HOW IS ORGANIZATIONAL KNOWLEDGE CREATED IN A VIRTUAL CONTEXT? AN EMPIRICAL APPROACH

Key words: knowledge, virtual, dialogicality

Evangelia Baralou *

Athens Laboratory of Business Administration (ALBA), Greece

2A Athinas Avenue & Areos Street

16671 Vouliagmeni, Athens

Greece

Haridimos Tsoukas

Athens Laboratory of Business Administration (ALBA), Greece

2A Athinas Avenue & Areos Street

16671 Vouliagmeni, Athens

Greece

Abstract

The paper aims to explore, theoretically and empirically, the creation of orgnizational knowledge in the virtual context, in which geographically dispersed individuals communicate through Information and Communication Technologies (ICTs). The paper brings together the writings of Vygotsky, Bakhtin, Schön and Goffman to argue that knowledge creation involves the continuous effort of individuals to understand themselves through external and internal dialogues they have, with real and imaginal others and with artifacts, within various front and back regions of interaction, in a way not easily done in a face-to-face context. We empirically explore the process by conducting discourse analysis on a virtual setting, based on the discursive practices of the team members.

* Evangelia Baralou

Assistant Professor of Organizational Behavior, ALBA Graduate Business School

Athinas Ave & 2A Areos Str., 166 71 Vouliagmeni, Greece

Tel.: +30 (2) 10 8964531-8 (218) Fax: +30 (2) 10 8964737

email: ebaralou@alba.edu.gr

1. THE THEORETICAL BACKGROUND

The paper adopts a dialogical approach aiming to explore the mechanisms through which new organizational knowledge is created in the virtual context. Tsoukas (2005) considers dialogue to be "fundamental in human affairs, and dialogicality an inherent feature of human thinking as well as the most important characteristic of interaction" that generates differences, which may lead to new distinctions and thus to the creation of new knowledge. The individual ability to draw new distinctions may be developed, since human experiences already involve a certain level of articulation and as such they admit of further articulation within a collectively created domain of action. The process of articulation, makes social practice clearer and develops through organizational members engaging in three kinds of dialogical encounters: with real others, with imaginal others and with artifacts in the course of addressing a problem. In dialogical encounters with real others, individuals can have their attention drawn to hitherto unnoticed aspects of their experience that were not focally aware of before; they can make certain distinctions that could not make before and thus develop a richer account of their experience. In dialogues with imaginal others, individuals can still have their attention drawn to certain aspects of their experience. In this case, individuals engage in imaginary dialogues that they run off without the physical presence of others. Individuals rather imagine what others would say or draw on past experience of what others have said in the past. These imaginary dialogues can still enable individuals to make sense of their experience in new ways. In dialogues with artifacts (such as drawings, documents, and prototypes), an unexpected change in the attributes of an artifact enables the individual to make new unexpected distinctions.

In this paper we revisit the above theory and contextualize it to the virtual context. A number of authors have described the unique characteristics of the virtual context (Giddens, 1991a; Van Dijk, 1999; Metiu and Kogut, 2001), basically the ability to live online in different types of social communities, which appear to be:

- More diffused as they stretch further and further across time and space;
- Less stable and concrete without time, place, physical ties;
- Based on ICTs-mediated communication;
- More abstract with the increasing use of symbolic means;
- Offering new modes of exercising power, as the use of networks can both disperse and concentrate power;
- Less hierarchical due to the greater demands of changing knowledge requirements and potential for greater equality in participation;
- Shaped upon special interests.

We draw upon Goffman's writings (1959) who explains social interaction using two frameworks, the "front region" and the "back region". In face-to-face interaction, "actors perform", share the same front region, but have different back regions. Mediated social interaction involves a separation of the contexts within which individuals interact (Goffman, cited by Thompson, 1995). A framework of various front regions is established, which are separated in space and perhaps in time and still have their respective back regions (see further, Baralou and Tsoukas, forthcoming).

Then we use Vygotsky's ideas on social interactions that are conceptualized as mediated activities by tools (tools of communication and tools of labour). Vygotsky believed that we become what we are through others. Vygotsky claimed that social relations need to be understood through an analysis of the transformation from an external into an

internal psychical entity, in the historical context in which they take place. In order to explain the transformation from external to internal processes, Vygotsky (1962: 5) attributed great significance to the role of language in the methodological analysis of his studies, emphasizing the interrelation of thought and language. We claim that the same process evolves in the virtual context, in which language is even more emphasized as everything has to be written or spoken due to lack of visual cues. Considering that the nature of virtual context brings together people from diverse backgrounds that may not be able to draw on common references, one would need to engage in a process of continuous decontextualization and recontextualization of meanings in order to translate distant others to his/her own language. Considering Dreyfus' (2001) suggestion that reality becomes more abstract due to the physical absence of others, and Gidden's (1991a) "disembedding mechanisms" that lift out social relations from localized contexts, individuals in the virtual context dynamically engage more in internalised dialogues, as others are no longer physically present. The dimensions of time and place change in a way that offers the opportunity to one to be on his/her own and have the time to recollect past dialogues, to look at various sources of information –and reflect on them- as he/she sends an email.

We also use Bakhtin's insights (1929) to understand better dialogicality. Firstly, his assumption that language originates in social interactions, which are implicated in its use and meaning in everyday life. Secondly, his assumption that in order to understand language we must use *utterances* as the unit of analysis that are always created and formed as a response to a previous utterance or utterances and in anticipation of a responding utterance. Thirdly, his assumption in relation to genres that suggests how social groups have their own characteristic way of speaking, embedded in genres, which reflects and embodies a set of values, rules and a sense of shared experience. Fourthly, his work on multi-voiced dialogic self. Bakhtin suggests that internal and external dialogues take place throughout social interactions and relate "social intercourse" to external dialogue, external dialogue to internal dialogue and to consciousness, consciousness to the world around it and the self to others. We draw on Bakhtin's concept of multi-voiced dialogic self and extend it to claim that in the virtual context of interaction, the dispersion between time and place enables the individuals to bring into play more than one voices, which is done in a far more limited way, in a face-to-face context. The asynchronous nature of ICTs-mediated interactions, the time between a response is required, provides greater thinking space, which dynamically enables dialogical relations to occur between one's utterance (voice) and the utterance (voices) of imaginal others that are no longer present (or have never been visually present). If the individual has some time to construct a reply he/she can draw on the various voices of others and appropriates others' words, reflect on them, construct new accounts of his/her experience, dynamically come up with new distinctions that form the basis for creating knowledge.

We also draw on the work of Schön (1991) on the notion of reference entities. Schön (1991) has offered an insightful account of how individuals interact with the materials they work with. By using the example of a designer, he illustrates how a designer uses particular materials to make things, sometimes as the final product and other times as a representation (a plan, program, or image) of an artifact to be constructed by others. The process is typically complex, as there are a lot of variables, in the form of possible moves, norms and interrelationships of these that can be represented in a finite model. The author suggests that due to this complexity, the designer's moves may typically produce consequences other than those intended. When this happens, the designer may consider the unintended changes and form new appreciations and understandings and

make further new moves that act as "reference entities". For Schön (1991: 78), these reference entities can be new moves or changes in certain configurations that "talk back" to the designer, while he/she responds to them by making additional new moves and by forming new understandings. We extend Schön's assumptions to suggest that a reference entity simultaneously reflects back to the individuals what they already know and it is there to be used further in new ways.

To summarize so far, bringing together the work of Goffman, Vygotsky, Bakhtin and Schön, we suggest that the individual ability to draw new distinctions through articulation of experience is influenced in the virtual context by the dispersion between time and place and by the mediation of ICTs. Language becomes the tool that continually constructs, reconstructs and transforms the virtual context and at the same time becomes meaningful in the particular context. Let us consider each type of discursive interaction (with real others, with imaginal others and with artifacts) one has in the course of addressing a problem.

The individual, initially, engages in external conversations, written or spoken, with other individuals that are geographically dispersed. These dialogues are ICT-mediated, which suggests qualitatively different characteristics from face-to-face interactions. Individuals make and communicate meanings without the richness of a shared face-to-face context, which provides physical proximity. Individuals make sense of their experience in a more abstract and textualized way that stretches across time and space. The type of ICTs used to enable communication in the virtual context is of major importance as it can define the amount and type of nonverbal social cues (i.e. facial expressions, gestures, voice tone) and genres that are developed and transmitted. For example, the ability to share ostensive references (e.g. modify files dynamically, observe a change in a common S/W application in real time) creates more opportunities for dialogue that allows individuals to articulate and further articulate their experience and develop a richer account of it. Inability to make ostensive references together with lack of visual cues (given that different front regions do not allow the monitoring of one's responses), increases the use of symbolic cues that renders dialogues more abstract. Individuals need more time and information to understand each other as language seems to be open to misinterpretation, incompleteness and fussiness that can lead the conversation to circles and conflict due to inability to reach a common understanding of the situation. Considering, also, that the nature of the virtual context brings together people from diverse backgrounds (that may not be able to draw on common references or develop and use genres), one would need to engage in a process of continuous de-contextualization and re-contextualization of meanings, in order to translate distant others to his/her own language. At the same time, this process may lead to new ways of addressing a problem and consequently to new approaches or solutions, to creation of unexpected meanings, which are dynamically a source of new knowledge. The less common references individuals have, the fewer past solutions they can draw on, the more they will improvise, while developing a solution to a problem. What is also worth considering is that a lot more is going on in the back region, in the sense that the virtual context allows one to take advantage of lack of visual cues and greater time between a response is required and have greater control over the self he/she projects. For example, one can hide feelings of uncertainty, fear or anger and discursively construct a more determinative, imaginative, dynamic persona (considering also that hierarchy can be flattened due to greater demands of changing knowledge requirements).

Once the individual engages in external dialogues, he/she is then in a position to translate others into the individual's own language, in which meanings become comprehensible to the individual in relation to others. The transformation from external into internal processes of interpretation is based on language and ICTs that always mediate one's social interactions with distant others in the virtual context. The individual can still have his/her attention drawn to certain aspects of his/her experience in order to make better sense of it, by running imaginary dialogues off without the physical presence of others. The virtual context, by its diffused nature, isolates physically individuals and, potentially, gives them more options of imaginary dialogues. Due to the dispersion between time and place, an imaginary and abstract world can be created, precisely, on imaginary dialogues with others that the individual physically met before or through online interactions. In other words, as a lot more takes place in the various back regions, in a virtual context of interaction, more opportunities for imaginary dialogues are created. These dialogues develop through disembedding mechanisms that decontextualize and recontextualize meanings. A combination of physical and virtual context, which are influenced by each other, allows individuals to draw on multiple voices. Considering the ability of individuals to reside in their own back regions during asynchronous interactions, they have the opportunity and the time to reflect and appropriate past voices of others, in order to serve their own intentions. While doing so, they can bring into play more hidden voices, in a way they could not do, as easily, in a face-to-face context of synchronous interaction, in which they would be in the immediate presence of others or they would have no time to think and reflect before a response would be required. The accentuation of imaginary dialogues can potentially enable individuals to form a clearer account of their experience and make new distinctions, which is a dynamic source of knowledge creation. However, knowledge created in this way is qualitatively different from knowledge that would be created in a face-to-face context, as it lacks practice and does not allow the experience to have the thickness of reality. It is discursively constructed with limited symbolic means that does not encompass the full bandwidth of physical senses.

Mediated communication in a virtual context is dependent on the use of ICTs that enable, shape and frame interaction, among geographically dispersed individuals and, in a sense, substitute the physical absence of others. In other words, as individuals cannot engage in dialogues with real others, they spend more time playing with ICTs and their applications, in order to make sense of their experience. Considering lack of visual cues, the use of artifacts (such as software applications that can be dynamically modified) enables ostensive references and possibly creates more opportunities for dialogues. Individuals can observe each other's actions (on a dynamically shared application) and engage in external and internal dialogues based on the shared use of artifacts. At the same time, individuals can engage in dialogues with artifacts. Individuals can play with the attributes of an artifact and create reference entities that not only reflect the individual's existing knowledge, but through unexpected changes (different from those initially intended) may enable the individual to make new distinctions or create new meanings that can be a source of knowledge creation. For example, an individual testing a new program, with the use of a programming language, engages in real and imaginary dialogues. The program for some reason does not run, at the beginning, so the individual needs to find out what is wrong, he needs to make a new distinction in the writing of the program so that it can run successfully. This may require asking others, running off past dialogues with others that are not physically present, or playing with the programming language, rewriting code until the program finally runs. A different command, an unexpected order of syntax may solve the program and create a new solution, a new approach to a problem.

Based on the theoretical framework developed above, we now explore empirically our suggestions in a virtual team.

2. THE CASE

The empirical data presented here, comes from observing the discursive interactions between members of a virtual team while trying to solve a technical problem. VT is involved in the Virtual Reality Ship project. This project consists of 38 partners from different European countries within shipbuilding. The purpose of the project is to develop an integrated platform for a ship's system critical technologies. VT, forms a technical committee, which consists of nine members (from several organizations) and acts as a platform for the exchange of all relevant technical issues. The main mode of communication is email. Synchronous communication also takes place through instant messenger, at least once per month. At the same time, participants can share applications dynamically and view synchronously any modifications on any of the applications.

To begin the synchronous communication, participants construct the context of interaction. They connect to the internet and specifically to an instant messenger. Specifically, prior to the connection to the instant messenger, emails are exchanged, in order to circulate each participant's "IP" address, which is used later on during the synchronous meeting, in order to enable the "communication" of the participants' computers. Then a second phase follows during which the problem is defined. Peter explains to everyone the problem that has emerged and needs to be solved, which is the compatibility of the different software components. Then the third phase follows and is analysed below, during which the solution is developed.

2.1 PHASE III. SOLUTION DEVELOPMENT

1. *James*: Gerry, I've included a list of IP addresses.
2. *John*: James, Gerry was disconnected. He can't see any of the
3. messages even when he gets back in.
4. *James*: Here's a list of IP addresses: David (SDL): 147.102.98.8 Gerry
5. (AVPro): 213.44.0.138 …
6. *John*: Is Steve in here?
7. *Gerry*: Ok. Thank you.
8. *Steve*: Yes, me and Kaj is here.
9. *James*: John, I think you're right about testing the wrappers first. Is all
10. of the software ready? (*checks the various IP addresses*)
11. *Peter*: IE is listening…
12. *David*: Ok I'll start…
13. *James*: I've pinged all of the IP addresses and they're all available, no
14. firewalls by the looks of things.
15. *David*: Or should I wait for the tools before me?
16. *James*: I think we ought to go in sequence.
17. *David*: Ok then waiting.
18. *Gerry*: We should run the tools one after the other, no?…
19. *Gerry*: So, I start when all is ok for all of you.
20. *James*: It should be AVPro first – is the common model okay?

21. *John*: …Ok, Gerry you can go ahead and try the wrapper.
22.   … *(test stops)*
23. *James*: It shouldn't really matter at this point that the data in the
24.   IE doesn't exactly match the data in the wrapper.
25. *Peter*: No I need to change "Preliminary Deck Structures" to
26.   "Preliminary Deck Structure…
27. *John*: Yes, just to check that the communication is OK, you can double
28.   check the messages Peter from each wrapper and configure the
29.   IE
30.   … (*performs changes*)
31. *Peter*: IE propagate the change automatically…
32.   …
33. *Steve*: Ok, we have finished tb1…
34. *John*: Steve all the communication with the common model ok?
35. *Steve*: It looked fine
36.   …
37. *James*: For the JCA's to be configured, I need to make sure that the
38.   information in the process controller matches the information in
39.   each JCA…
40. *David*: The pc rebooted when tried to stop the JCA. This has happened
41.   a couple of times..
42. *John*: The same has happened to me here. The laptop crashed here as
43.   well. Chris any ideas?
44. *Chris*: What version of the Java runtime have you installed?
45. *John*: 1.4.1 …
46. *Chris*: Are you stopping the server of the JCA or are you closing the
47.   entire JCA window?
48. *John*: I can't close the JCA at all... I can close the server window, if I
49.   press the 'OK' button, but not the JCA…
50. *Chris*: So do click on the button called stop server?
51. *John*: Yes but then I can't close the JCA…
52. *James*: Could I suggest that no-one tries closing the JCA during testing,
53.   since on some machines it seems to have a problem returning to
54.   the prompt…
55. *David*: By the way the PC is running WinXP pro and the laptops winx
56.   XP home
57. *John*: Is Steve here?
58. *Chris*: David can you identify the difference between the two
59.   computers that you have tried the JCA?
60. *James*: I don't think he is
61. *David*: Well apart from the operating system everything else were
62.   quite the same.
63. *Chris*: Which operating system do you have the problem?
64. *David*: Linux. I'll switch to Unix
65. *James*: Steve has just signed in, are you here Steve?
66. *John*: Guys come to the other conversation. We had a problem adding
67.   Steve here
68. *David*: …ok the JCA is up and running here.
69. *James*: Which conversation?
70. *John has left the conversation.*
71. *Mark has left the conversation.*
72. *David has left the conversation.*

7

73. *Chris has left the conversation.*
CHANGED TO DIFFERENT CONVERSATION
74. *John*: Steve I invited everyone here because I couldn't add you to the
75.   old conversation
76. *Steve*: We had a BSOD (JCA??) so we had to reboot
77. …
78. *James*: Have we finished with the old one?
79. *David*: yes
80. *John*:   Ok, it seems that everyone is here now…
81. *Gerry*: How can I be sure that the JCA is running properly?
82. James: Gerry we have found out that the JCA works better on Unix
83. *John*:   Ok is every JCA ready?
84. *Steve*:   Yes
85. *David*:   Yeah
86. *Michael*: Yes
87. …

Each participant brings to the process the component that has been previously developed by his/her organization. By being able to view each other's components, participants can make ostensive references and share information that acts as a reference point, in order to build the integrated product. Technical problems result in participants missing parts of the conversation, which affects their virtual presence and their understanding of the conversation that is being developed. James reports indirectly John's words (lines 9-10), in relation to "testing the wrappers first" and uses them for organizational practice, in the sense that at the same time James uses the technical tools available to him (PC, network, software components) to check if the wrappers are ready for testing. Gerry is the first one to test his wrapper (line 19). There is a micro-problem (its data doesn't match the data in the "IE") that participants can view due to shared files that enable ostensive references to be made. This creates an opportunity for dialogue, in which participants negotiate different meanings. Dialogic interaction allows them to make sense of the situation, further articulate it and work towards its solution. Their judgments, deriving from their interactions with the technical tools, are different: James considers the problem not important (lines 23-24), while Peter suggests a change in the configuration (lines 25-26). John agrees with Peter (lines 27-29) and Peter performs the change in the configuration that now "matches the data of the first wrapper with the data of the IE". Considering how individuals interact with the materials they work with, Peter's action to change the configuration creates a reference entity that enables Peter to make a new appreciation of the situation. Peter can now see the results of his action that "talk back" to him, while he responds and makes a new distinction "IE propagates the change automatically" that as he admits later on, could not be made before. Peter's change of the configuration of the data creates a reference entity for the other participants as well, to which they respond differently. Steve considers the problem, in relation to the first wrapper, solved. On the contrary, John does not appear to make the same distinction and asks for confirmation that the problem is solved. Later on in the conversation James suggests that in order to configure the "JCA's" (lines 37-39) "the information…in each JCA". The analysis will now flash back to past stories in James's organization to demonstrate the "presence" of others' voice in his utterance that act as "thinking devices" for him. Observation of the exchange of emails between James and others in his organization (which includes Peter) for months prior to the meeting at hand allows others' voices to be identified as involved in the production of the specific utterance. Specifically the excerpt below is taken from an email exchange that took place prior to the online meeting at hand:

88. …
89. James [14/03/2003, 12:49] to: Chris
90.   I've tried the new version of the JCA and receive the following
91.   information just after with JCA starts the tool… I am not sure
92.   what the JCA is doing …
93. *Chris [14/03/2003, 13:24] to: James*
94.   … I could better test the JCA if you could give me a version of
95.   the process controller that has more than 1 process on the
96.   process tree…
97. *James [14/03/2003, 15:45] to: Chris*
98.   That has the same problem. I've tested it with the version of the
99.   process controller that I sent you…
100. *Chris [14/03/2003, 16:29] to: James*
101.   Almost there. What actually happens now is that the tool
102.   monitor starts but the process ends immediately, i.e. the JCA
103.   responds to the process controller but the data in the process
104.   controller does not match the information in the JCA…

The above excerpt demonstrates how James's utterance can now be conceptualized as a multi-voiced utterance that contains at least two voices, James's and Chris's voice. Chris's voice is appropriated and interweaved with James's voice to serve the purpose of the meeting at hand. In the email exchange, focus on discursive practices is put to understand how James initially makes sense of the situation through a certain level of articulation ("I am not sure what the JCA is doing"). As Chris makes comments on the situation ("give me a version of the process controller that has more than 1 process…") James can now see connections that he was not focally aware of (try the process controller differently). As James follows Chris's suggestion, he appears to have a richer account of the situation, considering his utterance ("That has the same problem"). As the dialogic interaction continues, Chris makes a further comment in order to make sense of the problem ("data in the process controller does not match the information in the JCA"). Chris's comment enables James to make further sense of his experience. Chris's words appear to have acted as a thinking device for James who can appropriate them and use them in the online meeting at hand to explain to others the problem.

As the meeting evolves, David reports a problem that emerges during the testing of the JCA (lines 40-41) as his "pc rebooted when tried to stop the JCA". John reports the same problem (lines 42-43) and asks Chris for help. Every interaction with the software has to be articulated explicitly and has to be textualized in the virtual context, because at this point the communication between the two machines (PC and laptop) has been interrupted. John tries different approaches to solve the problem. Every approach creates a reference entity for John that enables him to form new appreciations and understandings of the situation and make further new moves ("close the JCA", "close the server window", "press the ok button"), which in this case do not seem to work. Chris suggests that the operating system could create the problem, which leads David to another action ("switch to Unix"). The change in the operating system solves the problem ("JCA is up and running") and allows participants to make a new distinction, they did not appear to have made before, which is that the operating system can create a problem in the communication between the JCA and the common model.

While participants attempt to solve the specific problem, technical problems with the connection do not allow all the participants to follow the conversation and the development of the solution, and create the need for continuous reconstruction of the

virtual space of interaction. James and John ask if Steve is "here" (lines 57, 65). "Here" refers to the shared front region, which is constructed through genres along with the use of technical tools. Since some participants cannot be "present" in this specific shared front region due to technical problems, John suggests (lines 66-67) that they switch to another "conversation", which now becomes the shared front region that allows synchronous communication. Participants need to indicate their "presence" in the new shared front region (lines 70-74). When participants switch to the new shared front region and verify that everyone is "present", James repeats how they managed to solve the problem with the "JCA" that could not run in the common model. The conversation in this case is repeated, until all the participants agree on the approach taken. The mode of communication of the specific team has very interesting characteristics, in the sense that it can be considered synchronous and asynchronous at the same time. Participants can interact synchronously by exchanging instant messages, but at the same time they can recede to their back regions without being noticed and engage in other parallel interactions. For example, John during the synchronous conversation, called one of his colleagues, in order to ask for his advice regarding the problem with the JCA. John's parallel interaction could only be noticed by Peter and James who were in the same office with him at the time of the virtual meeting. In this case, John's colleague suggested that John should "close the server window" as John reported to James, which was one of the approaches John had taken without any results. While the specific parallel interaction was not helpful in this case for John, it demonstrates how participants can use their separate back regions to bring into play others' voices (ideas, approaches, experience) in the process without interrupting the continuity of the synchronous conversation. In a face-to-face meeting, for the sake of its continuity, it is unlikely that participants would interrupt the meeting to consult other people.

The last phase of the process is reached when the communication between specific components, developed by the different partners, has been tested in one common model and the components are found to be compatible.

Considering the knowledge creation process and how it evolves, one could observe the initial need for discursive construction of a shared virtual context, which is not necessary in a face-to-face context. This shared context plays the role of a shared front region, not in the traditional sense, since participants cannot be in the same geographical place, but in the sense that it allows them to be in the same space at the same time. There are several front and back regions that participants can be in at the same time, but these individuals would have to move to the discursively constructed shared front region, in order to communicate synchronously.

However, participants also communicate asynchronously, so they can take advantage of the "thinking space" between each response and have more time to determine the language they use. If we consider the amount of information that becomes available, when participants move to the shared front region, they become exposed to the other team members. While this is a similarity with face-to-face communication, in the virtual context individuals have a greater agility to switch more easily between front and back regions and bring into play more voices. When engaging in asynchronous communication, participants spend more time in their back regions, where a lot more is going on and are "less exposed" to the rest of the members.

A certain level of understanding achieved between participants is related to the additional information they can have access to. Despite the synchronous communication, each participant cannot observe the responses of others and the moves between the individual front and back regions, since there are no visual cues available

(e.g. facial expressions). The meeting seems to be rather informal, has a lot of interruptions and short utterances. The team appears to adopt a less confident communicative style than that of participants that could see each other, in the sense that there are numerous questions regarding whether they have reached a shared understanding, but also regarding continuity of presence in the shared context due to technical problems. Metiu and Kogut (2001) who have studied dispersed settings suggest that participants who can see each other are more familiar with each other, thus more confident that mutual knowledge is successfully established, since they can check that information has been received and understood, and "a good deal" of shared knowledge can be assumed without explicit discussion.

Despite language being technical, there seems to be great difficulty to interpret cues in a similar manner, as some voices in the team are not familiar so that participants can make sense of, which results in low level of confidence in understanding each other well enough in order to reach a consensus and also results in a continuous process of rephrasing and recontextualizing each other's words. The type of communication used affects the ability to use ostensive references, given the different front regions. The shared front region provides the ability to share files dynamically and to view a common screen, in which changes are made visible. The ability to share reference entities, creates further opportunities for dialogues. The shared front region allows participants to speak, act and at the same time demonstrate their actions to each other, which appears to facilitate a common understanding to be reached. There is a high degree of descriptive definitions that, at times, creates ambiguity and leads conversation to cycles regarding the symbolic use of common terms. However, the struggle to reach a common understanding, to resolve misinterpretations and fuzziness, pushes team participants to more diverse ways of thinking, to make sense of their experience in a new way, which becomes a dynamic source of knowledge creation.

3. DISCUSSION

The process of knowledge creation has been conceptualised and analysed as a discursive one that has qualitatively different characteristics from a face-to-face context. Knowledge creation is a unique process, in the sense that it is not only influenced by the specific characteristics of the mediated by ICTs communication and the specific nature of the virtual team, but it is also influenced by the experience, the values and ideas of its members. Our conceptual framework conceptualizes how the virtual context differentiates qualitatively the process. The constructive role of language (written or spoken), has been highlighted - echoing also the writings of Vygotsky (1934) and Bakhtin (1929)- as essential in human activity, as the most characteristic symbolic medium that allows individuals to construct knowledge. By adopting a dialogical approach, we have looked at creation of knowledge through discursive practices with real others, with imaginal others and with artefacts. Following Bakhtin's claims (1929) on multi-voices, we have illustrated how one takes advantage of the virtual context to draw on voices of others to negotiate and form meanings. While doing so, it has been demonstrated at the same time, how team members can make new distinctions (that involve a certain level of articulation), invent new approaches that lead to solution of problems and dynamically to the creation of knowledge. Three things must be taken into account in a virtual context that qualitatively differentiate the process from a face-to-face context.

Firstly, despite Dreyfus's (2001) claims about loss of social presence in a virtual context due to lack of actual embodied presence, the findings suggest that the context within which members of the virtual teams interact to create knowledge needs to be discursively constructed and for this, it requires a sense of shared social presence. Team members that engage in synchronous interactions need to move from their individual front and back regions to a shared front region (Goffman, 1959).

Secondly, the findings demonstrate that every act of understanding oneself involves a negotiation of meanings, as in a face-to-face meeting. However, in virtual teams, depending on the degree of virtuality and working history, members of the team depend solely on written and spoken language to negotiate and to construct meanings of the language they use within a variety of front and back regions. Being social groups, virtual teams develop genres to serve this purpose, related also to the type of communication that as Bakhtin (1929) suggests, allows language to be understandable and recognizable and meetings to evolve despite restrictions due to distantiation between time and space. In the virtual context, this results in team members struggling at times to understand themselves through decontextualization and recontextualization of meanings. Team members appropriate voices without the additional meaning found in direct auditory and visual communication, as indicated also by Christou and Parker (1995). Specifically in this team, in which audio is not enabled, participants manage to develop written genres that reflect mainly team understandings, indicate their presence in the virtual context, articulate the purpose of the meeting, develop approaches towards solution and closure of the meeting. The struggle to negotiate meanings can at times lead participants to misunderstandings, fuzziness and ambiguity, but it can at the same time, lead participants to construction of unexpected new meanings, to new approaches to the world that are a dynamic source of new knowledge. The less background information members of the virtual team have about the norms of the team, the less structured the team is, the less members know about their roles within the team they participate, the more they seem to improvise, to try out new approaches to the problem they need to solve, which can dynamically lead to knowledge creation. At the same time, the ability to share ostensive references in the virtual context has been found to create opportunities for dialogues (with real others, with imaginal others and with artefacts) and to help the negotiation of meanings. In the team we analysed, participants could share files and observe actions of others, they were found to have a better understanding of the reference entities created and could enhance the dialogicality of the specific situation by articulating and further articulating their experience.

Thirdly, and in relation to Schön's (1991) suggestions about reflective dialogues, it has been found that the more asynchronous the interaction, the greater the intervals between utterances, the less an immediate response is required, the more time participants have to think and reflect on what they are doing and to bring into play more voices. The ability to bring into play more voices compared to face-to-face settings by taking advantage of the various back regions within which a greater part of the interaction takes place, has been found to be related to the control one exercises over the "I" he/she projects to others, as part of knowledge creation. The findings suggest that the frontiers among front and back regions become looser and the greater part of the interaction takes place in the back region. Lack of visual cues and limited range of social cues that can be transmitted, provide a "mask" of the internet to members of the virtual teams who can reveal or conceal parts of the self.

It is not argued that in the virtual context one has complete control over the self that he/she projects, because that would contradict with the main argument of the paper,

which is the dialogical self being socially constructed. It is rather argued that the "I" has the possibility to move from a front region to a back region by taking advantage of the changes in situation and time. We have shown that the ability to move between the different "I" and project the "I" one wants is influenced by the different degrees of virtuality, the amount of information members of the team share about each other and the mode of communication.

4. REFERENCES

Bakhtin, M. (by *Voloshinov, V.*) (1929) "*Marxism and the Philosophy of Language*", Cambridge, Ma.

Baralou, E. And Tsoukas H. (forthcoming) "How is organizational knowledge created in the virtual context? A theoretical approach" .

Christou, C. and Parker, A. (1995) "*Visual Realism and Virtual Reality: a Psychological Perspective*" in Carr, K. and England, R. (eds.), "*Simulated and Virtual Realities: Elements of Perception*", Taylor and Francis, USA.

Dreyfus, H. (2001) "*On the Internet*", Routledge, London.

Giddens, A. (1991a) "*The Consequences of Modernity*", Stanford University Press, CA.

Goffman, E. (1959) "*The Presentation of Self in Everyday Life*", Doubleday Anchor, New York.

Metiu, A. and Kogut, B. (2001) "Distributed Knowledge and the Global Organization of Software Development", working paper.

Schön, D. (1991) "*The Reflective Practitioner: How Professionals Think in Action*", Ashgate Publishing Limited, UK.

Thompson, J. (1995) "*The Media and Modernity. A Social Theory of the media*", Polity Press, UK.

Tsoukas, H. (2005) "*How is New Knowledge Created in Organizations? A Dialogical Approach*", unpublished document.

van Dijk, J. (1999) "*The Network Society*", SAGE, London.

Vygotsky, L. (1962) "*Thought and Language*", M.I.T. Press, Cambridge.