

‘Post-Modern’ Professional Work and Mobile Technology

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Abstract. This paper aims to theoretically discuss the emergence of the ‘post-modern’ professionals out of the ‘modern’ professionalism in the second half of the twentieth century, and how their adoption and intense use of information and communication technologies (ICTs), particularly mobile and wireless technologies, potentially shapes and is shaped by the emerging professionals’ work practices. For this discussion, the theory of Communities of Practice is employed as an analytical lens. In doing so, we outline three distinct characteristics of the ‘post-modern’ professionals’ work in relation to their adoption and use of mobile technology and other ICTs: multi-participation, boundary objects, and knowledge brokering. Finally we draw some implication for future research.

1 Introduction

The last two decades have seen rapid adoption and intense use of various information and communication technologies (ICTs) as an essential foundation for business activities. It is clear that although ICTs have not changed the basic nature of their business as dramatically as anticipated, newly developed ICT solutions such as groupware, ERP and video conferencing have offered the firms various alternative options for restructuring their business activities. Presently, we are witnessing the advent of the mobile and wireless technology Era influencing contemporary businesses and organisations. Although mobile technologies such as mobile phone and personal digital assistants (PDAs) were first developed as consumer products rather than business solutions, a number of innovative firms are adopting those technologies for restructuring their business processes and organisational forms.

The aim of this paper is to explore the under researched area of *professionals' use of mobile technology and their changing role for organisations*. Professionals include for example designers, planners, consultants, accountants, lawyers, technicians, and programmers. Although various kinds of professionals have played an important role in contemporary business, they are likely to be a 'neglected workforce' (Barley and Orr, 1997) who recedes from the 'front stage' of business studies and information systems research. One of the reasons for this could be that most of these professionals are 'outsiders' to the organisations in which they work. They perform their jobs independently and bring their distinct skills and expertise to organisations on an *ad-hoc* basis. Since business activities are becoming more and more 'knowledge-intensive' (Alvesson, 1995), effective utilisation of external experts who can bring distinct expertise to the organisation is increasingly important for organisations. Furthermore, a blurring of formal organisational boundaries can be observed as a result of more flexible and fluid modes of organising and of the uptake of interaction technologies (Kakihara and Sørensen, 2002). The characterisation of organisational membership in terms of people being "outside" or "inside" the organisation is therefore increasingly difficult when the notion of organisation is based on economic transactions as opposed to the operational aspects of collaborative activities based on mutual interdependency (Schmidt, 1994).

Prior to the widespread availability of mobile communication technologies, they would depend heavily on fixed telephone and fax lines, offering limited communication abilities across temporal and spatial boundaries. This in effect rendered the professionals 'ad-hoc participants' separated from the organisations' everyday activities. Contemporary mobile technologies such as the mobile phone, web-based email clients, laptops and networked PDAs have enabled professionals much more fluidly to participate in clients' business activities. For professionals, many of whom are working independently, being accessible to and keeping in touch with the surrounding world is crucial for their everyday work. This involves keeping communication lines open and stable. In particular the mobile phone have enabled the professionals to be continuously involved in organisational activities by providing them with a geographically independent and portable means of communication. Considering these emerging work practices, it is obvious that contemporary professionals' work must be addressed as an integral part of understanding contemporary modes of business organisation.

This paper offers a theoretically based analysis and discussion of the changing nature of professionals' working practices. The analysis points towards the importance of analysing the operational, locational and interactional aspects of mobile professionals' work. It also highlights the following three defining aspects of their work: *multi-participation*, *boundary objects*, and *knowledge brokering*. Section 2 discusses how contemporary 'post-modern' professionals differ from the traditional 'modern' professionals who typically were internal experts or employed by an expert-organisation. Section 3 explores the impacts of mobile technology on the professionals' work practices. Section 4 applies the theory of Communities of Practice (CoP) (Lave and Wenger, 1991; Wenger, 1998; 2000) as an analytical lens in order to explore the distinct characteristics of 'post-modern' professionals' work by applying. Section 5 discusses the findings and concludes the article by drawing out further implications for research.

2 Professionals on the Frontiers

2.1 The rise of the ‘modern’ professionalism

Professionals are not at all a new occupation. They have a long history from the medieval time. Among the oldest professionals would be the clergy and teachers, although they must not have been called or even recognised as professionals at the time. Architects also have a long history of contributing to society as professionals with their expertise of designing and constructing buildings. However, we in the contemporary society can see much more diversified kinds of professionals, including accountants, designers and artists, writers, doctors and nurses, engineers, computer scientists, lawyers, pharmacists, psychologists, counsellors, social workers, scientists, librarians, professors, urban planners and so on. As Schön (1983) argues, professionals have become “essential to the very functioning of our society” (p. 3). Many have discussed the social drivers of the rise of professionals in the twentieth century and the increasing importance in our social lives in general and our workplaces in particular (e.g. Abbott, 1988; Friedson, 1986; Larson, 1977). Synthesising, the basic arguments forwarded are that there is 1) A need for the workforce dealing with increasingly complex work, and 2) A need for organisations to adapt to turbulent business environments.

1) *The workforce needs to deal with increasingly complex work.* After the World War II, the nature of work has become dramatically complex in consequence of the popularisation of Taylorist division of labour in a wide range of industries and the rapid diffusion of modern manufacturing methods such as assembly lines. Managers were no longer capable of being experts of every part of their businesses that was highly specialised in terms of both physical and symbolic manipulation. For example, effectively controlling a manufacturing assembly line is clearly beyond a job of a single manager: it requires a number of professional and technical workers such as controllers in front of the console panel and mechanical specialists for specific manufacturing machines. Barley and Orr (1997) explain: “it becomes increasingly difficult for individuals to master the breadth of knowledge necessary to remain a generalist... Consequently, most science and professions divide themselves into ever narrower subfields as their knowledge base grows” (p. 7). Moreover, the introduction of computing technologies into almost all workplaces has further made the nature of work complex (Kling, 1996). Such increasing complexity of modern work and diversification of knowledge necessary for getting the job done has been constantly requiring highly skilled workforce with distinct expertise and knowledge.

2) *Organisations must constantly adapt to turbulent business environments.* It would be fair to say that today’s business environments have become much more uncertain and unpredictable compared with those fifty years ago. This is in part because of the rapid expansion and globalisation of business activities in the second half of the twentieth century and in part because of ever-increasing consumer demands that constantly and aggressively urges firms to create new products. In such a business environment, traditional hierarchical organisational forms and bureaucratic decision making process are likely to be significant fetters for firms in their intense competition. In order to cope with such turbulent business environments, the firms have had to make their organisational forms flexible and decision making agile in some ways. In response to this environmental change, many firms have introduced various solutions in the 1980s and 90s, for example flatter organisational hierarchies, eliminating middle managers, massive downsizing of the permanent workforce, virtual teams as well as extensive use of subcontracting and outsourcing. This attempt to increase adaptability to constantly changing business

environments has further raised the importance of professionals in work settings. The qualities that professionals are expected to hold include a certain *distinct expertise, autonomy, objectivity, disinterestedness*, adherence to a set of *professional ethics*, and a *service orientation* (Friedson, 1986; Kerr et al., 1977). With these qualities, professionals have played a critical role in increasing adaptability of firms' capability, being the most skilful and mobile workforces that can be strategically deployed within an organisation.

Responding these two social and organisational needs, professional work has rapidly grown during the second half of the twentieth century. In the United States, for example, the number of professional and technical jobs has grown by over 300 percent since 1950s to 1990s, whereas the growth rate of the total jobs was 97 percent (Barley and Orr, 1997). Many scholars have analysed and discussed in depth this rapid growth of the 'modern' professional workers (e.g. Abbott, 1988; Bell, 1976; Drucker, 1993; Friedson, 1986; Leicht and Fennell, 2001; Raelin, 1985; Reich, 1992).

2.2 The emergence of the 'post-modern' professionals

The literature tends to either study professionals *within* organisations or inter-organisational arrangements. As a consequence the literature generally neglects professionals working *independently*. Obviously, most of the 'modern' professionals have been deployed within an organisational structure. As Whalley and Barley (1997) argue, the need for the professionals' expertise was 'created' in response to several changes of inner conditions of the firms. These changes are for example; *hiving off* of work by established professions within organisations, *de novo* creation resulting from the introduction of new technologies into organisations, *occupationalisation of amateur work* that was formerly performed largely on a voluntary basis, and *upgrading of mechanics* in various scenes of business processes. All of these phenomena have been initiated by the first social and organisational need we discussed earlier: *a need for the workforce dealing with increasingly complex modern work*; however, if we take the second need, *to increase adaptability of organisation to turbulent business environments*, then addressing only professionals inside the organisational structure clearly does not suffice. In fact, during the last two decades we have seen a rapid growth of workers who are independent of a formal organisation and, in many cases, do their jobs on a freelance and temporary contract basis and establish ongoing relationship with several different client firms (Segal and Sullivan, 1995; 1997). And most of them are knowledge-based rather than material-based professionals such as consultants, designers, writers, journalists and planners of various kinds (Meager, 1992). They live on their lives by selling their own distinct skills, knowledge and/or tangible and intangible products they make to firms. This trend is symbolically proved by the rapid growth of temporary employment agencies such as Manpower Inc. (<http://www.manpower.com/>), which employs 2 million people worldwide, far exceeding the number of employees at General Motors, IBM or any other global corporation. The emergence and rapid growth of the 'post-modern' professionals outside formal organisations is becoming a critical factor in contemporary business environments, especially in knowledge-intensive sectors. Yet surprisingly little research has been done on such 'post-modern' professionals and their work practices which are not bounded by formal organisational structures, rules and constraints but playing critical strategic roles in organisational contexts.

Among the notable exceptions is Malone and Laubacher's (Laubacher and Malone, 1997; Malone and Laubacher, 1998) work. Seeing Linux open source community's success, the emergence of virtual

companies, the rise of outsourcing and telecommuting and the proliferation of freelance and temporary workers, they argue:

The fundamental unit of such an economy is not the corporation but the individual. Tasks aren't assigned and controlled through a stable chain of management but rather are carried out autonomously by independent contractors. These electronically connected freelancers – e-lancers – join together into fluid and temporary networks to produce and sell goods and services” (Malone and Laubacher, 1998: p. 146).

It can be argued that this kind of independent professional workers, ‘e-lancers’ in their words, is at the forefront of the contemporary economy, since they are certainly children of the ICT revolution. Although independent professionals outside organisations have already existed in various forms such as lawyer and accountants since the middle of the twentieth century, they have remained quite small volume compared with workers employed by a certain firm including both white- and blue-workers. This is mainly because, as traditional economic theories of organisation suggest, firms have benefited from internalising a wide range of labour forces into the formal organisational structure and placing them in the same, fixed locations such as offices and factories to effectively manage them in a centralised manner. In other words, the firms have seen it costly and risky to utilise people who are outside of the organisational boundaries and largely distributed in a wide area due to limited communication and coordination technologies in the industrial age such as trains, cars, telegraph, fixed telephone, and mainframe computers. In consequence, the firms have remained large.

However, with the introduction of powerful and cheap personal computers, laptops and software, the internet, web-based technologies such as email, mobile phone and personal digital assistants (PDAs), the firms have become capable of coordinating their business processes and utilising the outside workers, particularly those who have distinct skills and expertise. They no longer have to hold a large number of permanent workers inside the organisations for the sake of centralised coordination of business processes (Malone et al., 1987). Many of the highly skilled people in firms are actually spinning out and finding their workplaces outside of the firms, since being free and independent can provide them with much larger benefits such as gaining more reward for their work and managing their career and lives more flexibly than staying inside the firms. Some of those people are getting together and forming a loosely bounded, partnership based organisation such as a consulting firm and a design studio, but each of them still keeps much more autonomy and freedom than professionals inside the firms. Therefore, considering these shifts occurring around the ‘post-modern’ professional jobs and their impacts upon contemporary business activities, we must give careful consideration into how such independent professionals work *with* organisations and how particular ICTs are utilised in their work practices. We shall take a close look at one particular set of ICT, *mobile technology*.

3 Impacts of Mobile Technology on the ‘Post-Modern’ Professional Work

As we have discussed in the previous section, the rise of the ‘post-modern’ professionals is directly associated with the diffusion of various personal ICTs. First of all, the wide spread of telephone throughout the society is undoubtedly the basic foundation for today’s human communication, not only for professional work. Perhaps the first notable technology introduced into the professional work with a significant impact is fax machines, enabling the professionals to immediately exchange and share paper documents with distant clients and other members of projects in which they are involved. Personal

stationary computers and laptops have also become a necessity of contemporary professionals' work, becoming ubiquitous in virtually all workplaces and liberating the professionals from the spell of the mainframe computer systems. Integrated with the internet technologies such as web browsing, email and instant messaging, personal computers have become an indispensable communicative infrastructure for the professionals, particularly in the case of self-employment. However, we here shall take an emerging technology being rapidly introduced into the 'post-modern' professional work: *mobile technology*, because it has great potential of transforming the nature of the professional work as fax machines and personal computers have done before. Yet, before stepping into detailed discussion of mobile technology's impacts on the professional work, we need to appreciate the nature of the 'post-modern' professional work in order to avoid naïve technological determinism.

3.1 The nature of the 'post-modern' professional work

Unlike the 'modern' professionals working mainly for and within a certain firm, the 'post-modern' professionals are inherently 'mobile' in many ways. It is essential when conceptualising their work to explore the following three aspects; the *operational*, the *locational* and the *interactional* aspects.

Firstly, they are mobile in an *operational* sense, that is, they are mobile human resources that firms can utilise on an on-demand basis. Since establishing flexible organisational and operational structures is of paramount importance for virtually all firms in our time, a growing number of firms are employing such solutions as project teams, task forces and virtual organisations (Murchie, 1998; Randolph and Posner, 1992; Townsend et al., 1998). In executing these solutions, independent professionals outside the firms usually play important roles. They are important not only because they often have much more competent skills and knowledge than their counterparts inside the firms but also because their work practices are extremely task-based and thus can be utilised *ad hoc*. Saxenian (1994) describes the growing prevalence of freelancing and contract-based work practices of engineers in the information technology industry in Silicon Valley. Similarly, it is a usual practice in retail and fashion industries that firms make contracts with highly reputable, outside designers for a specific product design project for a specified period of time. Such professionals' distinct skills and knowledge enable them to work with a number of different firms and to be mobile work forces for the firms.

Secondly, they are mobile in a *locational* sense, that is, they usually get their jobs done at various different locations rather than spending a long period of time in one place such as an office. Except for computer programmers and some others, independent professionals extensively move around to meet their clients, both existing and potential, and other members of ongoing projects. Urban and town planners, for example, seem to be one of the most mobile professionals in this sense (Tewdwr-Jones, 2002). Not only do they visit their clients' offices to present their plans and explain the progress of their work, they also need to meet various other members involved in a project in different locations such as project members from construction companies, architects, various advisors, people of government and administrative offices, and so on. Furthermore, in some case, they need to visit construction sites to check the progress of the actual work. As opposed to the conventional image of white-colour worker sitting in an office, independent professionals are wildly mobile in terms of their extensive *geographical movement* in their work practices.

Thirdly, they are mobile in an *interactional* sense. More specifically, what is mobile is not just their body but also their interaction with others in their work practices. Kakihara and Sørensen (2002) offer an extended perspective of the concept of 'mobility,' which has tended to be addressed in terms exclusively

of humans' corporeal geographical travel. It is argued that when discussing the concept of mobility and its related issues, it is crucially important not to limit our perspective to solely concerning humans' geographical movement, because "*being mobile* is not just a matter of people travelling but, far more importantly, related to the interaction they perform — the way in which they interact with each other in their social lives." Following this argument, interactional patterns of the 'post-modern' professionals' can be seen as significantly mobile because their interaction with a number of members involved is freed not just from geographical constraints with the support of various telephone and fax machines but also from temporal and contextual constraints by using asynchronous communication technologies such as email and instant massaging. It is the professionals' high interactional mobility that enables them to be highly effective work forces in organisational contexts. This *fluid interaction* (Kakihara and Sørensen, 2002) exactly makes their work practices mobile.

3.2 The impacts of mobile technology on the 'post-modern' professional work

As discussed above, the nature of the 'post-modern' professionals' work can be seen as highly 'mobile' by nature. By the introduction of various ICTs, their work practices have become mobile in terms of their operational, locational and interactional aspects. Based on these understandings, it would be easier to relate their work practices to their growing use of mobile technology.

Mobile telephony, now almost an everyday commodity in the developed world, is in many ways revolutionary. It changed and still is changing a wide range of our everyday lives, not just ways we communicate but also our ways of doing, behaving, and even perceiving the world (Kopomaa, 2000). It enables people to make and receive a call regardless of location. Integrated with PDAs such as sub-notebooks and handheld PCs, people can send and receive email and connect themselves to the WWW. We have also web-enabled mobile phone such as WAP and i-mode. Emerging mobile technologies clearly hold a variety of social impacts on our everyday lives, and there is no reason to believe that their impact on the working life of professionals' is any less. Mobile technologies may impact on the professionals in relation to the three aspects of the nature of their work practices as follows:

Operational aspects: The qualities of the 'post-modern' professionals as mobile human resources are ensured by not only their highly competent skills and expertise but also their communication and coordination capabilities that have been greatly enhanced by the introduction of ICTs. Looking at the emergence of the 'post-modern' independent professionals, 'e-lancers', Malone and Laubacher (1998) describe:

Because information can be shared instantly and inexpensively among people in many locations, the value of centralized decision making and expensive bureaucracies decreases. Individuals can manage themselves, coordinating their efforts through electronic links with other independent parties. Small becomes good. In one sense, the new coordination technologies enable us to return to the preindustrial organizational model of tiny, autonomous businesses – businesses of one or of a few – conducting transactions with one another in a market. But there's one crucial difference: electric networks enable these microbusinesses to tap into the global reservoirs of information, expertise, and financing that used to be available only to large companies. (pp. 147-8)

Mobile technology can drive this trend further. Whereas newly developed business strategies such as project teams, task forces and virtual corporation are increasingly prevalent, the execution of such strategies requires smooth communication and efficient coordination of the members. But since some, or sometimes many, of those members are independent contractors outside of the firm, it tends to be difficult to keep such communication and coordination among those distributed members stable and

effective even if they introduced the internet technologies such as email in their work practices. In such a situation, mobile technology can be 'glue' among the distributed members, providing them with communication access regardless their location, connecting them together more tightly, and hence reducing communication and coordination costs in the execution of the distributed teamwork strategies. This means that by using mobile technology, the 'post-modern' professionals can become more 'mobile' work forces in terms of flexible operation of businesses.

Locational aspects: This would be the most obvious impact of mobile technology on the 'post-modern' professionals' work practices. As discussed earlier, the 'post-modern' professionals work at various locations: in their own office, at clients' offices, at other members' offices, at work sites, on train, plane and car, in a hotel room, in a coffee shop and a restaurant, and so on. Kristoffersen and Ljungberg (2000) describe three distinct modalities of mobile work. First, *travelling* is the process of going from one place to another in a vehicle such as by train, car and plane. This type of mobility seeks to capture the mobility of people in a vehicle. Second, *visiting* is spending time in one place for a certain period of time before moving on to another place, for example, spending in a hotel room or a construction site. Third, *wandering* is extensive local mobility in a building or local area basically on foot and sometimes by skateboard. Excluding computer programmers and other professional workers who usually work sitting down in a room for a long period of time, the professionals' everyday work practices exhibit all of these modalities of mobility. Thus it is easy to imagine that during such extensive geographical movement, they often lose the most basic communication means: telephone. However, by using mobile phone, the professionals become able to be 'on-line' regardless their location and extensive movement. For a kind of professional who particularly move extensively and rarely stay in one place for a long time such as journalists, mobile phone is a much more important communication means than fixed telephone and other ICTs in their work. Baines (1999) investigates ICT adoption and use of freelance journalists in UK (mainly in London) and found that they use mobile phone in their work more regularly than the internet. In a sense, mobile technologies such as mobile phone and PDAs are the only communication technology that can 'follow' the professionals' extensive movement (Fagrell, 2000).

Interactional aspects: Although the impacts of mobile technology on locational aspects of the professional work are perhaps the most obvious and immediate, mobile technology can bring forth much broader consequences in the 'post-modern' professionals' work practices. As discussed, compared with 'modern' professionals who are employed by and work for a firm, the 'post-modern' professionals constantly interact with a much wider kinds of people both inside and outside the formal organisational boundaries, who are mostly distributed in an extensive area. It can be argued that such *fluid interaction* among extensively people is a fundamental quality of being a 'post-modern' rather than 'modern' professional. Email has significantly contributed to their fluid interaction and become as essential to independent professionals' everyday work as telephone. It enabled them to communicate with remote members asynchronously, giving both a sender and a receiver much freedom in the sense that a sender no longer need to care whether a receiver is available when he/she sends a message and a receiver can choose when to read and reply to the message. Asynchronous communication enabled by email has made the professionals' interaction with others more fluid and flexible. However, asynchronous communication inevitably creates time-lag. Until a receiver of an email actually goes to his/her computer, starts up email software, and opens and reads the email, the communication does not come into effect in practice. Furthermore, email communication of course requires a computer and email software, which are mostly fixed to a certain location such as an office and home. In order to cope with

such limitations of asynchronous communication by traditional emailing, the professionals can benefit from mobile technology. The combination of mobile phone and PDAs can provide the professionals with a capability of receiving and sending email regardless their location with a relatively low cost. More interestingly, web-enabled mobile phone enables them to constantly check email. In Japan, where *i-mode*, NTT DoCoMo's always-online web-enabled mobile phone service, has greatly succeeded gathering more than 30 million subscribers (NTT-DoCoMo, 2002), it is gradually becoming a common practice among the professionals to automatically forward email coming into their formal account to their web-enabled mobile phone so that they can read email on their mobile phone immediately after its reception no matter where they are, and, in urgent cases, reply from their mobile phone. This can be seen as an emerging fluid interaction practice of combining advantages of email and always-online web-enabled mobile phone communication.

As shown above, mobile technology has without doubt great potentials to transform the nature of the 'post-modern' professional work and increase their effectiveness in various organisational business contexts. However, again, surprisingly little attempt has been made so far to investigate and clarify how such 'post-modern' professionals' work and their use of mobile technology shape each other and what consequences will be potentially made by their adoption and intense use of mobile technology in their everyday work practices. Admittedly, some have investigated mobile technology use in social and/or business contexts (e.g. Brodie and Perry, 2001; Esbjörnsson, 2001; Juhlin and Weilenmann, 2001; Wiberg, 2001; Wiberg and Ljungberg, 2001). However, although they offer details description of people's mobile technology use and its consequences, their research contexts are mainly manual-based, blue-colour, or 'modern' professional workplaces such as telecommunication service technicians, highway emergency service, and airport maintenance workers. Furthermore, due to such research contexts, they do not deal with organisational boundary issues that are closely linked to the 'post-modern' independent professionals' work practices. Yet, considering both the rise of the 'post-modern' professionals and the rapid diffusion of mobile technology in their work practices, there seems to be a growing need, both in academics and practical fields, to put forward our debate on those issues.

4 Conceptualising Characteristics of the 'Post-Modern' Professional Work

Although our attempt here to discuss the emerging 'post-modern' professionals and their growing use of mobile technology together with other ICTs is inevitably hypothetical due to lack of established research and empirical data on the topic, it might be of worth, based on our discussion above, to conceptualise distinct characteristics of the 'post-modern' professionals' work practices enhanced by mobile technology. For this task, we use the theory of Communities of Practice (CoP) (Lave and Wenger, 1991; Wenger, 1998; 2000) as an analytical lens.

4.1 The theory of Communities of Practice

A *community of practice* is seen as an informal group of people bound together by their collectively developed understanding of what their community is about and they hold each other accountable to this

sense of joint enterprise. It is built through mutual engagement of the members who interact with one another and establish norms and relationships of mutuality that reflect these interactions. In consequence, the community of practice produces a shared repertoire of communal resources such as language, routines, sensibilities, artefacts, tools, stories, styles, and so on. Obviously, the concept of *practice* holds an important meaning for the theory. Practice offers the source of coherence for a community. Wenger (1998) argues:

It includes the language, tools, documents, images, symbols, well-defined roles, specific criteria, codified procedures, regulations, and contracts that various practices make explicit... But it also includes all the implicit relations, tacit conventions, subtle cues, untold rules of thumb, recognizable intuitions, specific perceptions, well-tuned sensitivities, embodied understandings, underlying assumptions, and shared world views. (p. 47)

This understanding of practice is implicitly based on the conception of practice in American Pragmatism, especially the work of Dewey (1922). The Pragmatist perspective places great emphasis on *action* rather than abstract concepts and principles. Taking such questions as “what we know” and “how we know”, Pragmatists would answer that we should not focus (solely) on ‘knowledge,’ which is abstract, static, and separated from human action, but on ‘knowing,’ as a dynamic human action. Knowing, from the Pragmatist view, refers to not possessing and gaining a set of knowledge but more importantly “an aspect of action, not to something assumed to underlie, enable, or be used in action” (Cook and Brown, 1999: p. 387). In other words, knowing is a dynamic process of human action of making use of knowledge.

The reason why we see the theory of CoP as a particularly useful theoretical and analytical lens for looking at professional work in organizational contexts is that, following the Pragmatist conviction, the theory conceives professionals’ fundamental quality not as possessing a large amount of abstract and formal knowledge about a certain field but as their *reflective action of knowing* about what they do, in what situation they are, what they see, and what is problematic in the situation. For this issue, Cook and Brown succinctly provides a good example: “An accomplished engineer may possess a great deal of sophisticated knowledge; but there are plenty of people who possess such knowledge yet do not excel as engineers” (Ibid. p. 387). This kind of Pragmatist understanding of professional work is crucially important for our purpose because we easily tend to see great importance in knowledge as such the professionals hold and ignore their actual *practicing* of the knowledge in a problem domain.

Furthermore, we see the theory of CoP is useful also because, based on this Pragmatist understanding of practice, the theory successfully integrates the discussion of professional practice and learning to that of organisational boundaries and knowledge diffusion across them. A community of practice is seen as a place where professionals learn methods, attitudes, values, and interpretation of their community and problems they face. They learn not only just a body of knowledge but an ability of *reflective conversation* with the problem situation (Schön, 1983). Participating in a community of practice is essential to learning and identity building. Often one person belongs to several different communities of practice, since the boundaries of communities of practice are permeable. As communities of practice dynamically interact with each other, they are overlapping and constantly create a new one.

Since reviewing the theory of CoP fully here is beyond the scope of this paper, we here take particularly three concepts introduced by the theory in relation to the ‘post-modern’ professionals’ work practices with mobile technology and other ICTs: *multi-participation*, *boundary objects*, and *knowledge brokering*.

4.2 Multi-participation

In the theory of CoP, participation is a key notion for learning and identity of members in a community of practice. Participation is “a complex process that combines doing, talking, thinking, feeling, and belonging. It involves our whole person, including our bodies, minds, emotions, and social relations” (Wenger, 1998: p. 56). Also, it is “always based on situated negotiation and renegotiation of meaning in the world. This implies that understanding and experience are in constant interaction – indeed, are mutually constitutive” (Lave and Wenger, 1991: pp. 51-2). A newcomer first enters a community of practice from its certain periphery. He/she would negotiate with the community and try to know what the community do, how other members behave, what rules they have, and so on. Through such a process, He/she participates gradually into the community from its peripheral to its core, learns the culture and social system of the community, and becomes a legitimated member.

Participating into several different communities is a crucial task for professional work, particularly the ‘post-modern’ independent professionals’ work. At the beginning of a project, an independent professional is likely to be a ‘stranger,’ having quite a different culture, conventions, and rules for other members of the project. Professionals usually reserve and seek strong autonomy and freedom of self-management. However, they have to collaborate with other members for a common objective. Hence, through the process of participation, they seek to build certain legitimacy and to keep their distinct identity. Furthermore, since the professionals are usually involved in several different projects simultaneously, they need to manage their identity and legitimacy for each community.

ICTs in general and mobile technology in particular help such professionals to manage their practice of *multi-participation*. As discussed earlier, the introduction of various personal ICTs into workplaces has reduced communication and coordination costs among members significantly. In particular, the combination of email and mobile technology enable the professionals to interact with clients and other members of the projects stably and continuously. It is exactly this quality of the emerging mobile technology that makes the independent professionals ‘regular participants’ rather than ‘ad-hoc members’ of the project.

4.3 Boundary objects

Boundary object, originally introduced by Starr and Griesemer (1989), is a concept to refer to objects that serve an interface between boundaries of different communities of practice. Boundary objects are a certain entity shared by several different communities but viewed or used differently by each of them. Boundary objects are flexible enough to adapt to local needs and have different distinct identities in different communities, but at the same time robust enough to maintain a common identity across the boundaries to be a place for shared work. Boundary object are not necessarily physical artefacts such as a map between two people: they can be a set of information, conversations, interests, rules, plans, contracts, or even persons.

It is obvious that a variety of boundary objects serve critical roles in the ‘post-modern’ professional work. Since the professionals are involved in different communities (i.e. projects) simultaneously, *traces* of their work practices are necessary to manage fluid interaction with other members. Reports are a classic example of traces as boundary objects that the professionals and other members share. Faxed documents and email messages are also the boundary object among distributed members. Pawlowski et al. (2000) investigate that shared information systems can also play a role of boundary object in IT professionals’ work practices. Because the ‘post-modern’ professionals’ work are highly fluid in terms

of their operation, location, and interaction in their actual practicing across various boundaries, such boundary objects effectively connect members in different communities together and also make each of them distinctively different from each other in their work practices.

Moreover, the professionals themselves are in a sense boundary objects. They work within and across different organisations with their distinct skills or expertise. Just because of this quality of the professionals, they can be 'shared' by different communities of practice for, in some cases, quite different purposes. In this sense, the professionals are often 'boundary persons' linking different communities. This is also largely ensured by various ICTs. Without ICTs, especially mobile technology, that maintain the stability and flexibility of communication and coordination in the professionals' work practice, they cannot serve such a 'boundary person' role.

4.4 Knowledge brokering

Brokering is another way of linking different communities of practice together. Brokering:

Involves processes of translation, coordination, and alignment between perspectives. It requires enough legitimacy to influence the development of a practice, mobilize attention, and address conflicting interests. It also requires the ability to link practices by facilitating transactions between them, and to cause learning by introducing into a practice elements of another. Toward this end, brokering provides a participative connection. (Wenger, 1998: p. 109)

Brokering practice can take a variety of forms, including: *boundary spanners* who take are one specific boundary over time; *roamers* who go from place to place, create connections, and move knowledge; *outposts* who bring back news from the forefront and explore new territories; and *pairs* who come from different communities and exchange certain entities based on their personal relationship (Wenger, 2000: p. 235).

The 'post-modern' professionals are by nature knowledge brokers. They do knowledge brokering through their fluid work practices, participating into different communities dynamically and smoothly. They exhibit all forms of knowledge brokering practice, namely, boundary spanners, roamers, outposts, and pairs, sometimes simultaneously. The transfer of specific knowledge from a community to another is not as simple or easy as moving an object from one place to another, because any kind of knowledge, even a digitally codified pattern of knowledge, is inherently embedded in and connected to its specific social context. Such 'stickiness' of knowledge (Brown and Duguid, 2001) can be overcome not by symbolic manipulation of the knowledge such as being codified into a transferable data set but by brokering practice through which a broker conveys the knowledge and implement it to a new situation by him-/herself. Given that effective transfer and diffusion of organisational knowledge is an urgent issue to be tackled in a wide range of business fields (Kogut and Zander, 1992), the professionals' knowledge brokering practice holds significant importance, and he or she embodies and embrains the knowledge (Blackler, 1995).

However, we need to bear in mind that knowledge brokering is very much delicate. Brokering "requires an ability to manage carefully the coexistence of membership and nonmembership, yielding enough distance to bring a different perspective, but also enough legitimacy to be listened to" (Wenger, 1998: p. 110). Therefore, for the professionals, managing interaction and relationship with various members across boundaries is of paramount importance for knowledge brokering practice. So depending solely on such traditional communication means as telephone and fax machines is highly risky in this regard. Effective integration of mobile technology and traditional ICTs can provide the professionals with much more flexibility in managing and maintaining the interaction and relationship.

5 Concluding Remarks

In this paper, we have discussed why the 'post-modern' professionals are emerging and how their introduction of ICTs, particularly mobile technology, shapes and is shaped by the professionals' work practices. Needless to say, there must be various unanticipated or even unwelcome consequences around the 'post-modern' professionals' work practices and their use of mobile technology. Perhaps the most immediate drawback of the to their intensive use of mobile technology would be that, with mobile technology, in particular mobile phone, the professionals would inevitably be faced with the problem of 'interaction overload' (Ljungberg and Sørensen, 2000). The more they become dependent upon email and mobile phone, the more emails and phone calls come a day. Coping with an overwhelming flood of interaction from others including clients and other members will be particularly an important task for the professionals.

Moreover, although high fluidity of interaction created by the integration of mobile technology and traditional ICTs can offer the professionals much flexibility in managing communication and coordination in their work practices, such fluidity easily turns to be obstacles for effective communication (Kakihara et al., Forthcoming). By having mobile phone, people can be disturbed by anyone who knows their number regardless the level of busyness. Although e-mail is basically an asynchronous communication way that does not require immediate response, the work environment becomes "overloaded" by e-mail unless constantly reading and deleting emails already received. The combination of mobile phone and PDAs enable workers to check and send e-mail outside their offices, but colleagues who know that a person has a PDA would expect that he/she always check and replies to e-mail. As seen in these immediate examples, high fluidity of mobile interaction offers us a practical issue to be solved: the asymmetry of interaction (Nardi and Whittaker, 2000).

Many of the ideas we submitted here are largely hypothetical and even speculative at the moment. For future research, empirical validation, especially through detailed fieldwork looking at the professionals' work practices, is clearly needed. Nevertheless, it is undoubtedly true that the phenomena occurring around the 'post-modern' professionals we have seen above are already upon us, and those are left largely unexplored.

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