

Executive Summary

Environment/Behavior/Neuroscience Pre & Post- Occupancy Evaluation of New Offices for



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1. The Neuroscience and Design Challenge

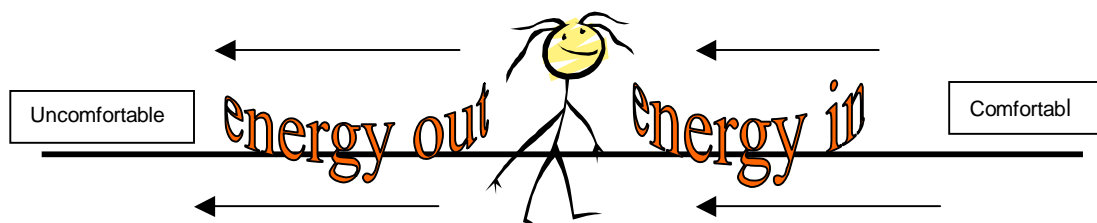
At the end of *Neuronal Man* (1986), Jean-Pierre Changeux poses a dramatic and challenging research and design question:

[Do] the forms of architecture we enclose ourselves in, [and] the working conditions we endure ... favor a balanced development and functioning of our brains? It is very doubtful. (p. 283)

The Society for Neuroscience (SfN) and the American Institute of Architects (AIA) in 2005 requested the Academy of Neuroscience for Architecture (ANFA) to carry out a Neuroscience-based evaluation of the SfN offices before and after moving their Head Office into a new building. The Society For Neuroscience (SfN) manages membership of approximately 37,500 scientists, of which about two thirds attend the tri-annual conference organized by SfN and usually held in Washington DC. The SfN and the AIA jointly funded this study. ANFA requested John Zeisel, one of its members, and Jacqueline Vischer and her team of researchers at the University of Montreal to carry out the study.

The goal of the study was to compare the environment of the new offices with that of the previous office-space, and to assess how – and how much – the new workspace contributes to worker performance. In Changeux’s words, to determine whether the new workspace “favor(s) a balanced functioning of ... brains”, and supports the goals and objectives of SfN.

The following “energy-in, energy-out” diagram represents the major organizing principle of the study.

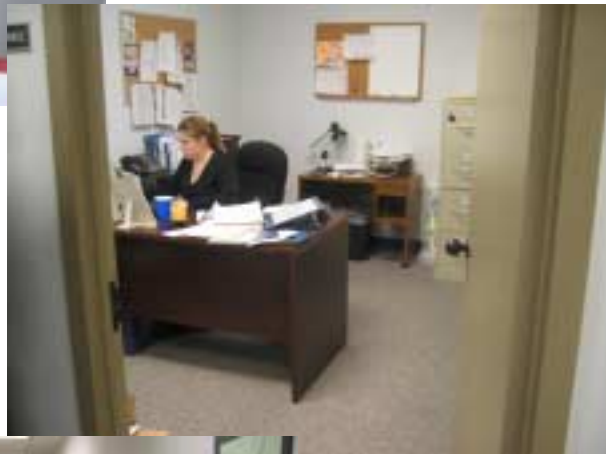


Study results are interpreted in terms of how the workspace draws energy out of the user, energy that occupants expend on overcoming environmental barriers to the detriment of their work - ‘energy out’. It also identifies ways in which the environment supports work so that users’ energy is fully applied to their tasks - ‘energy in’.

2. Building-In-Use Assessment and Neuro-Environment Assessment

2.1 Design Objectives for the New Offices

The 60+ staff of SfN head office were formerly lodged on 3 floors of 60 Dupont Circle, in downtown Washington D.C., as illustrated below.

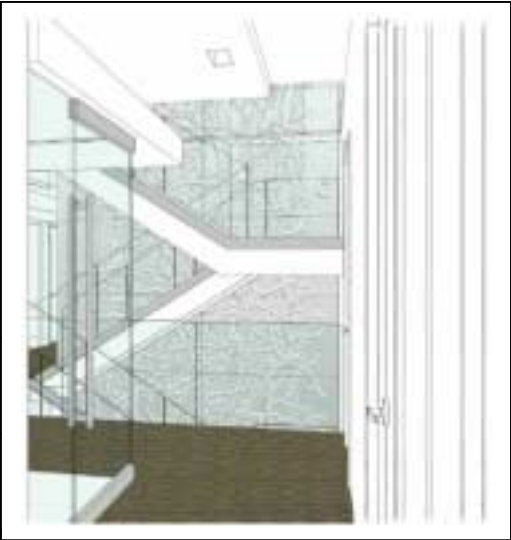


In January 2006, SfN offices moved to three floors in a new office building on 14th Street N-W, some of which is illustrated below.



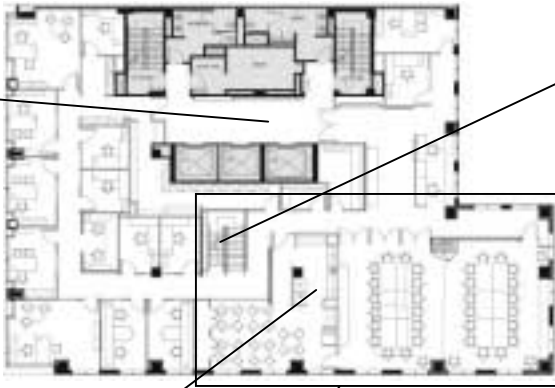
On the next page, an annotated diagram indicates the principal design intentions for the offices at 14th Street, including wayfinding and feeling part of a cohesive organization.

A 3-storey high 6-layer neo-cortex as connecting image reinforces collective image of office & concept of art & science. Letters “A” to “F” indicating cortex levels add to ease of wayfinding



Centralized stair provides naturally mapped sense of place

Porcelain tile paving in reception are—from elevator to central stair—reinforces organizational unity.



All microwaves in lunch room segregates cooking odors and reinforces central lunch preparation

Centralized communications and meeting “agora” with conference rooms, main entry, lunchroom, focuses employee attention on this area and makes wayfinding easier.



At the SfN 14th Street N-W offices, all three office floors are connected by a common centrally located stair—with entry and major services on the middle floor

2.2 Study Procedure

The study was carried out in two parts. Each part took the form of a questionnaire survey administered 'virtually' to SfN staff. The BIU Assessment questionnaire was first given to SfN personnel at their office at 60 Dupont Circle in July 2005. This was followed by the Neuro-Environment survey questionnaire in January 2006, shortly before they moved. In the second phase, both the BIU survey and the N-E survey forms were administered over a 2-week period in August 2006, some 6 months after the move into 14th Street. Response rates were high for both surveys on both occasions (approx. 85% for the BIU and 100% for the N-E survey).

2.3 Building-in-Use Assessment

The New Work Environments Research Group at the University of Montreal used their Internet survey tool (DiConFon™) to perform the functional comfort BIU Assessment part of the study. Developed and used for some 15 years, this study tool has tested occupants of over one hundred office buildings in the U.S. and Canada. The BIU questionnaire consists of about 30 questions in the form of scales with scores from 1 (uncomfortable) to 5 (comfortable). Each scale then combines with others to yield scores of between 1 and 5 on eight dimensions of workers' functional comfort: that is to say, the degree to which the features of their workspace support (ENERGY-IN) or inhibit (ENERGY-OUT) the performance of employees' work.

The dimensions of functional comfort measured in SfN offices are: *Air Quality, Thermal Comfort, Spatial Comfort, Collaborative or Teamspace, Visual Comfort, Workstation Comfort, Lighting Quality, Office Noise Control, Building Noise Control, and Security*. These pre- and post-occupancy scores are compared to each other and to normative or baseline scores in the BIU international building database.

2.4 Neuro-Environment (N-E) Post-Occupancy Evaluation

The N-E POE focuses on contributions the environment can make to eight user-based behaviors or feelings, each of which has been identified in previous research to support balanced brain functioning. These are: *Security, Wayfinding, Cohesiveness, Outdoor Awareness, Ability to Retreat and Unwind, Expectations at Work, Support/Comfort, and Pride of Work*.

While the BIU Assessment evaluates the workspace, N-E POE evaluates the effects various design elements have on these eight behavioral responses to the work environment. Each behavior or feeling is measured in terms of how it has been or is being affected by selected physical features of the workspace. The data are interpreted in terms of how brain functioning is affected. Together the two questionnaire surveys indicate the effectiveness and supportiveness of the

environmental design of SfN's new offices in terms of helping Head Office staff to achieve organizational goals.

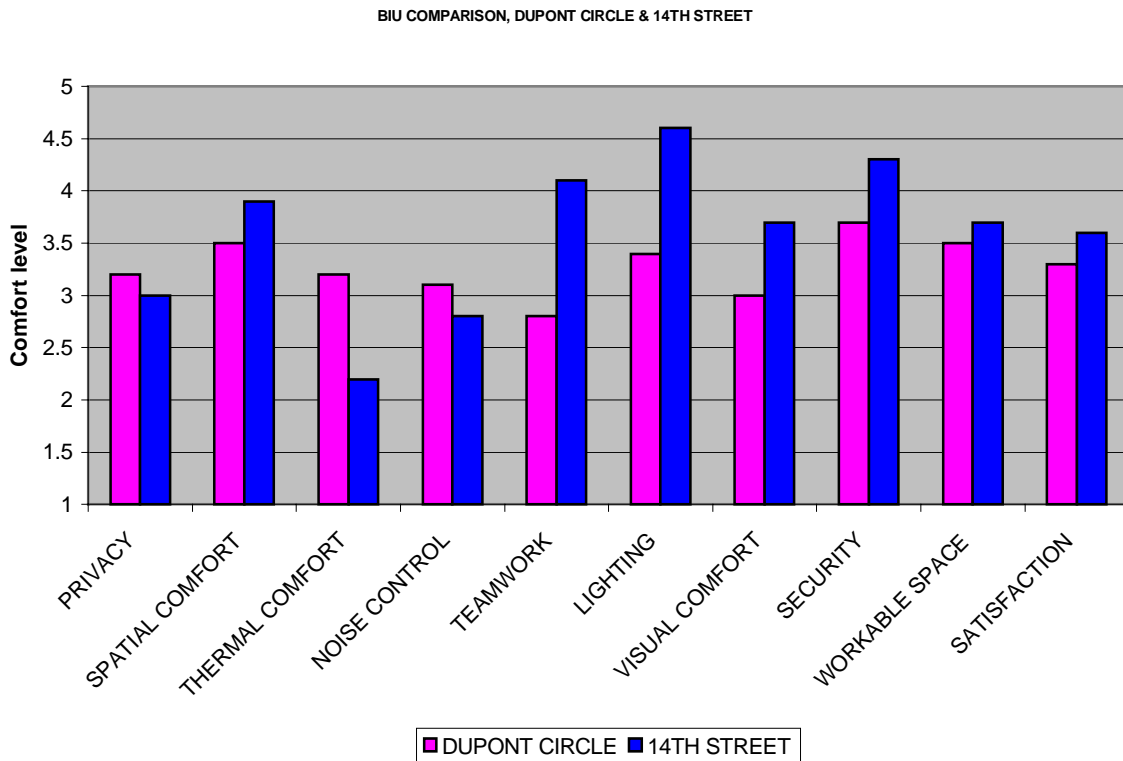
3. Summary of Results

3.1 Building-in-Use Assessment Summary

Overall the BIU survey results and comments show that employees perceive conditions to be much improved for SfN employees in their new offices at 14th Street N-W. This improvement should reflect in staff's ability to work better and to be more productive. The environmental aspects currently causing discomfort are temperature control and thermal comfort conditions. Concerns about being too warm or too cold seem to outweigh concerns about ventilation and air quality, although comments suggest that this is also not comfortable for everyone.

In Figure 1, below, the functional comfort scores calculated for Dupont Circle are compared for those received at 14th Street.

FIGURE 1: BIU PROFILES COMPARED, DUPONT CIRCLE and 14TH STREET OFFICES



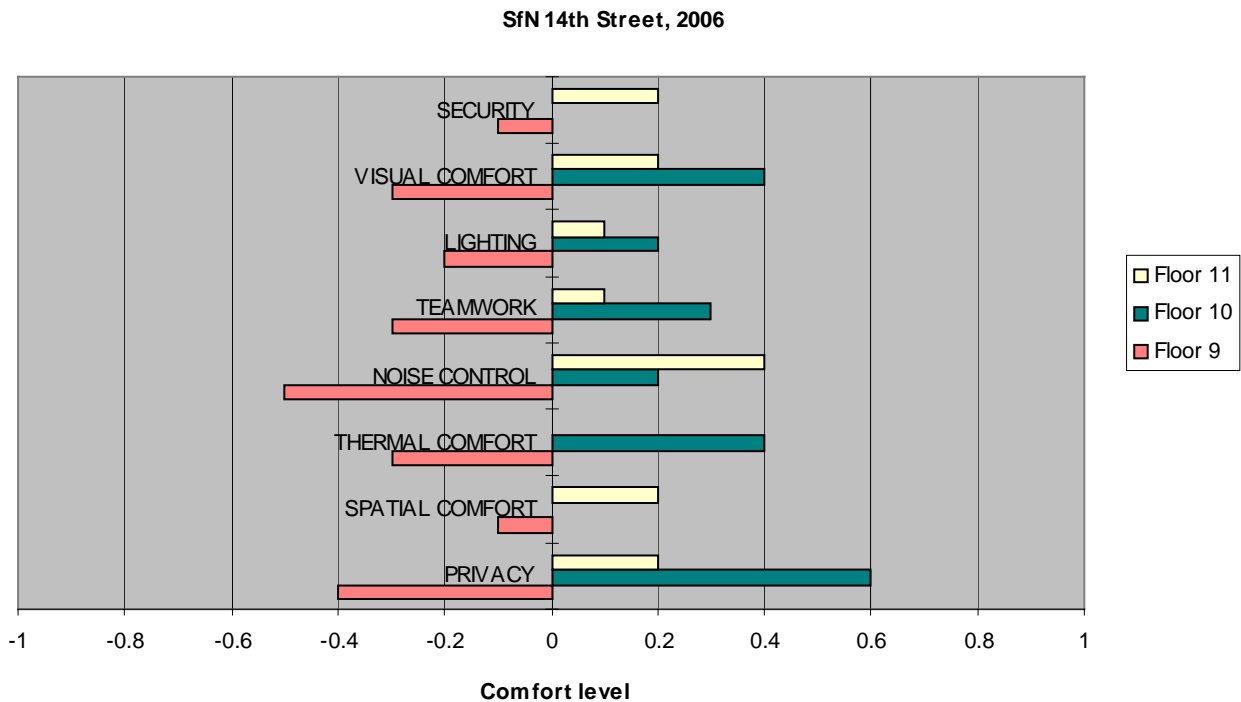
The figure shows that SfN staff are very much more positive about opportunities for collaborative and team work, that their lighting comfort and visual conditions have improved, as well as a small increase in overall spatial comfort – that is, floor and furniture layouts, circulation and common spaces. They also feel more secure.

However, occupants' thermal comfort (which includes ventilation and perception of indoor air quality) is significantly reduced in the new building. They also feel they have less privacy and that there is more noise from co-workers.

The figure includes the scores for the overall 'workability' or functionality and for overall environmental satisfaction; these global ratings have both improved since moving into 14th Street.

Figure 2, below, compares scores from each floor with the overall building scores. The purpose is to identify if all floors of the building have the same perceptions of their functional comfort, or if, for some reason, respondents from one or some floors have different functional comfort ratings from the others.

FIGURE 2: BIU SCORES FROM RESPONDENTS ON EACH FLOOR, AS COMPARED TO OVERALL BUILDING PROFILE (14TH STREET).



The center line at '0' in Figure 2 represents averaged functional comfort scores for the overall building (see Figure 1, above). Those floors whose scores appear to the right of the center line show ratings that are more positive than the total; those scores to the left of the center line have more negative ratings than the total. The Figure shows that occupants on the 9th floor are more uncomfortable than those on floors 10 and 11; in fact they are more uncomfortable on all functional comfort dimensions. This differential may be due to the fact that the 9th floor has been the most directly impacted by HVAC malfunctions in this (very new) building. Conditions of excessive heat or excessive cold are the result, and the resulting discomfort has likely affected occupants' perceptions and judgements of their overall functional comfort.

Finally, Figures 3 and 4 below present the scores for each individual comfort scales rated by respondents for both Dupont Circle in 2005 and for 14th Street in 2006. In both figures, the ratings are ranked from most positive to least positive, with colours to indicate those that fall into the Comfortable category (green), those that fall into the Less Comfortable category (blue) and those which fall into the Least Comfortable or Uncomfortable category (red).

FIGURE 3: USERS' COMFORT RATINGS AT DUPONT CIRCLE, RANKED FROM MOST TO LEAST COMFORTABLE (2005)

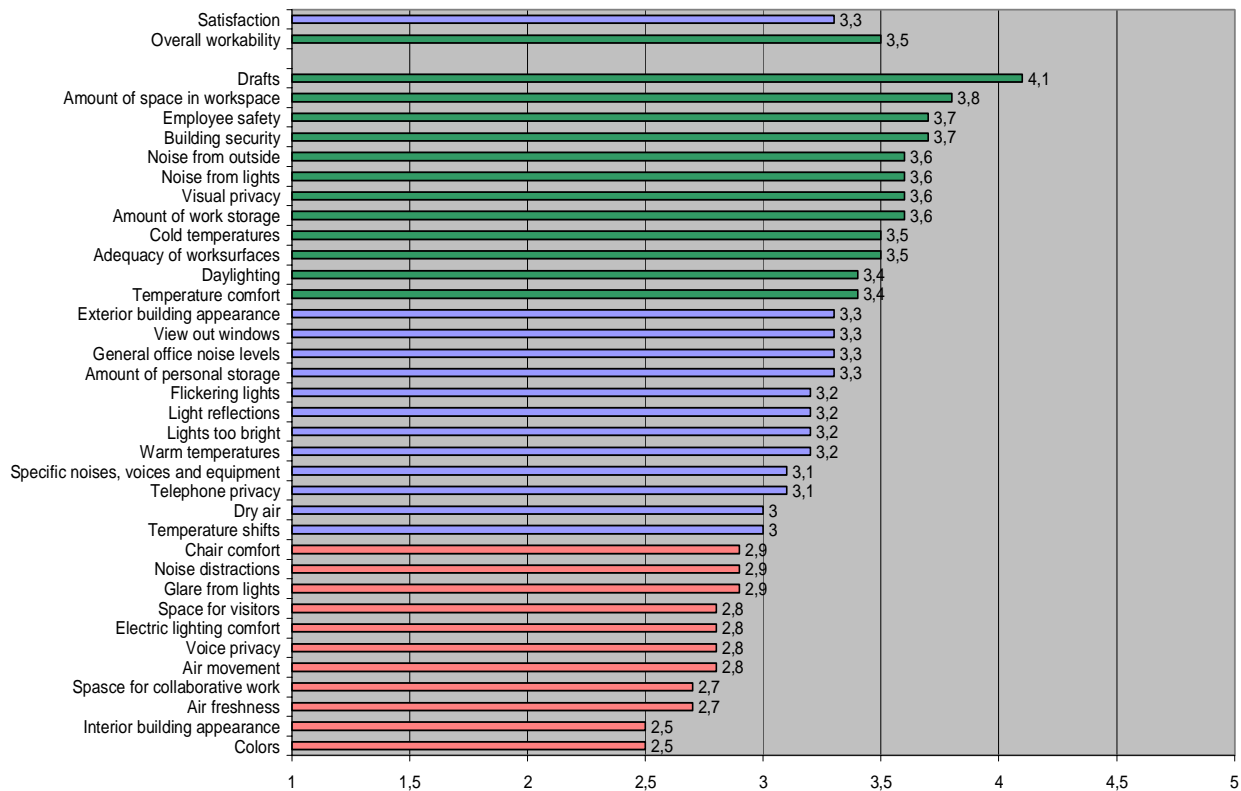
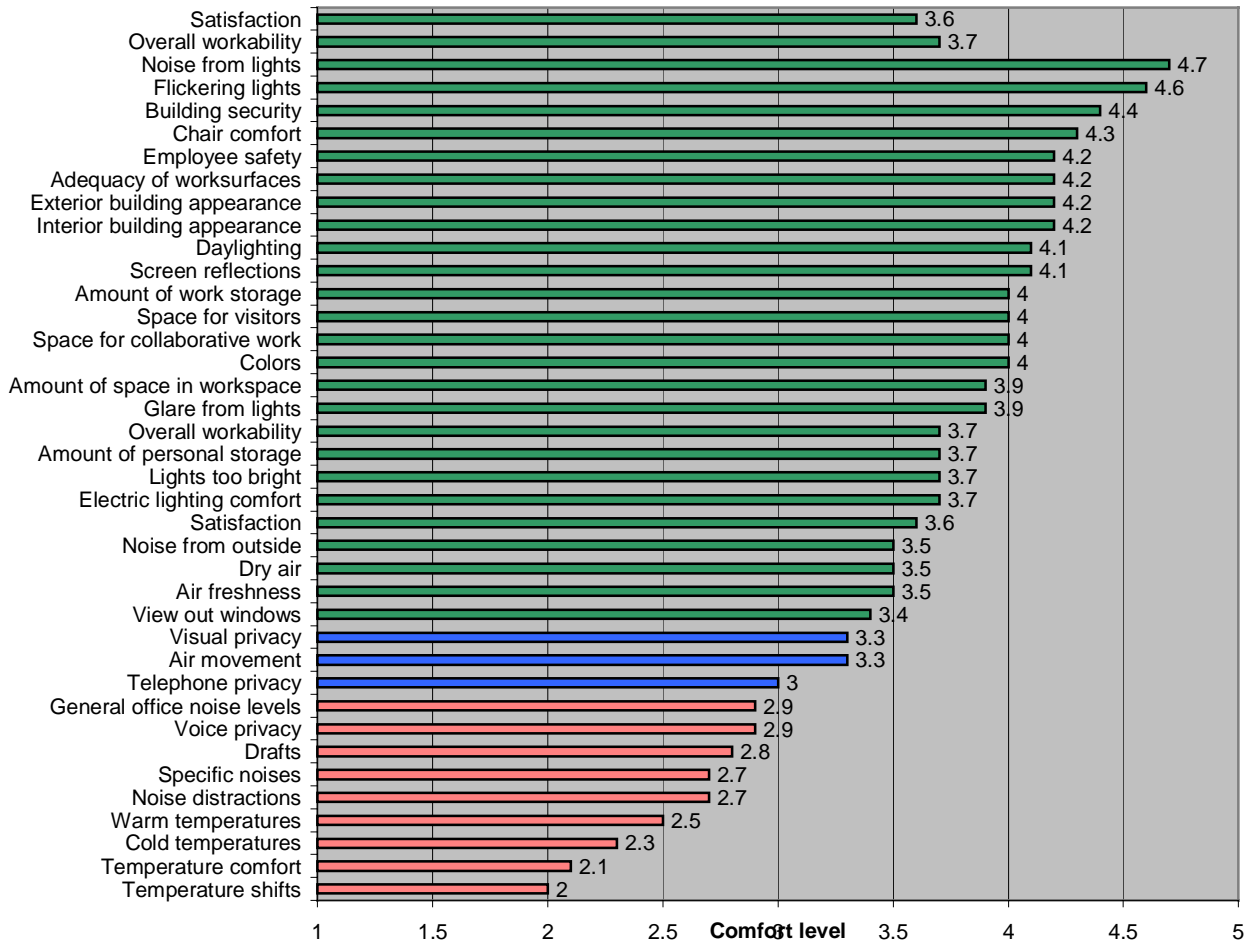


FIGURE 4: USERS' COMFORT RATINGS AT 14TH STREET, RANKED FROM MOST TO LEAST COMFORTABLE (2006)



The results show that there are many more Comfortable features in 14th Street than in Dupont Circle. There are more Comfortable features than both Less and Least Uncomfortable features. The most comfortable aspects at Dupont Circle were Drafts, Amount of Space in Workspace, and Safety and Security. The most comfortable features in 14th Street are Noise from Lights, Flickering Lights and Building Security.

The comparison shows that Chair comfort has gone from being among the Least Comfortable to among the most Comfortable, whereas Drafts has gone from being Comfortable to being among the Least Comfortable. The Least Comfortable aspects of the new building are Noise Distractions, Warm and Cold temperatures, Temperature Shifts and Temperature Comfort; whereas the Least Comfortable features of the Dupont Circle offices were Colors and Building Appearance, Voice Privacy, and Space for Collaborative Work.

3.2 Neuro-Environment POE Summary

The SfN Head Office work environment at 14th Street N-W contributes directly and positively to the ability of employees to do their work and employees are more satisfied with their work environment than they were in the previous Dupont Circle offices. This is also reflected in the BIU Assessment results.

Major environmental effects on the eight neuro-environment factors or feelings-behaviors were found in three cases. Results indicate that environmental features that support security, wayfinding, and feeling part of a cohesive organization all show improvement since moving into the new building. It should be noted that all three were explicit targets of the pre-design programming effort and the architectural design of the 14th Street N-W offices.

The range between the lowest and highest ratings for N-E factors was reduced from 1.3 in the pre-N-E survey to nearly half that, or 0.8, in the post-occupancy survey. This shows a greater balance of N-E factors in the new offices, and may provide an explanation for the improved “workability” and satisfaction responses. On this basis, it can be hypothesized that the greater the balance among N-E factors the greater the positive impact on stress, focus of attention, and mood in the workplace. However, determining these relationships empirically was not part of this study.

Ratings of neuro-environment features related to the remaining five feelings-behaviors did not increase in the new offices. This probably reflects the short time employees have had to get used to their new space. They may need more time to fully habituate to its environmental characteristics. Respondents’ ratings of being able to retreat and unwind, having a sense of the outdoors, developing pride in their work, understanding what is expected of them at work, and finding support for their personal and work needs are likely to improve as employees become increasingly familiar with the policies, technologies, and neighborhood of the new offices.

4. Conclusions

In conclusion, the results show that the strong positive attribute of the new offices is increased opportunities for teaming and collaborative work. This may be due to the increased common space (conference rooms and work-rooms). It may also be due to the large number of shared offices in the new building. However, it is clear that occupants of the shared offices, while they may be working together more, are having some trouble adapting to changes in noise levels, sense of privacy and spatial comfort as well as working in teams.

It is clear that space alone cannot make people adapt their work processes, and that more collaborative space does not automatically bring with it more

collaborative work processes. Typically, there is an adaptation period while employees adjust to, and then actively take advantage of, collaborative and teamwork opportunities. In the case of SfN offices, this adaptation period may be longer than 7 months, and may in fact only be felt after staff have lived through the full cycle of annual conference planning and execution.

In spite of the complaints about temperature and ventilation, most people (i.e. those on Floors 10 and 11) seem to recognize that this is a temporary situation that can be remedied. It is not uncommon in a new building and efforts are ongoing to fix the HVAC problems.

Overall, results from the combined BIU and N-E studies demonstrate that the new offices are a success in terms of providing better support to SfN employees than was the case in the previous building, and therefore helping to further the organization's mission and work objectives. Results also indicate unmet needs that can serve as the focus of future communication with employees and decisions about the use and management of the present SfN offices. Follow-up data collection efforts, once thermal comfort and ventilation problems are corrected, and after employees have had more time to adapt their work processes to the new space, are strongly recommended.

John Zeisel

Jacqueline Vischer

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1 October 2006