

MEASURING THE IMPACT OF MOVING ON BUILDING USERS CAN NEW WORKSPACE CHANGE ORGANISATIONAL CULTURE?

Jacqueline C. Vischer Ph.D.
New Work Environments Research Group
University of Montreal



ABSTRACT

A 350-person office headquarters in Montreal was relocated to a new, purpose-built building. It was felt that moving into new space would create a more open work environment, increase communication, encourage staff to exchange and collaborate, and ultimately increase the quality of the company's services. Part of the change management process included a questionnaire survey of all building occupants, which took place before the move and again one year later, after the move into the new building. The results showed some interesting differences in comfort, but little change in self-reported productivity. It was possible to determine from the data analysis some ways in which organisational culture is – and is not affected by workspace change.

Keywords: thermal comfort, productivity, building design, organisational culture

Introduction

In recent years, a range of different ways of measuring building users' perceptions of interior environmental conditions has evolved. Once we have found out what users think about the building they work in, other questions emerge. How do we interpret the meaning of building users' answers to our questions? When and how do their reactions to the buildings they work in actually affect their morale, and the performance of their work? And then, once we find out what kinds of changes to their workspace users need or would like, how do we assess the value of making those changes in terms of what it might cost to do so, and what benefits they might yield to the company?

As part of trying to find - if not answers - at least ways of answering these questions, a before-and-after user survey was carried out in two buildings occupied by IMS Health Canada, in Montreal. Founded in 1954, the head office of this world leader in medical information gathering and analysis is located in Connecticut, USA. The Canadian office opened in Montreal in 1971, and in 1993 the company moved into a three-storey suburban office building. After ten years, the need for additional conference rooms and workspace dictated either renovation of the existing facilities or relocation.

In 2003, the company decided to build new facilities to address present and future expansion needs. One of the goals of the project was to create a more open and collaborative



workplace, which would provide the different work groups with better accessibility to each other, to team leaders and to senior managers. Another goal was to ensure better environmental conditions in a custom-built building than were possible in their leased space. Senior management was concerned to know what effect improved environmental conditions would have on productivity, and whether the new workspace concept would help change the somewhat traditional and hierarchical organisational culture.

The study was designed to question employees about the comfort and functionality of their workspace in the old building in order to have a basis for comparison. The survey was conducted a second time some nine months after moving into the new building. The results were then compared, and changes in people's assessment of environmental quality, effects on productivity and impact on organisational culture, were identified.



The old (above) and new (right) IMS Health buildings

The IMS Health Canada buildings

At the time of the first survey in October 2003, some 350 employees occupied the three floors leased to IMS Health. The building was a conventional suburban office building of 5204 m², which included a small reception area, a 30-seat eating area with vending machines and an undersized (230-space) outdoor parking area. Overhead lighting was provided by 0.4 x 1.32 metre deep cell three-lamp parabolics; and air, cooling and heat were delivered by a variable air volume (VAV) system through three large air handling rooftop systems. Floors were covered with carpet, and the blend of open workstations and enclosed offices was furnished with the Steelcase 9000 system featuring 1.3 metre partitions and light-grey, 0.57 metre-deep worksurfaces in 'L' and 'U' configurations. Fenestration took the form of strip windows along the perimeter, but the deep floors, enclosed offices on the perimeter walls, and high workstation partitions meant that little natural light penetrated the interiors of the floors. Workstation size varied from 7.4 m² to 11.1 m², and private enclosed offices ranged from 11.1 to 23.2 m² with a slightly larger office for the CEO.

There was little room for expansion in this building, and as the number of employees grew, 'spare' spaces, such as corners of corridors, small meeting-rooms, and the larger offices became filled with workstations. People complained about feeling crowded, high noise levels, and warm temperatures. If the company's growth was to continue, new office space was necessary. When the building's lease came up for renewal, senior management opted for a new building in the same general neighbourhood, built to their specifications in a collaborative project with the developer, who then leased some of the new space for their own offices.

IMS Health employees moved into their new building in December 2003. Situated approximately two miles from their old building, the new, three-storey building was designed as an open concept featuring a two-storey, sky-lit atrium, a gymnasium with massage room, a library, and an airy, 100-seat cafeteria offering fresh hot meals. The company occupies floors 1 and 2 of the 8,364 m² building. Ventilation is provided by rooftop AC units through a constant air volume system in the two-storey, open office areas, with VAV boxes in the more enclosed, interior parts of the building. Direct-indirect lighting

fixtures provide overhead illumination. These are flush with the ceiling on the upper floor and in the offices and dropped in the 2-storey, open workstation area. Large rectangular windows and the long skylight ensure natural light throughout.

Unlike the previous building, the workstations in the new building are 'open-concept', measuring 2.2 x 2.2 metres with dividers 1.6 metres high. Whereas the previous building had 69 enclosed private offices, the new building has 28. These are smaller (2.7 x 3.0 metres) and have a sliding door. They are located in the interior of the floors, although the CEO's slightly larger office has access to a window. Most office furniture was not replaced; however, one work-surface was replaced with a new, standard size and individual storage lockers were added.

Using Building-In-Use assessment to measure comfort and productivity

Building-in-Use assessment is a validated and reliable standardised survey that can be administered to occupants of any office building in order to measure the effects of key environmental conditions on workers. The survey comprises 55 questions pertaining to environmental effects on the performance of work, each in the form of a 5-point scale where '1' means 'uncomfortable' and '5' means 'comfortable'. The results are collapsed into scores on 12 key dimensions of users' functional comfort, which can be compared to other buildings and to BIU normative scores ('norms'), derived from a database of over 100 buildings. The scores on the 12 functional comfort dimensions indicate the degree to which the work environment supports or slows down people's performance of their tasks. The degree to which building scores and database norms line up forms the basis for a diagnostic evaluation of how building conditions affect productivity. If the score is below the norm, people's work is slowed down and correcting problems is in order; when the score is above the norm, the space is successful in supporting work. This highly structured and useable form of building user feedback allows priorities to be set on correcting problems,

making improvements and setting environmental objectives for the future.

To measure anticipated changes in organisational culture, respondents were asked how much they agreed or disagreed with 20 statements, each of which describes a dimension of organisational culture such as 'democratic-authoritarian', 'open-closed', and 'stable-changing'. Analyses of their responses to the two surveys were compared to determine how much change had occurred.

The first survey was distributed to 330 employees, of which 232 were returned. In the new building, 293 questionnaires were distributed, of which 195 were returned. The response rate therefore improved from 66.5% in October 2003 to 70% in November 2004. Upon reception, each survey form was coded in preparation for data entry, and all written comments transcribed. The data were entered into SPSSPC and submitted to Factor Analytic techniques to collapse the data into key functional comfort dimensions. As expected, almost the same factors emerged from each survey (2003 and 2004) and thus scores could be compared to each other for the two buildings, as well as to the baseline scores or norms.

Comparing the functional comfort of building users

Functional comfort scales

Out of the 55 scales rated by occupants, 17 comfort items improved or slightly improved in the new building, 12 comfort items worsened or slightly worsened, and 24 items stayed the same. The remaining two items ask for people's overall assessments of their satisfaction and of the functionality of their workspace and these were unchanged. The table below lists the comfort scales showing the most extreme (significant) changes between the two buildings. The numbers represent average scores for each scale, where 1 is uncomfortable and 5 is comfortable.

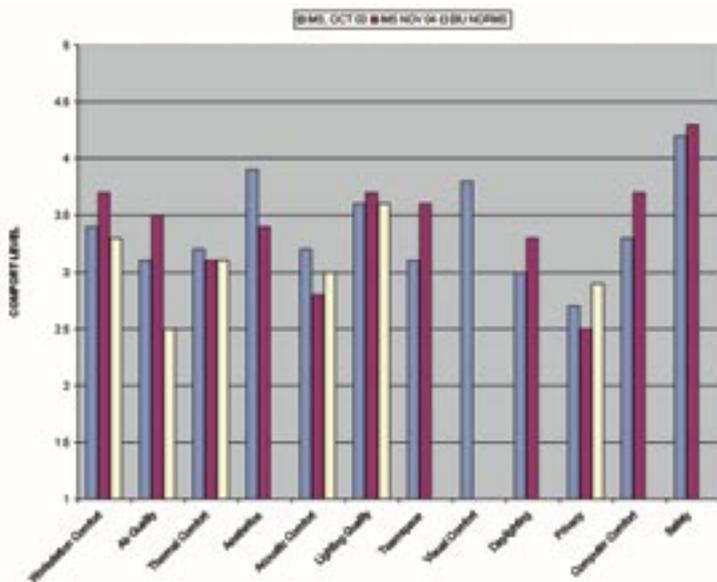


Figure 1 – comparing building profiles with BIU norms

		2003	2004	worse
1	Overall interior appearance	4.01	3.42	↓
2	(Un)pleasant colours	3.55	2.97	↓
3	Drafts from ventilation	3.70	3.25	↓
4	General noise levels	3.25	2.83	↓
5	Noise distractions	3.15	2.70	↓
6	Specific noises from voices, equipment	3.10	2.72	↓
				better
1	Computer screen comfort	3.41	3.71	↑
2	Mouse comfort	3.25	3.69	↑
3	Work storage	3.36	3.72	↑
4	Personal storage	3.09	3.79	↑
5	Air movement	3.03	3.35	↑
6	How warm it gets	3.14	3.37	↑
7	Access to daylight	3.05	3.32	↑
8	View out of windows	3.01	3.25	↑
9	Informal meeting-spaces	2.93	3.84	↑
10	Space for meetings	2.81	3.85	↑

Table 1 – comparing responses between buildings

The table shows that occupants find the appearance of the new workspace, and the acoustic conditions in which they work, to be the most problematic aspects of the new workspace. However, more items show a positive change, including the comfort of computer use, workstation storage, access to natural light, temperature comfort, and places to meet and work together. In terms of effects on morale and productivity, research indicates that aesthetic aspects and natural light have their primary effect on employee morale, whereas acoustic conditions, space to work collaboratively and workstation comfort have a direct effect on task performance or productivity. These results suggest that while employee morale may be unchanged in the new building, people should be performing their tasks better.

Building-in-Use profiles

Subsequently, the 55 scales were collapsed into 12 key dimensions of functional comfort by using the scores from those scales which are most significantly related to each dimension. Each functional comfort dimension therefore has its own score on the 1-5 scale, where 5 is comfortable and 1 is uncomfortable. Table 2 lists each dimension and the score it received, with arrows showing whether scores went up or down. Where the difference is less significant between the two buildings the arrows have a lighter colour.

The overall distribution of results indicates clearly the way functional comfort has changed since moving into the new building. In all, four of the functional comfort dimensions show significant improvement in the new building, and one more shows slight improvement. As well as better space for collaborative work, people appreciate the better daylighting,

feel they have better air quality, and also feel their furniture better supports computer work. Only two key dimensions show some reduction in level of comfort. Acoustic comfort appears to have diminished, indicating that people need to manage noise-generating behaviours better in the new, more open space. In addition, users indicate less satisfaction with the aesthetic aspects of the new space. The colours used in the interior, and the look of the interior spaces, are less appealing in the new building. Privacy is rated slightly lower in the new building, but as this is not a significant difference, it might be concluded that privacy is unchanged.

	Oct-03	Nov-04	
Workstation Comfort	3.4	3.7	↑
Air Quality	3.1	3.5	↑
Thermal Comfort	3.2	3.1	-
Aesthetics	3.9	3.4	↓
Acoustic Comfort	3.2	2.8	↓
Lighting Quality	3.6	3.7	-
Team-space	3.1	3.6	↑
Visual Comfort	3.8		-
Daylighting	3	3.3	↑
Privacy	2.7	2.5	↓
Computer Comfort	3.3	3.7	↑
Safety	4.2	4.3	-

Table 2 – scores on the key functional comfort dimensions

We don't like wasting energy

We reclaim every last drop!



Fitness First Rockdale uses Air Change 100% fresh air package rooftops fitted with dual energy reclaim system

- ☀ Free hot water heating by reclaiming energy from the condenser
- ☀ Reclaims up to 75% sensible & latent energy in the exhaust air

Helping you design for an ecologically sustainable future



Air Change Pty Ltd - Leaders in Heat Exchange Technology
 Phone 02 9531 4699 Fax 02 9531 5294
 QLD 07 3809 3987 Fax 07 38 09 3989
 SA 08 8366 6563 Fax 08 8366 6501
 Email sales@air-change.com Internet www.air-change.com



PREVIOUS BUILDING		PRESENT BUILDING
Acoustic Comfort Air Quality (Aesthetics)	+E	Workstation comfort Air Quality (Safety) (Teamspace)
Thermal Comfort Lighting Quality Workstation Comfort (Safety)	0	Thermal Comfort Lighting Quality (Daylighting)
Privacy (Daylighting) (Teamspace)	-E	Privacy Acoustic Comfort

Table 3 – degree of support for the performance of work

In the first survey, in response to an invitation to write in additional comments, respondents volunteered comments about poor workstation set-up, lack of storage, and lack of meeting space. There were also negative comments about noise levels, which were disruptive to work, lighting (lack of access to daylight), and air quality (too warm). In the new building, respondents wrote in almost no comments about spatial comfort, indicating that these problems had been solved, although they still expressed concerns about acoustic privacy and noise. The majority of respondents' negative comments concerned the distance of the main entrance from the parking lot. Another frequent remark was the selection of the grey colour for the interiors. Many written comments asked for more plants and/or artwork.

Figure 1 (*previous page*) compares the two building's functional comfort scores with the BIU norms available for 6 of the 12 functional comfort dimensions.

The figure shows that functional comfort in the new building is equal or superior to functional comfort in other, comparable office buildings. The key dimensions of workstation comfort, air quality, and lighting quality are rated above the norm in the new building, whereas privacy and acoustic comfort are below. The new building's thermal comfort is 'normal' or average.

How do these results compare with the design decisions made during building planning and construction? A more expensive light fixture was chosen – and results show that lighting quality is 'normal' in this building. It might have been below normal had conventional fixtures been used. However, more windows and a more open layout are reflected in an improved daylighting rating. A superior air handling system was specified in order to improve ventilation, and results show that air quality is rated above the norm. An effort was made to provide dedicated space for teamwork and collaboration, and the score on this functional comfort dimension is also above the norm. The new building has more security features, and occupants' ratings for safety have improved. It can be concluded that investment in these features – daylight, teamwork, security and to a lesser degree, office lighting – was worthwhile in terms of the positive effects on occupants' task performance.

On the other hand, little investment was made in new workstation furniture, yet a larger work surface and more storage was sufficient to improve comfort ratings. The open workspace concept and reduction in number of enclosed offices might be anticipated to produce low privacy comfort ratings, which, although they are below the norm, are not significantly different between the two buildings. However, privacy ratings may have more to do with morale than with productivity because people must adapt both their expectations and their work processes to a more open workspace. Surprisingly, in spite of complaints about noise and a drop in comfort between the first and the second building, users' ratings of acoustic comfort are close to normal. This likely means that task performance was slowed down while people

adapted to a noisier environment but not negatively affected in the longer term.

Overall these results provide support for design decision-makers' priorities. By investing in improvements to environmental aspects that affected functional comfort negatively in the older building, they provided a new workspace that helped people work better and improve task performance. In short, the results show the value of improved environmental quality in terms of those workspace features that support productivity.

Changing organisational culture

One of the objectives of the study was to determine whether moving into a new work environment had an effect on changing organisational culture. The reduction in private enclosed offices, accessibility of managers' offices, open workstations, shared meeting-space and enlarged cafeteria were all intended to foster more communication and collaboration among groups and individuals.

Results indicate that the degree of cultural change after 11 months is not dramatic. There are some interesting indications of trends that may become more pronounced over time. Responses from the new building indicate a slight increase in authoritarian and traditional perceptions, as compared to the more democratic and innovative judgments of the culture that were received in 2003. The open-ness of the company, the willingness of managers to listen, and the sharing of information emerged strongly in both surveys. However, "knowing what's going on", a "tendency to keep things secret", and "listening to employees' opinions" all shifted towards the negative end of the scale, indicating perhaps that employees felt they were less involved in planning the new workspace than they would have liked. Support offered to employees "seeking advancement", "with ideas" and "wanting to get ahead" emerged more strongly in the new building than in the previous survey.

These results suggest strongly that although new workspace design affects organisational culture, the process of design decision-making, and how well people are informed, may have even more of an impact.

Conclusions

Employees of a company located in Montreal, Canada, were surveyed twice - before and after moving into a new building - in order to compare their functional comfort, or the degree to which workspace supports task performance and therefore productivity. Workspace design innovations in the new building aimed at encouraging collaboration, better communication among groups, and a more open and democratic culture.

As is often the case where workers have moved into a more open workspace, comfort ratings for privacy and noise control have gone slightly down, whereas comfort ratings for collaboration and meeting-space have gone significantly up. The fact that global workability and satisfaction ratings have

not improved in the new building suggests that the new way of working is still an adjustment for many people, perhaps needing more managerial encouragement for the new space to be fully functional.

By comparing the 12 functional comfort scores with BIU norms, it is possible to determine how work performance is being affected by environmental conditions. Table 3 summarises results from the two buildings by placing them in three categories. The top category (+E) means these aspects of the environment help people perform tasks, allowing users to conserve energy for their work. The second level has a neutral effect, neither speeding up nor slowing down task performance. In the bottom category (-E) are those aspects of the work environment that slow down the performance of work by drawing energy out of users in order for them to perform their tasks. As there are as yet no reliable BIU norms for those items in parentheses, these are simply compared between the two buildings.

The table shows that the two buildings differ slightly in their effects on work, with workstation comfort being more supportive in the new building. Air quality is rated positively in both buildings, but more so in the new building (+E). Thermal comfort and lighting quality are neutral in both buildings but draw no energy away from the performance of work. Privacy (or lack of it) is drawing energy away from task performance in both buildings, and in the new building, poor acoustic conditions are also having a negative effect (-E).

Responses to items measuring organisational culture do not show large differences between 2003 and 2004. There is evidence that people feel the company has an egalitarian, open and inclusive culture that has been strengthened since the move. Also, a greater emphasis on job security and feelings of stability emerged in 2004. At the same time, respondents appear more aware of hierarchical (authoritarian) decision-making, and this may be a function of the degree to which employees feel design decisions for the new building were imposed on them.

Uncertainty generated by moving to new space affects employees' perceptions of their environment, and the prospect of change is unsettling for many people. The more people are informed and involved in workspace decision-making, the more likely they are to manage their resistance to change and to accept environmental innovation. Overall, survey results indicate that the new workspace is more supportive of worker productivity than the old building was. User feedback on environmental features shows that decision-makers valued those which are most effective in improving environmental quality for their employees. ■

about the author

Dr. Jacqueline Vischer is an environmental psychologist with extensive international research and consulting experience. She is the author of six books and numerous articles. She has worked with such corporate clients as The World Bank, Bell Canada, Via Rail, Coopers & Lybrand, Sears, Reuters, Harvard University and MIT, as well as several large and medium-sized companies linking a process of organisational restructuring and business transformation to space-related decisions and new workspace. Dr Vischer teaches post-professional courses for architects at Harvard University. She is a full-time professor at the University of Montreal, where she runs the New Work Environments Research Group (www.gret.umontreal.ca)

This paper has been peer reviewed. Visit www.airah.org.au for more information on the review process.

The writing's on the wall... are you?

2006 wall planner
R CONDITIONING AND HEATING

2006 AIRAH
WALL PLANNER

BOOK BY 2 SEPT

To advertise, please call Neil on
03 8623 3005 or
email neil@airah.org.au



achieving
recognition