COMPUTER MEDIATED COMMUNICATIONS AND INTERNATIONAL COMMUNITIES OF PRACTICE.

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Abstract

Within the Knowledge Management context there is growing interest in computer support for group knowledge sharing and the role that Communities of Practice play in this. Communities of Practice are groups of individuals with a common purpose and who share some background, language or experience. The community is regenerated as newcomers join the group and old-timers leave. The newcomers have access to the old-timers and learn from them. This generally takes place through situated learning. New group knowledge is also created as members of the community have a problem to solve and swap experiences and anecdotes to solve the problem, possibly arriving at a novel solution. This may then be further shared through anecdotes so that it eventually becomes part of the group's store of collective knowledge.

Communities of Practice provide an excellent forum for knowledge sharing and a vital question is whether the new communications media, which provide new possibilities for collaboration and distributed working, could support the existence of such groups in a distributed environment. This question takes on an added relevance with the rapid internationalisation of business [Castells 1996] that can spread the distribution over national boundaries posing problems of cultural and temporal as well as physical distance.

This paper reports on a case study which was the first stage in exploring whether Computer Mediated Communications technologies (CMCs) can support distributed international Communities of Practice. The aim of the case study was to explore the possible existence of Communities of Practice in an international organisation, to identify such groups and to ascertain the media used.

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1 INTRODUCTION

It has recently been recognised that the knowledge in an organisation is an important resource, and as such the management of that resource has become a hot topic [Amidon 1996, Berghel 1997, Kidd 1994, Lucier 1990, Tricker 1992, Wathne, Roos and von Krogh 1996]. A variety of types of knowledge have been discussed, for example tacit and explicit knowledge, [Nonaka 1991], embodied knowledge, formal knowledge [Fleck and Tierney 1991] domain knowledge [Nardi and Miller 1991, Nardi 1993] and supra individual knowledge [Walsh 1995].

An essential part of Knowledge Management is the identification, sharing and development of knowledge [Maglitta 1995, 1996], much of which is an unrecognised resource held in the minds of workers. Supporting the sharing and development of knowledge provides a new challenge for Information Technology [Manville and Foote 1996].

The nature of information and communication technologies that support business organisations is changing. Technological developments and the convergence of computer and communications technology have led to an explosion of new and diverse forms of Computer Mediated Communications (CMCs) technologies. Although electronic mail (e-mail) is perhaps the most well-known and well-established of the new technologies voice mail, fax, video conferencing and GroupWare, together with the telephone, paper messages and face to face meetings, are all media through which internal and external communication might take place.

In this paper we are particularly interested in exploring support for one channel of knowledge sharing, namely that which is found in so-called Communities of Practice [Lave and Wenger 1991, Lave 1991] where domain knowledge is often shared through an apprenticeship system, that is, through shared practice and situated learning. There are also occasions when the newcomer may be fully qualified. However, in these cases, what is to be learnt is probably simply the ways of working which have developed in the group. The interest is therefore not simply the transmission of facts and figures, or codified knowledge but is more to do with the interaction and communication between individuals in the group as people learn from one another, solve problems together and new knowledge is created.

Lave and Wenger's [Lave and Wenger 1991, Lave 1991] examples of Communities of Practice are examples of groups which have a feeling of community due to a common purpose. Members will probably have some shared background or experience and will share a common language. As new members join the group they have access to existing members and learn from them as they work. In such groups the informal lines of communication have been shown to be important for learning to take place and for new

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knowledge to be created - members will swap experiences and anecdotes and learn from each other [Goldstein 1993, Orr 1990, Sachs 1995]. Lave and Wenger's analysis concerned co-located non-IT settings (tailors, midwives, quartermasters, butchers and a recovering alcoholics group). Implicit in this is that situatedness is restricted to co-location, although Lave and Wenger [Lave and Wenger 1991] do state that co-presence should not be regarded as essential. More recently, however, Seely Brown and Duguid [Seely Brown and Duguid 1996] have shown similar communities evolving around IT technologies such as an Object Oriented Multi User Dungeon (MOO), where there is a distributed aspect. This suggests a role for CMCs in supporting distributed Communities of Practice as work becomes globally distributed.

Globalisation is an issue currently affecting many organisations and which will have implications for the work of Communities of Practice. Global forces are affecting every area of business as well as private and public activities [Manheim 1992, Castells 1996]. Some companies are having to restructure themselves to compete on the global basis [Sachs 1995, Karimi and Konsynski 1991, Ives and Jarvenpaa 1992]. Working in a distributed environment will affect communities in that they will lose many of the opportunities for informal communication. Working in a more internationalised context places strains on the way a Community of Practice may work as they not only have to cope with geographical distance but also time, culture and, possibly, language differences.

As business becomes ever more international the use of teams and communities will become increasingly important [Manheim 1992, Sachs 1995]. The knowledge available to an organisation will be ever more distributed. Therefore, we need to study the process by which individuals learn in a Community of Practice. We also need to find out how well technologies fit into this process and help overcome the spatial and temporal difficulties imposed by work in a global environment.

A key research question is: What differences are there between a Community of Practice which exists in the real environment and one which exists in a virtual environment (VE) similar to the one reported by Seely Brown and Duguid [Seely Brown and Duguid 1996]? In this paper, we will report on the results of a case study undertaken in Watson Wyatt Partners, an international actuarial consultancy.

The paper will describe the case study itself and report on the results, drawing some conclusions from the results of the case study.

2 COMMUNITIES OF PRACTICE

The definitions of Communities of Practice have been very wide ranging [Lindstaedt 1996, Manville and Foote 1996, Lave and Wenger 1991, Seely Brown and Duguid 1991, Sandusky 1997]. In order to explore Communities of Practice through the survey and

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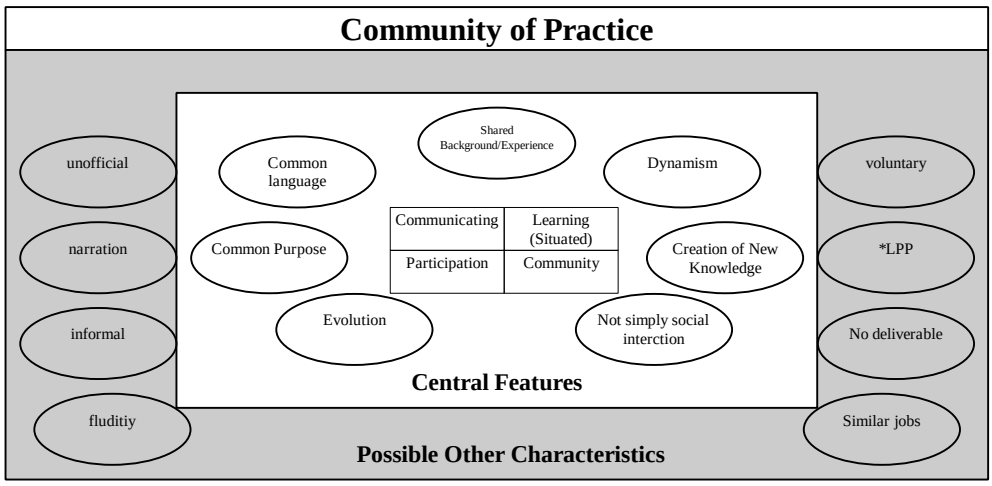
interviews, a range of 15 characteristics was highlighted from the literature [Orr 1990, Stewart 1996, Lave 1991, Lave and Wenger 1991, Seely Brown and Duguid 1991 and 1996, Manville and Foote 1996]. Some of these characteristics were felt to be essential to the working of a Community of Practice whereas others appeared to be present to a greater or lesser extent. The characteristics are shown in Figure 1.



*LPP = Legitimate Peripheral Participation [Lave and Wenger 1991]

Figure 1: Community of Practice Characteristics

Further discussion of these characteristics is outside the scope of this paper, but a key point is that it is the members who make the community, for example the group might be officially set up but might gradually take on the characteristics of a Community of Practice. As the non-central characteristics may be present to differing degrees the term Community of Practice acts as an umbrella with different shades of grouping encompassed within the definition.

3 THE CASE STUDY

This study arose from a letter circulated to Universities in February 1997 by Watson Wyatt Partners, an international firm of actuarial consultants, seeking help with an e-mail problem. During discussion, it became clear that there was scope for the exploration of communication between group members. The purpose of the study was to ascertain

- Whether any Communities of Practice exist in the company
- If so, whether any are distributed or have international aspects

- How members identified themselves when the community cut across formal or functional lines
- What media are used

The research took two approaches to exploring the issue: a survey, collecting factual information, and interviews to explore the issues raised in greater depth by the survey.

The questionnaire on which the survey was based was issued to 1500 staff (UK and Europe) currently in employment with Watson Wyatt. 567 were returned, representing a 37.8% response rate. The survey aimed to identify the possible existence of co-located and distributed groups that functioned as a Community of Practice. This was achieved by eliciting responses regarding five central activities of a Community of Practice and extending them to cover distributed locations.

Following the survey, interviews were carried out with 22 staff at two sites. The aim of the interviews was to move beyond the five activities explored in the survey, extend this to cover the Community of Practice factors outlined above and to obtain richer data about the type of groupings with which people were involved. Each interview followed a semi-structured format. With the consent of the each interviewee the interviews were recorded and then transcribed by Watson Wyatt's own secretarial staff. The transcripts have remained confidential to the research team.

4 THE RESULTS

4.1 The Survey

The survey addressed five metrics which had been identified as being typical activities of a Community of Practice and which were suitable for researching in a questionnaire format. These were used to be indicators of the possible existence of a Community of Practice. The indicators were divided into 'same location' and 'other locations' in order to differentiate between co-located and distributed communities.

The dataset was reduced to those respondents who:

- Are in regular contact with colleagues/peers doing similar jobs in other locations. This referred to the characteristic of 'similar jobs' and addressed the distributed aspect.
- Talk with colleagues/peers in other locations when they have a problem to solve. This metric addressed problem solving.
- Share projects with colleagues in other locations. This was used as an indicator of common purpose.
- Swap anecdotes/experiences with colleagues in other locations. This was used as an example of narration.
- Learn from discussions with colleagues in other locations. This touched on common language, narration and Legitimate Peripheral Participation [Lave and Wenger 1991].

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These were felt to be the five factors that were both important in a Community of Practice and were unambiguously testable in questionnaire format.

This then resulted in a dataset of 98 respondents. As all members of this reduced dataset match all five of the metrics this gave us an indication of the possible existence of distributed Communities of Practice. The aim of the survey part of the study was identification and location. The data were explored to find out the physical location of the respondents, their rank and which practice they belonged to.

The 98 respondents who matched the criteria, were spread across 13 practices (the Watson Wyatt term for business function), but five of the practices accounted for almost 75%. The other areas that stood out were:

- Head Office alone had 46% of them
- The Lower Level staff were the least represented. In fact, the higher the level the greater the representation.

In order to obtain some idea of what media were used for the tasks, the 8 main communications media in the company (e-mail, fax, GroupWare, meetings, phone, paper and video conferencing) were also checked for swapping anecdotes and sharing projects against level, location and practice.

For sharing anecdotes, e-mail and the telephone were the most widely used. This might suggest that when swapping anecdotes users need a more informal situation and e-mail and the telephone provide the facility for a quick easy message, that is one which is easily to hand and does not involve a great effort in setting up the communication. Anecdotes were also swapped in meetings – this tended to be more with people at higher levels.

When the responses for sharing a project across locations were examined, although it is a more formal situation, e-mail and the telephone were again the most widely used. Meetings were used more for sharing projects, but particularly by Higher Level individuals and by those in Head Office and the South. The latter could conceivably be because Head Office and the offices in the South are relatively close, i.e. it could be a function of the proximity. There were only slight increases in the other media used for sharing projects. GroupWare was used less than might have been expected. This could be due to a lack of availability. This view was supported by the fact that all those who said they used GroupWare for sharing a project were in Head Office.

The main outcome of the survey was the confirmation of the existence of Communities of Practice in the organisation and that there was a distributed aspect to them. This lent support to the view that Communities of Practice can exist in a distributed environment. The interviews were then approached with the aim of obtaining fuller data regarding the types of group in existence.

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4.2 The Interviews

Responses from the 22 interviewees indicated the existence of a variety of groupings, some formal and some informal, some functional and some cross-functional. The basic grouping in the organisation is the business function (called 'practices' in Watson Wyatt), for example the Benefits Practice, HR Consultancy, Pensions Administration. These groups varied in size and approach. Two of them (Communications, and a regional Benefits group) worked very much along Community of Practice lines. Some groups crossed practice boundaries. There were formally created project groups, and at least one group that had evolved to provide mutual support and help for practice administrators. Each interviewee was a member of more than one group. The different groups can be classified, as seen in Figure 2.

	Formal	Informal
Functional	13	4
Cross Functional	12	5

Figure 2: Classification of Groupings

The questions in the interview were designed to seek indications of all of the Community of Practice characteristics listed in Figure 1 and from the responses it could be seen that there were eight which worked along Community of Practice lines and one which appeared to have the potential to be a Community of Practice.

An important point was that Communities of Practice were not restricted to one sector. They appeared in all sectors except Cross-Functional/Formal, as can be seen in Figure 3. There are some groups that originated formally (such as the functional groups) but because of the way the individuals work, the group functions as an excellent example of a Community of Practice. However there are other informal groups where one might expect to find a Community of Practice that fails to function like one.

This shows that we cannot simply say, for example, that a Community of Practice is an Informal Group that cuts across functional boundaries. The most important factor in a Community of Practice is the people who make up the group, for example the chemistry between the individuals, their willingness to share with and support each other. There are a lot of facets to a Community of Practice as shown in Figure 1, and the lack of one of them will not prevent the group from being a Community of Practice. A good example of this is the informality. Many of the groups in the literature were informal and this aspect

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appears in Figure 1 as a ‘possible other characteristic’.

Figure 3 demonstrates that even if formally constituted, a group can work like a Community of Practice.

	Formal	Informal
Functional	4	1
Cross Functional	0	3

Figure 3: Classification of Community of Practice Groupings

The eight groups used a variety of media for their communication needs. E-mail was the most well-established of the CMCs, but face-to-face meetings, fax and telephone were also widely used. Video conferencing and GroupWare were used a little but the interviews supported the impression gained from the surveys, that a problem with these media was availability.

An international aspect was also sought in the interviews. Several groups had an international link to them, but only two of the ones that were Communities of Practice. There was also one particular informal grouping which had international links and appeared to have the potential for a Community of Practice but which had not yet become one.

The survey and the interviews together showed that:

- Communities of Practice do exist in the organisation
- Some of these groups have started to make links with people in other locations
- Two have started to make links with locations abroad and there was one potential Community of Practice with international links.
- The most widely used communications media currently in use in these groups are the telephone and e-mail

Although the initial aim was to explore the knowledge sharing in a distributed Community of Practice, the data showed an interesting point regarding the development of the groups. From this we hypothesise that the development or evolution follows the lines:

1. Communities of Practice seem to evolve, either from nothing or from an official grouping, as a result of the way the members work.
2. The Community of Practice may then create a link with other people at other locations who do similar work. These people will possibly be members of other Communities of

Practice.

3. This situation can develop even further, in that the Community of Practice might create links with a group of others in another area, possibly abroad, who are involved in similar work and who also function as a Community of Practice. We are then left with a possible situation as shown in Figure 4:

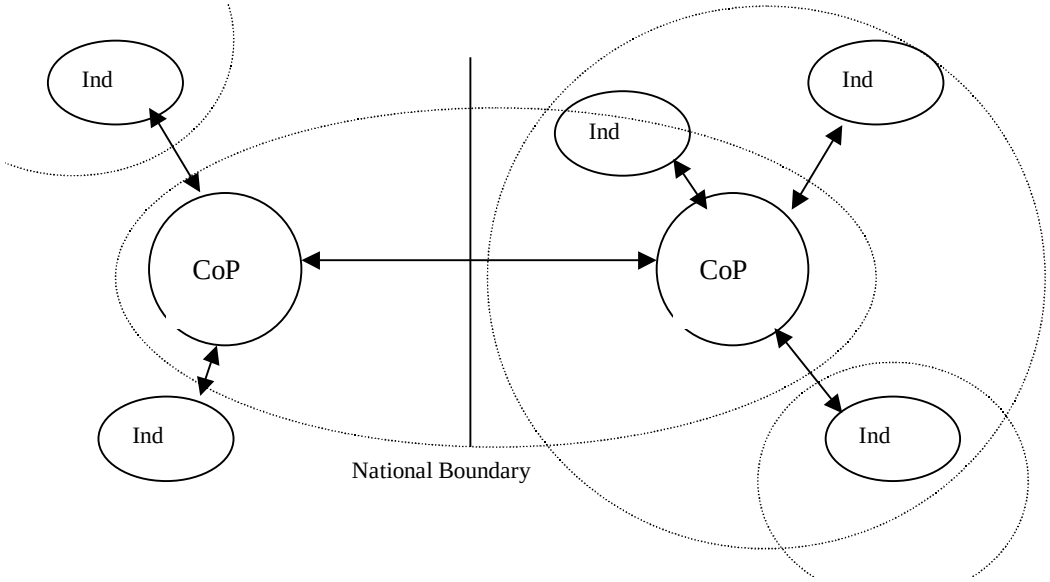

Figure 4: Development of Communication Links

Figure 4 shows the links between a Community of Practice and other individuals who then may become members of the community but not be co-located. It also shows that they may be members of other Communities of Practice and that there may be links developing between Communities of Practice. To some extent, this mirrors the networks of organisations developing in the globalised environment [Castells 1996].

These stages of development show us some differences between a Community of Practice in the real world and one in a VE. In Figure 4, we can see a co-located core to the Community of Practice with other members working on the periphery. A good example of this in Watson Wyatt is the Practice Administrators' group. Here there are several members of the group in one location who work in close proximity with each other and who have ample opportunity for informal interaction. More recently, links have been made with practice administrators in other locations. They contribute to the group but they do not have the same opportunities as those who are co-located. It shows a peripheral participation, but a different peripheral participation from that of Lave and Wenger [Lave

and Wenger 1991] .

In Lave and Wenger's examples [Lave and Wenger 1991], the peripheral participation is where a newcomer to the group was given certain work on the periphery of the group, perhaps a task under the supervision of an old-timer, and as (s)he learned, (s)he was able to move towards full participation. In the scenario above, as shown in Figure 4, the peripheral participation is concerned with physical location. This means that there is a core to the Community that is co-located, with other members who function on the periphery. This scenario demonstrates very well the difference between the physical Community and the distributed Community. The members of the physical core are able to enjoy the 'by chance' encounters, the learning with an 'old-timer' can be situated, whereas those on the periphery lose that situatedness and the opportunity of chance meetings in which useful items are often communicated. Does this then become one larger Community of Practice with two co-located cores, or does it remain a simple link between two independent groups?

This raises the question as to at what point will the Community of Practice become a distributed Community of Practice and not merely a group with links to individuals. Indeed it poses the question – can the Community of Practice exist virtually or are we seeing something different?

The situation indicated by the study has moved us beyond simple one-to-one communication, and involved one-to-many communication. Up to now, the two Communities of Practice which are developing international links appear to be in the early stages, and so far e-mail has played a key role in supporting that link as it solves problems of both temporal and physical distance.

5 WHERE NEXT?

We have seen that the groups in question are so far relying on e-mail and the telephone to support their distributed links. They also, in most cases, meet face-to-face. There are some aspects of the Community of Practice interactions for which e-mail is less-suited. Work has been done on some of these aspects:

- awareness of other members so that chance encounters are possible [Dourish and Bly 1992, Tang and Rua 1994 Adler and Henderson 1994]
- informal communications [Fish, Kraut, Root and Rice, 1992]
- situatedness [Kuzuoka 1992].

Work has also been undertaken to explore the use of other media. Seely Brown and Duguid [Seely Brown and Duguid 1996] report on the use of an object-oriented multi user dungeon (MOO) to support and educational Community of Practice, and Conkar [Conkar 1997] explores the users of a Multi-User Dungeon (MUD) as a virtual Community of

Practice, but in this case the medium *is* the practice. The community is centred round the MUD. It is the purpose of the group, and newcomers have to learn the language and norms of the group.

It is important to explore in more detail the workings of a Community of Practice in its context [Benford, Snowdon, Colebourne, O'Brien and Rodden,1997]. In our case, we are interested in exploring further the content of the communications and interactions of the type of groups identified in Figure 4.

An important point that emerges from our initial studies is that simply trying to reproduce face-to-face characteristics in an electronic form is not sufficient [Hollan and Stornetta 1992]. Analysing the types of communication will show some needs where the telephone and e-mail are not sufficient. One Community of Practice was already beginning to use video-conferencing to include people from regional offices in meetings. Some work has already explored the appropriateness of certain media for tasks [Rice 1987, Purchase 1997]. The choice of a medium is partly explained by Clark and Brennan's [Clark and Brennan 1991] concept of 'grounding' whereby communication partners constantly reach common ground in an exchange. Clark and Brennan [Clark and Brennan 1991] describe constraints that a medium may impose on communication. As different media will have different characteristics meaning that they impose different sets of constraints, then they will force people to use different grounding techniques. Clark and Brennan [Clark and Brennan 1991] refer to these as costs of grounding. From this, they show that some media are more suitable for specific tasks than others.

6 SUMMARY

The initial aim of the survey was to seek indicators of the possible existence of Communities of Practice, both co-located and distributed in Watson Wyatt Partners. The results of the survey suggested that such groups may exist, and that there is a computer mediated element.

Armed with these results the interviews were tackled to elicit more detail about the identity of the groups, to find out whether there were distributed Communities of Practice and whether there were any with international links and what media were used to support them. The study answered the above questions in that it confirmed the existence of some Communities of Practice, identified them and showed which media are most widely used.

This paper has taken Communities of Practice as a focus as they are a vehicle for knowledge sharing between individuals and groups, but it has explored them with the aim of finding out how they function when in a distributed environment, possibly even international. The Communities of Practice we have encountered appear to be in the process of becoming distributed and international. It has shown some differences between

co-located and distributed Communities of Practice and has shown the early development of distributed and individual groups in differing stages of their development, showing the groups evolving or developing from a co-located core rather than being wholly distributed. It has also shown that, up to this point at least, the groups had relied on e-mail and telephone to maintain the links and support their work, with only one beginning to use video-conferencing. The form of the groups at these stages of development showed a structure with co-located cores and links to members in other locations. This raises the question as to whether these groups will become distributed Communities of Practice or whether we are looking at something different.

7 CONCLUSION

What conclusions can be drawn from the study reported in this paper?

- There may be a different form of peripherality from that described by Lave and Wenger [Lave and Wenger 1991], in that these groups show a clear physical peripherality.
- In Lave and Wenger's groups [Lave and Wenger 1991], much of the learning took place in one-to-one situations. Within the groups explored here, there was still a need for one-to-one communication, but the need for one-to-many communication was greater than in Lave and Wenger's examples [Lave and Wenger 1991].
- A simple distinction between formal/informal cannot be made – formal groups can work very well as Communities of Practice.
- Lave and Wenger's examples [Lave and Wenger 1991] were all co-located, suggesting that situatedness and co-location was important, although they did state that co-presence might not be essential. Seely Brown ad Duguid [Seely Brown and Duguid 1996] discussed an example of a group based round a MOO where co-location was not always present. The groups identified here support this, as they evolve and move to populate a distributed environment. This raises the question as to whether the groups are actually Communities of Practice or something different.
- This also raises the question as to what is the Knowledge Management implication of this form of grouping and the knowledge it embodies.
- In Section 5 it was explained how the concept of grounding described by Clark and Brennan [Clark and Brennan 1991] shows that some media are more suitable for some tasks than others. In looking at the support for a Community of Practice in a global company, the question should not be what is the best medium, but rather what is the right medium? Each medium is a medium in its own right.

Following this avenue should indicate how different media can support groups working in the environment described earlier.

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