

Spacing Innovation and Knowledge Creation on Design Organizations: a Study of Working Spaces

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Abstract. Using an enacted view of the organization and a practice-theory of learning, this paper brings spatial, urban and architectural considerations into the field of organizational knowledge. Drawing from experiences and cases of IDEO, MIT Media Lab and Design Continuum, the paper explores and describes how their organizational embodiment in physical spaces are key --either to foster or constrain, depending on the choices-- knowledge creation and sharing. The paper proposes the following spaces for analyzing knowledge sharing and learning practices in design organizations: i) urban location, ii) building, iii) working places, and iv) the user's space. Drawing mainly on visual ethnography, the paper shows how these four organizations' situated spaces-in-use shape their innovation, learning and knowledge sharing -oriented practices. The findings are used to complement and expand existing theories, to reflect on the "spacing" of the three design organizations and to contribute to the outline of this interdisciplinary emerging field of research.

Keywords: organizational learning, physical space and knowledge, creative industries, urban ecologies, workplace, user-centered design, innovation

Suggested Track: Knowledge creation and innovation and/or Practice-based perspectives on knowledge and learning.

Space: the missing dimension

Knowledge and space have a fundamental relationship that is often overlooked in organizational theory and practice. Due to different reasons, the analysis of knowledge creation in relationship with physical spaces has not been carried out in a consistent and detailed manner over time. This paper, drawn from a larger research project, tries to outline a preliminary spatial framework for the assessment of knowledge generation, learning and innovation in the context of design organizations.

In the knowledge management and organizational learning literature, there are only a few accounts concerning how spaces –both the design and use of the workplace- might impact organizational practices and business performance of firms. The abundant literature on knowledge management, strategy, firm theory, and innovation accumulated over the years has dealt with several aspects of information, knowledge issues, and related technologies within organizational settings. However, the spatial dimension(s) of such issues have been missing until recently. And, “vice versa, in the architectural literature, there is relatively little about organizational theory” (Duguid, 2003), meaning creation and innovation research.¹

Contemporary concerns have been the explorations around the effects of information and communication technologies (ICT) on organizations (Fulk and Steinfeld, 1990; Orlikowski and Yates, 1992; Contractor and Eisenberg, 1990) Garton and Wellman, 1995, Haythornwaite 2002), the importance of knowledge in product development and innovation (Nonaka, 1994; Leonard, 1995; Hargadon and Sutton, 1997; Carlile, 2002), the social and communal aspects of knowledge (Prusak and Cohen, 2001; Brown and Duguid, 1991; Wenger, 1998), the dynamic between the explicit and tacit layers of knowledge (Nonaka and Takeuchi, 1995; Brown and Duguid, 2000; Von Krogh, Ichijo, and Nonaka, 2000), among others.

In terms of the spatial considerations of knowledge, the literature usually focuses either on the regional-urban space of knowledge creation and

¹ Frank Gehry, probably unfolds a vision of architecture related to creativity, and collaboration, all together for learning and innovation. At the time of writing, Gehry just inaugurated the new Stata Center at MIT for the informational, computational and intelligence sciences. Built instead of the historic wood-made Building 20, the MIT Stata Center raises interesting questions about the design of a creative mixed environment to foster research and innovation in science and technology.

competitive advantage (Marshall, 1920; Porter, 1990; Saxenian, 1995; Kenney and Florida, 2003; Brown and Duguid, 2000; Sassen, 1998) or on the office space itself and related effects on communication, agility and productivity (Allen, 1977, 1997; Stone and Luchetti, 1985; Porter, Horgen, Joroff and Schön, 1999; Joroff and Bell, 2001; Duffy, 1996, 2000; and Leonard and Swap, 1999). The former has drawn increasing attention specially over the last years and the latter is still an emerging field of research.

The goal of this paper is to start bridging the gap between the workplace (office) and the urban ecology (location) through a continuum of organizational embodiment. That is, to connect the different physical spaces that enable the emergence of organizational practices from the larger urban space to the situated workplace in a coherent multi-dimensional framework for understanding and assessing knowledge generation, learning and innovation.

The four material dimensions of the framework (urban, building, workplace and users of products and technology) are connected in theory and practice. That is, users live, work and move around a location, buildings are in a position within a location as well as enclosing workplace practices. Such workplaces can be made of more or less shared practices, depending on the type of work, the structure and function of buildings, and on the supporting/collaborative/partitioning places. These spaces constitute what I refer to as *organizational embodiment*, that is, spaces of possibility for organizational practice to emerge and to be structured (Giddens, 1984; Orlikowski 2002). In other words, physical space is a “continuum embodiment” of an organization in all layers of cognition and structure because space mediates the interaction between the “knowing” capabilities and the environment.

The analysis of these spaces as well as of work practices is not a study of espoused architectural discourses or representations but rather an exploration of “situated spaces-in-use” within organizations. Such exploration introduced by this paper is about the relationship of *situated* spaces (urban life, functionality of building, agility of workplace and proximity of users’ experience) and the way organizations enact creativity, collaboration, and innovation.

This paper examines these relationships and issues through case studies analysis. From these cases based on three design organizations, the paper

reflects on their spatial resources and strategies as well as highlights a spatial framework that might be used in other contexts of organizational research.

The Urban Ecology as the Diffuse Organizational Embodiment

When it comes to innovation and urban space throughout the world, the so-called “milieux of innovation”² are phenomena, primarily, metropolitan: “major metropolitan centers around the world continue to cumulate innovation-inducing factors and to generate synergy, in manufacturing as in advanced services.” (Castells, 1996/2000: 421) Even in the case of what Castells refer to as “secondary” (often new or renovated) milieux of innovation constituted sometimes as decentralized systems that spin off from primary metropolitan centers, they often “find their niches in competition with their original urban matrices.” (Castells, Idem:423). The urban space (location) does matters and can make an important difference in organizations’ learning, i.e., what happens “inside” can become leveraged or constrained by such urban surroundings. Therefore, we better take a look at them and their impact on the organizations under study.

The ecological-urban space matters, in different ways, to IDEO, Media Lab and Design Continuum. The analysis of the urban spaces showed the differences in the type of cluster, in the type of university and research environments as well as in the urban stimuli of cities for people within these organizations working on user-centered design. Each office is augmented or constrained by their urban location. This might seem obvious, but discloses a fundamental—and often overlooked—resource for organizational performance.

The map is different from the territory. The position of IDEO in both Silicon Valley and Route 128, seen from the vantage of the *milieux* of innovation, seems similar. Both are in important high-technology centers, nearby important cities and financial services, and connected through highways and airports along

² By milieu of innovation, Castells understand a “specific set of relationships of production and management, based on a social organization that by and large shares a work culture and instrumental goals aimed at generating new knowledge, new processes, and new products.” (Castells, 1996/2000)

the *space of flows*³. If we take the representations and images as they come from IDEO's managerial discourse, that is a reasonable account. However, if we explore the *situated buildings* and their surroundings as well as the designers' experience, other picture emerges. IDEO Lexington, for instance, is in the midst of an industrial park where highways converge, firms are vertically integrated and where "places" (restaurants, people, cultural venues, product users) for meaning and knowledge creation are rather scarce in the environment. As one IDEO's designer puts it: "*One of the problems we have here is the location. We are in this location based on where everybody sort of converges, where the highway systems are ...in the midst of an industrial park where there is not too much happening outside ... whereas being in Cambridge would be much more vibrant for our work*" (ES, 2003)

From the point of view of emphatic design (the core business of IDEO), the office is positioned in a hostile *space of places* where there is not too much going on to the eyes and senses of a designer looking at how her prototype/product will fit into the lifestyles and behaviors of future/present users. The location negatively impacts IDEO's Boston office performance. Moreover, if we take into account scholarly research on regional advantage such as Saxenian (1994), the ethnography and experience research is corroborated. Route 128 has evolved in a different way than Silicon Valley has: the former is dominated by autarkic corporations that internalize a wide range of productive activities, whereas the latter is a network-based system that promotes learning and mutual adjustment.

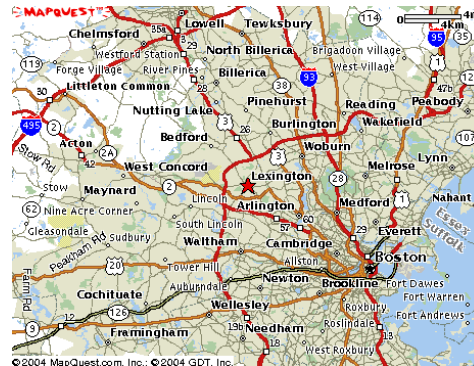
The larger space for organizational embodiment, even a so-called "cluster," can negatively impact the experiences of designers in our case and, thus, organizational performance. The communities and networks of practice that populated IDEO have constraints to interact, collide, produce and share

³ The *space of flows* is the material arrangements that allow for simultaneity of social practices without territorial contiguity. It is not a purely electronic space. It is made up first of all of a technological infrastructure of information systems, telecommunications, and transportation lines. The space of flows is made up of nodes and hubs. Hubs are communication sites, airports, harbors, train, or bus stations that organize exchanges of all kinds. On the other hand, the *space of places* is the most usual form of spatial existence for humankind. Place is the locale whose form, function, and meaning are self-contained within the boundaries of territorial contiguity. People tend to construct their life in reference to places, be they their homes, their neighborhoods, their cities, their regions, their countries (Castells, 2000)

knowledge, in part, due to this ecological space. If we look closely at such situated-space-in-use, the cluster may no longer be a cluster for a particular organization such as IDEO. It not about “the” cluster anymore but about the situated and experiential agglomeration of creative people (Florida, 2002). For that reason, IDEO is actually changing its office from Lexington to Cambridge, Mass., a more-rich and lively ecology, which is not only strategically in terms of the *space of flows* but rather in terms of the *space of places*.



IDEO Office at Lexington, MA



In the case of the MIT Media Laboratory, most of its strength as a research organization is due to its location within the territorial boundaries of MIT in Cambridge. The willingness for going global, the funding (in the case of the Media Lab Asia) and the powerful idea of a “media arts and sciences” discipline have encountered important constraints in trying to extend its local place to foreign spaces such as Germany, India, New Zealand, South Korea and now Dublin where the Media Lab Europe operations are going to be shut down in February 2005, as was recently announced in the MIT Tech News.

There are some ecological limits to achieving that goal of global presence. Even the powerful digital technologies have constraints to move knowledge—especially its tacit dimension—across geographic boundaries. Can a laboratory be translated? There is something that cannot be translated. The

specific textures and resources of the research worlds that unfold in MIT cannot easily be translated. ⁴

The Media Lab Europe running in Dublin is quite different from the Cambridge based one. That is the case not only due to their workplaces or the people working there but also because of the urban ecology. The immediate surroundings of MIT Media Laboratory are certainly the Institute and all the resources and ideas that come out of MIT labs, from engineering and computer science to artificial intelligence, physics and biology. Such context of research and development is missing in Dublin. The members of Media Lab Europe participate in different kind of activities and practices that affect ‘the re-embedding’ conditions for knowledge to be produced, translated and shared.



Media Lab Europe, Dublin



MIT Media Lab

These examples show us that innovation, in the context of design organizations, is related to “places” and their urban contexts. The urban contexts and their situated textures can be decisive in enabling “re-embedding conditions” for organizational knowledge to be transplanted, shared and used across locations.

I am not claiming that such sharing is not possible (in fact it is possible), but rather suggesting that we have to look carefully at these subtle situational and environmental aspects of organizational practice. To overlook constraints

⁴ For more about the discussion of the translability of laboratory practices, please refer to the complementary—though sometimes divergent—views of Bruno Latour (1987) and Peter Galison (1999).

and opportunities of the urban space can seriously damage the organization's capacity to change, learn and innovate.

Workplace Making Styles

Though connected to the urban space (with boundaries and separations), the *workplace* and office design are immediately related to the ongoing work activities. It is the organizational embodiment *par excellence*. It contains different resources and materials at hand to foster agility, learning and *co-evolution* between work and workplace. This is an research area where knowledge management and office architecture intersects, becoming a field for actionable intervention and transformation.

The co-evolution between work and workplace is far from being an autonomous or automatic process, but rather an ongoing design game that can be nurtured by materials, the social life of the office, transparent messiness and situated boundary objects.

I explored three different styles of *workplace making*, that is, the ongoing process for continual improvement where "people are willing to challenge assumptions about work, employees, workplaces and the ideal state of organizations." (Joroff, Porter, Feinberg and Kukla, 2001:20) Each organization can learn from the other two about the way workplaces are constructed and learning enacted.

The literature about design firms usually describes IDEO's innovation practices and processes as very similar to Design Continuum's (Hargadon 2003). Such accounts usually describe their *similar* process as user-centered design firms with *similar* aspects on their organizational learning such as a flat structure, a sharing culture and a process of rapid prototyping.⁵

However, if we look at their *situated* spaces-in-use, as I did, a different description is required because the supposed similarity is replaced by a different attitude to the space and to workplace evolution with consequences in learning and innovation. Such a different spatial attitude has allowed IDEO to be more agile in pursuing new directions of work practice and business development and, thus, in creating a competitive advantage. Though IDEO and Design Continuum

⁵ The Media Lab can also be a case of such description.

have both a similar process and clients, IDEO's attitude regarding space makes a positive difference in its work practice and knowledge produced. IDEO's workplace allows more flexibility, agility and readiness for new projects or new strategic directions that come out of the "transparent mess."



IDEO San Francisco



Design Continuum Boston (West Newton)

Design Continuum is in an earlier phase of co-evolution between work and workplace because it has a more random attitude to its urban location, building space and, especially, workplace. Continuum is positioned strategically on the space of flows, namely, in Boston (West Newton). Its buildings are rather generic and without any identity. In terms of workplace making, Continuum has also been active in producing new spaces, especially open spaces with wide hallways but still with slight partitions demarking territorialities and work boundaries. Continuum has evolved out of a partitioning heritage. Changes towards open space have taken place recently, triggering unexpected changes towards "shared ownership" because with an open space "change comes more quickly and there are both a motivation and a condition to share ideas and prototypes" (Design Continuum Strategy Director , 2003).



Spatial Boundaries at play (work): Design Continuum's first floor and basement in Boston

As the reader/viewer can see in the above photos, there is not a consistent workplace co-evolution at Continuum since there are different patterns within the same office that act as physical boundaries and constraints for learning. According to interviewees and to visual ethnography, there is a need for a more coherent physical background to support team and community dynamics.

Across Continuum locations, such inconsistency is even greater, creating different “embedding conditions” that might have important effects on how knowledge (prototypes and products) is created and shared. Such particular way of enacting its *space-in-use* has consequences in the type of design Continuum does, which is still product development design in the traditional sense, particularly, medical products. With the exception of certain areas of the first floor, Design Continuum seems not well equipped to handle new directions of design and innovation that might require agility. The co-evolution of knowledge work and workplace, so to speak, has important physical constraints.

If we follow the argument of physical “situated boundary objects” or “evocative objects” (Turtle, 2004) as members of the workplace that might foster prototype and product development (Schrage, 2000), IDEO and the Media Laboratory are again ahead of Design Continuum. If we take seriously the argument of playful environments, meaningful and intelligible messes, Continuum is probably losing some opportunities of learning, knowledge creation and sharing with its smooth and “clean” spaces. With a meaningful messy and full of prototypes environment, I think, it is still possible to make design choices

(Continuum's reason for clean spaces), if there is a robust process. And Continuum has one, which is used both in Boston, Milan and Seoul.



Design Continuum (Boston)

IDEO Palo Alto

Therefore, spatial innovation is not only about having a playful environment where the products done so far are up on the hallway walls (where they are hardly perceived in the unaware *coping mode* of doing things in everyday life) or in one side of the reception area for visitors and clients to look at them. Rather, meaningful spatial innovation in design organizations is about having them scattered throughout the working places to actually remind the collective intelligence and to spark a creative dialogue with such products' genealogy.

Organizational cognition is done against a physical shared background of practical memory, i.e., of the way of carrying out process and doing things. In terms of managerial implications, one might suggest, "Why can't you add more situated boundary objects and evocative objects carrying the shared and received organizational meanings, which can spark further knowledge creation?" It might also help to make good choices in organizations that try to avoid messiness and information saturation. It might also have a similar beneficial impact on shared practices (less territorialities and power-issues), growing involvement and network membership, and thus, a creative co-evolution of the workplace.

As I noted above, recent changes at Continuum, especially the partial elimination of cubes two years ago, has been well received because they

triggered more shared ownership (knowledge creation) and much less territoriality (decrease of power issues). So, without being behaviorist, spatial changes led to a change in organizational practice, i.e., in the way designers produce and share knowledge as well as in the way they relate to each other as members of a mutual and shared intelligible world.

At least in the case of design organizations and creative industries, open, playful, evolving and evocative objects-dense spaces that support work practices with *ad hoc* materials, seem key for sustaining innovation, agility and learning.



IDEO's Physical Memory with Movable Walls

The MIT Media Laboratory also presents an interesting and, sometimes, contradictory relationship between space-in-use and knowledge creation.

At the Media Lab there is, on the one hand, a discourse of being a bottom-up organization and, on the other, a practice of top-down architecture or, architectural determinism. Below I summarize this discourse and practice and thus, obtain some insights about the lab's workplace making style.

The Media Lab is not a traditional or hierarchical organization. The official discourse of being a bottom-up organization describes, to a certain extent, many organizational practices at the lab. The faculty have a great deal of freedom to do their work. They are hardly "managed" by anyone but they direct and advice (not manage, though) the work of graduate students.

As of organizational spaces, however, there is a top-down architectural practice towards what may be called a "transparency philosophy" embodied in the *glass practice*, as revealed by the facilities manager of the media lab

building: “Every time we have a reason to renovate the space we will convert the walls into glass” (Tucker, 2004)



Media Lab: Glass Transparency at 3rd Floor of Wiesner Building

Probably other organizations—hierarchical or not—also follow a top-down architectural approach because it is easier and takes less time to reach an agreement. But when it comes to workplace making, that is, the ongoing process of structuration and change of people who are willing to challenge assumptions about work, employees, workplaces and the ideal state of organizations, top-down approaches are rather useless because they separate the learners from their sources of awareness and change. That is, they separate them from the physical *bricolage* that is created and recreated in an ongoing process of interaction of the communities and networks with their environments.

A material like the glass may decrease both the degree of co-participation in the daily design of spaces and the frequency of messy situations by fostering a vision without resistances (in the sense that all has to be transparent and visible). It may constrain some aspects of the co-evolutive process, especially the one related to the role of human agency in the design and transformation of the workplace. The critique that I am pursuing here requires an analysis of the glass as a material and the transparency as a value.

Briefly, the glass all over the place allows members to see what other people are doing (where are they sitting, what are they doing or not doing, what are the current projects), and gives a sense of vision and visibility. Glass partitions are for seeing through and to allow a physical sense of transparency within the community. But the glass as a material and a philosophy has also constraints: since it is a glass for transparency, it is not common (nor expected)

to stick photos, post-its, sketches, and ideas on the glass because it is used to look through. It is possible to see prototypes, project announcements, artifacts of different sorts (mostly computer machinery in the case of the media lab), but the glass can be rigid enough for the workplace evolution and for the actual “play” of evocative objects that are there not to be seen but manipulated. In other words, the glass in the forms of partitions, divisions, and general office lay-out can become an obstacle for re-appropriation, re-use and transformation.

The idea and practice of transparency, i.e., that everyone can look at everyone else’s work, may also have unexpected negative consequences for innovation and creativity. Researches on *Ba*—shared context in motion and a sort of inspirational “place” in Japanese—have shown that innovation not only happens in places (Kao 1999), but also that such places require some kind of care: “Boundaries must be set within which a meaningful shared context can emerge. This is sometimes called ‘cocooning,’ the practice of building a unique world or context (de Monthoux, 1996). Leaders should set boundaries and protect *ba* when it is necessary.” (Nonaka, Toyama and Scharmer 2001) Therefore, too much emphasis on transparency as both an organizational and architectural goal can have negative consequences on, precisely, the production of new ways of doing things and products.

In other words, while transparent walls might be a good solution for a room, a specific context or a project, they could be the worst for emerging and peripheral practices of innovation such as a new group, or newcomers who are doing something different or, apparently, worthless.



Media Lab's Machinery Transparency



IDEO's "cocooning" and User Transparency

It is interesting to contrast MIT Media Lab's literal transparency with IDEO's evolving group memory and incubation spaces. While in the Media Lab the transparency is mainly for members (visitors and sponsors) to look at themselves and their "stuff" around (prototypes, projects and machines), at IDEO the transparency is for designers to be aware of contextual and tacit knowledge involved in the process of product design. That is, not only knowledge about what they are doing, but also about what others (within IDEO and outside) have done so far and, especially about what users feel, desire and want as present/future products (see photo above: "group memory space" that captures, and incubates users' experience).

So, whereas at IDEO the transparency is physically enacted to look through to clients' demands and users' needs, at the Media Lab the transparent glass is for looking at themselves, i.e., at the designers and "lead-users" inside the lab, which is anything but transparent to ecologies beyond the Wiesner building.

As I have tried to show, the organizational (human) relationship with space is circular: we design the space and the space designs us in an ongoing relationship that I have called, following Porter, Schön, Joroff and Horgen (1999), workplace making. From a structuration prospective (Giddens, 1990; Orlikowski 2002) the lesson here is simple and straightforward: materials do matter. Overlooking the constraints of a material like the glass or other for fostering interaction and creativity may also damage workplace evolution and, thus, its agility to move to new and unexpected directions.

Spacing and Making Users

Design organizations and other types of organizations are related, in one way or another, to customers. There are different types of customers and network positions in the value-chain of design organizations. I concentrated my analysis on the end-customer, that is, the customer of the customers of IDEO and Design Continuum and the customers of the sponsors of the Media Lab. In other words, on the users, or rather, communities of users that are using products today and will be using prototypes and new products tomorrow.

Users have been equated to social practice (Tuomi 2002), to organizations' environment as well as to key sources of innovation (Von Hippel 1988). Users embody a fundamental context for successful innovation, that is, the context of technology-in-use.

Users can also become members of an organization by bringing strategic resources from the periphery (metaphorically and physically, i.e., around the location). Users may also be left aside, idealized or labeled as a mirror of the organization (they are as we—designers and engineers—are). Users can also be dismissed as not related or even not useful practices to understand and follow, which can imply an important loss of competitive advantage for a design firm.

Users of prototypes, products and technology are members of that fuzzy construct called "society." Moreover, they are social practice to be structured meaningfully by future technology and products. Users can become important sources for organizational learning and innovation because they carry the context of successful design, i.e., they co-construct technologies (Pinch and Oudshoorn, 2003).

Users may or may not be part of the spatial embodiment of the organization. Users, *stricto sensu*, are not a space or a place. They are social practice that might be activated and constructed by an organization or a technology (like Open Source Software), depending on its needs and choices. Users are related to a space in both a literal and metaphorical sense. Literally, users are in a location (may or may not be the same as the organization) or they can be invited to the office, as IDEO does with their users or as the Media Lab does inviting some youth to program and to play with technologies over the summer. Metaphorically, users are a *space of experience* that the organizations are trying to understand and design for.

Users can become a competitive resource for organizations in times of a network economy (Von Hippel *et al* 1990). As Michael Schrage (2003) notes, lead-users can help save huge costs as exemplified by Microsoft Windows 95 that was effectively subsidized to the tune of \$900 million by sending out 400.000 beta version copies to thousands of beta sites worldwide, to individuals and organizations willing to help track bugs and suggest improvements in exchange for receiving the software in advance.

IDEO has sophisticated techniques of user-centered research (human factors engineering) by which they actively construct the users and their contexts and, more importantly, they try to articulate their unarticulated background of needs, tastes and desires into products and brands.

At the Media Lab, I found out a particular way of labeling the *function of users*, a sort of “ladder of inference” about the role of users in the innovation and creative process. In the Media Lab discourse/practice, users are in general not taken into account. I also found a lack of (tacit) knowledge and related techniques for following, constructing and taking advantage from users, i.e., co-constructing prototypes and technologies with them to have a better innovation impact (diffusion and use) on the long run.

There is a discourse and practice that tend to see users as actors unable of thinking about tomorrow’s worlds or as co-designers of technologies. The Media Lab is missing some relevant users’ contexts and, to a certain extent, it is not seeing their potential value for sustainable innovation. There is a latent resource out there, on the ecologies surrounding the lab and MIT that might be put into practice. So, there is a latent possibility to actively construct some of these contexts of technology-in-use. Such construction can be both literally and metaphorically by following and inviting users to their workplaces, and thus, connecting the larger ecology to the “internal” mind and body of the organization.

The Media Lab has the potential to be as radical and creative as it has been in the design of new technologies by bringing the social and urban context inside the lab. The invention of the future (one of the lab’s goals) is rather a co-invention of the future enabled by both a maximization of ideas and a integration of users located in its legitimate periphery.

The Bottom Line: Tacit Knowledge Creation and Sharing

Most of the knowledge creation in design organizations occurs within offices, in the interaction of people with materials, projects and places. Although there is a common process beyond the geographical barriers of each design organization, I found differences in the work styles and cultures across locations. A great deal of the knowledge sticks and remains in the local offices—that is, in a spatial context—and, sometimes, it is not easily shared or translated.

Most of this knowledge is produced by a “tacit and situated knowing” in a building setting within a particular urban ecology. As Polanyi (1966) put it, such tacit knowing is part of every act of knowing. Our body is “the ultimate instrument of all our external [explicit] knowledge, whether intellectual or practical.” (Polanyi 1966: 15) The urban location, the building, the workplace and even the users, as we discussed, are critical to foster learning and awareness in our body-based relationship with the creation and sharing of knowledge.

For this reason, workplace making is such an important factor of innovation because it does incorporate the body and its tacit knowing capability into the learning and transformation of the work space. The design (and use) of spaces that overlooks the resources of the body (of the communities, networks, and teams of practice) for “workplace making” can damage one of the key sources of organizational innovation.

What can we do, when as Moggridge (IDEO’s principal) says, “If you want to get effective tacit knowledge sharing, you need something you can experience like a physical browsing.” The body is a fundamental source of knowledge in design organizations (and probably in other types), but if we try to imagine an experience of physical browsing across locations, or even across floors in a building, we may encounter important limits for knowledge sharing. On the one hand, the body-based learning and work supported by urban ecologies, agile, and evolving workplaces is crucial, and on the other hand, there is a limit on the scalability of that learning across physical boundaries.

How can organizations and leaders manage such body-based resources and capacities? How do they overcome (or try to) the related constraints of tacit knowledge creation and sharing?

By enabling workplace making: that is, by spreading the practice of tacit knowing and the relation to which the explicit knowledge makes sense because “knowledge, in short, runs on rails laid by practice” (Brown and Duguid 2001: 204). Both the enabling of workplace making and the spreading of work practice are intimately related to space design, space-in-use, and space transformation.

On the one hand, the design of spaces has to avoid “overdesign” by anticipating possible breakdowns of work situations, and allowing agility through flexible materials, activity settings, and evocative objects (plus IT flexible infrastructure). On the other, the re-design has to attend and respond to specific,

pre-existing and productive *spaces-in-use* and invent latent fields of practice. For that reason, the design and use have to really understand the meaningful interactions, the shared worlds, how the work really gets done, the body-based aspects of learning and collaborating, and the social life of the office. The design has also to attend to particular features of buildings-in-use that might open directions and “knowledge corridors” for spreading practice across floors and thus, enable the conditions for tacit knowledge sharing.

The life and evolution of an organization has to do, among other things, with its spatial embodiment. The “making” of organizational places in these case studies and, probably in other cases, is something that deserves attention, care and action not of only one department or level (such as real estate people, HR or managers) but rather requires a distributed participation of a great deal of members, if not all of them. To enable such “making” and co-evolution between work and workplace is to enable organizational agility and distributed leadership to deal with changing environments and increasing uncertainty. That is to say that not only the organizational mind but also the body and its surrounding spaces have to be ready to learn.

Brief Summary

	IDEO	Continuum	Media Lab
Urban	Cluster	City	University
Building	Opportunistic	Random	<i>Conscious</i> <i>Work of Art</i>
Workplace	<i>Agile, playful</i> <i>Evolving Present</i>	Open, territorialities Past & present	Glass, “stuff” Past & present
Users	<i>Construction Central</i> <i>Sophistication</i>	Important	Indirect missing context & opportunity

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