

Published in: Enhancing Building Performance (2012) Eds: S. Mallory-Hill, W.F.E.Preiser, C.Watson. Chichester, U.K: John Wiley & Sons, Ltd.

Chapter 7

The changing meaning of workspace: planning space and technology in the work environment

Jacqueline C. Vischer

7.1 INTRODUCTION.

The meaning of space – especially interior spaces designed for work – is changing as a result of increasingly sophisticated communications technology. There are already indicators that this happening (Mitchell, 2003). The meaning of workspace is no longer limited to the physical interior space within which work is done, but increasingly incorporates a rapidly growing range and variety of communications tools and technology. The new meaning of workspace is described in this chapter in terms of a recent example of new office building planning, considering the needs of a future workforce and the tools likely to be used 10, 20 and 40 years into the future. The chapter examines workspace for the future, and anticipates the effects on designers, property owners, business managers, and, most importantly, building users.

As offices have become more computerized over the last 25 years, guidelines for good office design have changed. Furniture must accommodate long-term sitting at screens and keyboards; lighting must be glare-free on screens; and building systems must extract more heat and provide more cooling, because not only human users but also machines are producing heat. In place of typewriters and telephones being used by some of the people some of the time, noise levels nowadays are affected by the electronic buzz of everyone's computers, keyboards clicking, and the churning noises of numerous printers and copiers.

Furthermore work itself is changing, becoming more team and project oriented, more diverse and complex, and more mobile (Heerwagen et al, 2004).

In recent years, workspace design has adapted incrementally to electronic work. Behaviors that did not exist – remote work, teleworking, videoconferencing – are now routine in the business environment. Companies are experimenting with different ways of using space, such as hotelling and hot desking, flex-time and desk-sharing, and more recently, mobile working. Increasingly, office workers have no fixed workstations, and workspace design translates into a rich range and diversity of settings each furnished and colored differently to accommodate the complex variety of tasks that have come to be part of the modern work environment (Stegmeier, 2008).

Yet questions remain. Information technology continues to grow and change at breakneck speed. A diversity of new professions and occupations has come into being to provide IT services of all kinds both inside and outside the organization. With little knowledge of what the future of technology holds, buildings are now being designed and built to provide workspace to the next two or three generations of workers. What can be learned from current building projects, in which owners and occupants have been forced to anticipate the future in planning conjointly both space and technology for future workspace? The description of a recent building project through the first two phases of the BPE framework - planning and programming (briefing) - illustrates how a user involvement process helped address these issues (see Preiser, chap.2).

7.2 THE ‘X’ ORGANIZATION – BUILDING FOR THE FUTURE ¹

A contemporary organization currently planning a new building provides a detailed example of how to anticipate the future of both space and technology. Since 9/11, Western governments have vastly increased their resources for electronic surveillance and monitoring of electronic communications, both inside their own countries and from abroad. Numerous private sector companies have come into being to help these government agencies and to support the services they provide. Some of these are defense-

related, but others are not. One thing they all have in common is that they not only acquire, invest in and create cutting-edge information technology, they also have to be electronically prepared to capture, analyze and communicate to their clients' incoming information in innovative and unpredictable ways. As a result, these organizations are heavily technology dependent, and their equipment and tools are constantly evolving.

Recently, one such organization in Canada embarked on a process of planning a new building, designed to accommodate both the immediate and the long-term future. The organization was occupying several different buildings, which were already outgrown, and they needed not only more space, but more electrical power, more cooling, more duct space, more specialized equipment and more laboratory facilities. Retrofitting an existing office building was not feasible, so work began on planning a new one.

The new building will accommodate some two thousand workers. Among the objectives advanced by senior management are increasing contact and collaboration, to be sure that members of different specialties, as well as members of individual teams, work more collaboratively, exchange useful information, and have plenty of opportunities to meet informally to facilitate discussion and shared problem-solving. Another objective is to become an employer of choice for the young, highly trained computer scientists and mathematicians they seek to hire and train. This younger generation of university graduates is highly sought after in business today; the "Gen-X" and "Gen Y" organization is competing with all types and sizes of business for its human capital, knowing that the knowledge, skills, creativity and determination it relies on to do its work can make the difference between a safe and secure nation and one that is not.

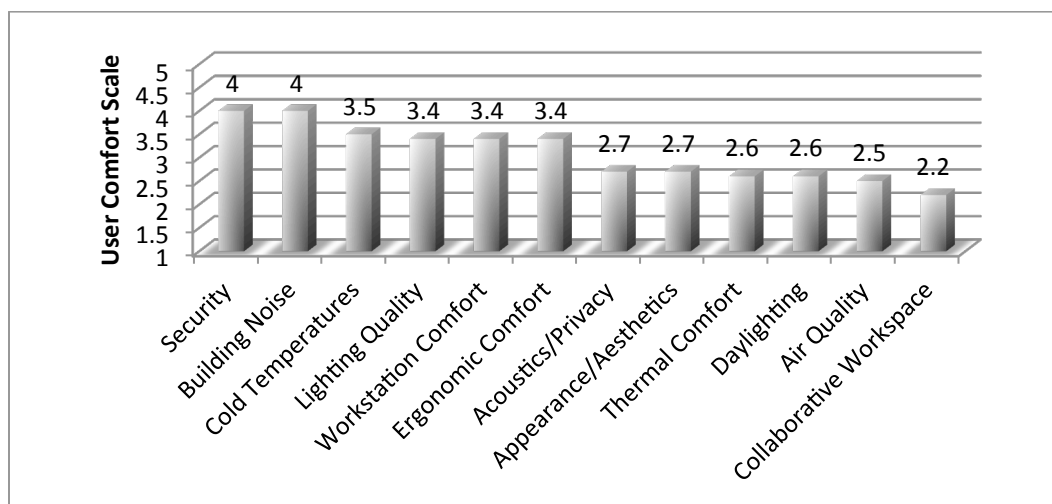
Other building objectives include providing a humane and effective work environment for employees. This means an egalitarian, functional, and functionally comfortable high quality workspace that will help people work more effectively – solve problems more quickly and accurately – as well as enjoy life and maintain work-life balance.

A site was chosen, an architectural program developed, and employees were invited to participate in a shared design decision-making process known as the User Involvement Strategy (Vischer, 2005).

7.3 INVOLVING USERS FOR BETTER WORKSPACE DESIGN

The key to an effective workspace is the degree of functional comfort afforded to occupants. The concept of functional comfort signifies the environmental support users receive for performing their tasks. Any given workspace can be assessed on a continuum ranging from functionally comfortable, or supportive of work, to functionally uncomfortable – and potentially stressful – where users have to overcome environmental barriers in order to perform work. In an environment that is highly dependent on using, inventing and accessing technology, functional comfort is experienced in terms of both space and technology: environment as a tool for work. In order to measure functional comfort, and to identify possible workspace features that slow down or demotivate workers, feedback from users is necessary. At the X organization, a questionnaire survey was administered to all workers asking them to rate the functional comfort of their current space (Vischer, 1989). Respondents were asked to rate forty features of their work environment on a scale from 1 (uncomfortable) to 5 (comfortable) in terms of support to their work. Figure 1 tabulates the survey results across all buildings.

Figure 7.1 : Building-In-Use Profile – all buildings



The results indicate that occupants feel relatively comfortable with their security, the noise generated by the building, how cold it gets, their lighting, and overall furniture and ergonomic comfort. Items rated as functionally uncomfortable and therefore unsupportive of work were: overall noise levels and privacy, the appearance of their environment, thermal comfort (too warm), (lack of) daylighting and windows, indoor air quality, and access to collaborative workspace. The survey results were then presented to different workgroups to facilitate discussion about the building-specific environmental problems they were having, as well as to generate ideas for solving these problems and ensuring a higher level of overall functional comfort in the new workspace.

To be applied successfully to building design for the future, planners need to capture users' experience and knowledge in a constructive and relevant way that goes beyond simply asking them to list how much storage they need or what their equipment requirements are (Vischer, 2009). Once building users have an opportunity to contribute their own detailed specialized knowledge of what they do to solving problems of workspace design, they acquire a sense of empowerment that raises morale and increases enthusiasm for new workspace. The group work sessions, designed for user feedback and engagement, generated a sense of involvement and environmental empowerment among the workers.

The User Involvement Strategy designed for a project needs to fit in with the culture and operations of the organization to ensure that people have structured opportunities to participate. A less successful information-gathering technique used on this project invited employees to post comments on an internal web site devoted to planning for the new building. People took the opportunity to make demands that were unrealistic – one wanted an indoor swimming-pool – as well as to be critical of decisions that they knew had already been made, such as the move to more open workspace. For the most part, these comments could not be used. However, the structured feedback received from the survey and in the group sessions provided invaluable information to the planning team that was built into the recommendations, into the architectural program (brief), and finally into the design.

7.4 BUILDING AND WORKSPACE OUTCOMES

The building is not yet occupied. Key design guidelines based on the information received from users address all features of the desired new workspace and are incorporated into the architectural program or brief. They are based on users' behaviors and perceptions while performing their technology-based tasks both now and with a view to future changes in technology tools and workspace needs.

Lighting

Clearly one of the most important aspects of an information technology-driven environment that depends on visual display is a supportive lighting environment. This means that task and ambient lighting, colors and materials, and worksurface placement must be considered together to ensure that the visual environment is not fatiguing and that individual users can make adjustments to suit their needs. While ambient light levels should be low throughout, not all employees need task lights as some work only on screens. In informal and circulation areas, light levels should be bright enough to avoid gloom. Functionally comfortable lighting and visual task support should exist all over the building and not just at individual workstations.

Collaboration

The urgency of contacting and collaborating with co-workers means that the visual display of information must be able to take place throughout the workspace. Speed and accuracy are essential, and if workers have to look for a place to go, call up the desired screens, and find chairs to sit and examine them together, they will be less likely to do so than if they can all have immediate access to the same information, no matter where they are located. Employees need meeting opportunities throughout their building: abundant informal meeting tables, closed rooms for more confidential material, places to sit together in cafeterias and coffee areas, and even outdoors, in the atrium, and in fitness rooms.

Another key feature of technology-supportive space concerns software developers. Known for their solitary work practices, programmers need to be supported by space that

lets them concentrate completely for the demanding work they do. They also require easy and comfortable opportunities to come out of 'the zone' to consult or share with co-workers. This balance between concentration and contact is key to effective software programming, and needs explicit attention during building design in the management of individual workstation placement, orientation and partition height, as well as access to shared enclosed spaces. Proximity to co-workers and to shared space or resources are key, as well as an acoustic environment that does not distract from concentrated work while allowing workers to get each other's attention when necessary.

Flexibility

Flexibility is a well-worn trope in contemporary workspace planning. This term has a variety of meanings, none of them very precise, and is a requirement when designing for change. Analyzing feedback from 'X' employees generated three meanings of workspace flexibility. First, flexibility of workstation configuration and furniture layouts enables teams to sit together for the duration of the work they are doing, and then for members to move easily into other team space to perform other tasks for varying periods of time. Flexibility also applies to an interior environment that easily and seamlessly accommodates a large and growing diversity of tasks, as the technology-based nature of the work means that much of what people do is quite removed from traditional office tasks. This variety and complexity needs to be accommodated, as well as rapid space change and convenient access to tools at short notice.

Finally, flexibility also means a workspace adapted to changing tools and equipment, some of which are known, some of which can only be imagined, by providing more or less power, more or less cooling, more or less floor loading, and different kinds of lighting and noise management, to ensure that functional comfort is assured to future employees as well as current workers.

Security

A key component of all the design decisions is building security. Much of the work concerns national security, and has to be performed in a secure environment. People do not always know what their colleagues are working on and they do not ask. Some

items, documents or projects are classified as more secret and some as less. The most secret need special environmental security features to ensure that only the people authorized to do so have access to them. Many teams are concerned to protect the confidentiality of what they are working on, and quite simply do not want people walking behind them or listening to their telephone conversations. Visitors to the building are not encouraged, as they, like all the workers, require security clearance.

On the other hand, the organization does not intend to turn its back on the community that it is protecting, and another building objective is to ‘be a good neighbor’. This means not having the appearance of a fortress, while at the same time controlling access. It also means managing employees’ informal activities, such as listening to music on iPods and interacting on social networking sites. Regarding building design, windows can be a security risk, in that they can be seen through from the outside and material can be illegally removed to the outside. However, to limit or remove windows is unthinkable in view of the objective to protect and increase workers’ quality of life.

Windows

Windows can also translate into other design challenges. Their size and orientation may cause too much daylight, or direct sun on screens, which create uncomfortable glare conditions. However, users overwhelmingly prefer access to natural light. The building design ensures a harmonious blend of electric and natural light from windows by providing more, smaller window openings rather than large floor to ceiling bands. Visual comfort is protected by locating workers’ desks away from windows – while making sure they can see out to views from where they sit – and placing informal meeting areas, coffee counters and reflective ‘serenity’ space closest to windows.

In identifying building objectives, senior managers were concerned to provide opportunities for ‘downtime’ or spaces to breathe and de-stress. The new building provides non-work spaces ranging from a gym and a yoga room, to a library for quiet reading and concentration, to access to outdoor space and benches under the trees. In addition, workers supported the concept of ‘serenity spaces’ adjacent to teamwork areas. These are small – perhaps an armchair, or a bench – facing the window and sheltered

from team activity by potted plants. People feeling overly pressured can then move away from the team's work briefly, look at the view, and catch their breath while staying within reach if needed.

7.5 CONCLUSION

These days it is not possible to plan new workspace without simultaneously planning communications technology access and use. Moreover, one of the features of a high-tech environment is the sustained pressure on workers, and the need to plan workspace that is not only supportive of complex tasks, but also responsive to basic human needs such as thinking, reflection, informal social interaction, and quiet time. Thus occupants' functional comfort in this and other new office buildings will increasingly depend not only on supportive workspace for task performance, but also on spatial opportunities that support non-work moments. Moreover, the more workers engage with IT, the less reason they have to observe structured schedules, so a building that accommodates workers coming and going at different times must also make building services and amenities equally available, and ensure that people who arrive before dawn or stay until midnight find the building systems operating, their lights and equipment on and food and fitness services available.

Building for the future - a future which is largely unknown - does not necessarily mean building in large amounts of extra features that may or may not be used as IT tools change and expand. It means being sensitive to the ways people work now, and investing in an environment that meets human as well as technological needs. If people can perform their visual tasks without fatigue and eyestrain, and can sit for hours in well-designed ergonomic furniture that does not place strain on the body, then they will continue to be able to do so in the future. It is also important to design workspace as a place not just to perform tasks but also as a supportive environment for users' quality of life. This means space to relax and restore, space to concentrate and reflect, space to be creative and have new ideas, and space that gives pleasure and that people enjoy. In these and other ways, the meaning of workspace is changing.

7.6 BIBLIOGRAPHY

Heerwagen, J., Kampschroer, K. Powell, K. Loftness, V. (2004) Collaborative Knowledge Work Environments *Building Research and Information* 32 (6), 510-528.

Mitchell, W.J. (2003) *Me++ : The Cyborg Self and the Networked City* Cambridge, MA: MIT Press.

Stegmeier, D. (2008) *Innovations in Office Design: the critical influence approach to effective work environments* Hoboken, N.J. John Wiley and Sons.

Vischer, J.C. (2009) Applying Knowledge on Building Performance: from evidence to intelligence *Intelligent Buildings International* 1, 239-248.

Vischer, J.C. (2005) *Space Meets Status: Designing Performing Workspace* London, U.K.: Taylor and Francis/Routledge.

Vischer, J.C. (1989) *Environmental Quality In Offices* New York: Van Nostrand Reinhold.

¹ The 'X' organization is used to conceal the agency's identity, owing to the highly classified work of the organization.

BOX 7.1

Designing today's workspace for tomorrow's workers means paying as much attention to communications technology and IT tools as to the physical features of interior space.

Priorities for task-supportive workspace include:

- Paying close attention to lighting design, not only in type and placement of light fixtures, but also size, orientation and placement of windows, as users' visual comfort and screen legibility are affected by lighting fixture placement, direction, and light output. Light levels should vary in different areas of the building, so that visual display is facilitated by subdued illumination, and meeting rooms and walkways have brighter more diffused lighting;
- Provide plentiful daylighting to increase workers' quality of life, but computer screens must be shielded from close window proximity to reduce glare while at the same time ensuring that all workers can see windows during the workday. Ideally window dimensions should be small and window openings numerous rather than monolithic floor-to-ceiling bands of glass; and placing informal and shared workspace (e.g. for team meetings) closer to windows provides access to views while shielding individual screens from window glare;
- The entire interior of the building should be suitably designed for visual display and technology access, so that workers can collaborate easily and also find quiet, individual space for concentrated tasks throughout the building;
- Sound levels must be managed so that needed sounds – colleague's voices, telephone conversations – can be heard, while distracting sounds – loud conversations or telephone calls by people seated in another group, groups talking and laughing together as they walk by, the noise emitted by machines or equipment – are unobtrusive;
- Increasingly, workspace must be optimally functional beyond the 9 – 5 workday, as people may start early and stay later, and need not only their tools but also building amenities (food, fitness) to be available to them during their working hours.