CHAPTER 19

**HUMAN CAPITAL AND
THE ORGANIZATION-ACCOMMODATION RELATIONSHIP**

**by
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Human capital comprises the skills, knowledge, and capabilities of the workforce of a firm, as well as the organizational arrangements and networks of relationships that enable employees to be innovative and productive. As pointed out in Chapter 1 of this volume, the notion that the stock of productive knowledge and skills possessed by people are a form of "capital" that can be acquired and enhanced by various kinds of investments has proved to be an evocative and powerful way to frame discussions and analyses of what kinds of investments make organizations more productive. In this chapter we look at one factor among the diverse influences on human capital in organizations, that is the physical environment in which people work.

The 'work environment' is an important concept that typically includes employee-employer relations and HR policies, corporate values, job design and organizational structure, as well as informal networks and work patterns. Environment also includes accommodation: the buildings, locations, interior space layouts, office-space, furniture and equipment, including information and communications technology (ICT), that employees occupy and use to perform work. An often neglected dimension of the employee experience, an organization's accommodation and decisions about workspace bear on the investment a company makes in its human capital and consequently in employee performance and competitive advantage (Holtham, 2003). The workspace employees occupy has an effect on – but is not the only determinant of – how well they work, how much they work, and how they feel about their work. The accommodation that an organization selects both defines its organizational environment and is a key factor facilitating or hindering human activities. Accommodation supplies workspace, an important mediating influence on the relationship of the organization to its human capital.

The concept of an organization's environment has several overlapping meanings. These include the social context: employee interactions, social support networks,

social norms and expectations within and among groups, as well as amount and type of socialization. The social and cultural norms that guide employee behaviour and relationships are both transmitted and mediated by space and spatial decisions. For example, are senior executives accommodated in open plan offices that communicate their availability and approachability to employees, or do they occupy remote private offices that communicate their superior status, and are only reachable by scaling long and possibly intimidating hallways?

Environment also includes corporate culture: that is, the way the company is structured and managed, patterns of employer-employee relationships, styles of decision-making (more hierarchical versus more autonomous), managing the flow of information, staff behavioural expectations, as well as norms and types of individual and group behaviour. The space an organization occupies is an important communicator of organisational culture and values; it has a symbolic function, such as larger and more private individual space allocation typically marking an employee's advancement through the company. Hierarchy is expressed through spatial divisions and distinctions: spatial features can reinforce issues of privacy and confidentiality, just as flatter and more open organizations favour open plan workspace that facilitates communication. Its choice of workspace concept or type indicates whether a company's HR policies support 'coordination' or 'cooperation' as preferred mechanisms for the integration of organizational knowledge (Grant, 1996).

Environment also incorporates the virtual environment: the information and communications technology (ICT) that is available and used, the times and ways in which it is used and by whom, constraints on its use and effectiveness, as well as relationships created through its use. ICT tools employees use for their tasks and in their relationships complement the spaces they occupy to become determining factors in how learning occurs, how knowledge is acquired and shared, and how production decisions are made. For example, one of the effects of globalization is that project teams rely increasingly on remotely located members, some of who may work for other companies and occupy other time-zones (Langhoff, 2006). In addition to physical resources, such as co-locating team members' desks and assigning them a project room, teams need network access that lets geographically distributed members meet in real time to share notes, documents and drawings.

In this chapter, the environment being examined is physical: the type, features and location of the buildings that are occupied, and the interior spaces - or workspace - within which work is performed. The chapter examines ways in which the physical environment has a direct effect on human performance and organizational processes. The design, configuration and features of its workspace affect how well and how much a company benefits from 'the acquired and useful abilities of all the inhabitants or members of the society' – its human capital. There are three key ways in which space affects people in organizations: space as an *organizational resource*, linking accommodation decisions with

corporate business objectives (Fischer, 1997; Guillen, 1997); space as a *tool for work*, providing needed support for employees' daily tasks (Leaman and Bordass, 2001; Vischer, 1996); and space as it frames organizational interactions and social network formation, a mediating influence on the creation and operation of *intra-organizational relationships* (Kampschroer & Heerwagen, 2005; Stephenson, 1998).

Corporate decision-makers frequently underestimate the value of space as a resource to invest in owing to the prevalence of a business viewpoint that sees accommodation as a cost to the organization. This view has resulted in common workspace features such as the standardization of workstations and furniture, efforts to reduce 'footprint' and increase density, and a 'value engineering' approach to construction projects that does not address the human aspect and can have the effect of eliminating anything new and humanizing about workspace design. Employers tend to demand proof that there is a payoff from investing in high quality workspace before they look into an alternative to the least-cost options. The payoff in terms of image or corporate branding though building design and architectural features is well-established – look at how Frank Gehry's design of the Bilbao Museum has affected museum design and attendance worldwide. And the payoff from 'green building' certification is becoming increasingly clear. But a payoff defined in terms of more effective use of human capital, such as employee and knowledge retention, more employee learning and commitment, new knowledge creation and sharing, and improved performance outcomes, is slow to be accepted by corporate decision-makers in spite of the increasing amount of persuasive research.

This chapter reviews the current state of our knowledge under the following headings. First, the ways in which an organization's choice and design of its physical environment affects the success of corporate business practices, especially in combination with HR policies and procedures; second, the role of space in the social contract and its influence on the employer-employee relationship; and third, how workspace affects human learning, task performance, and knowledge creation and communication.

The organization-accommodation relationship

Space is a resource to the organization: how can it derive value from this resource? Space is itself a fuzzy term. Most commonly, space is defined by the building or buildings in which employees work; in this chapter, we use the term 'workspace' for this meaning of space. Workspace can be thought of as a set of concentric circles: at the centre, the individual worker occupies his or her workstation or office. Each individual workplace is connected by walls or circulation to others, and these in turn to hallways and elevators that lead to other work-groups; eventually, workspace extends beyond the building. Workspace exists at all these scales because workers' behaviour and therefore effectiveness

is influenced not only by the size, style, comfort/convenience and location of individual space, but also by the circulation paths he walks along, the meeting-rooms he sits in, the cafeteria and coffee station he stops at, as well as the time it takes him to access support spaces such as copier rooms, stairs or elevators, and parking. Moreover, space is increasingly defined virtually: some employees work at home, or from airports, hotel, or their cars. Some start-up companies think it is no longer necessary to occupy space at all; instead they supply workers with laptops and cell-phones and keep them on the road.

For decision-makers, the contextual space in which their company's building is located also has meaning. Companies choose locations that facilitate access to a trained labour pool, for example, or to suppliers, or to transportation. There are examples of socially responsible companies opting to build in deteriorating neighbourhoods to increase land values and provide jobs to the community.[1] How a company defines and thinks about its space can be summed up in its organization-accommodation (O-A) relationship, that is, that unique configuration of land, buildings, interiors (workspace) and information technology that each company defines for itself, according to its views of itself and of its workers, dynamically and over time.

The idea that an organization has a relationship with its accommodation that, like all relationships, ebbs and flows and changes over time, is not new but is relatively unexamined (Vischer, 1996; O'Mara, 1999). This in contrast with the employee-organization relationship, which has received considerable attention and in which companies are encouraged to invest (Tsui, Pierce, Porter, Tripoli, 1997). The traditional view of space as a cost to the organization - a view that originates with and is endorsed by the real estate industry – considers investment in property acquisition and divestment terms rather than in human capital terms. Trends such as the rise of the networked organization and the knowledge economy (see Chapter 2) have affected the O-A relationship as well as corporate views of human capital. The move towards 'hotelling' or temporarily occupied offices and meeting-rooms was hailed a few years ago by large accounting and management consulting firms. Designing workspace for hotelling rather than permanent occupancy reflected the economic fact that the more professional and technical employees were out of the office, the more they were in clients' offices and therefore increasing their billable time. By taking away their desks, these employers believed people would spend less time 'catching up on paperwork' or other unbillable activities in the home office, and more time with their clients. To facilitate this transition, companies such as Accenture provided extensive concierge services to help people who spent their weekdays on the

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[1] An early example was the (then) NMB Bank which relocated to South-East Amsterdam in the 1980s (see Vischer & Mees, 1991). In the 1990s, the CDPQ (Caisse de dépôt et placement du Québec) building was built in and designed to revitalize the Quartier International in Montreal, Quebec. More recently, the Australia's Macquarie Bank built a new flagship building in the docklands area of Melbourne.

road with such prosaic matters as taking their car to the garage for repair, dropping off and picking up dry cleaning, getting tickets for theatre and sports events, and reserving specific spaces – a desk, an office, a meeting-room – for when they would be back in the building. A less deluxe model of the hotelling concept has been widely applied to corporate sales teams. IBM realised up to 30% reduction in real estate costs in North America by providing a limited number of small, shared workstations for its sales teams, on the grounds that they need to be outside the building more than inside it to get their work done.

Seen from the company's perspective, hotelling and other non-territorial workspace options, such as 'hot desking', would seem to present a reasonable balance between cost reduction and better returns on the human capital investment.[2] While hotelling accommodation is comfortable and supportive, access to it is limited; these limits on accessing workspace define ways in which workers can make the company more profitable, but not necessarily the ways in which they can communicate and collaborate to learn and increase knowledge. Thus the decisions an organization makes about its accommodation need to find a balance similar to that which is sought in other organizational systems, namely between 'exploration', that is space that provides opportunities for new behaviour, and 'exploitation', that is space that facilitates existing ways of doing things (March,1991).

In most companies, however, the conventional organization-accommodation relationship is not balanced. It is more reactive and retrospective than it is innovative and embracing of change. It is reactive in that companies typically change their accommodation not to embrace new ideas and processes, but to solve problems of numbers – of too much or too little space. It is retrospective in that decisions about new space are most commonly based on what already exists in the firm, and result in reproducing workspace concepts that are already known and familiar. This approach serves the need for exploitation better than the need for exploration and may therefore limit innovative thinking and the creation of new knowledge.

Relatively few organizations take advantage of the opportunity offered by an accommodation change or move to rethink the relationship between workspace and human capital and to seek improvements, although lowering costs as the single most important objective a company has for its accommodation is slowly being replaced by more diverse and organisation-related goals (Ouye & Serino, 2004). These include better customer relations, improving worker productivity, generating opportunities for tacit learning and mentoring, and growing and consolidating community and culture. To facilitate a shift towards defining accommodation in terms of how well it attains these human capital-related

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[2] 'Hot desking' applies to environments in which employees do not go to a fixed location every day, but instead may choose from a variety of work settings within the building, depending on what is appropriate for the tasks they are working on.

objectives, it is useful to think of four basic categories or states that characterize the organization-accommodation (O-A) relationship. Each has a key influence on the social contract and on the employer-employee relationship. These categories are 'poor', 'neutral', 'positive' and 'active' (Vischer, 2005). Where workspace hinders work – perhaps people are too crowded, or they have to move too often, or noise distractions hinder concentration – the relationship is *poor*, adding no value and even detracting from business activities and worker efficiency. This can impair customer relations and over time increase employee turnover, and the loss of organization-specific skills and knowledge. A move or other workspace change provides an opportunity to improve business processes and solve problems. The relationship can become *neutral* – less adverse to worker activities – and it can become *positive*, supporting people's tasks and improving their ability to perform them. A positive O-A relationship means accommodation that supports information exchange, helps build trust, and enables collaboration – all goals of strategic human resources and essential to increase competitive advantage (Lepak & Snell, 1999). Ideally, an organization has an *active* relationship to its accommodation, in which accommodation is viewed as a resource and workspace as a tool, and the organization has O-A strategies in place to derive maximum value from its facilities.

Making accommodation decisions explicit and purposeful is one way to initiate a process that makes the O-A relationship more active. Strategies for involving and engaging workers in planning their own workspace help ensure that both their explicit knowledge (what they do) and their tacit knowledge (how they do it) are applied to workspace decision-making (Dewulf & Van Meel, 2003; Gann & White, 2003; Lennertz & Lutzenhiser, 2006) . Increasing employee empowerment in relation to the buildings and space they occupy by providing information and offering opportunities to participate in decisions helps knowledge dissemination, increases commitment, and improves their performance (Lawler, Mohrman & Ledford, 1995).

From social to socio-spatial contract

Like ICT, accommodation is an important investment for a firm, and the workspace it provides is a strategic tool for implementing HR policies and philosophies. Companies increasingly believe that a dynamic and supportive workspace plays an active part in making a business successful; Google, Muzak, Capital One and Macquarie Bank are well-known examples of companies that have invested in high quality and innovative buildings. They recognize that workspace is a powerful mechanism in the relationship between employees and the organization, symbolizing mutual commitment and assuring both sides that each worker has 'a place' and that some degree of territorial control can be negotiated. It is this implicit 'deal' between employee and employer that gives workspace its symbolic power.

To understand fully the power of workspace symbolism, we need to analyze the implicit terms of the employer-employee agreement known as the socio-spatial contract (Vischer, 2005). This contract, rarely made explicit and unlikely to be acknowledged unless violated, includes space as a key component of the deal that both sides make when an employee joins a company. Although space is not typically part of the HR function of fitting people to tasks and jobs, there is an implicit promise that physical space – along with pay, training, supervision, and other forms of compensation – is offered to employees in exchange for their time, energy, skills, knowledge and commitment. In view of the importance of combining 'core', 'traditional', 'alliance' and 'contract' workers for optimal organizational performance, the way their time-space is structured, equipped and provided is likely to be a key influence on the effectiveness of the combination selected (Lepak, Takeuchi and Snell, 2003).

The most critical of the unexamined assumptions on which the socio-spatial contract is based are territoriality, environmental control, and job performance. Territoriality is a basic human behavioural trait, and people at work occupy, decorate and defend the space they have been assigned individually as well as space they consider to be their group or team territory (Becker, 1981; Brown, 1987; Vischer, 2005). Typically, the contemporary open plan office concept encourages territorial expression in at least two ways. First, the forest of cubicle partitions that greets visitors to almost any modern office building floor in North America is characterized by its standardization and homogeneity. Its lack of distinctive features fails to support wayfinding and orientation, and send employees a message from employers that 'you are all the same to us'. This very sameness inspires people to personalise, expand or make other individual changes to indicate their uniqueness that the environment seems to deny. Second, the symbolism of the individual office, desk or workstation is a powerful and deeply rooted symbol of the individual's and the organization's mutual rights, responsibilities, expectations and commitment. Without 'my desk', however modest and ill-defined, I do not have a clear role and place in the organization. In laying claim to 'a space I can call my own', I maintain my individuality and the uniqueness of my contribution. The socio-spatial contract provides at least one small space in the building where the individual user is 'in charge', and some companies supply individual environmental controls (task lights, task air, heater and fan, white noise controls) to give each worker control over her environmental comfort (Aronoff & Kaplan, 1995).

The combined effect of their needs for territory and environmental control often causes workers to resist workspace change, although managing workspace change to increase efficiencies, generate process improvements, and make better use of human capital is an important aspect of an organization's ability both to adapt to and to create change (see Chapter 18). Companies experimenting with non-territorial approaches, such as shared desks or 'hot-desking', mobile or remote officing, and various forms of telecommuting and telework, find their employees' first response is resistance to workspace redesign

and renovation. Features of the physical environment in which work is done communicate the importance of the work, and therefore the importance of the role and rank of those who are doing it; they also sustain one's sense of self as defined by job, self-image and role (Fischer et al, 2004). Workspace change risks violating the terms of the socio-spatial contract by threatening employees' expectations, and thereby challenging the implicit accommodation promise. This is one reason why emotional upheavals and employee resistance have accompanied workspace change in many companies. In order for workspace change to be successful, employees need to be empowered to participate in decision-making. Studies show that the more people are informed and engaged in workspace change, the more accepting they are of both the process and the outcome, and the more effective and successful the new work environment they occupy (Becker & Kelley, 2004; Davenport & Bruce, 2002).

The spatial aspect of the social contract has many facets. As well as the employer committing to providing workers with the tools necessary to perform the job, the work environment also operates at symbolic and semiotic levels. The presence or absence of walls or partitions around individual offices, and the height of those partitions, are a key indicator of social status, as are proximity to windows to the outside, and proximity to management offices. In more traditional companies, meticulous attention is paid to status indicators such as number of visitors' chairs, art on the walls, and chrome accessories, to ensure that employee promotions are rewarded by environmental recognition of seniority (Vickers, 1999). Companies less concerned with maintaining a hierarchical structure honour the spatial part of the social contract by providing services and amenities that go beyond what employees need for their work. These might include fitness facilities, dry cleaning services, and a choice of places to eat, as well as the concierge-type services mentioned previously that are offered in environments favouring 'hotelling'.

Modern workspace design trends are weakening the traditional symbolism of the individual office. The emphasis on projects and teamwork mean more space is needed for shared and group work; the flattening of organizational hierarchies mean fewer size and other distinctions among spaces at different levels and ranks. Companies – Hypertherm, HP, Sun Microsystems, and others – are embracing space standards based on functional and task needs rather than on rank. A participatory space planning process not only gives employees the chance to voice their opinions and preferences, but also enables the organization to draw on and use their knowledge – especially the tacit knowledge of how they perform their tasks – to provide the best fitting workspace. However, as we know, companies today operate in a rapidly changing business and economic environment, and need to be proactive towards their constantly changing circumstances. As a result the challenge of defining the right workspace is also a challenge of balancing 'fit' and 'flexibility', much as these must be balanced in strategic human resources (Wright and Snell, 1998). A responsive HR system fits the strategic needs of the firm but also enables a flexible response to changing

strategic requirements over time. Similarly, the optimal workspace meets users' needs at one point in time in order to 'fit' – that is, to support, enable and enhance – how people work. It is also readily adaptable (flexible) to changes such as team reconfigurations and moves, mergers with newly-acquired companies, and unanticipated facilities expansion or shrinkage. Both concepts are essential for organizational effectiveness. Workspace that successfully balances fit and flexibility contributes to competitive advantage; how a company defines this balance for itself depends largely on the competitive environment in which it operates.

For many firms over the past decade – telecommunications companies, for example – the challenge has been shifting from the fit of a stable and predictable competitive environment to the flexibility needed in a dynamic and unpredictable competitive environment (Vischer, 1995,1999). As workspace is defined more flexibly, thought can be given to a better fit between human capital characteristics, strategic HR practices (job design, staffing, training, remuneration), contractual terms, and workspace concept. Contractual terms may include making the socio-spatial contract explicit – letting future employees know not only what kind of space they will occupy, but also organisational rules and expectations regarding acceptable uses of the space they have been allocated. Examples of implicit cultural rules include whether advancement to more senior positions is accompanied by larger and more enclosed (private) space, or not; which communal spaces are shared by which staff members in the organization; and how supplementary and support spaces for tasks not performed inside individual offices or workstations are made available and accessed. Typically, most space-related rules and expectations are unstated, and learning them is one of the ways new employees gain knowledge of the organisational culture. However, making them explicit as part of the hiring process is one way to speed up employee acceptance into the culture and thereby help them make optimum use of workspace resources sooner, thus reducing the time between investing in new space and the human capital return on that investment.

As Chapter 11 of this volume points out, companies invest differently in different employee sub-groups, depending on their value to the organization. The next section looks at how workspace investment decisions are made as a function of type of employee, technological environment and kinds of services. A better understanding not just of how an employee works, of her skills and knowledge and what she has to contribute, and the tools, training, and support she requires to be effective, but also of the most suitable space-time framework for her to perform opens new horizons in organisational use of human capital. This understanding is part of the process of defining an optimal balance between fit and flexibility for work environments that are moving beyond standardization to a more customized approach, and designing workspace to fit the human capital characteristics of the organization.

The environmental psychology of workspace

Detailed knowledge of user-environment interaction and how workspace features affect human behaviour is needed to negotiate the socio-spatial contract and to understand and improve the organization-accommodation relationship. The space-time environment that accommodation provides structures the relationship between value and time that is basic to human capital (see Chapter 3).

Some interest in the physical environment for work – mostly in factory settings – is evident in research published earlier in the 20th century, such as the Hawthorne studies of the effects of changed lighting conditions in the 1930's, Herzberg's analysis of factors influencing worker motivation in the 1940's and 50's, and Barnard's advice to factory managers in the 1960's (Barnard, 1964; Herzberg, 1966; Roethlisberger & Dixon, 1939). Systematic studies of what has come to be called the environmental psychology of workspace began in the 1980's. One of the first studies compared workers' assessment of and responses to office buildings they occupied before and after a major move (Brill et al, 1984). Based on the dominant paradigms of environmental psychology, this study and those that followed looked at how positively workers felt about the buildings they worked in: whether they felt they were 'productive', how many health-related symptoms they reported, and whether or not they were satisfied with the work environment.

Substantial knowledge has since accumulated on how people work in different physical settings and how they interact with workspace. Research results indicate that the environment has a powerful effect on human performance at work, and can positively or negatively affect human output, including creativity and ideas generation, communication and knowledge sharing, and individual and group problem solving. The concept of 'ba' or *place* is gaining currency in part because it combines physical, virtual, and mental space to signify "a shared space for emerging relationships" (Nonaka & Konno, 1998; p.40). A recent analysis of space use in organizations concluded that accommodation must provide not only space, but also the time, attention from leaders, and opportunities for relationship building to facilitate the creation of new knowledge (Nenonen, 2004). The author proposes a list of ten environmental attributes needed for high quality ba – that is, space for knowledge creation and sharing – that includes balancing open areas for connection with 'cocoon' space to facilitate new ideas; a sense of 'purpose' and 'intention'; and ensuring that 'dialogue' and 'high quality conversations are encouraged (p.236). The 'topos' or physical space that is a critical component of ba is formed through a balance among physical, social and virtual work environments, and quality of place is an important factor shaping the quality of knowledge (Nonaka et al, 2001).

The design research orientation of the environmental psychology of workspace has been slow to shift its paradigm away from users' workspace preferences and towards human capital priorities. For example, studies of whether workers are

satisfied with an open plan configuration in various office environments demonstrate that they are mostly dissatisfied. This is usually attributed to lack of privacy, too much noise or insufficient storage (Hedge, 1984; McCoy & Evans, 2005; Mital et al, 1992). By limiting the outcome measured to individual satisfaction, little new insight has been gained about exactly how people's work is affected by open office conditions, whether new knowledge is slower or faster to be generated, how formal and informal networks of communication are affected, or if open plan affects rates of employee turnover – all factors influencing human capital and investment in it.

We are learning more about how workers' perceptions of the quality of place is shaped by ambient environmental conditions such as lighting, acoustics, ventilation and temperature, as well as by configuration of physical features and dimensions of spatial layout (Vischer, 2008b). Analysis of ambient environmental conditions in indoor work environments enable regulating bodies to determine ideal standards for *physical* comfort relative to ventilation and thermal comfort, indoor air quality, and illumination conditions and light levels (ASHRAE, 1999; NIOSH, 1991; IESNA, 1999). These standards are routinely applied to workspace environmental design. Analysis of ambient conditions has also generated a better understanding of *functional* comfort, that is, how well the physical environment supports employees' tasks and activities. The notion of functional comfort provides a direct link between the environmental psychology of workspace and the value and uniqueness of human capital. An environment designed to provide functional comfort ranges from meeting the practical requirements of daily tasks – such as the right lighting and ergonomic furniture for working on the computer – to facilitating the tasks and activities needed for better customer relations, generating opportunities for tacit learning and mentoring, and growing and consolidating community and culture. Whereas functionally comfortable workspace improves employee performance and thereby organisational productivity, a functionally uncomfortable workspace reduces workers' effectiveness and can even be considered a cause of stress at work (Vischer, 2007a). Companies whose employees struggle to hear on the telephone in noisy settings, squint at their computer screens to deal with glare, and whose shoulders ache or who get headaches if they do not leave the building during the day, are wasting their human capital on overcoming environmental barriers, capital that should be invested in their work. Environmental conditions in offices can range from comfortable (supportive of employees' tasks) to uncomfortable (stress-generating), regardless of whether they are 'liked' (Vischer, 2007b).

Users providing feedback on their functional comfort also assess key ergonomic features such as furniture configuration and floor layout. Distances to meeting-rooms, printers and copiers, time to climb stairs or take the elevator, proximity and accessibility of co-workers and collaborators, as well as access to file storage for both individuals and teams, number and dimensions of work-surfaces, and wall or partition height are all influential factors affecting worker productivity (Brill et al, 2001; Hatch, 1987; Sullivan, 1990; Vischer, 1989).

Furniture and spatial layout influence not only the performance of individual workers, but also of teams (Heerwagen et al, 2004). A recent study of functional comfort in the Canadian offices of a large pharmaceutical corporation revealed that providing highly-paid professional employees with large private offices did not compensate for the lack of meeting-rooms and collaborative spaces of varying sizes and functions (Vischer & Prasow, in press). Team leaders and members spent their workdays not only in back-to-back meetings, but also in covering large distances to get from one meeting-room to the next. A poor fit between workspace design and how people work is costly no matter the quality of the space provided. Feedback from employees on what works and what does not can lead to changes that result in a better fit between workspace design and employees' use of their tacit and explicit knowledge.

It is a simple matter to expand the concept of functional comfort to include Nenonen's conditions for creating 'ba'. In human capital terms, it is not only people's tasks and daily activities that are important, but also their knowledge, their skills, creativity, and their connections with co-workers. The importance of well-designed collaborative workspace is growing as companies rely more on project teams than on individual work, and on collaboration though both formal and informal networks, for generating new ideas and sharing new knowledge. While 'quality of place' is affected by ambient environmental conditions and aspects of furniture and layout, knowledge creation and sharing are most directly affected by the configuration of interactive and collaborative space. Shared and interactive workspace provides opportunities for the four stages of the SECI knowledge-generating cycle – socialization, externalization, combination and internalization (Von Krogh et al, 2000). The 'topos' that might be said to correspond to 'ba' is located by and large in shared group space, rather than in the features of individual workspace that have traditionally been important for the socio-spatial contract.

Improving accommodation to increase knowledge creation

The SECI sequence promotes the conversion of tacit to explicit knowledge and therefore the creation of knowledge in an organization. Whereas studies of users in workspace have tended to focus on individual space and individual perceptions of environmental conditions, the four behavioural or activity categories of the SECI sequence take place primarily in physically or virtually shared space. *Socialization* is focused on the individual, but involves sharing experience with another and is therefore not only an isolated activity but also requires interaction; *externalization* requires the articulation of tacit knowledge largely through the use of dialogue that others can understand and use, and therefore requires a 'place' in which to occur; *combination* results in the appearance of new knowledge that transcends the group in which it has arisen – who perhaps occupy shared workspace – and is diffused throughout the organization because physical and virtual opportunities are there for it to do so; and *internalization* requires learning by doing, training and exercises – activities

that mostly take place with others in places designed for that purpose. Although some of these activities are also solitary, for example, where reflection is required, or testing, most depend on contact and connecting, for which spatial opportunities are key. Consequently, shared and group workspace in offices and other work environments need to be designed with a view to enhancing the SECI sequence.

Collaboration is a general term for a range of group activities. It can mean two people together, or four, or fourteen. From a space-time viewpoint, it can mean anything from a quick question, taking less than a minute to answer, to several hours in a meeting, to a weeks-long project with a dedicated team. Co-workers who need to work together collaborate using communications technology when they are not in the same space or close by, and in these situations the quality of ICT determines how effectively team members interact, cooperate and make decisions when connecting remotely (Joroff & Bergman, 2007). People working on individual tasks – that is, whose work is not team-based – also need to communicate with colleagues to receive and impart information. Waiting to meet in conference rooms that have to be reserved in advance is not an effective way to create or to transfer new knowledge. Recent trends in workspace design, such as reducing the dimensions of individual workstations and offices and providing a more varied and accessible array of communal workspaces, reflect the increasing importance of generating and sharing knowledge in organisations.

The social dimensions of collaboration have been categorized, variously, as "awareness": knowing what is happening around one, while not necessarily being involved in actions and events; "brief interaction": rapid and momentary personal and work-related exchanges; and "collaboration": two or more people working together over time to produce a joint outcome (Heerwagen et al, 2004). The matrix in Figure 1 can be used to focus on the implications each of these has for designing workspace to support SECI.

Figure 1 : Workspace design considerations to respond to SECI

	Socialization	**Externalization**	**Combination**	**Internalization**
Awareness	Open office teamspace concept	Shared space and meeting-rooms	Information on screens and displays	Open office teamspace concept
Brief interaction	Co-located teams	Informal and formal places to meet	Information exchanged while crossing paths, meeting, getting coffee	Team shared spaces
Collaboration	Communications tools	Project and war-rooms	Shared group facilities	Training rooms and workrooms

As the table shows, some companies provide a range of spaces for collaborative work, from 'war rooms', where members of project teams occupy the same space to "collaborate" for the duration of a project to a series of just-in-time workrooms, useful for "brief interaction", where two or three people sit on a first-come, first-served basis, conveniently located for easy access and no reservations needed. Various forms of team workspace cluster team members' desks around a worktable or file cabinets or display surfaces to ensure that team members are "aware" of new information by overhearing what others say, and to provide centrally-located space to facilitate socialization, externalization and combination. Informal spaces designed to be attractive and convenient for unscheduled meetings and impromptu collaborative work sessions are furnished with mobile worktables and white-boards, network access, and café-type tables and chairs clustered near windows or coffee counters. Formal meeting (conference) rooms range from boardroom-style – deep carpets, upholstered chairs and dark wood – to a minimalist-style workroom providing network access and file sharing, and enabling connections to remote team members.

Collaborative spaces do not encourage use for knowledge creation and sharing activities when
* they are in an inconvenient or inappropriate location,
* if employees are embarrassed by their informal and 'non-work' appearance, and
* when there are not enough of them and they are unavailable.

Principles for ensuring the effective design of group workspace include keeping group size relatively small (four to eight people), ensuring control over environmental conditions such as lighting, ventilation and temperature, and protecting users from unwanted distractions (Leaman, 2003). Well-designed group workspace and spatial layouts that encourage contact and communication facilitate socialization and externalisation. Combination activities also need robust and accessible communications technology (virtual workspace). Internalisation depends on all of these as well as on a corporate culture that encourages training, mentoring, continuous learning and the like.

Human capital value, the accumulated knowledge and skills that employees apply to improving processes, increasing efficiencies and providing more and better benefits to customers – and uniqueness, the degree of specialisation and specificity of knowledge and skills to the organization – are affected by HR architecture (Morris et al, 2005). Human capital value and uniqueness are also affected by workspace architecture. The distinction between entrepreneurial activities that generate new knowledge – exploration – and cooperative activities that "involve the refining and recombining of existing knowledge in new ways" (p.20) – exploitation – implies that the same, standardised approach to workspace may not work for all companies, nor for all departments in one firm. Companies like 3M or Ideo Product Design favour entrepreneurial activities that culminate in new ideas and new processes, rapid development decisions, and a short time to market. The socio-spatial contract offered to these employees is not

based on individual territorial identity so much as on team opportunities. Ideo's space in Burlington, Massachusetts, has the chaotic appearance of worksurfaces cluttered with objects and gadgets, polished concrete floors on which desks can be pushed around, a circular ramp leading up to meeting-rooms with white boards on all four walls, interior windows that look into the labs and fabrication workrooms for prototyping, and a large airy coffee bar with café tables and seating. There are almost no walls or doors. At one stage, team leaders thought they should have offices, and a wood framework for enclosed individual offices was constructed, and then left unfinished, a symbolic nod to irrelevant corporate management practices!

For employees working in firms whose activities require cooperation and integration to support the exploitation of existing knowledge, the pharmaceutical company that favoured comfortable private offices for everyone rather than an abundance of places to meet offers a cautionary tale. The socio-spatial contract was apparently respected in that employees had large private offices with walls and doors, but the situation yielded an uncomfortable ambiguity: lacking opportunities for teamwork and collaboration, the space was not supporting them or the value and uniqueness of their knowledge. The effect was an underperforming organization handicapped by a negative O-A relationship. As the company embarked on a renovation and upgrade of its space, negotiations were initiated with employees to convert them to a belief in teamspace and eventually to giving up their walls, doors and heavy dark status-symbol furniture in order to communicate and collaborate more effectively.

For knowledge application as well as knowledge creation, workspace provides opportunities for a supportive and enabling physical environment. If taken advantage of, these opportunities can ensure that value is added; if they are ignored, the organisation-accommodation relationship may remain neutral or even become negative, adversely affecting knowledge stocks and the performance of human capital.

Conclusions

To facilitate workspace change, design criteria and building performance guidelines exist to ensure that new work environments support individual tasks, facilitate group processes and contribute to organisational effectiveness (Preiser & Vischer, 2004). Many of these guidelines address design outcomes, such as the right lighting for individual tasks, control over accessibility (privacy) in group settings, and flexible furniture configurations that can be adapted as work changes. The criteria identified as necessary for 'high quality ba' offer a different approach to identifying guidelines to aid and improve workspace design (Nenonen, 2004). In identifying 'ba' as a desirable design outcome, these guidelines go above and beyond directives for improving physical workspace to incorporate ideas about how workspace performs, how people use it and what

intangible qualities it might have. By invoking design guidelines oriented to creating topos for ba, accommodation can be explicitly designed to enhance knowledge creation rather than based on more conventional rationales for accommodation decisions, namely either reducing occupancy costs or worker dissatisfaction, or both. As Nenonen's ten qualities are not limited to physical space but also consider virtual space as well as social and relationship space – the emotional/spiritual dimensions of organizational culture – they enable the complexity and interactivity of the user-space relationship to be incorporated into workspace design. This kind of 'design guideline' goes beyond the dualistic concept of environment that artificially distinguishes between built space and people occupying it. Guidelines that promote workspace for knowledge creation and sharing assume that the people occupying space and the way they perceive and interact with space is part of the definition of space. While it is tempting to focus on how people are affected by features of the environment in which they work – a one-way relationship – in reality, the relationship is equally affected by what people do in and with their space, as well as the experience of interacting with it.

This belief is at the core of the concept of the organization-accommodation relationship. As we achieve a better understanding of the interactive effects of users and space, more accommodation decisions are made in the light of this mutually adaptive relationship. If accommodation's goal is to enable knowledge creation and application, workspace that supports HR objectives emerges as a more comprehensive design objective. Thus HR – as well as facilities – architecture need to be designed, hopefully in concert, to ensure that the right type of employee is hired, that opportunities exist for training and other activities that increase knowledge, and that new knowledge is applied and integrated among the firm's internal work-groups and departments. The organization-accommodation framework is available to place facilities decisions along with HR as essential considerations in enhancing the value and uniqueness of human capital.

In understanding the mechanics of the O-A relationship, space is a powerful if unrecognized element in the social contract. As many have pointed out (see Chapter 25), modern trends towards a global, knowledge-driven economy with a diverse workforce and increasing employee mobility mean the terms of the social contract are changing; they will need to be based on more trust and belief in mutually beneficial outcomes than has historically been the case. What does this mean for the socio-spatial contract?

It means, *first*, that feedback and engagement of workers in devising their own space must be activated to ensure that both their implicit and tacit knowledge are applied to workspace design processes. This is a departure from the usual space planning process in which managers make selections from limited choices offered by facilities staff and design teams. The resulting environment is imposed on workers and they have to adapt to it. In the future, using an approach based

on human capital considerations, they will have a chance – indeed they will need – to be involved in participatory design. *Second*, it means that workspace will function less as a reward for promotion through the company and more as a functional and supportive tool for work. Employees will seek out space – physical and virtual – that supports the work they do, and has an enhancing effect on their performance. If space is planned as a tool, changes that are presently considered anomalies may seem obvious, such as administrative assistants having larger offices than their bosses because they store files and information and because managers are often away and their offices empty. *Third*, it means that workspace design will focus increasingly on group and shared space and opportunities for communication, collaboration and networking. Valuing knowledge means making sure it is produced and actively used, as well as making sure it stays inside the organization and accumulates. This requires a balance between comfortable individualized space for people to perform solitary and thinking tasks, and a range of attractive and functional collaborative and communicative opportunities. *Fourth*, it means that not just conventional space but ICT and other tools must be integrated to facilitate 'distributed working' and dispersed teams as people collaborate with colleagues in other parts of the world (Harrison et al, 2004). *Finally*, it means that companies will identify the type of human capital they want to invest in, and will make accommodation decisions both to recruit and to retain the kind of employee mix that suits the management of knowledge in the organization. An emphasis on exploration for producing new knowledge may not yield the same workspace concept as an emphasis on exploitation of existing knowledge or as a balance between the two. Moreover, an optimal fit between employee characteristics, HR architecture, and accommodation is likely to be time-limited, meaning that some degree of flexibility must be built into any workspace concept because of the changing circumstances of modern business.

Studies of the environmental psychology of workspace aimed at identifying the various ways in which people are affected by and interact with their physical environment at work provide evidence that people not only have instrumental relationships with their milieu – environment as a tool for work – but also experience their workspace as a powerful cultural and emotional symbol (Vischer, 2008a). To date, measurement of workers' functional comfort has been oriented to forging a link between the environment's effects on worker performance and the overall productivity of the organization. Linking functional comfort to the concerns of human capital researchers expands the theoretical framework to include studies that examine how effectively occupants' knowledge is acquired, used, transferred and integrated in the context of the space provided to attain improved company performance and competitive advantage. The desirability of ba and the space-dependent aspects of SECI offer an important new paradigm for measuring dimensions of the organization-accommodation relationship and the effectiveness of workspace in the future.

In summary, the workspace provided by a company's accommodation is a critical element in effective use of and access to its own human capital. Space structures the relationship between value and time that is basic to fulfilling the human capital potential. The puzzle remains as to why it is taking businesses so long to see the value of investing in workspace and to evaluate their investment in terms other than returns on real estate assets. The first call for managers to pay attention to 'an underutilised resource' came in the early 80's (Seiler, 1984). More than twenty years later, the same call is still being issued (Morgan & Anthony, 2008). And although some companies appear to be paying attention, perhaps recognizing that by designing innovative and high quality workspace they are investing in their human capital, studies designed to follow up not only on the quality of 'fit' of innovative workspace concepts but also on how 'flexible' they are as the organization's needs change over time have yet to be published. As a mediator of key organizational activities such as information flow, social contact and reinforcement of corporate values, the occupied environment needs to be recognized for the underutilized asset that it is. Greater attention to the organization-accommodation relationship, making the socio-spatial contract explicit, and supporting workers' collaboration and communication as well as their individual tasks are all needed to derive maximum value from an organization's human capital.

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