Global jobs on the other hand, which occurred when the fleet was busy and no vehicles were parked, were given out on a first-come first-served basis. Depending on the amount of work and time of the day, the dispatcher therefore either directly assigned jobs to drivers or encouraged drivers to *bid* for outstanding jobs. Fares were read out to the fleet via the radio channel and free drivers were encouraged to bid for them.

During busy periods, the parking information was used less as the fleet was generally busy moving around. Nonetheless, the drivers who were closest to a pick-up location were given preference over more distant ones where possible. Similarly, when vehicles were parked, the dispatcher gave those drivers preference over moving vehicles within the area. During less busy hours, the dispatcher considered parked cars and compared the location of different drivers that bid for the job in order to assign it to the best matching vehicle. At those times, the dispatcher was also aware of subtle inconsistencies of driver's statements in terms of their

location or vacancy and could act upon it by not assigning jobs. The dispatcher could only suspect foul play by a driver when a job was not taken up on time and there were no rational explanations for the delay from the driver. As two different dispatchers put it:

> *He is not lying, I am not lying, we are not fabricating our details whereas before drivers would be saying this "I will be with him (customer) in a couple of minutes" and you (dispatcher) 'ld never know. The driver could tell you he is anywhere and sometimes he would.*
>
> *They (drivers) would tell you any porkies just to get the work.*

Under the old dispatch system, the drivers held considerable information and knowledge about the dispatch operations. For example all the jobs that were available to the drivers, each individual dispatch, details of drivers that were bidding for a job, the manner in which dispatchers were giving out fares, experiences that drivers had had and reported to the dispatchers were all publicly available and openly shared over the airways. The constant connection to the base via the radio channel provided a permanent link for each driver to the base. By listening to the organisation working, the drivers were able to see certain regularities and patterns over time. Certain jobs occurred regularly as they were booked for the same time each day or week. This therefore allowed to distinguish interesting jobs, for which the destination was know, from random jobs or short distance jobs. Consequently, a driver had the opportunity to locate himself or herself close to the pick-up of a fare to obtain a fare due to close proximity. As an alternative to being physically close to a pick-up, "parking" could also be used to obtain a job during busy period. The drivers entered their parking location into the system and no control mechanism was available to check the actual location of the vehicle. In this way it was possible for drivers to park themselves in an area of high demand even before they would actually arrive, thereby ensuring that they were in the front of the queue in the dispatcher's system rather than having to actual park before logging on for business.

For those drivers interested in using the system for their own advantage, it allowed them to take one job after the other and to cherry-pick jobs without wasting time between jobs. However, this approach to obtaining jobs might have resulted in more unpaid mileage as the driver had to travel from the destination point of the last job to the pick-up point of the requested job. The certainty of a job made this expense worthwhile. The only situation in which drivers might miss information on vacant jobs was when they turned the radio down while driving as the noise level from the radio was very distracting.

Communal aspects of old practice

Despite the isolated character of taxi work (portrayed vividly in Scorsese's 1976 film Taxi Driver) there is evidence of a *community culture* among taxi drivers, reinforced by common experience and evident in certain work norms, rituals and specialised language. Community practice involves tipping each other off, looking out for each other, and confronting transgressions of informal 'rules'. At Dublin airport in particular there is evidence of *in-groups* and others may be threatened, for instance by the scratching of their car, when they

try to enter the ground of these drivers. This group of drivers is regarded as a breakaway group, without affiliation to the majority of drivers or companies.

While there is *no formal induction process*, taxi drivers learn and reinforce these cultural containers by developing a complex social network. They frequently have informal gatherings while parked at a rank. They also have communal breaks at mutually recognised gathering points such as the Spar shop in Leeson Street which would be a well-known contact point where drivers would meet at certain times during the day or in the evening. Drivers would also join together while waiting at taxi ranks/the airport or other parking locations. The socialising of drivers affiliated to the same organisation would be particularly engaged in, as this would not involve a loss in job opportunities. A group of drivers would be able to listen to the same announcements from a single car. The individual driver interested in an offered fare would be able to accept a job from someone else's car and would simply depart from the group in order to do the job then. One experienced driver also described rules, which showed the strong link between drivers and the existence of unspoken rules of the trade. Drivers can 'park' in a queue at a rank without actually parking in the line and therefore losing the place in the cue. A driver who fails to understand the system will be directly approached at the first incident to ensure no further occurrences. This is often due to the space restriction on the rank, which force drivers to locate their car at a distance or which allows them to take short breaks or run errands while waiting for a fare.

Generally, all these are occasions of rich storytelling, exchange of experiences that add to identity construction and informal learning. In these ways, drivers constitute, negotiate and enact the organisation's knowledge system through effective communities of practice (Orr, 1990b; Brown and Duguid 1991; Wenger, 1998). Unlike many organisations and occupations, however, such *meetings are unpredictable and snatched* in nature, as interaction is suspended by the arrival of a customer. Drivers working for NRC, as with most other taxi firms, do not have any organizationally-provided forum to meet collectively. As with van Maanen's (1988) field research into mobile police work, the taxi drivers create, through their use of the two-way radio, virtual community. Through the interconnectivity of the radio network the drivers 'hear' the organisation into being. While they cannot communicate with each other they can listen to the pattern of jobs, read nuances, discover who is doing what, and where the busy and trouble spots are. These activities, in turn, influence practice and the subsequent flow of knowledge and learning.

Taxi dispatching post-GPS

A shift to fragmentation and individualisation

In 2000 NRC introduced a Raywood Dispatcher III computer-controlled taxi dispatch system. The novelty of the Raywood system is the integration of the GPS facility in a dispatch system. The system is able to identify the location of a car via a mobile data terminal (MDT) and combine this information with the location of the pick-up and the characteristics of the vehicle. The computer decides on a match between job and driver data based on especially defined software algorithms and automatically dispatches the jobs to the best match. Most jobs are now guided by the system with no involvement by the dispatchers.

With the new system, the position of the dispatcher could be better described as a supervisor over the system's functioning. He or she is responsible for dealing with any possible conflicts in the system and difficulties resulting from it. The dispatcher is still in radio contact with drivers but only in order to deal with any queries concerning assigned jobs or to obtain verifications on job statuses. The communication direction is changed, as the driver has to log a call request in the system, detailing the nature of the request. The incoming requests are dealt with on a separate terminal, which is linked to a radio channel. The dispatcher is the only party that can initiate the voice contact and the contact is with the individual driver only. This greatly reduces the noise level both within the driver's vehicle but also at the company base as most of the communication is pure data transmission.

An alternative way of contacting the fleet, either all members or individuals, is by sending text messages through the system to the MDT in the cars. The nature of those messages is to inform the fleet of traffic situations, outstanding jobs and any other important reminders as well as personal messages for individual drivers that were received for them. The message facility is only one way and the drivers can only reply via logging a call query. The new system also cuts the dispatch time to less than half of the time required for voice dispatching. The assignment of the closest car also ensures the least *wear and tear* for the driver and reduces the amount of *unpaid miles* that the driver has to cover between jobs.

The management of NRC decided to change its technology as the old system limited the efficiency of the company's operations. The company was barely able to maintain the customer base and was not in a position to consider expansion. The goals that NRC wants to achieve with the new dispatch system can be summarised as increased work efficiency, customer service, control over drivers, organisational data and expansion in customer base and service offers. The management explicitly stated their main aim to be *decreased interaction with the drivers*. Under the old system, drivers provided the information about their status and location. This made NRC dependent on the drivers, as it could not control the accuracy of the information that the drivers were providing. The new system allows the organisation to collect information on its drivers as the system automatically records their activities and locations as long as they are logged onto the system. The expansion of the customer base and the opportunity to provide additional services is possible with the new system. The use of data channels increases the amount of bookings that the system can possibly dispatch at any given time which translates into the satisfaction of more customers as long as the fleet and traffic conditions allow to cope with the number of bookings.

The management's source of information about the operation of the organisation was derived mainly from the administration and the base operators. Account charges and driver payment gave an indication of the amount of work that the organisation and the individual driver were doing while it did not allow to derive detailed statistics on the dispatch time, peak periods and driver contact. This type of information was obtainable from observing the base operator and interacting with them as well as closely reviewing a day's work. Due to the lack of immediate information and hence evidence, the management's reactions to individual driver's behaviour was limited. The management relied on the co-operation of the drivers on the basis of the implicit contract as it had few means of reinforcing desired driver behaviour. As one dispatcher put it:

> *You were selling your work all the time – you were verbally selling it all the time over the radio. You were waiting on them (the*

> *drivers) to pick and choose. They were responding but they were also picking and choosing, 'cause they had the pick up points and the destinations. So the customer really wasn't getting any service. Now everything is completely different, this is completely managed by them and we manage the fleet. Before that they were managing us because they could do what they wanted to – it changed the whole outlook, the whole operation changed as such.*

Another dispatcher put it this way:

> *A fleet that was managing us, out there to please themselves. Sometimes you got them to do what you wanted while other times they just did what pleased themselves ... there were guys out there that would please themselves all the time and doing nothing for you ... they just wanted monetary gains.*

The management came to the conclusion that the old system could not cope with an increasing number in customer requests with the existing taxi fleet. Reviewing the system's operations, the reduction of the direct interaction with the drivers was seen as a desirable feature of any new system. As one dispatcher complained:

> *The query channel is used less now. It used to get terrible abuse ... 60 to 70 percent were irrelevant to the working situation – just muck, useless repetition, all job related but useless in efficiency: What was that job again?*

Another dispatcher complained in the following manner:

> *(On the radio)... you could spend ten minutes with a driver – not every call comes in straight forward, it doesn't always work that way – there is complications and everything.*

The new system automatically dispatches jobs to vacant drivers only, based on proximity or waiting time. The management can instantly review the activities of the whole organisation, individual drivers or jobs with only a few keyboard strokes. The following dispatcher quotes illustrate this point.

> *We can look into our stats (job flow) – jobs dispatched this hour, last hour, today, yesterday – we can keep a daily record of that and we know what rate is going on. You can see if they (drivers) worked off the street as well – every meter movement he (driver) makes is recorded, every entry to the database is recorded for you.*

The management has access to any activity within the system and by determining parameters it can also identify certain activities as being undesirable and consequently punish their re-occurrence. It is possible to log drivers out of the system if they do not adhere to the implicit rules, something that was not possible with the previous system as the information was not directly and objectively available. As one of the managers explained:

> *Although the drivers are working for NRC ... they are still free to work the streets and to take cash jobs. There are certain expectations however. Drivers prioritise the system during busy hours to ensure the provision of the best service to the (NRC) customer. Rejection of a job is penalized which means that the driver is taken off the system for a period of five minutes at a time. They loose privileges.*

The new system provides the management with information on the drivers that it can use and translate into actions, directed at anyone who is using the system, be it the drivers, dispatchers or tele-operators.

Although the management openly admit that its objectives in introducing the new system was to increase control over and reduce the interaction with drivers, the way in which the new system was communicated to the drivers focused strongly on portraying the advantages of the system for the driver rather than disclosing the management's objectives for introducing the system. For example one of the dispatchers explained the lack of broadcast messages under the new system in the following way:

> *Where we used to use the voice all the time, this (system) is personalised for them (drivers) as well – everybody used to be able to hear what his business was when we had to give him a message.*

Another dispatcher defended the positive aspects of the system as follows:

> *It (system) saves them (drivers) time, wear and tear on the car ... petrol consumption ... before they served a bigger area and the bigger the area, the more mileage you had to do depending on where you were within that area ... now the areas are smaller ... the driver is travelling less distance ... he (driver) has the same jobs, he has got better pay for it in such a way as he has less wear and tear.*

The new system also allows the representation of the current location of a vehicle on a computer screen. It displays the section of the map in which the vehicle is located along with the movement direction. This is especially useful for dealing with customer queries concerning the whereabouts of the taxi. The operator is able to give the exact location of the taxi and can estimate the approximate arrival time. The mapping is also useful when a driver requires directions. In addition, the allocation of the vehicles functions as a security and safety feature. It allows to locate a stolen car or to map the movement of a vehicle whose driver alarm has been activated. This security feature encourages the drivers to leave the basic GPS mode switched on at all times.

The dispatcher supervises the automatic dispatch process re-sending outstanding jobs through the system, which have not been acknowledged by drivers. The radius in which an empty vehicle is located can be broadened by the dispatcher to ensure the earliest possible dispatch. The dispatcher also deals with problems within the system such as lost driver contacts or requests from drivers for clarification of job information which are dealt with via the separate voice channel. The supervisor can manually overwrite the system's decision but this is only

done under limited situations. The drivers still have the option for voice contact with the base but in order to do so have to specify the nature of the request first in the system and await being contacted by the base.

From a driver's perspective, the system's pre-selection of information for the drivers deprives them of updates on the organisation's working. Drivers are now largely unable to identify new regular job opportunities that are to their interest – although the past knowledge of certain patterns might still allow the drivers to engaged in their own selection of jobs but this is more difficult to achieve than beforehand. They are no longer aware of the jobs that others are doing; they do not receive information on fares that are serviced by the organisation. The drivers do not learn about new accounts unless they are taking the fares and might obtain information from the passenger about the account and regularity of a job. The amount of information that the individual drivers obtain through the system is marginal compared to the amount of information that they received beforehand. This also means that the driver does not obtain important information about the conditions of certain jobs or experiences with particular passengers. The receipt of this information is depending on the dispatcher's discretion, as it has to be actively broadcasted via data messages in order to share it with the fleet.

The driver's perception of the pay-off for the new system is generally positive as they see the advantages of the new system outweighing the disadvantages of the old one. Those advantages include the feeling of security as the base is constantly aware of the location of the vehicle, the introduction of an emergency button which alarms the base without the passenger's knowledge, reduction in wear and tear of the vehicles and most importantly the perception of equal treatment by the system which makes preferential treatment from dispatcher and fellow drivers' exploitation for their own advantage impossible. The drivers are aware of the surveillance mechanisms inherent in the system but seem, at this early stage at least, to perceive the advantages as outweighing the disadvantages. As one driver put it:

> *I don't mind that (monitoring). We are all self-employed, it is not like we are running away from our employer ... you are not getting paid when you are not working and that is that.*

The system's direct contacting of suitable drivers not only influences the indirect link between drivers via listening into the organisation's operations but also the direct link between drivers during breaks or waiting periods. One driver explains:

> *Radio (GPS) taxis tend…, you have to stay in your car ... that would cut down on the time you can spend talking to others for the simple reason that each car is designated another number and you have to be in your own car ... four or five people in one place from the same company, they have to stay in their car – with the old radio system the controller would call up and the call could be taken from someone else's car.*

Breaks now have to be arranged individually with other drivers via alternative means of communication (e.g. mobile phone, or per pre-arranged/regular gatherings). Waiting periods can no longer be shared without losing out on fares as differences in vehicles can lead to

different fare offers from the system. The system discourages strong bindings between taxi drivers and encourages the inherently individualistic aspect of taxi work.

The following are a sample of the varying views on the system expressed by drivers interviewed

> *GPS ... it's a lot harder ... with the old system we could pick and choose our work and now it gives you the work when it is available ... although it is very good and fair system it has made our daily work harder ... the new system is more customer friendly but not driver friendly.*
>
> *I think it is fabulous! ... it is so fair for the drivers: the driver in the area gets the job.*
>
> *It is a lonelier job now ... you don't hear anything anymore, even though you only had the one-sided conversation before ... I think it is better, it doesn't bother me.*
>
> *There is no listening all the time, no picking and choosing – the system gives you the job. You take it or you don't take it. You don't take it, you get penalized.*
>
> *You can't hand it (fare) back anymore, you can't tell lies ... cheating ... there is no point anymore.*

We will give the final word to driver No.7:

> *It is a lonely job – even more so now.*

Discussion and conclusion

Fundamentally, taxi driving is independent and isolated work underpinned by a *culture of individualism* and a short-termist, anti-cohesive mentality (Trudel, 1996). As sole traders, taxi drivers are in *direct competition with each other* for their income. This *isolation* is further heightened by the *fleeting nature of his relationship with the customer* (Davis, 1959). Many drivers find themselves forced into night-time work, despite a preference for more sociable hours primarily because of the difficulty of making money during daytime traffic congestion (Boland, 2001). The picture thus painted is of an occupation that is isolated and in many senses alienated (Berry, 1997), of *maverick lone cowboys* (Berry, 1997). To add to this, taxi driving is clearly a risk-laden occupation. The International Labour Organisation lists taxi driving as the solo occupation at greatest risk of violence (1998). Robberies at knife or needle point are common, and there is global and legitimate concern about the safety of drivers. Local practices emerge to deal with this threat. It is common, for instance, for drivers to radio in their movements and make it clear to the passenger that their location is known, in cases where the driver is suspicious as to their intentions. Having related this somewhat critical account of taxi work culture, it is important to add that drivers speak highly of the positive aspects of their work: its endless variety of people and places, but most especially its independence and flexibility.

In contrast to this image of troublesome individualism, there is also a strong *narrative of professionalism and modernising* among sectors of the taxi community. Taxi drivers band

together in pursuit of influence over regulators, campaigning on safety and regulation issues and *union or association membership* is high. However, the tone of this influence is often criticised as one of 'demands rather than dialogue' (Trudel, 1996). A series of strikes and demonstrations have served to reinforce this interpretation. Taxi drivers are generally united in their criticism of the deregulation of entry barriers to the trade, which took place in November 2000. Another united front has been the long-running demarcation issue between taxi-drivers and hackneys. This issue of a strong occupational community will be returned to below.

This paper has outlined what we see as the elimination of informal CoPs among the drivers at NRC. The developments outlined above have their roots in the management's rationale for introducing GPS. The change was driven by pressures to increase efficiency and customer service in the face of deregulation, and explicitly, to reduce high dependency on the discretion of drivers and 'time-consuming' contact. Those goals are reflected in the technology's focus: the improvement of operational efficiency is interpreted to mean externalised 'expert' knowledge. Evident here is the classic interpretation of knowledge as 'thing' rather than 'process' (Blackler, 1995).

At NCR, drivers have embraced the new system and perceive its benefits to them in terms of more efficient and equitable work allocation and potentially increased revenue per hour. They are also attracted to the safety benefits provided by their tracking, and the protection of textualised data-capture. Yet a directly observable consequence of GPS introduction is a turn-around in the power relationships within the organisation. The driver's role is shifting from a self-determined one, to something new, one largely dictated to by the technology of GPS. These changes in operational processes are resulting in a further isolation of drivers from each other.

From the organisational perspective, there is evidence that the knowledge configuration is also changing. Currently members retain past knowledge, which reduces the impact of shortcomings in the system. However, we suggest that GPS suppresses the exercising of knowledge, and fundamentally changes the way that knowledge is acquired and shared. Focusing initially on the dispatchers, we have suggested that their responsibilities have changed from actively dispatching jobs to supervising the system's automatic dispatch facilities and dealing with any irregularities within the system. The dispatcher is still a form of "last resort" source of advise for drivers but in most cases the system provides detailed resources of information as a basis and support of the information given to drivers. The existing knowledge of the dispatcher in terms of the operating of a taxi service and the area in which it is offered allows him to use the provided information most efficiently to enhance the quality of decisions that are made. However, the change in the skills that are required to operate the current system does not facilitate the maintenance of the existing knowledge while at the same time limiting the building of new knowledge as the system controls most of the relevant actions and sources of information that are required to dispatch a fare to a taxi.

Turning to the drivers, prior to GPS, information and knowledge sharing was deeply linked to ongoing radio interaction, a function that served to create a 'virtual' network whereby all members directly participated in and 'heard' the organisation doing its work. Similarly, informal gatherings at taxi ranks and coffee stops during slack times served as a key opportunity for community engagement and socialisation. In these ways, members of the organisation constituted, negotiated and enacted the organisation's knowledge system

through communities of practice. However, the introduction of GPS replaces the previous network with regulated and formalised means of interaction that do not integrate existing deeper structures. A primary outcome of GPS adoption is the removal of multi-directional radio communications between driver, base and driver-network and its replacement with a highly sophisticated automated job allocation system. Drivers are now tied to their cars, even when parking or queuing. The technology has replaced a network with a dyad. As such, GPS is rendered the single source of the organisation's knowledge and knowledge is rendered 'static' rather than social. Hence, the organisation is reconstructed as the owner, holder and distributor of that knowledge. From a practice perspective the computer has become the "master" (Lave and Wenger, 1991:35) and learning consists of complying fully with the master. Full participation from a driver's perspective is becoming increasingly difficult and unlikely but from management's perspective is, in any event, undesirable.

The commitment of the drivers to the organisation is essential in running the taxi service. However, the new working relationships between drivers and the organisation does not lend support for this type of relationship. The way in which taxi operations are now structured does not call for the interaction of the individual drivers at any level. The drivers are self-employed. They pay the organisation a fee for the use of their services, the provision of regular customer fares, and have therefore no direct obligation to the organisation. The contract between the two parties refers to the rental of the equipment and not the quality or extent of the services. There is an assumption however, that drivers will make themselves available and will engage in a minimum amount of use of the equipment by renting it. These contractual arrangements are implicit and not stated anywhere in writing.

The management of NRC appear to attribute no importance to the non-canonical practices widespread among the various groups of drivers. In their view non-canonical is deviant and inefficient in the face of the imperative of efficiency (Ritzer, 1996) and the cult(ure) of the customer (Du Gay, 1991). Given that some of these practices concerned the elimination of the drivers' capacity to 'hide', to steal jobs, or to bluff about location or activity management appear to have a moral imperative behind their cause to pre-dispose the drivers to cooperation. Brown and Duguid (1991), drawing on the work of Barley (1988) and others, suggest that deskilling technologies may drive non-canonical practice and communities further underground. This may lead to an ever-widening gap between espoused and actual practice, a gap that noncanonical practice will eventually be unable to bridge. In the case of NRC we have, so far, failed to observe any formal (or indeed informal) driver resistance to the new technology. As one of the managers interviewed put it:

> *95% of the drivers are happy with the system. Some drivers had difficulties at the start in dealing with the silence but less than 3% of the drivers were lost.*

At present to maximize the financial gain from the new system, individual drivers must adopt subservient behaviour or risk the imposition of penalties. This leaves limited scope for "deviant" behaviour. As one of the dispatchers put it:

> *GPS doesn't offer them an incentive to do it (manipulate the system) – the incentive is to work with the system, not to try and beat it.*

While clearly limiting the amount of informal knowledge flows among the drivers only time will tell whether this new sophisticated set of canonical practices will actually deprive the drivers of knowledge and, subsequently, of the skills they have (Orr, 1990a:26 – quoted in Brown and Duguid, 1991) to perform their task effectively.

While we agree that CoPs are important sites for negotiation, learning, meaning and identity (Wenger, 1998:133) we also question the explanatory potential of the concept to provide a comprehensive understanding of how the drivers make sense of their daily activities at work in this case (Wenger, 1998:123). In discussions with the taxi drivers over the past few years we have discerned a clear shift in emphasis from focused and multiple communities of practice within the organisation to ones with a combined friendship and industry or occupational focus. We feel that the concept of "constellations of practice" (Wenger, 1999:128) is inadequate in capturing the essence of this interaction. The focus of identity is now one of taxi drivers rather than employees. To this end we find that Van Maanen and Barley's (1984) earlier concept of an "*occupational community*" offering more scope for explanation and investigation. Van Maanen and Barley define an occupational community as one providing a distinctive communal identity and historically routed work culture with a strong emphasis on self-control and collective autonomy (1984:291). These discernible and unique communities are bound together by the common view of providing socially significant work, a common life style and skill pool, the collective confrontation of common danger and a close intermingling of work and social relations. A question posed here, but one for which we do not have an answer, is whether these broader communities will, in turn, loosen and disappear as the drivers increasingly loose control over knowledge and procedure.

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