# Why knowledge is linked to space

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### Abstract

This paper wants to go back to the emergence of space and knowledge in human discourse and to their inextricable links to understand what happens to them with ICT. In doing so, it adopts a phenomenological stance from which it emerges with great clarity that knowing is deeply grounded on space. From this viewpoint, knowledge is what links words and space coupling distinctions and sense making, so that words give sense to human actions and, conversely, actions give sense to human words. Even when it assumes highly abstract forms, knowledge cannot be liberated from its spatial ground: even when our discourse becomes abstract, in fact, it creates in metaphorical terms a new virtual space as its necessary counterpart. Knowledge is situated in space, time and human experience and it is at the level of situatedness that ICT systems can augment the capability to act and interact.

Human-centered design, interaction design and situated computing are the three lessons we must combine in order to do it.

## Introduction

We can face the question on how knowledge is linked to space on a very concrete level, considering how the distribution of the documents containing the knowledge interesting us in space (in which room they are, how they are stored, how they are classified and ordered, etc.) conditions their accessibility and the possibility to add new documents to the already existing collection. For taking into account the most sophisticated theories characterizing knowledge management, where also tacit knowledge is taken into account, we can integrate this picture of the spatial distribution of knowledge with the information about the locations of the people possessing important tacit knowledge about the issue interesting us, and the possibilities we have to interact with them, when needed.

From this viewpoint, Information and Communication Technology (ICT) impacts this relationship at two levels: on one hand, creating communication channels allowing to interact at distance with other people, to access remotely documents stored in digital repositories, and, finally, to tag documents and people so that searching knowledge items becomes more efficient and precise; on the other, creating virtual spaces where we can access explicit knowledge and interact with people possessing relevant tacit knowledge.

It is a very pragmatic approach that, apparently, grants good results in terms of efficiency and effectiveness of knowledge management, but it doesn't work as expected, since it is unable to deal with the situatedness of human experience. With this term we mean, in general terms, that every action and/or interaction we do is situated in a specific experience, where participants share the knowledge created in past actions and interactions and habilitating them to new actions and interactions.

Knowledge, as know how, is therefore also situated in space, time and experience, and its distribution cannot be considered as a rational problem: where this knowledge item should be placed, is a question not having a unique and steady answer. We must not imagine, in any case, that knowledge becomes a fuzzy concept that is difficult to link to the Euclidean space where we live our experiences. Space itself, in fact, should not be reduced to its Euclidean characterization, since, from a phenomenological viewpoint, it emerges in human experience exhibiting properties that cannot be reduced to a uniform quality of the external reality. Moreover, the emergence of space is strictly related with the experience of knowing, so that the complexity of knowledge is not separable form the complexity of space.

Going back to the emergence of space and knowledge in human discourse and to their inextricable links seems to me a necessary path, if we want to understand what happens to them with ICT: instead of looking at the superficial changes that are under our eyes it is more interesting to rediscover what characterizes the experience of space and knowledge beyond their physical limits.

The paper begins with a short foundational introduction, for continuing with a reflection about knowledge digitalization. A section on augmented places and some conclusive remarks complete it.

### **An Abridged Foundation**

In his "Inoperative Community" Jean Luc Nancy (1986) affirms that 'being in the world' (*dasein*; Heidegger, 1927) is 'being with' (*mitsein*, ibidem): we live together with other people so that the community becomes 'la position réelle de l'existence' (Nancy, 1986; 203).

We can move from this point in our investigation of the concept of space. Saying that the very primary experience of being of any person involves other people, with whom she constitutes a community (Nancy, 1986, 1996; Agamben, 1990; Esposito, 1998; Lave & Wenger, 1991; Wenger, 1998; De Michelis, 2011), we affirm that its beginning is the perception of something that is separated from her (the other) with whom she can interact and by the creation of a trust relationship with that other being out there. The distinction between 'her' and 'the other' brings forth what separates and connects them, where they are 'thrown' and co-exist: the space. The space emerges, therefore, in her discourse with its geometrical qualities, reflecting the physical extension of human beings and other entities and the perceptions and/or interactions they can do. We have not used the plural in the previous phrase by accident: the very first distinction, in fact, does not remain unique and alone: other distinctions follow it, both populating the same space of the first distinction, and creating new interaction spaces. A new distinction, in fact, may be incoherent, in principle, with previous distinctions and, when this happens, it brings forth a new space where the interactions with the newly distinguished entity are situated. Human experience is twice plural: several diverse actants (things and/or beings: see Latour, 2005) populate several diverse interaction spaces.

The incoherence among distinctions emerges within the discourse human beings associate to them: the act of distinction is, in fact, both perceptual and linguistic, since distinctions constitute together the world around them and the discourse about it. Any human interaction has therefore the form of a language game (Wittgenstein, 1953) linking words to the things and beings populating the space where it occurs. Emerging in the discourse of a person, an interaction space and what populates it allow her to

give sense to her experience, appropriating that space<sup>1</sup>. The *space* where she and other human beings are thrown – space is intrinsically social!- becomes their  $place^2$ (Harrison, Dourish, 1996), where they can act in accordance with their aims as well as give sense to their actions. This happens when the discourse switches from geometrical to functional language, where names and verbs characterize the things populating the place from the viewpoint of what a person can do with them, objectifying them. Giving sense and/or appropriating is performed, therefore, through the linguistic interactions of the people living together in a portion of space: the discourse continuously renovated through their conversations, continuously renovates the place where they live together and the objects populating it. This is possible because, on the one hand, their language game changes while they converse, on the other hand, beneath their place and its objects, there are a space and the things populating it that can not be reduced to their functions and features remaining, ultimately, matters of concern open to new unexpected possibilities. Appropriation is always contingent, partial and limited and it is ceaseless renovated. Any action and interaction performed in a place in accordance with its functional image, unavoidably, modifies that place and imposes to its inhabitants to re-appropriate it, to renovate their sense making. This is, contemporarily, a problem stressing the life of human beings but also their potential for innovation.

Why do I need such a foundational discourse for discussing the relationship between knowledge and space? Because within it, it emerges with great clarity that knowing is deeply grounded on space. What is, in fact, knowledge in accordance with this view of human experience? Knowledge - we take into consideration here knowledge for action, in a sense that can be associated to Nonaka and Takeuchi's work (1995) - is what links words and space coupling distinctions and sense making, so that words give sense to human actions and, conversely, actions give sense to human words. We don't need to evocate a reality out there to conceive the sense of our words: instead to look at a correspondence between words and reality, we can interpret the coupling between our discourse and our actions as the knowledge we create in our experiences. Even when it assumes highly abstract forms, knowledge cannot be liberated from its spatial ground: even when our discourse becomes abstract, in fact, it creates in metaphorical terms a new virtual space as its necessary counterpart. Knowledge is, therefore, intrinsically related with the distinctions we do in terms of nominating and qualifying the distinguished things and characterizing their potential for interaction.

Without further developing this phenomenological account (Rorty, 1979) on knowledge and space, let me affirm that we cannot experience our social existence out of space, as well as we cannot escape spatial discourse. The phenomenological stance (De Michelis, 2008) adopted in these opening pages, liberates our understanding from the idea that the appropriation of a space as our place presupposes

<sup>&</sup>lt;sup>1</sup> The reader should note that here 'appropriation' does not pre-suppose the existence of the space that we appropriate: space emergence and its appropriation are contemporary events developing in the interplay between actions and perceptions on one part and discourse on the other.

 $<sup>^{2}</sup>$  The diversity between space and place is the diversity between geometrical and functional discourse, and we should always remember that, but for extreme cases, we always oscillate between them.

our constitution as individuals<sup>3</sup>: we emerge as individuals together with the space where we are thrown and with the actants populating it. Our being with, in any case, projects our discourse in the social dimension: it is not by chance that language is the 'universal medium'. Again, we can avoid any naïf idea of discourse as a way for describing the world, to recognize, that language practice connects what is co-existent but irreducibly separated: conversing together we learn to associate to our common experiences the same phrasing. So space emerges in our discourse as a 'necessary condition' for our existence as social beings.

Language, as a collective medium, is also what creates the conditions for sharing our experiences with the other people: the language games we play with them reflect the knowledge we share with them.

Language is also the means through which we 'appropriate' space, transforming it in our place (Harrison & Dourish, 1996): but this 'placing' needs to be continuously renovated together with our identity and the sense of our experiences since unavoidable breakdowns dis-place the space where we live as well as put in crisis our knowledge (see, about this point: Chapter 7 of 'Design Things'; A. Telier, 2011). Dis-placing and re-placing are the moves through which we shift between making sense and opening to innovation, being able to limit inconsistencies so that we can orient our practice to our aims. The management of knowledge cannot avoid to reflect this ambiguity of our spatial experience.

# **Knowledge and Digitalization**

What happens to knowledge and space, with digital technologies? Information and Communication Technology has emerged in the twentieth century as means for creating new media and new tools for data/information processing. Telephone, fax, email, etc. were multiplying the means for communicating at distance both synchronously and asynchronously. Computers have allowed to handle large amounts of data as well as to perform complex computation. But the diffusion and multiplication of media as well as the invisible integration of data/information processing modules within human - computer interactions so that machines appear capable to react to human actions in a plastic, almost 'intelligent' way, made technology always more transparent. Media and computing systems disappear (or better, look like if they had disappeared) but the space where they are situated (embedded) is modified, augmented, by them.

In this augmentation of reality dis-placing and re-placing are multiplying their possibilities, since space, on the one hand, is loosing some of its distinctive features (as physical space) and, on the other hand, is becoming more plastic and flexible. For what regards the fist point above, the notion of distance is loosing sense: in the cyberspace there are no distances: we are always together and concepts like privacy need to be reinvented; on the other side, space can be articulated by users so that it changes form in accordance with user's will and/or situation. The plasticity of augmented space can offer solutions to both the problem of privacy (I can decide who is sharing a place with me, at any time) and the problem of openness (whichever is the boundary of a place, I can overcome it), but it leaves human beings without a shared

<sup>&</sup>lt;sup>3</sup> On this point, see: Nancy, 1986, 1996.

criterion for making sense of spaces and places (human beings, in fact, invented ways to assign value to spatial positions through distances and boundaries).

New criteria can emerge if we listen to the lesson of situated action and/or cognition (Winograd, Flores, 1986; Suchman, 1987; De Michelis, 2007): we can articulate spaces and places in accordance with the different contexts where we act, with the different stories we live ('stories and venues' is the metaphor inspiring the new operating system for workstations, itsme, we are developing in Milano; De Michelis et al., 2009).

Dis-placing and re-placing ca in fact be redefined as ways for, respectively, breaking the boundary of a story (and of its related place/venue) and redefining the place/venue associated to a story, after a breakdown.

This new grammar for space appropriation allowing us to give sense to our lives, can not be understood, if we don't remember that dis-placing and re-placing are moves based on knowledge creation and sharing, if we don't remember that knowledge is what transforms a space into a place but, also, that dis-placing is also supported by the creation of new knowledge reflecting the 'discovery' of the irreducibility of any thing to its objectification. After thousands of years, when the notion of space has been steady and immutable and we had no reason for reflecting on it, for de-constructing it, we are now forced to interrogate ourselves on the sense of space, and on its contribution to sense making.

The relationship between space and knowledge has been also analyzed by Nonaka and Konno (1998), revisiting the concept of 'Ba': Ba is, according to the Japanese philosopher Kitaro Nishida, a shared space, which harbors meaning for emerging relationships. Ba is the space where knowledge is created though the interactions among human beings inhabiting it. According to Nonaka and Konno, Ba is not necessarily a physical space, but can be also virtual or mental, or any combination of them. The space emerging through distinctions we have introduced in the previous sections of this text, shares therefore its basic features with Ba and converges with it in grounding in space the creation and sharing of knowledge.

In both cases, anyway, knowledge management can not be conceived in functional terms, since knowledge is always spreading light on something and, contemporarily, recognizing the limits of what we know about it. My theorization, assuming a phenomenological stance (Rorty, 1979; De Michelis, 2008), on the one hand, considers the spatial organization of knowledge as constitutive of knowledge itself, since the latter emerges together with the social space where it is situated and, on the other hand, shows how knowledge reflects, in its irreducible multiplicity, the diverse social spaces (and aggregates) where human beings live their social experiences. In this way, we can avoid any reduction of knowledge to information as well as recognize its dynamic nature (what matters is not knowledge in itself, but the process of its creation!).

### **Augmenting Places**

What can we do for enriching our capability to manage knowledge? For supporting knowledge creation and sharing? It appears immediately clear, from what we have said above, that developing systems for collecting and making accessible information is not enough. But also our experiences tell us that creating repositories of information does not solve our problems with knowledge.

I think that the inextricable links between knowledge and space teach us three important lessons for designing systems supporting knowledge management.

First (human-centered design), even when we are designing a specific artifact like a house, a chair or a computer, we must focus our attention on their stakeholders and on their experience, behavior and practice around that artifact. It is at this level, when we understand that the 'thing' we are designing is a potential transformer of the space of possibilities of its stakeholders, where we use space in the rather unconventional sense outlined in the above pages, that design can fully develop its potential for innovation. For long time, we have considered human-centered design as a good practice for its being democratic, more responsive of human rights, more acceptable by users: it is time that we affirm that this is true, but not disjoint from the effectiveness of its outcomes in the practice for which it is created. Second (interaction design), design is always spatial: any new ICT based system transforms the space of possibility of action and interaction of its users as well as any new space modifies the way people access, create and share knowledge. The issue is creating, with the functions and features of the new system, new possibilities of interaction and not creating user-friendly interfaces to the functions and features of the new system. It is not the case of placing interfaces before the software and hardware systems to which they give access, but to say that the interactions we want to sustain must fix the research agenda for ICT.

Third (situated computing), the aim of design is creating spaces capable to place any action and interaction within its context, supporting seamless switches among contexts as well as openness of contexts. Rather than, dedicating our energies to create always more sophisticated virtual emulators of human beings and of their experiences, we should develop systems capable to transform the space where we live habilitating experiences that are not possible in the physical world.

### Conclusion

This paper is just a fragment of a more comprehensive theoretical account of the spatial dimension of knowledge experience that I am developing as part of a characterization of interaction design as a new way of designing both spaces and ICT. I don't have philosophical ambitions and I work on these ideas, from the viewpoint of a designer. Therefore the theoretical conceptualization will progress together with the systems it inspires.

Two are the main open questions I will pay attention to, in the future.

First, how to guide the joint design of a space and its technological support, considering both small and large spaces, with the aim to develop flexible spaces that are capable to situate their inhabitants within the stories they live. The challenge is to couple the architectural and technological design traditions on the new understanding of space we have outlined here avoiding their simple juxtaposition.

Second, to what extent the idea of space as what separates and connects can sustain a more open conception of augmented physical spaces, where the outcome of design is not a physical space made flexible with ICT, but something we live as space, going beyond any reduction to the Euclidean notions. Along this perspective we can renew our understanding of the social dimension of spaces that social sciences have developed with concepts like milieux,

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