1996

Assessing Quality in the Work Environment

Janetta Mitchell McCoy
University of Wisconsin - Milwaukee

Assessing Quality in the Work Environment

JOHNSON CONTROLS

INSTITUTE FOR ENVIRONMENTAL QUALITY IN ARCHITECTURE

Authored by:
Janetta Mitchell McCoy

UWM

Assessing Quality in the Work Environment

Authored by:
Janetta Mitchell McCoy

TABLE OF CONTENTS

APPENDICES

EXECUTIVE SUMMARY

Based on the Procedure for Environmental Quality Assessment (PEQA), a comprehensive review of the literature on environmental assessment and environmental assessment instruments was conducted to determine the factors common to a definition of quality in the work environment. More than 120 articles and books from the scientific and popular literature have been reviewed, critiqued and categorized. When possible copies of the instruments have been obtained and are included in the appendices.

A quality work environment can only be defined by the people for whom the specific environment is important. The intention of this research is to offer a system of analysis and categorization with which it is possible to conceptualize a full range of contextual variables that may influence the quality of a work environment. Specifically the goals of this paper are:

1. *To demonstrate how the PEQA model, can be used to organize the environmental assessment tools that are available.*

2. *To provide operational definitions for the factors within PEQA*

3. *To demonstrate how the research and development of environmental assessment may be categorized based on the difference in intended uses: academic research, institutional standards, and professional application.*

4. *Provided an analysis of how these tools may most appropriately be used.*

Academic research, by far the largest body of literature, is intended to be used to inform designers, programmers and evaluators. It is also used to generate theory for generalization to multiple sites.

Institutional standards have been developed as tools intended to guide the management and occupation of government and other multi-site institutions.

Professional application procedures, informed by academic research and practical experience, are used by designers, programmers, and evaluators as assessment tools are intended as a service to their clients for use as both programming tools for future projects and as evaluation tools for existing projects.

This study confirms the comprehensiveness of the PEQA model and reveals significant gaps in the research. The assessments of objective physical elements and systems are the most common measurements of environmental quality. Mediating and moderating variables such as personal attributes, functional roles of employees, and organizational or societal constraints tend to be less often addressed or ignored altogether. It is the need to understand these variables that should drive future research. Four areas requiring further development are:

1. *Building management and services. What are the lines of responsibility, and what are the accepted definition of responsibility in managing and maintaining the environment?*

2. *Design and Development. How important is the experience and expertise the design team brings to the project?*

3. *Personal profiles. Employees may vary greatly by age, gender, culture and socioeconomic conditions, and yet these differences are rarely addressed.*

4. *Societal, organizational and individual goals and purposes frame the motivation and context of work. Available workforce, organizational motive, and the individual need for advancement may have a strong influence on work produced.*

By emphasizing the mechanical systems and ambient environment, but overlooking the people who work there and their perceptions of the place, generalizable standards of quality have been difficult to develop. If we are to bring definition to quality work environment, we must also define quality of work, match the research methods to the application and find methods that assess an environment relative to its own definition of quality.

ASSESSING QUALITY IN THE WORK ENVIRONMENT

Introduction

A comprehensive review of the literature has revealed literally hundreds of articles and books discussing the need to assess the built work environment. Their authors, representing many different disciplines, allude to the need for providing safe environments, or environments that optimize effectiveness and productivity. Some speak of saving corporate resources and maximizing profitability while others discuss benchmarking and sustainability. Under the umbrella of environmental assessment each discipline contributes a unique area of focus and with that focus different methodologies, different units of analysis and an increasingly confusing and complex array of environmental attributes deemed essential for identifying or providing a quality corporate workplace. Such diversity of focus , together with miscellaneous tools measuring an apparently divergent list of attributes offers an unsystematic if not meaningless definition of quality.

The purpose of this paper is not to define environmental quality *per se.* As others (Becker, 1990; Rapoport, 1978; Zimring, 1985) have pointed out, a quality environment can only be defined by the people for whom the specific environment is important. Rather the intention of this paper is to offer a system of analysis and categorization with which it is possible to conceptualize the full range of contextual variables that may influence the quality of a work environment. Specifically the goals of this paper are four fold:

1. *To demonstrate how the Procedure for Environmental Quality Assessment (PEQA) model can be used to organize the environmental assessment tools that are published and available.*

2. *To provide operational definitions for the factors within the PEQA model of environmental quality assessment.*

3. *To demonstrate how the research and development of environmental assessment may be categorized based on the difference in intended uses and goals: Academic; Institutional; Professional.*

4. *Provide an analysis of how these tools may most appropriately be used.*

Procedure for Environmental Quality Assessment

The Procedure for Environmental Quality Assessment (PEQA) model (Figure 1) (Witzling, Childress, & Lackney, 1994) demonstrates the intricacy and complexity of the environmental quality construct. This model also serves as a clear and explicit road map for finding the issues pertinent in defining quality of a workplace. First, the type of place must be identified and described; then, it must be determined how well the physical environment matches the activities and programs of the place. Quality is the degree of match between the place of the environment and the functions that are required within.

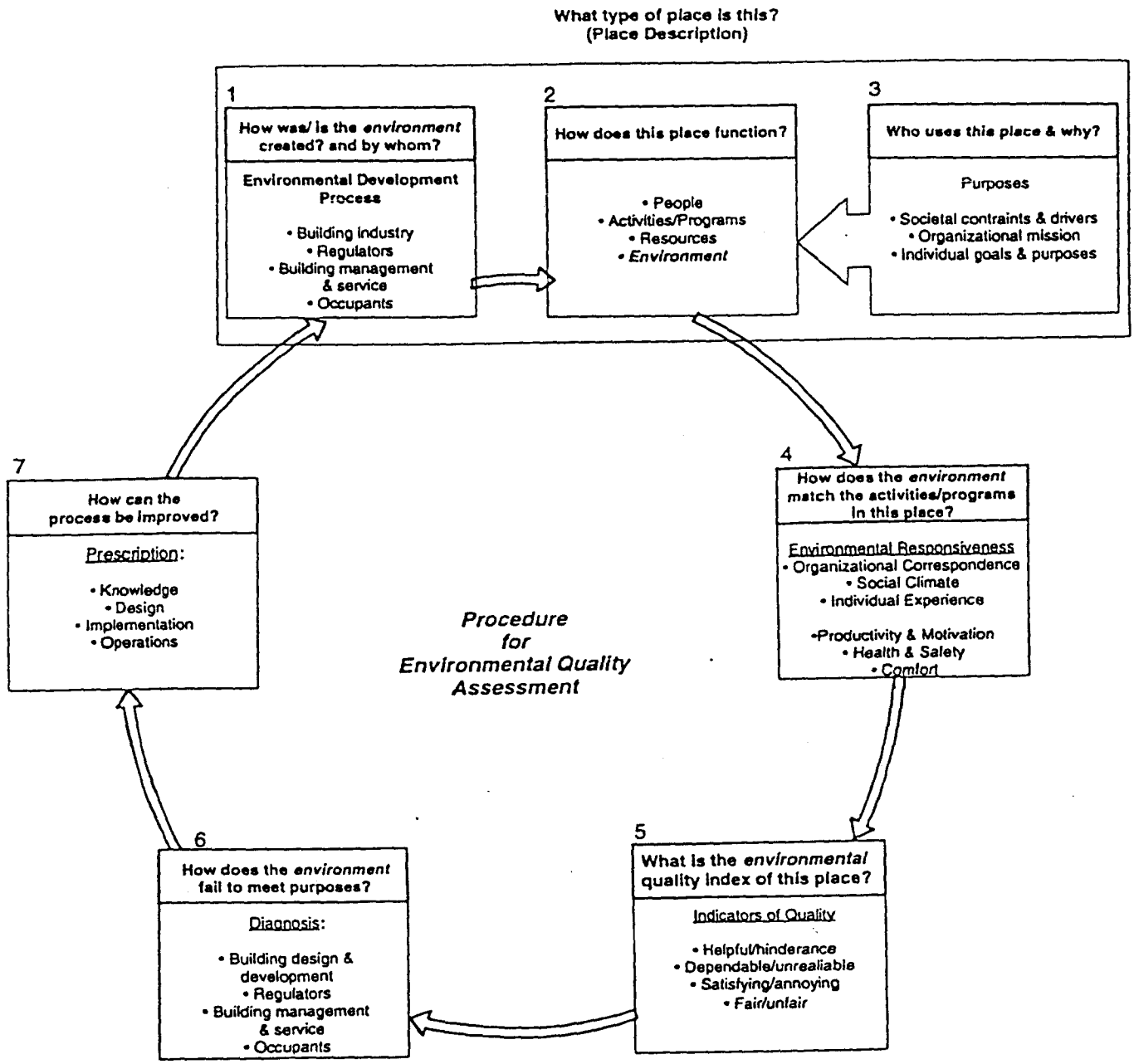
What type of place is this?

An environment is more than the sum of its parts. It is a place; a place has meaning (Canter, 1977, Hiss, 1991), Krampden, 1991). It has a history and a future. A place is experienced, both positively and negatively. A place is perceived as fulfilling both societal and individual needs and purposes. To assess quality in an environment, it is essential to describe and understand: how it was created and by whom; how it functions; and who uses it and why.

How was/is the environment created . . . and by whom?

The creation of an environment is influenced by four factors: occupants, regulators, design development, and building management and service.

Occupants. The occupants are those people who are motivated to action on a project (either to build new or renovate what exists). It is the confluence of motivation, timing and their own requirements that result in a plan for changes such as expansion, downsizing (or right-sizing), or simply the desire to promote a different image.



Case Study Method

Figure 1. Procedure for Environmental Quality Assessment.

Source: Witzling, L., Childress, H. & Lackney, J. (1994). The nature of environmental quality: A Johnson Controls Institute position paper. A Johnson Controls Institute for Environmental Quality in Architecture Monograph Series Report. University of Wisconsin-Milwaukee, School of Architecture and Urban Planning: Center for Architecture and Urban Planning Research.

Regulators. Regulations in creating a new environment may be as explicit as local, regional, or national codes that govern design and construction. Regulators also come in the form of societal and technological constraints, as well as availability of natural and financial resources. The system of inspections surrounding any construction site will typically require knowledge of and adherence to codes. Likewise, financial constraints are well regulated *(sometimes in triplicate!)* by investment and legal advisors. Societal regulations are often unforeseen, but very powerful and capable of overriding even the tightest of legal and financial documents. For instance, issues of place type, ethnicity of workforce, or even style of architecture may be strongly dictated by societal forces. Technological regulators may define a place depending on the availability of technology necessary to achieve or support corporate goals.

Design and Development. How a place is created relies heavily on the communication between designer and client. Designers with practical and theoretical knowledge base of a specific place type, the client profile and attributes in the specific region or locale contribute substance and understanding to the design. Likewise, the client who provides substantive, thoughtful feed back to the designer gives form and meaning to the creation of the environment.

Building management and service. An environment is also shaped and created by internal lines of communication and responsibility. Just as the design team must have a leader who directs and coordinates the external creative efforts, within the corporation, it must be clear who is responsible for making decisions and the criteria they will use for making them.

How does the place function?

How a place functions may be described based on the people who occupy the place, their activities and programs, the resources available and the physical elements of the environment. As attributes of these elements vary, so will the level of functioning of the place.

People. Age, gender, culture and socio-economic status affect a person's intention and performance in a place. Aside from the changing physical characteristics that accompany the aging process, mental and social changes also occur. Issues of gender and culture may not only affect the person's level of performance, but also the ability to perform. The socio-economic status of a person reflects the experience of formal education and personal history. Those issues together create a telling profile of the people for whom the place will function, and the attributes necessary for quality functioning.

Aging is frequently cited as a variable indicating prediction of physical and mental function (Lawton, 1986), including: illumination requirements for good vision change (Cohen & Weisman, 1989), temperature ranges for thermal comfort change (Cohen & Weisman, 1989), and competence in way finding may change (Weisman, 1990) due to aging. Age also has important social considerations. Young adults who are likely parents of young children will have different social needs than older parents of teenagers, or adults with no children. These issues will be reflected in different needs such as child care, insurance, training and transportation requirements.

Gender issues, more than simply providing for male and female occupants, may influence how a place functions (Weisman, 1992) How a place functions can be described by the diversity or homogeneity of the occupants, and the degree to which they are empowered based on those differences.

The socio-economic status of the occupants may present specific issues to functioning of a place. The occupant's educational levels, their income levels, and their perceptions of status, may influence how a place functions. Great disparities can influence morale. High socio-economic status may require a place to function with a heavy reliance on highly specialized or sophisticated technology. A low socio-economic status may demand more training programs, or unionization.

Activities and programs. How a place functions may be described based on required interactions (Becker & Steele, 1995; Sundstrom, 1987): whether the tasks to be done are performed individually or in aggregates. Increasingly corporations are acknowledging the benefit of working in groups or teams, in which case small personal spaces may function well for individual uses, leaving more and larger spaces designated for encouraging team work. Some corporations have also defined new ways of working with "hotelling" and other versions of non-territorial officing -- some individuals do not receive assigned work spaces, rather places are sequentially shared when attendance is required. In the case of home based work or telecommuting, "the place" required for functioning is not within the physical confines of the corporate office at all.

Resources. The physical functioning of a place may be described by its system of operations, maintenance, conservation and provision of services to its customers. Operations implies the system within the building for getting things done, administratively and physically. Operations includes looking to the current and past performance of the buildings system to project and plan for future situations. The operations team plans and executes a program of action for keeping the environmental system optimally active.

A responsibility of maintenance is to insure that the physical environment and systems run efficiently through a program of preservation of the status quo. Maintenance assures that the ambient and physical environment are consistent and are experienced as reliable. Likewise, it is important to an organization that its resources be conserved, this has both economic and production implications.

Services provided to the individuals by the organizations are also important resources. Services may be social or physical. Social services may include on-site child care, fitness programs, and insurance programs. Physical services may be as diverse as on-site company stores, transportation, food service or printing.

Environment. The most commonly cited measures of quality of an environment are safety, objective physical elements and the core building systems. It is almost self-evident that environmental quality can to some degree be described as the level of safety it provides. From issues of life and death to ergonomically designed equipment or furniture, safety is a primary consideration. Objective physical elements include structure of the building, its layout, its components -- its tangible attributes. This also includes the ambient environment such as air quality, and other sensory features, such as sounds and smells. The most frequently evaluated features in assessment of the building systems are the mechanical and electrical system: the physical performance of the building itself independent of occupant perceptions.

Who uses this place and why?

The work environment is also defined by who works there and their reasons for choosing this place of employment. The reasons may be societal, organizational or individual.

Society. Societal constraints determine who uses a work environment. Within a society is an available workforce contained within a larger population and they are mutually defining. That workforce has specific attributes based on issues larger than the individual or organization. Global, national or regional conditions of the economy, politics, or religion can determine not only who is available to work, but their attitudes toward the work. Within a society there are mores or standards of behavior and ethics that shape the profile of the workforce.

Organizational mission. How the organization fits into a society and how well it suits the people within the society is to a large degree determined by the organization's larger goal. The organizational mission may be simply to make a profit for its owners and investors; or it may be to develop and provide a quality product to the marketplace while also providing a quality work place. Although the two are not mutually exclusive, they may appear to be resulting in ambiguity or confusion for both

Social climate. Within the work environment there is a stated, explicit social climate, and a more implicit one based on physical cues interpreted by the occupants. The degree to which an individual or team experiences a sense of freedom, support, and unity of action may be derived from the physical attributes and be a measure of the social climate. The meanings of place associated with these physical attributes may affect work performance. Meanings communicated may be an indicators of environmental match with activities and programs required or needed for functioning. The influence of these issues will affect the morale of groups and the social climate within the organization.

Individual experience. The person's ability to do the work may be influenced by the individual's experience of comfort and health, sense of safety and security, level and variety of sensory stimulation, degree of perceived control over environmental conditions, and the perceived aesthetics of the place. Each of these experiences, in turn, are interpretations of the place, by the individuals who occupy and work in the place.

Current Models of Environmental Assessment.

A purposive sampling of the environmental assessment literature was conducted. Looking for the most comprehensive models and programs of environmental assessment, three categories of models have emerged: *academic, institutional and professional.* Each category has an apparently different agenda, as evidenced by differing approaches or targeted variables.

Table 1 provides an overview of the three categories and the environmental variables of focus within each category. It also clearly distinguishes which variables are most frequently investigated and those which may be neglected, or considered irrelevant, within each category.

Academic model. The academic model, by far the largest body of literature, also investigates the largest number of variables. While some academic programs are more comprehensive than others. This model does not necessarily represent an actual

assessment instrument. These areas of research are more likely intended to inform designers, programmers and evaluators in the development of assessment theory and measures for environmental assessment.

Zimring (1989) offers by far the most comprehensive model for the process of environmental assessment. He attempts to meld the divergent qualities of post occupancy evaluation with environment and behavior research. By gathering and representing the views and requirements of occupants in exploring conceptual issues (i.e., way finding, stress), he posits that the physical attributes and occupant's perceptions of those attributes will affect the organizational decision making process. (Appendix A)

Such intense areas of focus are both the strength and the weakness of the academic model. Although some researchers such as Zimring (1989), Johnson (1994), and Preiser (1988) suggest a holistic or contextual approach to environmental quality, many more academic researchers take a more partitive position and tend to look at specific variables in more isolated conditions. For instance McLain (1985) has focused on the value of user participation in decision making. Sundstrom (1986, 19887) investigated the benefit of analyzing variables at multiple levels. Sprekelmeyer (1986) looked at the effects of change and aesthetics on productivity. Hartkopf, Loftness, & Mill (1989) have focused primarily on diagnosing building performance in relation to individual function.

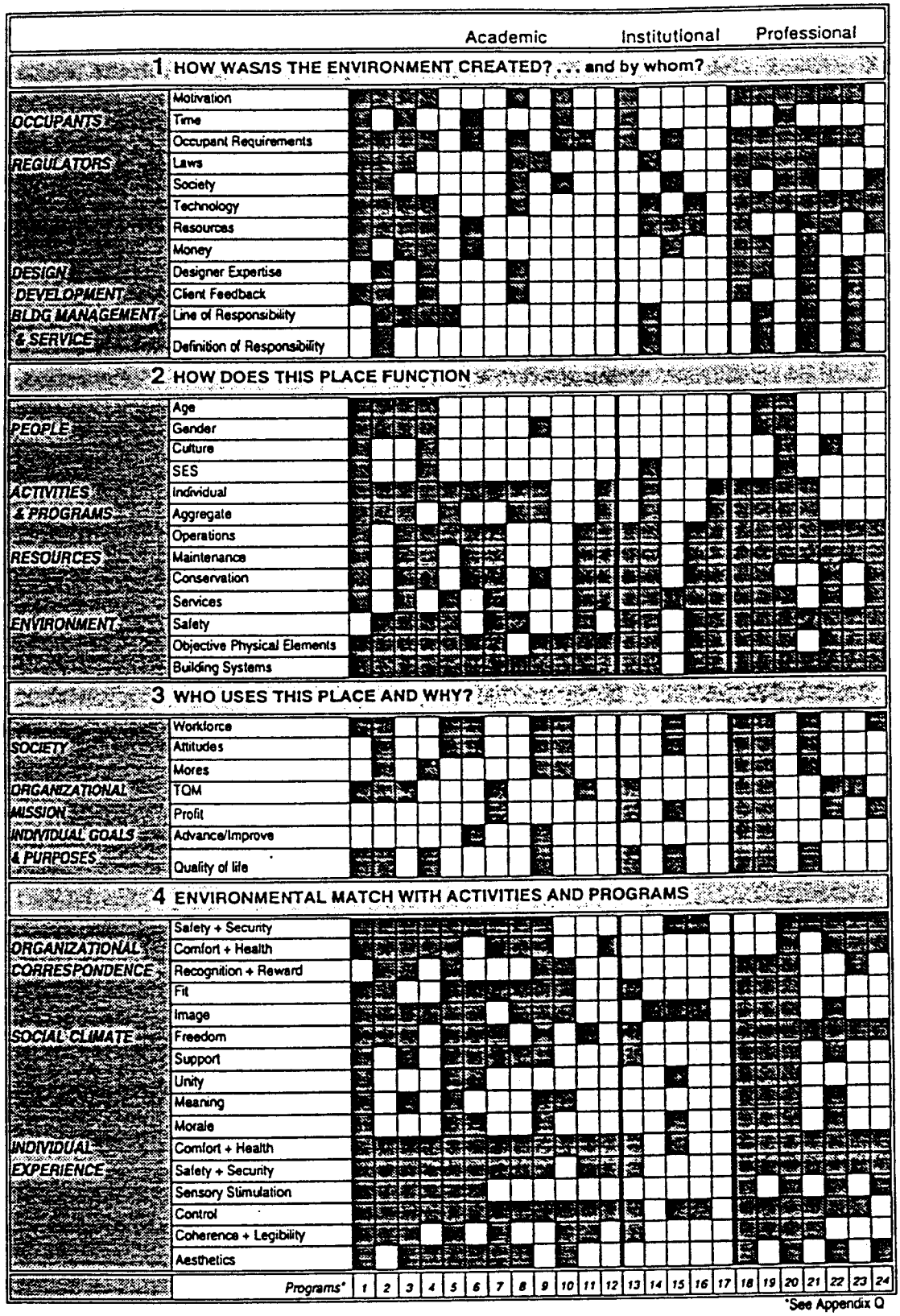


Table 1. Procedure for Environmental Equality Assessment operationalized with 24 programs of research.

Johnson (1994), Preiser (1988) and McLain (1985) emphasize similar variables and reinforce Zimring's position. Other researchers as indicated in Table 1, however, differ considerably from the former authors by rarely acknowledging historical aspects of how the environment was created. Though each of these studies had significant value in contributing to the understanding of the relationship of work, workers and the building structure, these narrowly focused variables alone are insufficient for assessing the more accumulative nature of the experience of quality in a work environment.

Appendices A - J offer examples and insight into the academic models of environmental assessment.

Institutional model. Based on academic studies, their own experiences, and formal, legal regulations, broad sets of standards have been established to guide management in the strategic planning and occupation of buildings intended for government agencies and multi-site institutions. Designed to be used by in-house or inter-agency staff, this model primarily leads to economic considerations and conclusions.

As illustrated in Table 1, the focus of the institutional model is primarily on the status and performance of the building as a physical and functioning structure. Concerned with resources and objective elements of the building, the institutional model rarely considers the experiential aspects of the people who will become its occupants. When service amenities and space requirements are explored, it is frequently in the context of convenience and efficiency.

Perhaps, the most comprehensive and most flexible instrument within the institutional model is Serviceability Tools and Methods (STM) (Davis, 1995) who defines a quality environment as a "serviceable workplace ... capable of meeting occupant needs, now and in the future" (p. 2). STM is a kit of tools that promotes a participatory process between facility providers and the facility customers. As a

process it attempts to provide a link between occupant requirements and specific combinations of building features - considering the facility as a whole.

Widely used instruments such as BEPAC (1993) and BQA (1993) focus clearly on the building and its functionality as a resource for doing work. Beyond the image it projects, no consideration is given to the environmental influence on the people who will do the work. BEPAC focuses primarily on environment as a consumer or polluter of resources. BQA concentrates on allocation of resources. NACOR (1995) similarly, focuses on assessment as a benchmarking process for comparisons of corporate headquarters based on setting, ownership, functionality, amenities image, space needs, location and costs.

Daish, et al (1982, 1983) post occupancy evaluation method attempts to include both building performance and behavioral issues. Outlining a fifteen page process that includes participant participation, the focus in still primarily on how the building performs, rather than how the building supports works performance -- though this may be implicit through their participation. Two strength of Daish's model are unique. First is the provision for recommendations of the assessment team to be translated into action. Second, the process of assessment is to be considered a continuing activity rather than an isolated event.

Because of their proprietary nature, examples of most institutional models were not available for this article. We have , however, included an overview of Daish's (19882, 1983) model as Appendix K.

Professional model. Informed by academic research and practical experience, the professional model is intended for application by independent designers, programmers and practitioners. This model is explicitly open to creating connections between people and environments . It seeks to justify expenditures for the human-environment experience.

Becker (1990) proposes two basic systems as required for reaching the essence of environmental quality: user based and expert based. The user basis elicits responses from building occupants to evaluate the adequacy of a building in terms of user satisfaction. The expert basis calls on a much wider range of informants to develop a holistic picture of the organizational environment. The expert based approach can provide an overview of changing technological needs, evolving organizational patterns, work profile and expectations and efficiency of resource use. (Appendix M)

As a group, those who apply the professional model, have produced the most comprehensive criteria for environmental assessment of quality. But, like the academic and institutional models describe previously, the professional model is heavily weighted to measure physical attributes of the building. And, they frequently overlook qualities of individual workers , as well as their distinctive collective attributes.

Brill, et al (1985) in a comprehensive two-volume "how to" explanation explicitly ties performance of the structure to human performance and equates them to economic value (Appendix L). Goodrich (1986) explains the mediating influences between user needs and the physical system of work environment (Appendix N). Farbstein & Wener (1982) illustrate that although the environment may be highly specialized (e.g., correctional institutions) the comprehensiveness and multiplicity of measures is still valid. Parshall (1988) draws on the Vitruvian metaphor of utility, commodity and delight to bind costs, function and aesthetics (Appendix O). Other assessment tools such as building commissioning and Real Estate Network (Appendix P) clearly connect building function and economic considerations from planning through post occupancy.

Methodology. Methods employed for environmental Assessment (Bechtel & Srivastava, 1978) vary across the models (Table 2). While all rely heavily on the survey or questionnaire instruments and observation, most tend to utilize a form of

methodological triangulation, which is important for providing trustworthiness to the data analysis.

The general weakness easily seen in the methods are a reluctance to treat the workers as individuals. As reflected in the few instruments that investigate the age, gender, culture and socioeconomic conditions of employees. There are also very few research programs or instruments that are designed to understand the individual's goals and purposes for working in the organization.

Conclusions. Differences within categories are as interesting as differences between categories of the environmental assessment models. Consistently the three models emphasize evaluation of the objective physical elements of the environment. How well the core mechanical system and the conditions of the objective physical elements work is assessed in every analytic tool. Similarly operations and maintenance are frequently referred to as variables that indicate and measure of quality. Likewise indicators of the individual comfort, health, safety, security, and control are frequently variables of investigation. This level of assessment clearly gives us an indication of building functioning, but it overlooks the function of the person within the buildings.

By focusing on building function and overlooking building management and service, an important component of morale and unity of the social climate may be negated. Or, by focusing on features of comfort, health, safety, security and control, an understanding of the role of age, gender or culture may be misunderstood, or missed entirely. Likewise by not understanding the organizational mission, how can recognition, reward, image or aesthetics be evaluated?

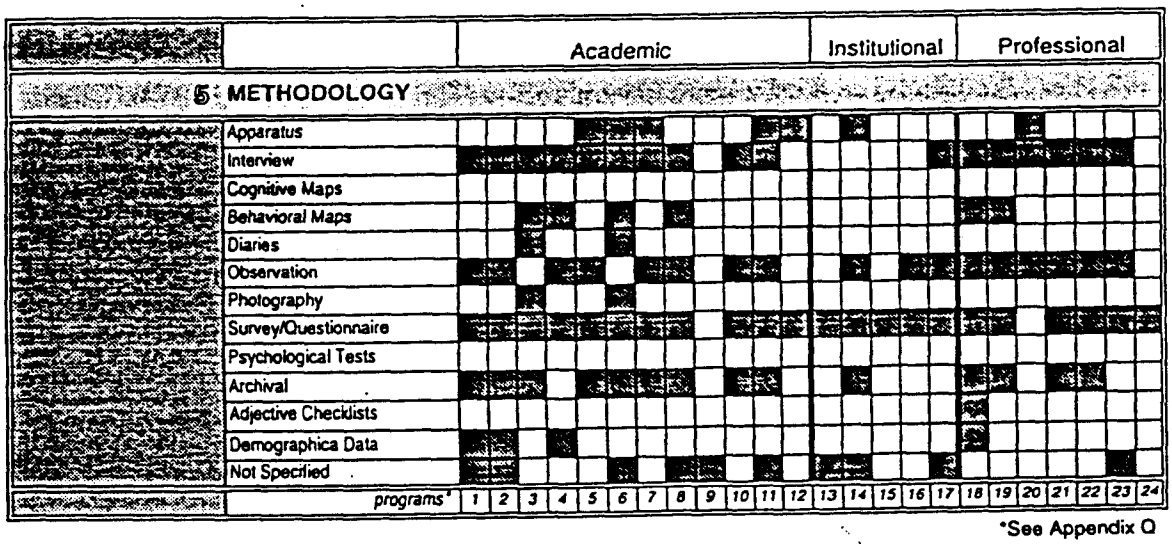


Table 2. Methodology Common to Environmental Assessment.

Future research directions. Clearly there are four areas of environmental assessment that require further development.

1. *Building management and services. What are the lines of responsibility, and what are the accepted definitions of responsibility in managing and maintaining the environment? Likewise, does the physical environment facilitate that level of communication? Environments in which there is no clear line of responsibility may see decisions made through default - which is unacceptable at any other level of the organization and probably inadvisable at this level as well.*

2. *Design and development. How important is the experience and expertise the design team brings to the project? Certainly a new design team fresh to a new building or organizational type may bring a refreshing approach to the task. Likewise, experience and expertise requirements may have varying degrees of importance. The more highly specialized the work environment, the more experience and expertise may be necessary. Conversely experience and expertise less may be important if the organization can clearly communicate and evaluate its environmental requirement. What role does environment and behavior research play in the phase?*

3. *Personal profiles. Employees may vary greatly by age, gender, culture, and socioeconomic conditions, and have greatly diverse requirements for working. And, how do we design for individuals, rather than for statistics?*

4. *Societal, organizational and individual goals and purpose frame the motivation and context of work. Available workforce, organizational motives, and the individual need for advancement may have a strong influence and reciprocal effects on work produced.*

By emphasizing the mechanical systems and ambient environment, but overlooking the people who work within the organization, generalizable standards of quality have been difficult to develop. If we are to bring definition to quality work environments, we must also define quality of work, match the research methods to the application and design methods that assess an environment relative to its own definition of quality.

References

Al-Saleem, Y. (1992). Evaluating the Performance of Government Office Buildings from the Users' Perspective: A Case Study of the Ministry of Foreign Affairs Headquarters Building in Saudi Arabia. A Ph.D. Dissertation, Texas A & M University, College Station, Texas.

Becker, F. D. (1990). The Total Workplace: Facilities Management and the Elastic Organization. New York: Van Nostrand Reinhold.

Becker, F., Steele, F., (1994). Workplace by Design: Mapping the High-Performance Workscape. San Francisco: Josey-Bass Publishers.

Brill, M., Margulis. S., Konar, E. ,and BOSTI. (1985). Using Office Design to Increase Productivity, Vol. 1 & 2. Buffalo, NY: Workplace Design and Productivity, Inc.

"Building Commissioning". Architecture, June 1995, 123-127.

Building Environmental Performance Assessment Criteria, 1993. Office Buildings. British Columbia.

Building Quality Assessment Operational Manual. Centre for Building Performance Research, School of Architecture, Victoria University of Wellington, September, 1993.

Cohen, U., Weisman, G., (1989). Holding on to Home. Baltimore, MD: Johns Hopkins University Press.

Daish, J., Gray, J., & Kernohan, D., (1983). "Post Occupancy Evaluation." Architecture New Zealand, (July - August), 20 - 21.

Daish, J., Gray, J., Kernohan, D., & Salmond, A., (1982). " Post occupancy evaluation in New Zealand. Design Studies, 3(2), 77-83.

Daish, J., Gray, J., Kernohan, D., & Salmond, A., (1983). "Post occupancy evaluations of government buildings." Architectural Science Review, 26(2), 50-55.

Davis, G., Szigeti, F., Blair, L., (1994). Serviceability Tools and Methods (STM). Ottawa, Ontario: International Centre for Facilities.

Farbstein, J., Wener, R. (1982). "Evaluation of Correctional Environments," Environment and Behavior, 14(6), 671-694.

Fisher,, T., Wineman, J., Zimring, C., "Energy past and future" Progressive Architecture, 67(4), 114-123.

Goodrich, Ronald (1986). "The Perceived Office: The Office Environment as Experienced by its Users" in Behavioral Issues in Office Design (ed.) J. D. Wineman. New York: Van Nostrand Reinhold Company.

Hartkopf, V., Loftness, V., Mill, P. (1986). "The Concept of Total Building Performance and Building Diagnostics." Building Performance: Function, Preservation, and Rehabilitation, ASTM STP 901, G. Davis, Ed., American Society for Testing and Materials, Philadelphia, 1986, 5-22.

Hiss, T. (1991). The Experience of Place. New York: Knopf.

Johnson, Lena (1994). "GAMSA: A Quantitative Assessment Model for Sustainable Architecture." in Environmental Quality: Programming, Design, Construction, Management.

Kennon, P., Bauer, J., Parshall, S. . (1988). "Evaluating Health Care Facilities." The Journal of Health Administration Education, 6(4),, 818-831.

Keys, C., Wener, R., (1980). "Organizational Intervention Issues: A four-phase approach to post-occupancy evaluation:" Environment and Behavior, 12(4), 533-540.

Kirk, S. (1989). "Post-occupancy value engineering. Ekistics, 58(336-337), 141-146.

Krampden, M. (1991). "Environmental Meaning." in E. Zube and G. Moore (eds.) Advances in Environment Behavior and Design, vol. 3, 231-270. New York: Plenum.

Lawton, M., (1986). Environment and Aging. Albany, NY: Center for the Study of Aging.

Loftness, V., V. Hartkopf, & P Mill (1989). "Critical Frameworks for Building Evaluation: Total Building Performance, Systems Integration, and Levels of Measurement and Assessment." in Building Evaluation (ed.) W. F. E. Preiser. New York: Plenum Press.

Marans and Sprekelmeyer, 1986. A conceptual model for Evaluating Work Environments, in J. D. Wineman, Behavioral Issues in Office Design. New York, Van Nostrand Reinhold, pp. 678 - 84.

Marans, R. W., & Sprekelmeyer, K (1982). "Measuring overall architectural quality: a component of building evaluation." Environment and Behavior, 14(6), 652-670.

McLain-Kark, J. (1985). User participation in Passive Solar Housing Design. Ph.D. Dissertation. University of Tennessee, Knoxville, Tennessee.

Parshall, S., (1988) "A Hospital Evaluation: The Problem-Seeking Method." in E. Zube and G. Moore (eds.) Advances in Environment Behavior and Design, vol. 2 207-220. New York: Plenum.

Preiser, W., (1989). Building Evaluation (. New York: Plenum Press.

Preiser, W.F.., H. Z. Rabinowitz, and E.T. White. (1988). Post Occupancy Evaluation. New York: Van Nostrand Reinhold Co.

Rapoport, A. (1982). The meaning of the built environment: A non-verbal communication approach. Beverly Hills, CA: Sage.

Real Estate Network, an unpublished manuscript, author unknown.

Sprekelmeyer, K. (1993). "Office relocation and environmental change: A case study." Environment and Behavior, 25(2), 181-204.

Sundstrom, E. (1986). Work Places. New York: Cambridge University Press.

Vischer, Jacqueline. (1989). Environmental Quality in Offices. New York: Van Nostrand Reinhold.

Weisman, L. (1992). Discrimination by Design: A Feminist Critique of the Man-Made Environment. Urbana, IL: University of Illinois Press.

Wener, R., (1989). " Advances in Evaluation of the Built Environment." in I. Zube & G. Moore (eds.) Advances in Environment, Behavior and Design, 2. New York: Plenum Press.

Wener, R., Olsen, R., (1980). "Innovative Correctional Environments: A User Assessment." Environment and Behavior, 12(4), 478-493.

Wineman, J. (1986). Behavioral Issues in Office Design (New York: Van Nostrand Reinhold Company.

Wineman, Jean D. (1982)."Office Design and Evaluation: An Overview". Environment and Human Behavior. Vol. 14 No. 3, May .

Witzling, L., Childress, H. & Lackney, J. (1994). The nature of environmental quality: A Johnson Controls Institute position paper. A Johnson Controls Institute for Environmental Quality in Architecture Monograph Series Report. University of Wisconsin-Milwaukee, School of Architecture and Urban Planning: Center for Architecture and Urban Planning Research.

Zimring, C. & Reizenstein, J. (1980). "Post-occupancy evaluation: An overview." Environment and Behavior, 12 (4), 429 - 450.

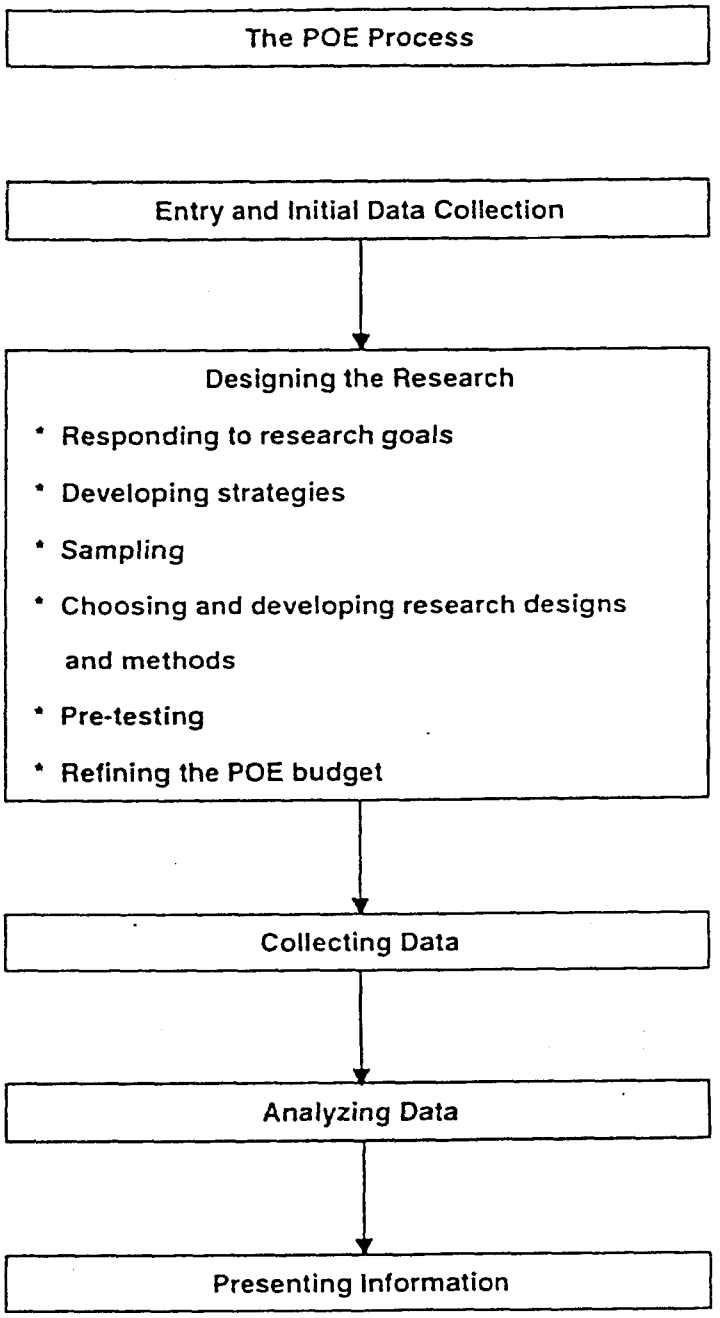
Zimring, C. & Reizentstein, J. (1981). "A primer on post-occupancy evaluation: Uses and techniques of an increasingly valued tool." AIA Journal, 70 (13), 52-58.

Zimring, C. & Welch, P. (1988). "POE: Building on 20 - 20 Hindsight." Progressive Architecture, 69 (7), 55-56,58, 60.

Zimring, C., & Wener, R. (1985). "Evaluating Evaluation." Environment and Behavior, 17 (1), 97 - 117.

Zimring, Craig (1989). "Evaluation of Designed Environments: Methods for Post-Occupancy Evaluation." in Building Evaluation, (ed.) W. F. E. Preiser. NY: Plenum Press.

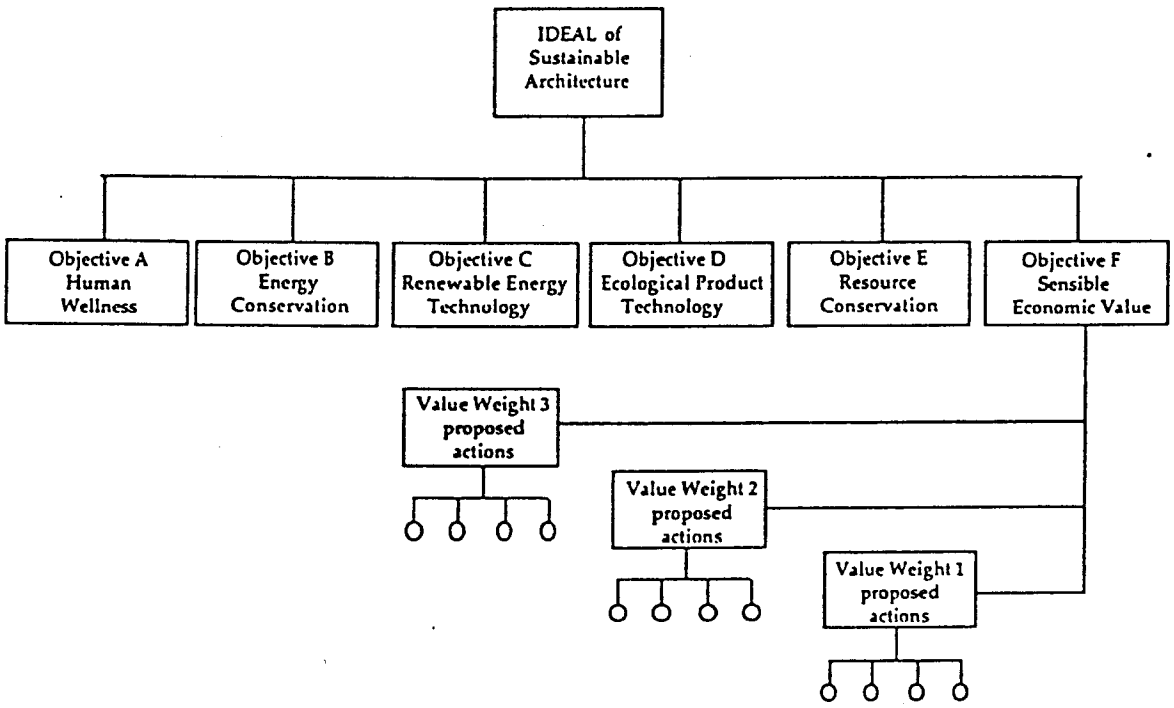
APPENDIX A



SOURCE: Zimring, Craig (1989). "Evaluation of Designed Environments: Methods for Post-Occupancy Evaluation." in Building Evaluation, (ed.) W. F. E. Preiser. NY: Plenum Press.

APPENDIX B

CONCEPTUAL FRAMEWORK FOR ENVIRONMENTAL QUALITY



SOURCE: Johnson, Lena (1994). "GAMSA: A Quantitative Assessment Model for Sustainable Architecture." in Environmental Quality: Programming, Design, Construction, Management.

APPENDIX C

CHECKLIST OF USEFUL DOCUMENTS FOR P.O.E.

Client-Related Information

1. Client mission statement, organizational chart, and staffing
2. Initial program from building
3. As-built floor plans
4. Space assignments and schedules
5. Building-related accident reports
6. Records of theft, vandalism, and security problems
7. Maintenance/repair records
8. Energy audits or review comments from heating/cooling plant manager
9. Any other feedback concerning the building which may be on record

Building Type-Related Information

1. Identification of selected recent, similar facilities
2. Review of programs and other pertinent information on the building type being evaluated
3. Identification and assessment of state-of-the-art literature

BUILDING EVALUATION QUESTIONS

We would like to know how well your building performs for all those who occupy it. Successes and failures (if any) are considered insofar as they affect occupant health, safety, efficient functioning, and psychological well-being. Your answers will help improve the design of future, similar buildings.

Below please identify successes and failures in the building by responding to the following broad information categories and by referring to documented evidence or specific building areas wherever possible:

1. Adequacy of Overall Design Concept
2. Adequacy of Site Design
3. Adequacy of Health/Safety Provisions
4. Adequacy of Security Provisions
5. Attractiveness of Exterior Appearance
6. Attractiveness of Interior Appearance
7. Adequacy of Activity Spaces
8. Adequacy of Spatial Relationships
9. Adequacy of Circulation Area
10. Adequacy of Heating/Cooling and Ventilation
11. Adequacy of Lighting and Acoustics.
12. Adequacy of Plumbing/Electrical.
13. Adequacy of Surface Materials
14. Underutilized or Overcrowded Spaces
15. Other (need facilities currently lacking).

OCCUPANT SURVEY

We wish to conduct a post-occupancy evaluation of your building. The purpose of this evaluation is to assess how well the building performs for those who occupy it in terms of health, safety, security, functionality, and psychological comfort. The benefits of a post-occupancy evaluation include: identification of good and bad performance aspects of the building, better building utilization, and feedback on how to improve future, similar buildings.

Please respond only to those questions of the following survey that are applicable to you. Indicate your answers by marking the appropriate blanks with an "X".

1. **In an average work week, how many hours do you spend in the following types of spaces** *(specify)*:

Space A _____
Space B _____
Space C _____
Space D _____
Space E _____

Hours	A	B	C	D	E
0 - 5	( )	( )	( )	( )	( )
6 - 10	( )	( )	( )	( )	( )
11 - 15	( )	( )	( )	( )	( )
16 - 20	( )	( )	( )	( )	( )
21 - 25	( )	( )	( )	( )	( )
26 - 30	( )	( )	( )	( )	( )
31 - 35	( )	( )	( )	( )	( )
36 - 40	( )	( )	( )	( )	( )
40 +	( )	( )	( )	( )	( )

Key for the following quality ratings:
EX= Excellent Quality
G = Good Quality
F = Fail Quality
P = Poor Quality

2. **Please rate the overall quality of the following areas in the building:**

		EX	G	F	P
a)	Space category A	( )	( )	( )	( )
b)	Space category B	( )	( )	( )	( )
c)	Space category C	( )	( )	( )	( )
d)	Space category D	( )	( )	( )	( )
e)	Space category E	( )	( )	( )	( )
f)	Restroom(s)	( )	( )	( )	( )
g)	Storage	( )	( )	( )	( )
h)	Elevator(s)	( )	( )	( )	( )
i)	Stairs/Corridors	( )	( )	( )	( )
j)	Parking	( )	( )	( )	( )
k)	Other, specify	( )	( )	( )	( )

_____

3. **Please rate the overall quality of Space Category A in terms of the following:**

		EX	G	F	P
a)	Adequacy of space	( )	( )	( )	( )
b)	Lighting	( )	( )	( )	( )
c)	Acoustics	( )	( )	( )	( )
d)	Temperature	( )	( )	( )	( )
e)	Odor	( )	( )	( )	( )
f)	Esthetic Appeal	( )	( )	( )	( )
g)	Security	( )	( )	( )	( )
h)	Flexibility of use	( )	( )	( )	( )
i)	Other, specify	( )	( )	( )	( )

_____

4. **Please rate the overall quality of Space Category B in terms of the following:**

		EX	G	F	P
a)	Adequacy of space	( )	( )	( )	( )
b)	Lighting	( )	( )	( )	( )
c)	Acoustics	( )	( )	( )	( )
d)	Temperature	( )	( )	( )	( )
e)	Odor	( )	( )	( )	( )
f)	Esthetic Appeal	( )	( )	( )	( )
g)	Security	( )	( )	( )	( )
h)	Flexibility of use	( )	( )	( )	( )
i)	Other, specify	( )	( )	( )	( )

_____

5. **Please rate the overall quality of Space Category C in terms of the following:**

		EX	G	F	P
a)	Adequacy of space	( )	( )	( )	( )
b)	Lighting	( )	( )	( )	( )
c)	Acoustics	( )	( )	( )	( )
d)	Temperature	( )	( )	( )	( )
e)	Odor	( )	( )	( )	( )
f)	Esthetic Appeal	( )	( )	( )	( )
g)	Security	( )	( )	( )	( )
h)	Flexibility of use	( )	( )	( )	( )
i)	Other, specify	( )	( )	( )	( )

_____

6. Please rate the overall quality of Space Category D in terms of the following:

		EX	G	F	P
a)	Adequacy of space	( )	( )	( )	( )
b)	Lighting	( )	( )	( )	( )
c)	Acoustics	( )	( )	( )	( )
d)	Temperature	( )	( )	( )	( )
e)	Odor	( )	( )	( )	( )
f)	Esthetic Appeal	( )	( )	( )	( )
g)	Security	( )	( )	( )	( )
h)	Flexibility of use	( )	( )	( )	( )
i)	Other, specify	( )	( )	( )	( )

_____

7. Please rate the overall quality of Space Category E in terms of the following:

		EX	G	F	P
a)	Adequacy of space	( )	( )	( )	( )
b)	Lighting	( )	( )	( )	( )
c)	Acoustics	( )	( )	( )	( )
d)	Temperature	( )	( )	( )	( )
e)	Odor	( )	( )	( )	( )
f)	Esthetic Appeal	( )	( )	( )	( )
g)	Security	( )	( )	( )	( )
h)	Flexibility of use	( )	( )	( )	( )
i)	Other, specify	( )	( )	( )	( )

_____

8. Please rate the overall quality of the design of this building:

		EX	G	F	P
a)	Esthetic quality of exterior	( )	( )	( )	( )
b)	Esthetic quality of interior	( )	( )	( )	( )
c)	Amount of space	( )	( )	( )	( )
d)	Environmental quality (lighting, acoustics, temperature, etc.)	( )	( )	( )	( )
e)	Proximity to views	( )	( )	( )	( )
f)	Adaptability to changing uses	( )	( )	( )	( )
g)	Security	( )	( )	( )	( )
h)	Maintenance	( )	( )	( )	( )
i)	Relationship of spaces/layout	( )	( )	( )	( )
j)	Quality of building materials				
	(1) Floors	( )	( )	( )	( )
	(2) Walls	( )	( )	( )	( )
	(3) Ceilings	( )	( )	( )	( )
k)	Other, specify	( )	( )	( )	( )

_____

9. Please select and rank in order of importance facilities which are currently lacking in your building:

10. Please make any other suggestion you wish for physical or managerial improvements in your building:

11. Demographic information:

a) Your Room #/Building Area _____

b) Your Position _____

c) Your Age _____

d) Your Sex _____

e) # of Years with the Present Organization _____

SOURCE: Preiser, W.F.E., H.Z. Rabinowitz, and E.T. White. (1988). Post Occupancy Evaluation. New York: Van Nostrand Reinhold Co.

APPENDIX D

No._____

INTERVIEW SCHEDULE (IS)

1. How many years have you lived in your house?_____

2. What year was your house built?_____

3. Please describe how your passive solar house works:
   ___ a. roof overhang
   ___ b. window area faces south
   ___ c. earth sheltered on north side
   ___ d. windbreak evergreen trees on north side
   ___ e. mass wall collects heat room(s)_____
   ___partial height full height____
   ___vented ___unvented
   ___water type: Drumwall__ Kalwall tubes__ One Design__
   Other:
   ___concrete type: block__ poured__
   ___other (phase change, etc.):
   ___ f. mass floor collects heat room(s)_____
   type:
   ___ g. movable insulation insulates windows at night
   ___ h. hybrid: describe_____
   _____
   Other features:

What sources of information did you consult before buying or building your home?
magazines____ (titles_____ _____ _____
Books___ (titles_____
_____
Nat'l Cooling & Heating Information Service____
federal government publications____
state government publications____
extension publications_____
utility publications_____

4. System type:
   Direct gain ___
   Direct gain/indirect gain___
   Direct gain hybrid _____

Source: McLain-Kark, J. (1985). User Participation in Passive Solar Housing Design. Ph.D. Dissertation. University of Tennessee, Knoxville, Tennessee.

5. Check one of the following statements which most accurately reflects the homeowner's involvement in the design and construction of the house.

___(0) No involvement.
___(1) Selected or helped select wall and/or floor finishes.
___(2) Worked with designer on floor plan and/or solar features.
___(3) Designed floor plan and/or solar features.
___(2) Contributed physical labor during construction.
___(3) Did most of the actual construction of the house.

Total:____

6. Would you run me through a typical weekday's routine for your family: (KIT, DR, BR, BA=bath, FR, BS=basement, etc.)

Order of occurence	Room activity located	Time	Comments:
___ a.m. wake up	_____	_____	
___ use bath	_____	_____	
___ dress	_____	_____	
___ turn up thermostat	_____	_____	
___ fire up woodstove	_____	_____	
___ turn on space htr	_____	_____	
___ fix breakfast	_____	_____	Who?
___ eat breakfast	_____	_____	

All household members eat at same time? Yes___ No___
If not, indicate members and time for each:
(F=father, M=mother, D=daughter, S=son) ___ Time ____
___ ____
___ ____

___ open draperies/ shutters	_____	_____	
___ go to work	_____	_____	Who?
___ read			
___ watch T.V.			
___ yardwork	_____	_____	
___ housework			
___ return home	_____	_____	
___ close shutters	_____	_____	
___ turn on space htr	_____	_____	
___	_____	_____	
___	_____	_____	
___	_____	_____	

Comments:_____

***Would you run me through a typical weekend day's routine:

Order of occurence		Room activity located	Time	Comments:
___	a.m. wake up	_____	_____	
___	use bath	_____	_____	
___	dress	_____	_____	
___	turn up thermostat	_____	_____	
___	fire up woodstove	_____	_____	
___	turn on space htr	_____	_____	
___	fix breakfast	_____	_____	Who?
___	eat breakfast	_____	_____	

All household members eat at same time? Yes___ No___

If not, indicate members and time for each:

(F=father, M=mother, D=daughter, S=son) ___ Time _____

___ ___

___ ___

___	open draperies/ shutters	_____	_____	
___	turn down thermostat	_____	_____	
___	go to work	_____	_____	Who?
___	read			
___	watch T.V.			
___	yardwork	_____	_____	
___	housework			
___	close shutters	_____	_____	
___	return home	_____	_____	
___		_____	_____	
___		_____	_____	
___		_____	_____	
___		_____	_____	

Comments: _____

_____

_____

_____

How do you feel your family's daily routine differs now as compared to the daily routine in previous houses you've lived in?

___ extra task: woodstove
___ extra task: movable insulation
___ extra task: operate vents
___ activities occur in different rooms
___ sit and look outside more
___ family spends more time together
___ family spends more time at home
___ family member(s) spend more time working on house
___ other:

HOUSEHOLD MEMBERS, SEX, AND AGE

Sex	Age	Relationship
___	___	_____
___	___	_____
___	___	_____
___	___	_____
___	___	_____
___	___	_____

7a. Maintenance tasks for system and auxiliary heating: (coded for intensity of involvement)

___ (0) No maintenance tasks.
___ (1) Opening/closing shutters (less than 5 mins. per day).
___ (2) Opening/closing shutters (about 10 mins. per day).
___ (3) Opening/closing shutters (over 10 mins. per day).
___ (1) Operating vents or fans (less than 5 minutes per day).
___ (2) Operating vents or fans (about 5 mins. per day).
___ (3) Operating vents or fans (over 10 mins. per day).
___ (1) Seasonally adjusting or applying shading devices.
___ (3) Operating woodstove.
___ (3) Making repairs or adjustments to system.

Total: _____

7b. On a scale of one to five, what would you say your level of enjoyment is with the solar maintenance tasks (excluding woodstove operation)? 1 2 3 4 5

7c. On a scale of one to five, what would you say your level of enjoyment is with the woodstove operation? NA___ 1 2 3 4 5

I AM INTERESTED IN THE FURNISHINGS YOU CHOSE FOR YOUR HOUSE
(NOTE: ASK ONLY THOSE THAT ARE RELEVANT)

8. Window Treatments:

Type:	Mfgr or description	Room	Satisfaction
___pull down shade	_____	_____	1 2 3 4 5
___pulley shade	_____	_____	1 2 3 4 5
___draperies	_____	_____	1 2 3 4 5
___pvc rolling shutter	_____	_____	1 2 3 4 5
___horiz. 1" blind	_____	_____	1 2 3 4 5
___vertical blind	_____	_____	1 2 3 4 5
___roman sh.(wood)	_____	_____	1 2 3 4 5
___roman sh.(fabric)	_____	_____	1 2 3 4 5

Comments_____

On a scale of 1 to 5, what would you say your level of enjoyment is with the operation of the window treatments? 1 2 3 4 5
Comments_____

9. Do you have any suggestions for designers of energy efficient window treatments or movable insulation?
___ easier to use ___ more insulating
___ better-looking ___ available in more colors
other:

10. Floor covering (living area):
a.___quarry tile (color_____reflectance___size___)
b.___ceramic tile (color_____reflectance___size___)
c.___brick floor(color_____reflectance___)
d.___seamless vinyl covering (color_____reflectance___)
e.___hardwood (stain:_____finish_____)
f.___pine or softwood (stain_____finish_____)
g.___carpeting (color_____reflectance____type_____)

11. Do you feel that furniture was difficult to arrange in this house in any room? What room? _____ Other rooms?_____
Very difficult to arrange _____
Somewhat difficult to arrange_____
Not difficult to arrange_____
If so, why?_____

12. Have you noticed any problems with fading of fabrics or deterioration of surface finishes? Yes___ No___
If yes, describe:

THERMAL COMFORT
(HYPOTHESIS 6 & 7)

13. What is the warmest area of the house in the winter?_____
time of day_____

Is there anything you particularly do about the warm areas? Yes__No__
If yes, what do you do?

CODED AS NUMBERED: 0=less effective interior design or clothing management to conserve energy. 3-5=more effective interior design or clothing management to conserve conserve energy.

____ (2) Take off some clothing (to short sleeves).
____ (3) Take off most of clothing (i.e. shorts and t-shirt).
____ (2) Move to another area of house.
____ (0) Close draperies or shades.
____ (0) Open windows to vent heated air outside.
____ (1) Turn on fan to circulate air to other part of house.
____ (0) Turn on air conditioning.
Other actions _____

_____

14. What area of the house gets the coolest during the winter?_____
Is there anything you particularly do about the cool areas? Yes__No__
If yes, what do you do?

CODED AS NUMBERED: 0=less effective interior design or clothing management to conserve energy. 1-3=more effective interior design or clothing management to conserve energy.

____ (1) Fire up woodstove/fireplace.
____ (2) Move closer to woodstove for warmth.
____ (0) Turn up auxiliary central heating.
____ (1) Turn on space heater (i.e. kerosene or electric).
____ (2) Put on a warm clothing item (i.e. a sweater).
____ (3) Put on two warm clothing items (i.e. sweater and hat).
____ (4) Put on three or more warm clothing items (sweater, vest, hat, insulated underwear, etc.).
Other actions _____

_____

(HYPOTHESIS 6)

15a. Are there some areas of the house your family does not use in the wintertime? Yes_____ No_____ If yes, does the family sometimes close off the rooms from the heating? Yes____No___

Yes=1

15b. Have you done any of the following things to conserve energy after the house was already built? (Each response coded as 1 and added with 13 and 14 for willingness to conserve energy index.)

___ a. added additional weatherstripping and insulation.
___ b. lowered water heater thermostat to below 110 degrees.
___ c. lowered thermostat of auxiliary central heating to below 65 degrees or keep indoor temperature with other auxiliary heating to below 65 degrees.

VISUAL COMFORT
(HYPOTHESES 6 & 7)

16. What measures have the homeowners taken to adapt to glare:

CODED AS NUMBERED: 0=less effective interior design or clothing management to conserve energy. 1+=more effective interior design or clothing management to conserve energy.

___ (1) rearranged furniture to face away from window.
___ (1) put on sunglasses.
___ (1) put in many houseplants to diffuse the light.
___ (0) seating facing south wall
___ (0) close draperies
___ (0) no evidence of efforts to diffuse light.

Based on observation, indicate severity of glare problem (Document with photographic slides):

___ severe problem.
___ moderate problem.
___ minor problem.
___ no problem.

17. In walking through your house, I noticed the sunlight coming through those windows. How do you feel about the sunlight? (CODED: 0=lower sunlight preference, 1=higher sunlight preference)

First item mentioned:

___ (1) The sunlight is great for raising plants.
___ (1) I like the sunlight to sunbathe or just sit in the sun.
___ (1) I really like the look of the sunlight in the room.
___ (0) The sunlight sometimes bothers me so I close the shades.
___ (0) I worry about the sunlight fading the furnishings.
___ other:

18. Do you ever sit in the sun to read (in the house during the winter)?

___ (0) Never ___ (1) Sometimes ___ (2) Often

19. Do you ever sunbathe in the wintertime in the house?

___ (0) Never ___ (1) Sometimes ___ (2) Often

20. Do you sometimes just watch the sunlight in the room?

___ (0) Never ___ (1) Sometimes ___ (2) Often

Total (Satisfaction with Sunlight) 17 thru 20:

21. Where does television viewing occur?_____

Do you have problems with too much light or veiling reflections?

Yes___ No___ If yes, what have you done about it?

_____

22. What are the most positive aspects of your house?
___ like the feeling of sunlight and warmth.
___ the energy savings.
___ the fact that we use a renewable energy resource.
___ the house design and layout fits our needs well.
___ location.
___ appearance.
___ innovative solar features.
___ site and yard.
___ neighborhood and neighbors.
___ ease of maintenance and convenience.
___ roominess and spaciousness.
___ low cost
___ other:

23. What are the most negative aspects?
___ not as much energy savings as expected.
___ too much sun.
___ not enough sunlight.
___ overheating.
___ appearance.
___ house doesn't fit in neighborhood.
___ house too small.
___ lack of privacy.
___ neighborhood and neighbors.
___ location
___ house design and layout does not fit our needs.
___ amount of maintenance and inconvenience.
___ traffic
___ cost of home.
___ other:

24. If there is anything you could change about your house, what would it be?
___ solar features simpler.
___ house larger.
___ look more conventional.
___ less costly.
___ location.
___ site and yard.
___ house design and layout.
___ maintenance.
___ neighborhood and neighbors.
___ appearance.
___ other:

25. Compared to previous homes you have owned or lived in, how is this house different?
___ open plan or multi-purpose room.
___ more sunlight in house.
___ located in more secluded area.
___ cozy and warmer in winter.
___ cooler in summer.
___ other:

26. Open Plan: Yes___ No___
I noticed that the living-dining-kitchen is open (no walls). Does this affect your family in anyway?
___ acoustics can cause interference in activities.
___ able to communicate with others in different area.
___ able to supervise children better.
___ other:

What do you like best about the open plan?
___ spaciousness and feeling of openness.
___ uniqueness of design.
___ can supervise children better.
___ other:

Is there anything you dislike about the open plan?
___ acoustical conflicts when family members trying to do two different activities.
___ not enough wall space to hang pictures.
___ not enough walls to put furniture against.
___ not enough storage space.
___ other:

27. Where is your favorite place in the house? _____

Why?_____

The children's favorite place?_____

_____

28. On a scale of 1-10 (10 being the highest), how would you rate your overall satisfaction with your home? _____

ENERGY CONSUMPTION

Location: Heating Degree Days:
Square Footage (include walk-out basement):

Type of auxiliary heating: Gas___ Oil___ Electric___ Kerosene___
Other:_____

UTILITY BILLS

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
Electric	____	____	____	____	____	____	____	____
Gas	____	____	____	____	____	____	____	____
Oil	____	____	____	____	____	____	____	____
Kerosene	____	____	____	____	____	____	____	____
Wood	____	____	____	____	____	____	____	____
Other:_____	____	____	____	____	____	____	____	____

Average summer monthly bill: Total Utility Bills: _____

No. of auxiliary heating units consumed (#cords, #therms, etc.):
____kWh electricity ____gallons of oil____cords of wood
____therms of gas ____gallons of kerosene ____other:_____

Price paid per unit:_____ Total auxiliary heating bill:_____

#Btu's per unit:_____
Total Number of Btu's consumed for auxiliary heating:_____

29a. Index of Energy Conservation:
Total #Btu's divided by Square Footage + Heating Degree Days =

29b. How satisfied are you with the heating bills you had this past winter?

Very dissatisfied				Very satisfied
1	2	3	4	5

OBSERVATION SCHEDULE

Checklist on Observation of Physical Traces

1. PERCEIVED COMPLEXITY (HYPO 1)
   1.___evidence of modification of system to optimize or enhance the energy savings.
   2.___evidence of modification of system which might interfere with energy savings.
   Comment:

2. WILLINGNESS TO CONSERVE ENERGY (HYPO 5)
   ____ (1) furniture arranged around woodstove helps heat transfer.
   ____ (1) electric blankets, extra quilts (use rather than turn up thermostat)
   ____ (1) afghans, blankets, or warm clothing located in or adjacent to living area for warmth during cool periods.
   ____ (1) other:

   ____ (0) no evidence of willingness to conserve energy.

3. EFFECTIVE INTERIOR DESIGN TO CONSERVE ENERGY: (HYPO 6)
   Interior Design:

Positive (+1)	Negative (0)
1.___high reflectance finishes for non-mass surfaces.	1.___low reflectance finishes for non-mass surfaces help to overheat home.
2.___low reflectance finishes for mass surfaces.	2.___high reflectance finishes for mass surface doesn't store heat well.
3.___furnishings used as heat storage. (i.e. ceramic table, etc.)	3.___no evidence of furnishings used as heat storage.
4.___south wall free from any major obstructions.	4.___furniture obstructing south wall.
5.___all matte surfaces reduce reflected glare.	5.___shiny surfaces enhance reflected glare problem.

4. CONSISTENCY AND INTENSITY OF INVOLVEMENT WITH MAINTENANCE TASKS: (HYPO 7)

___ (1) evidence of "tinkering" i.e. construction projects to enhance system, i.e. shutters, solar collectors, etc.
___ (1) shutters or window treatments show evidence of use
___ (1) vents or fans show evidence of use.
___ (1) other evidence:

___ (0) no evidence of involement with home (i.e. shutters look as if they are rarely used, or central air system only involves turning up thermostat)

Comments:

Total Score: _____

5. VOLUNTARY SIMPLICITY (HYPO 8)

___ (1) refinishing furniture, carpentry work
___ (1) physical exercise (bicycle, weights, exercise mat, etc.)

___ (.5) ecological posters, Sierra Club calendars, Solar organization calendars.
___ (1) food preservation or vegetable gardening.
___ (1) recycling of cans, glass or newspapers
___ (.5) books on self-reliance, ecology, physical exercise, etc.
___ (1) other:

___ (0) no evidence of voluntary simplicity.

Total:

6. SATISFACTION (HYPO 11)

evidence of dissatisfaction or dysfunctions:

___ (0) restricted living room size creates congested living area.
___ (0) furniture obstructs southwall because of restricted room size.
___ (0) other evidence of dissatisfaction:

evidence of satisfaction:

___ (1) seating arranged around woodstove for warmth and enjoyment.
___ (1) comfortable chair in direct sunlight to enjoy sunlight.
___ (1) other evidence of satisfaction:

No. _____

SELF-ADMINISTERED SURVEY (SA)

PLEASE INDICATE HOW STRONGLY YOU AGREE OR DISAGREE WITH THE FOLLOWING STATEMENTS BY CHECKING ONLY ONE BLANK FOR EACH STATEMENT:

1. Self-sufficiency is an important goal for our family.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
_____	_____	_____	_____	_____

2. Saving money is very important to us.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
_____	_____	_____	_____	_____

3. Using a renewable energy resource instead of fossil fuels is an important goal for our family.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
_____	_____	_____	_____	_____

4. Our home is compatible with the way we live.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
_____	_____	_____	_____	_____

5. If we were to buy another house, it would be different from this one.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
_____	_____	_____	_____	_____

6. Sometimes, we worry that we may lose money if we were to sell our house.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
_____	_____	_____	_____	_____

7. We are willing to go to a lot of trouble to conserve energy.

_____ Strongly Disagree _____ Disagree _____ Neutral _____ Agree _____ Strongly Agree

8. Our house is comfortably warm in the wintertime.

_____ Strongly Disagree _____ Disagree _____ Neutral _____ Agree _____ Strongly Agree

9. Our house is comfortably cool in the summer.

_____ Strongly Disagree _____ Disagree _____ Neutral _____ Agree _____ Strongly Agree

10. Our house has saved us a lot on energy bills.

_____ Strongly Disagree _____ Disagree _____ Neutral _____ Agree _____ Strongly Agree

11. We are very happy with our home.

_____ Strongly Disagree _____ Disagree _____ Neutral _____ Agree _____ Strongly Agree

12. We sometimes find we do not have the time to do the solar maintenance tasks.

_____ Strongly Disagree _____ Disagree _____ Neutral _____ Agree _____ Strongly Agree

13. We are consistent in performing solar maintenance tasks for our home.

_____ Strongly Disagree _____ Disagree _____ Neutral _____ Agree _____ Strongly Agree

14. We especially enjoy the sunlight on the interior of our home.

_____ Strongly Disagree _____ Disagree _____ Neutral _____ Agree _____ Strongly Agree

15. New ideas are very exciting to me.

_____ Strongly Disagree _____ Disagree _____ Neutral _____ Agree _____ Strongly Agree

(NOTE: Question 16 and 17 were sent to survey only sample.)

16. How many years have you lived in your house? _____

When was your house built? _____

What type of solar system does your house contain? Check all that apply.

____ Direct gain
____ Indirect gain (such as Trombe wall, waterwall, Rodwall, etc.)
____ Greenhouse or sunspace
____ Active heating system
____ Active hot water heating system
____ Other, please describe:

17. Check any of the following statements which most accurately reflects your involvement in the design and construction of your house.

____ House was already built and finished when purchased so was was not involved in design or construction.
____ Selected or helped select wall, floor finishes, or cabinetry.
____ Worked with designer on floor plan and/or solar features.
____ Designed floor plan and/or solar features.
____ Contributed physical labor during construction.
____ Did most of the actual construction of the house.

Check any of the statements which reflect your involement with the operation of your home.

____ No maintenance tasks for passive solar system.
____ Opening/closing shutters or shades (less than 5 mins. daily).
____ Opening/closing shutters or shades (about 10 mins. daily).
____ Opening/closing shutters or shades (over 10 mins. daily).
____ Operating vents or fans.
____ Seasonally adjusting or applying shading devices.
____ Operating woodstove.
____ Making repairs or adjustments to system.

Please indicate household members' sex nd age:

Sex	Age
___	___
___	___
___	___
___	___
___	___

FOLLOWING ARE A FEW QUESTIONS ABOUT YOU AND YOUR HOUSEHOLD.

18. Does anyone in your household own any of the following? (CHECK ALL THAT APPLY)
    1.____Video game
    2.____Home computer
    3.____Microwave oven
    4.____Solar toys and gadgets (calculators, wristwatches, etc.)

19. Which of the following activities have you engaged in during the last year? (CHECK ALL THAT APPLY)
    1.____(1) Worked with others to help solve community problems
    2.____(1) Contacted political officials or politicians
    3.____(3) Ran for political office
    4.____(1) Wrote a letter to the editor
    5.____(2) Made a speech
    6.____(2) Worked on a political campaign
    7.____(2) Wrote an article
    8.____(2) Was an officer of a community organization
    9.____(1) Signed a petition
    10.____(1) Often gave friends and neighbors advice
    11.____(0) None of these

WE NEED TO KNOW SOMETHING ABOUT YOUR FAMILY INCOME. THIS INFORMATION IS ANONYMOUS AND WILL NOT HAVE YOUR NAME ASSOCIATED WITH IT IN ANYWAY. IT WILL BE USED ONLY TO GROUP PEOPLE TOGETHER WHO HAVE SIMILAR INCOMES.

20. Please check off which category best represents the total annual income, before taxes, of your immediate family living in your household?
    1.___Under $5000 a year (or under $96/wk.)
    2.___$5000-$6999 a year (or $96-$134.50/wk.)
    3.___$7000-$9999 a year (or $135-$192.50/wk.)
    4.___$10,000-$11,999 a year (or $193-$229.50/wk.)
    5.___$12,000-$14,999 a year (or $230-$288.50/wk.)
    6.___$15,000-$19,999 a year (or $289-383.50/wk.)
    7.___$20,000-$24,999 a year (or $384-$480.50/wk.)
    8.___$25,000-$34,999 a year (or $481-$672.50/wk.)
    9.___$35,000-$44,999 a year (or $673-$864.50/wk.)
    10.___$45,000-$54,999 a year (or $865-$1056.50/wk.)
    11.___Over $55,000 a year (or over $1057/wk.)

21. Please check off which one of the following categories most nearly describes the kind of work the chief wage earner in your immediate family does. (IF CHIEF WAGE EARNER IS UNEMPLOYED, CHECK OFF WHAT TYPE OF WORK HE/SHE WOULD DO IF EMPLOYED.) (CHECK ONE)

1. ____PROFESSIONAL WORKER: e.g. lawyer, doctor, scientist, teacher, systems analyst, muscian, etc.
2. ____WORKS AT A SKILLED TRADE OR CRAFT: e.g., printer, baker, tailor, RR engineer, plumber, or does mechanical work such as garage mechanic, carpenter.
3. ____SEMI-SKILLED WORKER: e.g. operates a machine in a factory, is an assembly-line worker in a factory, drives a truck, taxi.
4. ____MANAGER, EXECUTIVE, OR OFFICIAL: in business, government agency, or other organization.
5. ____RUNS OWN BUSINESS WITH ONE OR MORE EMPLOYEES: e.g., store, factory, plumbing, contractor, etc.
6. ____FARM OWNER, FARM MANAGER
7. ____CLERICAL OR OFFICE WORKER: in business, government agency, or other type of organization, e.g. typist, secretary, postal
8. ____SALES WORKER: e.g., a clerk in a store or a door-to-door salesperson
9. ____MANUFACTURER'S REPRESENTATIVE: e.g., outside salesperson, salesperson.
10. ____SERVICE WORKER WHO PERFORMS SERVICES: e.g., policeman, fireman, waiter, maid, or barber.
11. ____LABORING WORKER (other than farm): e.g. plumber's assistant, construction laborer, longshore
12. ____FARM LABORER, FARM HELPER, OR FARM FOREMAN
13. ____RETIRED
14. ____FULL-TIME STUDENT
15. ____HOUSEWIFE
16. ____OTHER (please specify)_____

22. What is the highest level of education you have completed? (CHECK ONE)

1. ___Less than high school
2. ___High shool graduate
3. ___Trade or technical school
4. ___Some college
5. ___College graduate
6. ___Graduate work or more

HERE IS A SET OF STATEMENTS ABOUT ACTIVITIES THAT SOME PEOPLE ENGAGE IN. PLEASE INDICATE WHETHER AND HOW MUCH YOU OR MEMBERS OF YOUR HOUSEHOLD ENGAGE IN THESE ACTIVITIES

23. Use a bicycle for transportation or recreation (CHECK ONE)
    1.___ Very frequently ride bicycle.
    2.___ Frequently ride bicycle.
    3.___ Sometimes ride bicycle.
    4.___ Never ride bicycle.

24. Recycle the newspapers, glass, or cans used at home. (CHECK ONE)
    1.___ Recycle all of this material.
    2.___ Most of this material.
    3.___ About half of this material.
    4.___ Some of this material.
    5.___ Never recycle.

25. Developing and using skills to increase self-reliance, such as in carpentry, car, repair, food preservation. (CHECK ONE)
    1.___ Very frequently use these skills.
    2.___ Frequently use these skills.
    3.___ Sometimes use these skills.
    4.___ Rarely use these skills.

26. Buying clothing at a garage sale or second-hand store. (CHECK ONE)
    1.___ All of the household's clothing.
    2.___ Most items.
    3.___ About half of the household's clothing.
    4.___ A few items.
    5.___ None of the household's clothing.

27. Contribute to ecologically-oriented organizations (such as the Sierra Club, etc. (CHECK ONE).
    1.___ Contribute regularly to 2 or more organizations.
    2.___ Contribute regularly to 1 organization.
    3.___ Occasionally contribute.
    4.___ Used to contribute, but no longer do.
    5.___ Never have contributed.

28. Engage in exercise for physical fitness (e.g. running, swimming, calisthenics, etc.)
    1.___ Very frequently exercise.
    2.___ Frequently exercise.
    3.___ Sometimes exercise.
    4.___ Rarely exercise.

HOUSING SATISFACTION SCALE

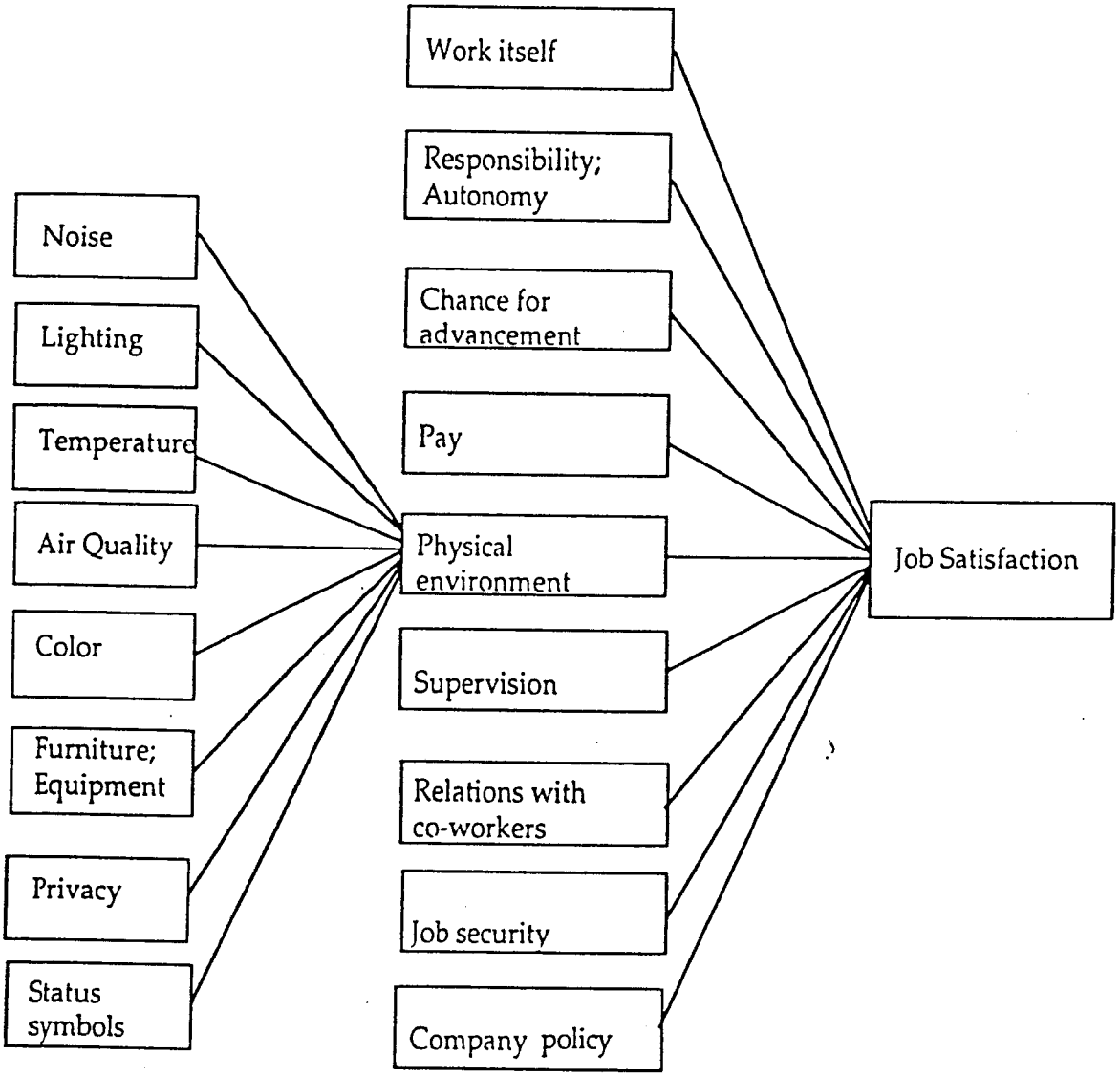
FOR EACH OF THE FOLLOWING HOUSING CHARACTERISTICS RATE HOW IMPORTANT EACH FEATURE IS TO YOU. THEN RATE HOW SATISFIED YOU ARE WITH THE FEATURE. RATE THE IMPORTANCE OF THE FEATURE ON A SCALE OF 1 THROUGH 6 (1 INDICATES VERY UNIMPORTANT; 6 INDICATES VERY IMPORTANT). YOUR SATISFACTION WITH THE FEATURE SHOULD ALSO BE RATED ON A SCALE OF 1 THROUGH 6 (1 INDICATES VERY DISSATISFIED; 6 INDICATES VERY SATISFIED).

VERY UNIMPORTANT					VERY IMPORTANT		VERY DISSATISFIED					VERY SATISFIED
						1. LAYOUT OF FLOOR PLAN:						
1	2	3	4	5	6	Privacy for family members (1a).	1	2	3	4	5	6
1	2	3	4	5	6	Separation of children and parent areas (1b).	1	2	3	4	5	6
1	2	3	4	5	6	Number of rooms (1c).	1	2	3	4	5	6
1	2	3	4	5	6	Arrangement of rooms (1d).	1	2	3	4	5	6
						2. STORAGE:						
1	2	3	4	5	6	Closet space in master bedroom (2a).	1	2	3	4	5	6
1	2	3	4	5	6	Closet space in other bedrooms (2b).	1	2	3	4	5	6
1	2	3	4	5	6	Storage for household linens (2c).	1	2	3	4	5	6
1	2	3	4	5	6	Storage for cleaning equipment and supplies (2d).	1	2	3	4	5	6
1	2	3	4	5	6	Storage at entry (2e).	1	2	3	4	5	6
1	2	3	4	5	6	Storage space in bath (2f).	1	2	3	4	5	6
						3. LIVING ROOM (note: if house has family room or recreation room, refer to room family uses most for family activities, i.e. tv-watching, etc.)						
1	2	3	4	5	6	Flexibility in arrangement of furniture (3a).	1	2	3	4	5	6
1	2	3	4	5	6	Size of living area (3b).	1	2	3	4	5	6
1	2	3	4	5	6	Floor coverings (3c).	1	2	3	4	5	6

VERY UNIMPORTANT					VERY IMPORTANT		VERY DISSATISFIED					VERY SATISFIED
						4. DINING:						
1	2	3	4	5	6	Size of dining space (4a).	1	2	3	4	5	6
1	2	3	4	5	6	Location of dining area(s) (4b).	1	2	3	4	5	6
1	2	3	4	5	6	Floor coverings (4c).	1	2	3	4	5	6
1	2	3	4	5	6	Flexibility of furniture arrangement (4d).	1	2	3	4	5	6
						5. KITCHEN:						
1	2	3	4	5	6	Amount of counter space (5a).	1	2	3	4	5	6
1	2	3	4	5	6	Amount of storage space (5b).	1	2	3	4	5	6
1	2	3	4	5	6	Arrangment of work space (5c).	1	2	3	4	5	6
						6. BEDROOMS:						
1	2	3	4	5	6	Number of bedrooms (6a).	1	2	3	4	5	6
1	2	3	4	5	6	Flexibility in arranging furniture in master bedroom (6b).	1	2	3	4	5	6
1	2	3	4	5	6	Flexibility in arranging furniture in other bedrooms (6c).	1	2	3	4	5	6
1	2	3	4	5	6	Size of master bedroom (6d).	1	2	3	4	5	6
1	2	3	4	5	6	Size of other bedrooms (6e).	1	2	3	4	5	6
						7. BATH:						
1	2	3	4	5	6	Number of bathrooms (7a).	1	2	3	4	5	6
1	2	3	4	5	6	Size of bathroom(s) (7b).	1	2	3	4	5	6
1	2	3	4	5	6	Arrangement of bathroom fixtures (7c).	1	2	3	4	5	6

APPENDIX E

FACETS OF THE PHYSICAL ENVIRONMENT CONTRIBUTING TO JOB SATISFACTION



SOURCE: Sundstrom, E. (1986). Work Places. New York: Cambridge University Press.

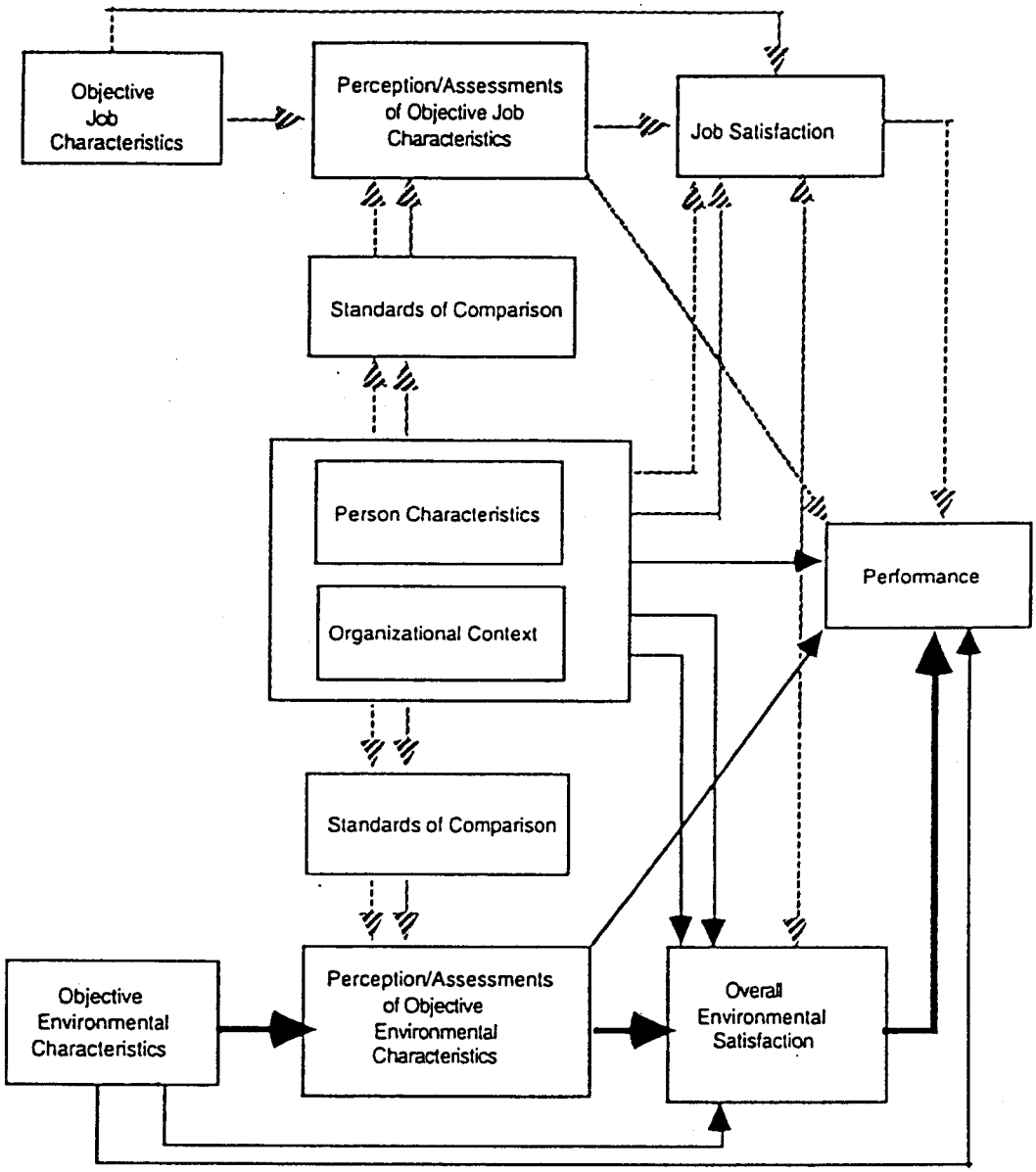
LEVELS OF ANALYSIS, FACETS OF THE ENVIRONMENT, PROCESS AND OUTCOMES

Level of Analysis	Facets of Physical Environment	Key Processes	Outcomes
Individual workers	Ambient Conditions Temperature Air quality Lighting Noise Music Work Stations Color Equipment Chair Floor space Supporting Environment Hallways Restrooms Work areas, etc.	Adaptation Arousal Overload Stress Fatigue Attitudes	Satisfaction Performance
Inter-personal relationships	Work spaces Differentiation Room layout Seating arrangements Furniture Building layout Inter-work-space proximity Enclosure of work spaces Gathering places	Self-identity Status Regulation of immediacy Self-presentation Choices in communication Regulation of interaction (privacy)	Adequacy of communication Group formation Group cohesion
Organizations	Buildings Separation of work units Differentiation of work units	Congruence of organizational structure and physical environment	Organizational effectiveness

SOURCE: Sundstrom, E. (1986). Work Places. New York: Cambridge University Press.

APPENDIX F

CONCEPTUAL MODEL FOR EVALUATING WORK ENVIRONMENTS



Source: Marans and Sprekelmeyer, 1986. A conceptual model for evaluating work environments, in J. D. Wineman, Behavioral issues in Office Design. New York, Van Nostrand Reinhold, pp. 678 - 84.

Note: Heavy lines suggest a relationship of importance to the environmental designer. Broken lines represent relationships not investigated by Al-Saleem. double lines denote characteristics of organizations and in their individual employees.

APPENDIX G

XYZ BUILDING OCCUPANTS QUESTIONNAIRE SURVEY NO.____

Dear XYZ Building Occupant:

This is the questionnaire we told you about several days ago. As you may recall, it is designed to thelp us in our evaluation of the new XYZ Company building. Please fill it out as completely as posssible and return it to the collection box as the reception desk.

If there is any question that you are unable to answer or don't want to answer, just ksip it an go on to the next one. As mentioned before, your responses to the questions will remain anonymous. Thank you for your cooperation.

Sincerely

Stepen J. Kirk, AIA, CVS
Project Manager XYZ Building Evaluation Team

---

1. Here are some words used to describe office buildings. Please rate aach of the following by placing an X in the box that best describes your feelings about the new building. For example, if you think the building is "attractive", put an X next to the work "attractive", and if you think it is "unattractive", put an X right next to the work "unattractive", and if you think it is somewhere in between, please put an X where you think it belongs.

Attractive	☐	☐	☐	☐	☐	☐	☐	Unattractive
Well kept up interiors	☐	☐	☐	☐	☐	☐	☐	Poorly kept up interiors
Well kept up outside	☐	☐	☐	☐	☐	☐	☐	Poorly kept up on outside
Good architectural quality	☐	☐	☐	☐	☐	☐	☐	Poor architectural quality
Easy to find way aound	☐	☐	☐	☐	☐	☐	☐	Difficult to find way around
Pleasant	☐	☐	☐	☐	☐	☐	☐	Unpleasant
Good over all design	☐	☐	☐	☐	☐	☐	☐	Poor overall design
Stimulating spaces	☐	☐	☐	☐	☐	☐	☐	Understimulating spaces
Good personal safety	☐	☐	☐	☐	☐	☐	☐	Poor personal safety

2. During the past month, how many times have you:

	none	1 - 2 Times	3 - 10 Times	11 - 20 Times	More Often
a. Been to a conference room	☐	☐	☐	☐	☐
b. Used the vending machines	☐	☐	☐	☐	☐
c. Used the indoor lounge area	☐	☐	☐	☐	☐
d. Used the outdoor patio area	☐	☐	☐	☐	☐

3. Overall, how would you rate the building as a place to work?

- ☐ Excellent
- ☐ Pretty Good
- ☐ Fair
- ☐ Poor

4. The way offices and other work spaces in my department are arranged in terms of making it easier for employess to get their jobs done well is:

- ☐ Excellent
- ☐ Pretty Good
- ☐ Fair
- ☐ Poor

5. Please rate your personal work station on each of these characteristaics:

	Excellent	Good	Fair	Poor
a. Amount of space available to you	☐	☐	☐	☐
b. Materials used for desks, tables and chairs	☐	☐	☐	☐
c. Lighting for the work you do	☐	☐	☐	☐
d. Location of ceiling lights in relation to work area	☐	☐	☐	☐
e. Color of walls and partitions	☐	☐	☐	☐
f. Amount of space for storing thins	☐	☐	☐	☐
g. Attractiveness	☐	☐	☐	☐
h. Conversstational privacy	☐	☐	☐	☐
i. Type of floor coveirng	☐	☐	☐	☐
j. Your view ouitside	☐	☐	☐	☐
k. Access to other people	☐	☐	☐	☐
l. Wall area for hanging things (e.g., pictures)	☐	☐	☐	☐
m. Style of your furniture	☐	☐	☐	☐
n. Number of electrical outlets	☐	☐	☐	☐
o. Location of electrical outlets	☐	☐	☐	☐
p. Visual privacy	☐	☐	☐	☐
q. Amount of surface area for work	☐	☐	☐	☐
r. Comfort of your chairs.	☐	☐	☐	☐
s. Overall aesthetiac quality	☐	☐	☐	☐
t. Ventilation and aircirculation	☐	☐	☐	☐
u. Heating	☐	☐	☐	☐
v. Air Quality	☐	☐	☐	☐
w. Height of work surface	☐	☐	☐	☐
x. Size of work surface	☐	☐	☐	☐

Source: Kirk, S. (1989). "Post-occupancy value engineering. Ekistics, 58(336-337), 141-146.

APPENDIX H

Visitors Users Questionnaire

Excuse me please, Do you work in this building?
--- Yes Thank you. End contact
--- No

I'm _____, a doctoral student. At this time I am working on a study which centers on evaluating government office buildings in Saudi Arabia. Would you mind answering a few questions - It should only take a few minutes. Pause

Good. Before we start, I want to assure you that the interview is completely voluntary. If we should come to a question which you do not want to answer, just let me know and we will go to the next question.

1. Is this the first time you have been in this building?
--- Yes
--- No (Go to Q. 5)

2. About how many times during the past month have you been hear?
--- Number of times

3. Have you ever been into and out of the other department in this building?
--- Yes
--- No

4. How do you come to this building?
--- Drive
--- Walk
--- Bus
--- Other_____
(Please Specify)

Source: Al-Saleem, Y. (1992). Evaluating the Performance of Goeernment Office Buildings from the Users' Perspective: A Case Study of the Ministry of Foreign Affairs Headquarters Building In Saudi Arabia. A Ph.D Dissertation, Texas A & M University, College Station, Texas.

Building Occupants Questionnaire

1. How long have you worked for your employer?
— Less than 1 year
— 1-2 years
— More than 2 years but less than 4 years
— 4-10 years
— More than 10 years

2. How long have you worked in this building?
— 1-6 months
— 6-9 months
— More than 9 months less than 1 year
— 1-2 years
— More than 2 years

3. How do you usually get to and from work?
— Own car (Go to Q. 3.a)
— Government car (Go to Q. 3.a)
— Share a ride or a car pool (Go to Q. 3.a)
— Bus
— Walking
— Bicycle
— Other _____
(specify)

3a. Where do you usually park?
— On street
— Provided parking for employee
— Visitors Parking
— Elsewhere _____
(specify)
— Don't have a car (Go to Q.4)

3b. Have you had problems with parking?

--- Yes

---- No (Go to Q. 3.d)

3c. What kind of problems? _____

3d. Compared to where you parked before working in this building is your current parking?

— More conveniently located

— Less conveniently located

— About the same

— Did not have a car

---- Wasn't employed

4. Before you began working in this building, how did you get to and from work?

— Own car

--- Work car

--- Shared ride or car pool

---- walk

---- Bus

— Bicycle

— Other _____
(specific)

— Didn't have a car

---- Wasn't employed

5. Since you started working in this building, are you more likely than before to:

a. Meet friends in the tea lounges	— Yes	---- No
b. Use provided spaces out side the building	— Yes	---- No
c. Use the library	— Yes	---- No
d. Eat lunch in the provided food service sections	— Yes	---- No
e. Use conferences rooms	— Yes	---- No
f. Use recreational facilities	— Yes	---- No

6. How do you rate the location of this building as a place to work?

— Excellent
— Good
— Fair
— Poor

7. Overall, compared to where you worked before is the location of the building:

— Better (Go to Q. 7a)
— Worse (Go to Q. 7b)
— Same
— Wasn't employed

7a. How better? _____

7b. How worse? _____

8. The following are phrases that are to be describe buildings. Please rate each of the following by placing an x in the box that best describes your feelings toward this building.

Attractive	—	—	—	—	—	—	—	Unattractive
Well kept up interior	—	—	—	—	—	—	—	Poorly kept up interior
Well kept up outside	—	—	—	—	—	—	—	Poorly kept up outside
Poor architecture quality	—	—	—	—	—	—	—	Good architecture quality
Difficult to find way around	—	—	—	—	—	—	—	Easy to find way around
Unpleasant	—	—	—	—	—	—	—	Pleasant
Conveniently located toilets	—	—	—	—	—	—	—	not conveniently located toilets
Attractive indoor signs	—	—	—	—	—	—	—	Unattractive indoor signs
Good overall design	—	—	—	—	—	—	—	Poor overall design
Poor security	—	—	—	—	—	—	—	Excellent security
Stimulating spaces	—	—	—	—	—	—	—	Unstimulating spaces

9. During the past month how many times have you:

	None	1 - 2 Times	3 - 5 Times	5 - 10 Times	More Often
a. Been to the building conference room	---	---	---	---	---
b. Used food service section	---	---	---	---	---
c. Sat in the lounges outside food service sections	---	---	---	---	---
d. Been in another section of this building	---	---	---	---	---
e. Used the library	---	---	---	---	---
f. Used exterior provided spaces	---	---	---	---	---

10. Overall, how would you rate this building as a place to work in?

--- Excellent

--- Good

--- Fair

--- Poor

These questions deal with the overall space available to your agency that is, the offices and other workspaces assigned to your organization. please rate each of the following:

11. The way to the offices and other spaces are arranged in term of making it easier for employees to get to their jobs:

--- Excellent

--- Good

--- Fair

--- Poor

12. The way the overall spaces looks?:

--- Excellent

--- Good

--- Fair

--- Poor

8. Do you have difficulty finding the:

a. Elevator — Yes / — No

b. Stairs — Yes / — No

c. Information desk — Yes / — No

d. Rest Room — Yes / — No

9. Did you ever wonder or look around or look around the building, that is just to explore it?

— Yes

— No

10. What do you think of the appearance of the inside of the building?

— Very Attractive

— Fairly Attractive

— Not Very Attractive

— Not At All Attractive

--- Don't Know

11. What do you think about the overall appearance of the outside of the building?

— Very attractive

— Fairly Attractive

— Not Very Attractive

— Not At All Attractive

—Don't Know

12. Is there anything about the building that you specifically like?

— Yes (Go to Q. 12a)

--- No (Go to Q. 13)

12a. What do you like about it? _____

13. Sometimes arrangements of offices and work spaces can be distracting to people working in a public building. please indicate how bothersome each of the following is to your work at this building.

	Not at all bother some	Not very bother some	Fairly bother some	Very bother some
Noise				
a. Ringing telephone in my working space	---	---	---	---
b. Ringing telephone in another working space	---	---	---	---
c. Noise from other equipment in my own agency	---	---	---	---
d. Noise from equipment in other agencies	---	---	---	---
e. Conversation of others in my agency	---	---	---	---
f. Conversation of other in other agencies	---	---	---	---
g. Noise from public lobby /corridors	---	---	---	---
h. Noise from ventilating systems	---	---	---	---
i. Noise from street or exterior sources	---	---	---	---
Lighting				
j. Glare from natural sunlight	---	---	---	---
k. Glare from ceiling lights	---	---	---	---
Heating and Ventilating				
l. Too hot in the summer	---	---	---	---
m. Too cold in the summer	---	---	---	---
n. Too hot in the winter	---	---	---	---
o. Too cold in the winter	---	---	---	---
p. Drafts	---	---	---	---
q. Heat from natural sunlight	---	---	---	---
p. Stuffy air	---	---	---	---
Other Distraction				
s. People walking around	---	---	---	---
t. Frequent rearranging of furniture	---	---	---	---
u. Frequent rearranging of lighting fixtures	---	---	---	---

14. On an average working day about how much of your time is spent at your desk or working station?

— All or 100 percent
— 99 to 76 percent
— 75 to 51 percent
— 50 to 26 percent
— 25 to 1 percent
— None

15. On an average working day how often does someone from outside the building come to see you on business?

— Never
— 1 to 2 times
— 3 to 4 times
— 5 to 10 times
— more than 10 times

16. On an average working day how many times do you meet with fellow workers at your desk\ work area to discuss or perform work?

— Never
— 1 to 2 times
— 2 to 3 times
— 3 to 4 times
— 5 to 10 times
— More than 10 times

17. On an average working day about how much time is spent talking on the telephone?

— 100 to 76 percent
— 75 to 51 percent
— 50 to 26 percent
— 25 to 11 percent
— 10 to 1 percent
— None/ Work does not require phone conversation.

18. On an average working day, about how many phone conversations do you have?

--- None
--- 1 to 2
--- 3 to 4
--- 5 to 10
--- More than 10

19. Do you share a desk or working space with others?

--- Yes
--- No

20. Please rate your personal work station on each of these characteristics:

	Excellent	Good	Fair	Poor
a. Amount of space available to you	---	---	---	---
b. Quality of furniture are made	---	---	---	---
c. Lighting for the work you do	---	---	---	---
d. Location of ceiling lights in relations to work area	---	---	---	---
e. Colors of walls and partitions	---	---	---	---
f. Amount of storage space	---	---	---	---
g. Attractiveness	---	---	---	---
h. Conversational privacy	---	---	---	---
i. Type of floor covering	---	---	---	---
j. Your view outside	---	---	---	---
k. Access to other people you have to work with	---	---	---	---
l. Wall area for hanging (e.g., Pictures)	---	---	---	---
m. Style of your furniture	---	---	---	---
n. Number of electrical outlets	---	---	---	---
o. Location of electrical outlets	---	---	---	---
p. Visual privacy	---	---	---	---
q. Amount of surface area for work	---	---	---	---
r. Comfort of your chair	---	---	---	---
s. Overall aesthetic quality	---	---	---	---
t. Ventilation and air circulation	---	---	---	---
u. Heating	---	---	---	---
v. Air quality	---	---	---	---

21. Compared to where you worked before coming to this building, is your present work station:

— Better (Go to Q. 21a)
— Worse (Go to Q. 21b)
— Same
— Was not employed

21a. How is it better? _____

21b. How is it worse? _____

22. Here are some statements about peoples' jobs, please indicate how true each is in your job?

	Very true	Somewhat true	Not very true	Not at all true
a. Travel to and from work is convenient.	—	—	—	—
b. The work is interesting	—	—	—	—
c. Whenever I talk to co-worker, others can hear our conversation	—	—	—	—
d. I do as much work as I can	—	—	—	—
e. I am given adequate opportunity to make friends	—	—	—	—
f. I have the ability to develop my own special abilities	—	—	—	—
g. Whenever I talk on the telephone others around me can hear my telephone conversations	—	—	—	—
h. The people in my agency do as much work as they really can	—	—	—	—
i. I have access to the equipment and material I need to get my job done well	—	—	—	—
j. The physical surrounding are pleasant	—	—	—	—
k. Compared to where I worked before coming to this building I do more work now	—	—	—	—
l. My work surface, storage space, chair,and other furniture are what I need to get the job done well	—	—	—	—

23. Overall, how satisfied are you with your work station?
—- Very satisfied
—- Fairly satisfied
—- Not very satisfied
—- Not At All satisfied

24. How many days during the week are you easily working in this building?
—- 2 days or less per week
—- 3 days per week
—- 5 days per week
—- more than 5 days per week

25. During your average working day, how many times you leave the building in connection with your work?
—- None, never leave the building
—- 1-2 times
—- 3-4 times
—- 5 or more times

26. About how long does it take you to get to work?
—- Less than 15 minutes
—- 30-40 minutes
—- 45-59 minutes
—- One hour or more

This complete the questionnaire. Thank you for your cooperation. If you have any additional comments about the building, feel free to write them down on the back of this page.

5. How did you get to this building this time (on this trip)

--- Drive (Go to Q. 5a)
--- Walk (Go to Q. 6)
--- Bus (Go to Q. 6)
--- Bicycle (Go to Q. 6)
--- Other _____ (Go to Q. 6)
(please specify)

5a. Where did you park? _____

5b. Did you have problems with parking?

--- Yes (Go to Q. 5d)
--- No (Go to Q. 5c)

5c. What kind of problems did you have? _____

5d. In general, how convenient is parking around here?

--- Not Convenient
--- Not Very Convenient
--- Fairly Convenient
--- Not At All Convenient

6. Do you ever have difficulty in finding your way to the places you had to go to in the building?

--- Yes
--- No

7. Did you ever use:

a. Elevator	--- Yes --- No	(Go to Q. 8a)
b. Stairs	--- Yes --- No	(Go to Q. 8b)
c. Information Desk	--- Yes --- No	(go to Q. 8c)
d. Rest Rooms	--- Yes --- No	(Go to Q. 8d)

13. Is there anything about the building that you specifically don't like?

— Yes (Go to Q. 13a)

— No (Go to Q. 14)

13a. What don't you like about it? _____

14. How well do you think the building fits into the Context?

— Very Well

— Fairly Well

— Not Very Well

— Not Well At All

---- Don't Know

APPENDIX I

FRAMEWORK FOR EVALUATION 1

Total Building Performance

I. FUNCTIONAL/SPATIAL QUALITY = satisfactory:
   - A. Individual Space Layout Quality
   - B. Aggregated Space Layout Quality
   - C. Building Siting Layout Quality
   - D. Quality of Conveniences and Services

II. THERMAL QUALITY = satisfactory:
   - A. Air Temperature
   - B. Mean Radiant Temperature
   - C. Humidity
   - D. Air Speed
   - E. Occupancy

III. AIR QUALITY = satisfactory:
   - A. Fresh Air
   - B. Fresh Air Distribution
   - C. Restriction of Mass Pollution
   - D. Restriction of Energy Pollution
   - E. Occupancy Factors and Controls

IV. ACOUSTIC QUALITY = satisfactory:
   - A. Sound Source - sound pressure levels and frequency
   - B. Sound Source - Background Noise
   - C. Sound Path - noise isolation (air and structure-borne)
   - D. Sound Path - Sound Distribution; absorption, reflection, uniformity, reverberation
   - E. Occupancy Factors and Controls

V. VISUAL QUALITY = satisfactory:
   - A. Ambient Light Levels
   - B. Task Light Levels
   - C. Contrast and Brightness Ratios
   - D. Color Rendition
   - E. View - visual information
   - F. Occupancy Factors and Controls

VI. BUILDING INTEGRITY = satisfactory:
   - A. Quality of Mechanical/Structural Properties
   - B. Quality of Physical/Chemical Properties
   - C. Visible Properties.

Source: Loftness, V., V. Hartkopf, & P Mill (1989). "Critical Frameworks for Building Evaluation: Total Building Performance, Systems Integration, and Levels of Measurement and Assessment." in Building Evaluation (ed.) W. F. E. Preiser. New York: Plenum Press.

FRAMEWORK FOR EVALUATION

Integrated Building Systems

STRUCTURAL	spatial	thermal	air quality	acoustic al	visual	building integrity
General System Type	•	•		•	O	O
System Material & Properties	•	•	•	•		•
Span, Bay Sizes, Column Spacing	•	O		O	•	•
Floor to Floor Height	O	•	O		•	
Cross-section of Structural Elements	O				O	O
Building Form: Plan, Section	O	O		•	O	
Expansion Capabilities	•	O	O	O	O	O
Connections to/ Accommodations of other Structural Components	O	•	O	O		•

ENVELOPE	spatial	thermal	air quality	acoustic al	visual	building integrity
Wall/Roof/Envelope						
Exterior Surface, Material Properties		O				•
Composite Materials, Thickness	•	O	O	O		•
Interior Surface	O	O	O	•	•	O
Form: Planar, Curved	•	O		•	O	O
Slope, Orientation	•	O		•	•	O
Module Size, Shape	•	O				•
Connection to Other Envelope Composition	O	•	O	O		•

Source: Loftness, V., V. Hartkopf, & P Mill (1989). "Critical Frameworks for Building Evaluation: Total Building Performance, Systems Integration, and Levels of Measurement and Assessment." in Building Evaluation (ed.) W. F. E. Preiser. New York: Plenum Press.

Windows/Openings	spatial	thermal	air quality	acoustic al	visual	building integrity
Material Properties	●	●		●	●	●
Size, Shape, Spacing	●	●		O	●	
Orientation		●		O	●	O
Control Systems, Sunshading	O	●		O	●	●
Control Systems, Heat Loss		O				O
Control Systems,Sec./Priv	O			●	O	
Access, Visual and Physical	O	O		O	●	●
Expansion Potential	O				O	
Change Potential-Access / Image	O				O	O
Color, Texture, Ornament	O		O		●	●

MECHANICAL	spatial	thermal	air quality	acoustic al	visual	building integrity
HVAC						
Service Generators						
Size, Volume	●	●	●	O		
Form, Configuration	●	●	●	O		
Expansion Capability	●	●	●			
Material, Ornament	O					O
Service Conduits						
Thickness, Volume of service	●	●	●	O		
Form, Shape	O	O		O	O	
Configuration, dist./rise/run	O	●	O	O		
Color, Texture, Ornament	O		O		●	●
Connection to Other Mech	●		O	O	O	O
Access		●	●	O		●

ServiceTerminals						
Planning Module	•	•	•	•	•	•
Number, Size, Capacity	•	•	•	•	O	•
Form, Material, Ornament	O			•	•	•
Interface/Expansion Capability	•	•	•	O		
Relocation Capability	O		O	O		
Connection to Other Mechanical	O		O		•	O
Control Systems						
Central Managment Systems	•	•	•	O	O	•
Local Management, Automatic/Manual	•	•	•	O	O	•
Service Generator - Size, Capacity						
Service Conduit	•	•	•	•	•	•
Thickness, Volume of Service	•	•	•	•	O	•
Interface, Expansion Cap.	O			•	•	•
Material and Ornament	•	•	•	O		
Access	O		O	O		
Service Terminals	O		O		•	O
Planning Module						
Size, Capacity	•	•	•	O	O	•
Form, Material, Ornament	•	•	•	O	O	•
Interface, Expansion Cap.						
Relocation Capability						
Connection to Other Mechanical						

POWER, TELECOMMUNICATIONS & SECURITY						
Service Generatory- Size, Cap.	•					
Service Conduit						
Thickness, Volume of Service	•					
Interface/Expansion Cap.	•					
Material, Ornament	•					•
Access						•
Service Terminals						
Planning Module	•			•		
Number, Size, Capacity	•	•				
Form, Ergonomics, Maneuverability						•
Material, Ornament	O				•	•
Interface/Expansion Cap.	•			•		
Relocation Capability	•					
PLUMBING AND FIRE SAFETY						
Service Generatory- Size, Cap.	•					
Service Conduit						
Thickness, Volume	•					
Configuration, Dist/rise/run	•			O		•
Interface/Expansion Cap.	•					
Access						•
Material, Ornament						
Service Terminals						
Planning Module	•					
Number, Size, Capacity	•		O	O		•
Form,Material, Ornament					•	•
Interface/Expansion Cap.	•		O			
Relocation Capability	•			O		

VERTICAL TRANSPORT						
Size, Volume of Service	•			•		•
Form, Configuration	•	O	•	O		O
Planning Module	•					
Expansion Capability	•	O	O			
Material, Ornament	O					•

APPENDIX J

GENERIC QUESTIONNAIRE

PLEASE RANK THE FOLLOWING ATTRIBUTES OF YOUR PARTICULAR DESK LOCATION IN THIS BUILDING. PLEASE CIRCLE THE APPROPRIATE NUMBER BETWEEN 5 (COMFORTABLE AND 1 (UNCOMFORTABLE) THAT BEST SUMMARIZES YOUR EXPERIENCE OF WORKING HERE:

Temperature comfort	1 Bad	2	3	4	5 Good
How cold it gets	1 Too Cold	2	3	4	5 Comfortable
Temperature Shifts	1 Frequent	2	3	4	5 Generally constant
Ventilation Comfort	1 Bad	2	3	4	5 Good
Air Freshness	1 State	2	3	4	5 Fresh
Air Movement	1 Stuffy	2	3	4	5 Circulating
Noise Distractions	1 Bad	2	3	4	5 Good
General Office Noise Level (Conversation and Equipment)	1 Too Noisy	2	3	4	5 Comfortabl e
Specific Office Noises (Voices and Equipment)	1 Disturbing	2	3	4	5 Not a Problem
Voice Privacy at Your Desk	1 Bad	2	3	4	5 Good
Telephone Privacy at Your Desk	1 Bad	2	3	4	5 Good
Noise from the Air Systems	1 Disturbing	2	3	4	5 Not a Problem
Noise from the Office Lighting	1 Buzz/Nois e	2	3	4	5 Not a Problem
Noise from Outside the Building	1 Disturbing	2	3	4	5 Not a Problem

Source: Vischer, Jacqueline. (1989).Environmental Quality in Offices. New York: Van Nostrand Reinhold.

GENERIC QUESTIONNAIRE, *continued*

Furniture Arrangement in Your Work Space	1 Bad	2	3	4	5 Good
Amount of Space in Your Work Space	1 Bad	2	3	4	5 Good
Work Storage	1 Insufficient	2	3	4	5 Adequate
Personal Storage	1 Insufficient	2	3	4	5 Adequate
Visual Privacy at Your Desk	1 Bad	2	3	4	5 Good
Electric Lighting	1 Bad	2	3	4	5 Good
How Bright Lights are	1 Too Much Light	2	3	4	5 Does Not get Too Bright
Glare from Light	1 High Glare	2	3	4	5 No Glare

QUESTIONNAIRE

Please rank the following attributes of your particular desk location in this building. Please circle the appropriate number between 5 (comfortable) and 1 (uncomfortable) that best summarizes your experience of working here.

1.	**Temperature comfort**	1 Bad	2	3	4	5 Good
2.	**How Cold It Gets**	1 Too Cold	2	3	4	5 Comfortable
3.	**Temperature Shifts**	1 Too Frequent	2	3	4	5 Generally Constant
4.	**Ventilation Comfort**	1 Bad	2	3	4	5 Good
5.	**Air Freshness**	1 Stale	2	3	4	5 Fresh
6.	**Air Movement**	1 Stuffy	2	3	4	5 Circulating
7.	**Noise Distractions**	1 Bad	2	3	4	5 Good
8.	**General Office Noise Level (Conversation and Equipment)**	1 Too Noisy	2	3	4	5 Comfortable
9.	**Specific Office Noises (Voices and Equipment)**	1 Disturbing	2	3	4	5 Not a Problem
10.	**Voice Privacy at Your Desk**	1 Bad	2	3	4	5 Good
11.	**Telephone Privacy at Desk**	1 Bad	2	3	4	5 Good

Source: Vischer, Jacqueline. (1989). Environmental Quality in Offices. New York: Van Nostrand Reinhold.

QUESTIONNAIRE

12.	**Noise from the Air Systems**	1 Disturbing	2	3	4	5 Not a Problem	
13.	**Noise from the Office Lighting**	1 Buzz/Noisy	2	3	4	5 Not a Problem	
14.	**Noise from Outside the Building**	1 Disturbing	2	3	4	5 Not a Problem	
15.	**Furniture Arrangement In Your Work Space**	1 Bad	2	3	4	5	Good
16.	**Amount of Space in Your Work Space**	1 Bad	2	3	4	5 Good	
17.	**Work Storage**	1 Insufficient	2	3	4 Adequate	5	
18	**Personal Storage**	1 Insufficient	2	3	4 Adequate	5	
19.	**Visual Privacy at Your Desk**	1 Bad	2	3	4	5	Good
20	**Electric Lighting**	1 Bad	2	3	4	5	Good
21.	**How Bright Lights Are**	1 Too Much Light	2	3	4 Does Not Get Too Bright	5	
22.	**Glare from Lights**	1 High Glare	2	3	4 No Glare	5	

WHAT MAKES A GOOD BUILDING?

Guidelines for Environmental Improvement

Work-Group Space Design

- Group Size
- Participatory Planning
- Absent Workers
- Storage
- Circulation
- Signage and Orientation
- Visitor Space

Acoustic Partitions or Screens

- Space Planning
- Visual Screening
- Lighting
- Acoustical Screening
- Enclosure

Noise and Building Noise Control

- Finishes
- Spacing
- Sound Masking
- Air Handling
- Acoustic Privacy
- Equipment-Generated Noise

Lighting Comfort

- Individual Adjustment
- Task-Ambient Lighting
- Warm Lighting
- Contrast Conditions
- Daylighting
- Colors
- Glare from Fixtures
- Maintenance
- VDT Lighting

Air Quality

- Standards
- Air Circulation
- Balancing
- Sources of Pollution
- Negative Ions
- Energy Conservation and Air Quality

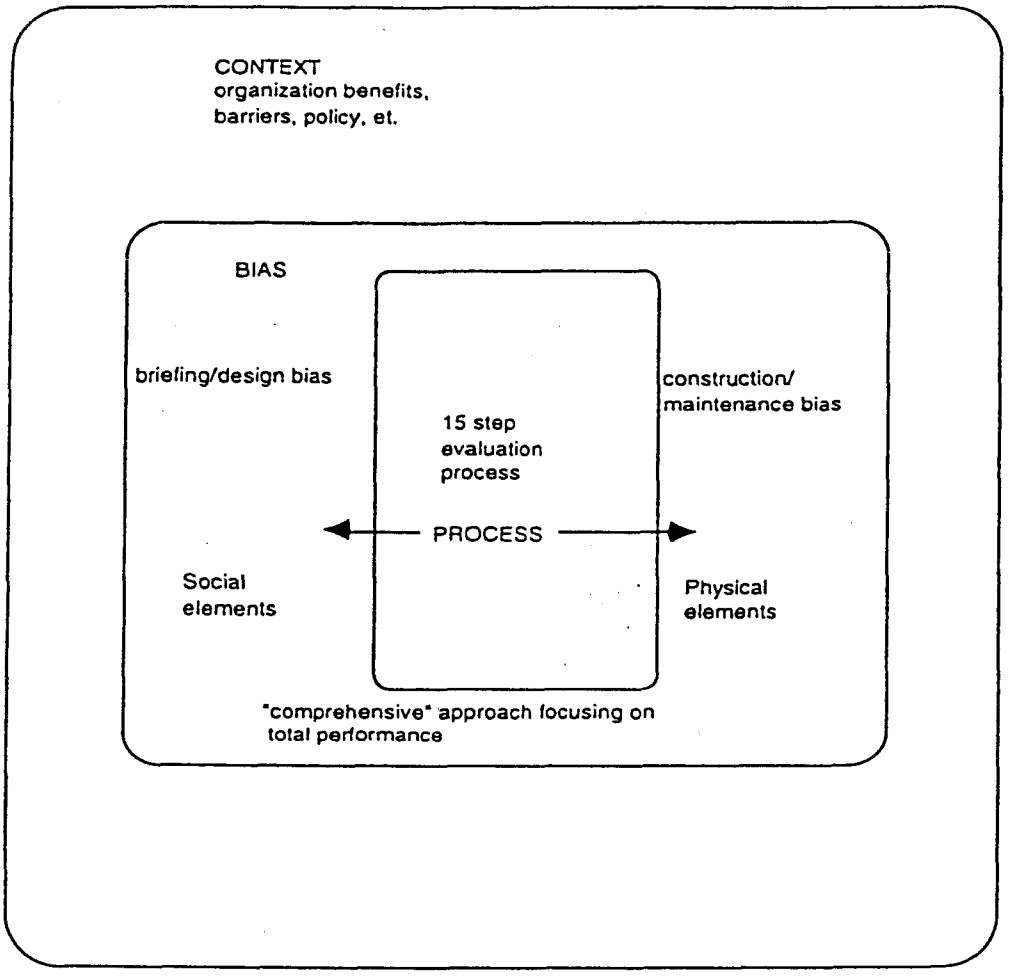
Thermal Comfort

- Cooler Temperatures
- Individual Control
- Electronic Equipment
- Heat from Windows

Source: Vischer, Jacqueline. (1989). Environmental Quality in Offices. New York: Van Nostrand Reinhold.

APPENDIX K

Evaluation Process Model



15 STEP EVALUATION PROCESS

1. Make initial plans for the evaluation.
2. Contact other participants
3. State project goals.
4. List tasks to meet project goals
5. Meet participants
6. Search documents
7. Conduct 'walkthrough'
8. Decide focus and sample
9. Decide data gathering methods.
10. Pretest methods and conduct trial runs.
11. Gather data
12. Analyze data to conclude findings
13. Review findings with participants
14. Communicate findings and store data.
15. Assess the process of evaluation.

Source: Daish, J., Gray, J., Kernohan, D., & Salmond, A. (1983). "Post Occupancy Evaluation of Government Buildings." Architectural Science Review 26 (2), 50-55.

CULTURAL DIFFERENCES: COMPARISON OF PROVIDERS' AND USERS' ATTITUDES AND BELIEFS WITH RESPECT TO FACILITIES.

Attributes	*Providers*	*Users*
Quality: what makes a good facility	Formal and technical qualities and properties of a facility as an artifact, e.g. how it looks, or how assured the idea	Relation between a facility and activity, e.g. how it works in relation to intended activity and perceived needs
Finance: who pays, and (as perceived) for what	Receive money(directly or indirectly from users) for technical or professional advice/services in provision and maintenance of facility	Pay money (directly or indirectly) for using facility
Market forces: roles, values	Supply side role. Increasing competition with other suppliers, but still a tendency to want for demand to make itself known	Demand-side role. Gradually increasing a critical outlook in a 'buyer's' market, but still tend to take what is offered
Activity in relation to facility	Work on facility: work/career exists because of facilitates	Work or live in or with facility: facility exists because of work or other activity
Reality: view of the 'real world'	View of reality acquired and maintained through professional training, associations and traditions, resulting in specific an predictable way of thinking and acting	View of reality based on direct experiences in operating in facility; little or no formal training or knowledge about facilities; see facilities as 'background' to daily operations
Language	Technical: often jargon; narrow, precise vocabulary	Non-technical, loose, diverse, idiosyncratic
Knowledge base	Received, formal, documented; combination of education and professional experience .	Experiential, informal, not documented
Perceived value of own and others' knowledge	High value attached to won knowledge and experience: we know best; low value attached to users' knowledge	Low value attached to own knowledge and experience; moderate or high anticipated value attached to providers' knowledge: 'they must know best'
Self-image	Confident of value and correctness of own views and knowledge; self-image of 'expert'	Uncertain of value or correctness of own views; defer to 'experts'
Power to decide what is provided to what quality	Considerable, derived through direct action, assigned or assumed authority based on expertise	Minimal, almost no participation in design decisions during the delivery stages of a facility; power limited to 'take it or leave it' points of decision

Source: Kernohan, D., Gray, J., Daish, J., Joiner, D., (1992) *User Participation in Building Design and Management*. Oxford: Buttterworth/Heinemann.

APPENDIX L

Major Steps in a Complete Walkthrough Evaluation Program

1. PLAN WALKTHROUGH PROGRAM	- Appoint task group - Become familiar with walkthrough method - Propose participant groups - Propose walkthrough program - Prepare talk-group work plan
2. ORGANIZE/INVITE PARTICIPANTS	- Decide actual participant-group membership -invite attendance - Obtain acknowledgments of attendance - Confirm walkthrough program
3. SEARCH/STUDY DOCUMENT	- Scan selected archival document - List principal events and facts - Prepare summary of "background" and plans
4. PREPARE FOR WALKTHROUGH	- Assign walkthrough roles to task group members - Prepare documents and equipment
5. FACILITATE WALTHOUGH PROGRAM	- Meet building management - Tour building and site - Conduct walkthroughs - Make photographic record - Take physical measurements - Collage Evaluation file
6. COLLATE AND ANALYZE DATA	- Name recommendations by keywords/phrases - Classify recommendations
7. REPORT/COMMUNICATE FINDINGS	- Check that evaluation file is complete - Prepare one-page summary for employees - Prepare summary report for management and present to discuss with them

Source: Brill, M., Margulis. S., Konar, E. ,and BOSTI. (1985). Using Office Design to Increase Productivity, Vol. 1 & 2. Buffalo, NY: Workplace Design and Productivity, Inc.

Equipment Used by Task Group Members During a Walkthrough

TASK	EQUIPMENT	COMMENT
ALL TASKS	Plain paper	
	Prepared data Collection sheets	
	Clip board	
	Pencils	
	Self-adhesive labels	Used as name tags
CONDUCT WALKTHROUGH	Large newsprint pad	Used for flip-charts during introductory and review meetings
	Marker pens	
	Masking tape	
	Drawing pens	
	Cassette tape Recorder and tapes	Optional
MAKE PHOTOGRAPHIC RECORD	Camera - SLR 35MM	An advantage to have two if using different films
	Lens - 35-80 MM zoom or equivalent	Provides acceptable distortion-free views of interior spaces and close-ups of building details or people at a distance.
	Tripod	
	Film -- 400 ASA	Color slides are most versatile. Can obtain black and white prints for reports yet have slides for presentation to groups
	Filter - neutral density	To screen strong sunlight
TO TAKE PHYSICAL MEASUREMENTS	Measuring tapes	For linear dimensions
	Flashlight	
	Light meter	Lighting levels (lux)
	Sound level meter	Interior/exterior sound level (dBA)
	Whirling hygrometer	Air temperature (°C) air humidity
	Cat-thermometer	Low valve air speed draughts
	Smoke tubes	Direction of air currents
	Daylight factor meter	Daylight factor
	Anemometer	Exterior wind speed
	Thermo-anemometer	Surface temperature
	Surveyor's compass	Horizon line around the site
	Abney inclinometer	Angle of slope
	Spirit level	
	Plumb-bob	

Possible Contents for a Questionnaire

About Individual Work Spaces

A. Workspace Size and Layout

1. Actual and perceived "territory" and size of workspace
2. Degree and type of enclosure (panels, walls, screens)
3. Configuration, layout, seating arrangement and direction faced
4. Location and access to windows, aisles, core, others

B. Furniture and Space Dividers

1. Chairs: number owned, comfort, adjustability, movability, safety
2. Work surfaces: ; number owned, comfort, adjustability
3. Storage: amount needed and available, type of items stored, degree of accessibility
4. Display: personal and work-related items
5. Walls, space dividers: types, sizes, number, location, opacity, door presence and use
6. Flexibility: frequency and type of relocation, reconfiguration or rearrangement of workspaces/workgroups
7. Modifications made by users, and rationale

C. Equipment Use Patterns

1. Type(s) of equipement used, accessories used
2. Purpose, frequency and duration of use
3. Location, access, shared or sole use
4. Comfort, satisfaction in using
5. Human factors in eqipment use

D. Ambient Conditions

1. Noise: type, sources, frequency and responses
2. Air quality: odor, clarity, movement
3. Lighting: natural and artificial/ceiling, task and ambient/direction/quality
4. Temperature: comfort and fluctuation
5. Electrical service: availability and adequacy
6. Controls over ambient conditions\
7. Environemtal "clarity": circulation, pathfinding and cues
8. Security of posessions, personal safety and physical hazards
9. Maintenance and repairs
10. Outside awareness and view

E. Work Space Design

1. Esthetics: forms, materials, colors
2. Status-communication throuigh workspace design
3. Worker participation in design decision process
4. Art in the office program

F. Privacy

1. Speech privacy
2. Noise distraction
3. Visual distraction
4. Seeing and being seen by others
5. Control over access and intrusions
6. Number of people sharing space

G. Interaction and Communication Patterns

1. Quality and ease of communicaiton
2. Enviornmental supports for communication

About Workers and Their Jobs:

H. Demographic, static and dynamic anthropometric data

I. Activity, time at activity, shift-work or flexitime and space use patterns

J. Health, discomfort, disability problems/type and degree

K Job title, characteristics, functions and tasks

L. Bottom-line measure: Job Performance/Job Satisfaction/Environmental Satisfaction

About Organizations:

M. Workgroups and Structure

1. Workgroup size, identity, and boundaries
2. Work flow within and across workgroups
3. Supervisory method, span of control, decision-making

N. Support Spaces and Services

1. Meeting spaces, availability and suitability
2. Support spaces: mail, library, copying, filing, cafeteria, etc.

O. Facilities Management Practices and Policies.

APPENDIX M

EXAMPLES OF POST OCCUPANCY EVALUATION SURVEY

Please rate common workplace on each of the characteristics below. First indicate your satisfaction with each one, and fill the number corresponding to your answer in the left side box. Then rate how important each one of the characteristics is to you, and fill your answer in the right side box. If you have some specific reason or explanation about your rating, please put your comments on the last column of each question.

1 Dissatisfied	1 Not Important
2. Somewhat Dissatisfied	2 Hardly Important
3 Neutral	3 Neutral
4 Somewhat Satisfied	4 Somewhat Important
5 Satisfied	5 Very Important

Physical Settings

Satisfaction		Importance	Comments
☐	1. Overall workspace size	☐	_____
☐	2. Shape of workspace	☐	_____
☐	3. Density of people	☐	_____
☐	4. Location of workplace	☐	_____
☐	5. Quality of lighting	☐	_____
☐	6. Quality of air conditioning	☐	_____
☐	7. Color of floor covering	☐	_____
☐	8. Color of overall furniture	☐	_____
☐	9. Noise level at workplace	☐	_____
☐	10. Over all image	☐	_____
☐	11. Overall Environment	☐	_____

Source: Becker, F. D. (1990). The Total Workplace: Facilities Management and the Elastic Organization. New York: Van Nostrand Reinhold.

EXAMPLES OF POST OCCUPANCY EVALUATION SURVEY

1 Dissatisfied	1 Not Important
2. Somewhat Dissatisfied	2 Hardly Important
3 Neutral	3 Neutral
4 Somewhat Satisfied	4 Somewhat Important
5 Satisfied	5 Very Important

Communication on the floor

Satisfaction		Importance	Comments
☐	12. Number of meeting spaces	☐	_____
☐	13. Size of meeting space	☐	_____
☐	14. Privacy of meeting space	☐	_____
☐	15. Location of meeting space	☐	_____
☐	16. Furniture of meeting space	☐	_____
☐	17. Visibility to co-workers	☐	_____

EXAMPLES OF POST OCCUPANCY EVALUATION SURVEY,
cont'd

1 Dissatisfied
2. Somewhat Dissatisfied
3 Neutral
4 Somewhat Satisfied
5 Satisfied

1 Not Important
2 Hardly Important
3 Neutral
4 Somewhat Important
5 Very Important

Personal Workplace Requirements

Satisfaction		Importance	Comments
☐	1. Location of your workplace	☐	
☐	2. Arrangement of furniture	☐	
☐	3. Amount of work surface	☐	
☐	4. Function of furniture	☐	
☐	5. Amount of storage for work	☐	
☐	6. Function of storage	☐	
☐	7. Display area for materials.	☐	
☐	8. Style of furniture	☐	
☐	9. Color of furniture	☐	
☐	10. Comfort of chair	☐	
☐	11. Degree of privacy	☐	
☐	12. Suitability to your work	☐	
☐	13. Opportunity to personalize	☐	
☐	14. Image of workplace	☐	
☐	15. Overall satisfaction	☐	

16. What do you like most about your current personal workplace?

_____

_____

17. What do you like least about your current personal workplace?

_____

_____

ISSUES OF BUILDING APPRAISAL PROCESS

OCCUPATIONAL HEALTH & SAFETY	-1	0	1	2	3	4	5	6	7	8	9
Life Safety											
Health											

INDIVIDUAL EFFECTIVENESS											
Indoor air											
Positive stress											
Cleanliness											
Temperature and humidity											
Acoustics and vibration											
Visual access to daylight and distance											

ACTIVITIES											
Task-related privacy											
Task-related illumination											
Conditions for meetings and teamwork											
Local control of the environment											

ISSUES OF BUILDING APPRAISAL PROCESS *cont'd*

MISSION AND WORK

	-1	0	1	2	3	4	5	6	7	8	9
Supportive building systems											
Adaptability											
Internal accessibility											
Structural capacity and rigidity											
Subdivision into rooms											
Physical security											
Computerization and interconnection											
Location and access to the facility											
Storage for occupants											

POLICY

Barrier-free											
Federal image											
Staff services											

KEY ISSUES OF BUILDING PERFORMANCE

1. Change of total staff size
2. Attract or retain workforce
3. Communication of hierarchy, status and power
4. Relocation of staff
5. Maximizing informal interaction
6. Human factors
7. High status image to the outside
8. Security to OUTside
9. Security to INside
10. Connecting equipment and changing location of cable
11. Adding or relocating environmentally demanding equipment
12. Protecting hardware operations
13. Demand for power

INDICATORS OF BUILDING PERFORMANCE

FINANCIAL

- Asset value of real estate portfolio
- Income from leases and disposals
- Expenses of real estate occupancy
- Construction costs
- Energy costs
- Maintenance costs

PERFORMANCE/PRODUCTIVITY

- Quality of work
- Quantity for work
- Absenteeism
- Innovation

INFORMATION TECHNOLOGY

- Networking IT
- Changing location of cables
- Protecting Equipment
- Electrical Power capacity
- Telecommunications

SPACE USE EFFICIENCY

- Rentable or usable/gross
- Space/employee
- Space/unit of income
- Renovations required
- Turnaround time
- Change orders
- Response time
- Disruption

ORGANIZATIONAL ISSUES

- Changes in workforce size
- Need to relocate employees
- Ability to attract and retain staff
- Security
- Communication of status
- Informal communication
- Image to outside

Workspace Ratings

Please evaluate your current workspace by responding to the questions below. Circle the appropriate number for your response. Please rate not only your SATISFACTION with the workspace, but the IMPORTANCE of each issue as well. If an item does not apply to your workplace, circle N.A. in the satisfaction column, but rate the issue's IMPORTANCE.

Workspace	SATISFACTION: Very Unsatisfactory		Neutral		Very Satisfactory	Not Applicable	IMPORTANCE: Not Important		Neutral		Very Important
1. Overall size of your office	1	2	3	4	5	N.A.	1	2	3	4	5
2. Amount of work surface for use in your office	1	2	3	4	5	N.A.	1	2	3	4	5
3. Auditory privacy (e.g. not being distracted by office noise, other conversations, etc.)	1	2	3	4	5	N.A.	1	2	3	4	5
4. Conversational privacy (e.g. not being overheard by others)	1	2	3	4	5	N.A.	1	2	3	4	5
5. Visual privacy (e.g. not being distracted by others working or passing by)	1	2	3	4	5	N.A.	1	2	3	4	5
6. Accommodation for computer, typewriter, printer, and related equipment in office	1	2	3	4	5	N.A.	1	2	3	4	5
7. Amount of storage for work materials in your office (files, binders, books, etc.)	1	2	3	4	5	N.A.	1	2	3	4	5
8. Ease of access to work materials within your office (files, binders, books, etc.)	1	2	3	4	5	N.A.	1	2	3	4	5
9. Amount of storage space for personal items (coat, shoes, purse, etc.)	1	2	3	4	5	N.A.	1	2	3	4	5
10. Opportunity to display work-related materials (charts, diagrams, etc.)	1	2	3	4	5	N.A.	1	2	3	4	5
11. Opportunity to display personal items (photos of family, art work, etc.)	1	2	3	4	5	N.A.	1	2	3	4	5
12. Ease of receiving telephone calls when you are in your office	1	2	3	4	5	N.A.	1	2	3	4	5
13. Ease of making telephone calls when you are in your office	1	2	3	4	5	N.A.	1	2	3	4	5
14. Ease of receiving messages	1	2	3	4	5	N.A.	1	2	3	4	5
15. Ease of receiving mail	1	2	3	4	5	N.A.	1	2	3	4	5
16. Accommodations for small (2-3 person) meetings at your desk	1	2	3	4	5	N.A.	1	2	3	4	5
17. Overall satisfaction with your office	1	2	3	4	5	N.A.	1	2	3	4	5
18. Overall satisfaction with the area in which your department is located	1	2	3	4	5	N.A.	1	2	3	4	5

Circle your response, again using the rating scale for SATISFACTION and IMPORTANCE.
If your workplace does not have the type of space described in the question, please circle N.A. under the satisfaction column, but do rate the IMPORTANCE of these spaces.

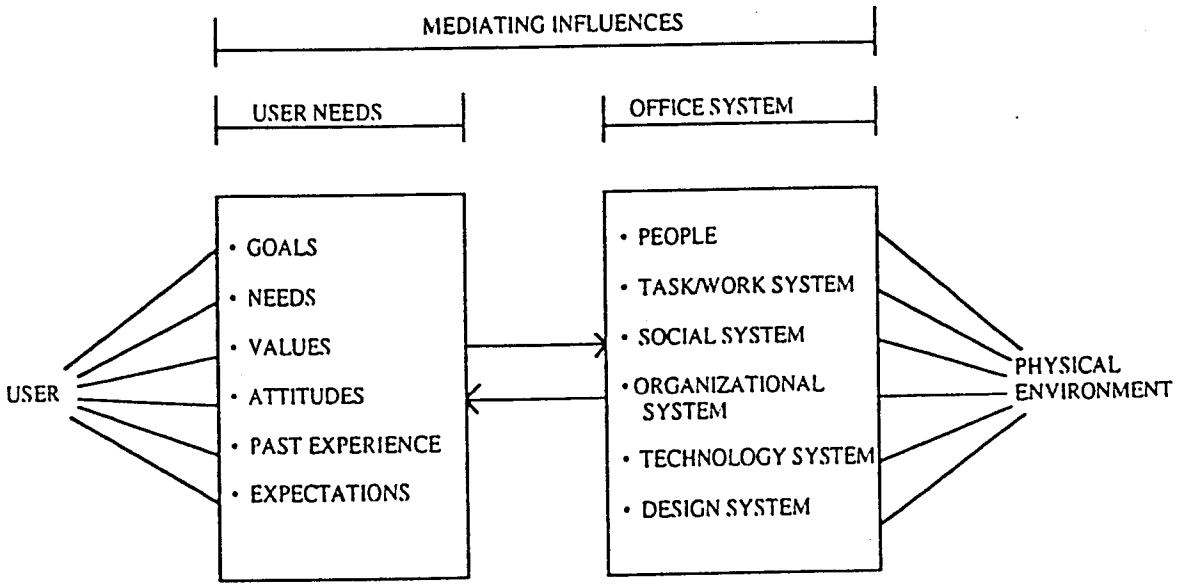
Common Areas	Very Unsatisfactory 1	2	Neutral 3	4	Very Satisfactory 5	Not Applicable	IMPORTANCE: Not Important 1	2	Neutral 3	4	Very Important 5
19. Informal break areas (small lounges, seating areas, etc.) in group or department area	1	2	3	4	5	N.A.	1	2	3	4	5
20. Access to shared equipment (copier, printers, facsimile machines, etc.)	1	2	3	4	5	N.A.	1	2	3	4	5
21. Dedicated project or team rooms for group or department use	1	2	3	4	5	N.A.	1	2	3	4	5
22. Reference/resource/information centers in department or group area	1	2	3	4	5	N.A.	1	2	3	4	5
23. Number of conference rooms	1	2	3	4	5	N.A.	1	2	3	4	5
24. Location of conference areas	1	2	3	4	5	N.A.	1	2	3	4	5
25. Ease of scheduling conference facilities	1	2	3	4	5	N.A.	1	2	3	4	5
26. Accommodations for informal meetings of 2-6 people in your group or department area	1	2	3	4	5	N.A.	1	2	3	4	5

This section deals with your effectiveness at work and your feelings about working here.

Effectiveness/Morale	Very Low 1	2	Neutral 3	4	Very High 5	Not Applicable	Not Important 1	2	Neutral 3	4	Very Important 5
27. Ease of dealing with confidential or sensitive issues while at work	1	2	3	4	5	N.A.	1	2	3	4	5
28. Ease of concentration	1	2	3	4	5	N.A.	1	2	3	4	5
29. Sense of being valued by your company as an individual	1	2	3	4	5	N.A.	1	2	3	4	5
30. Your own individual morale (e.g. how good you feel about your work situation)	1	2	3	4	5	N.A.	1	2	3	4	5
31. Sense of trust within your department	1	2	3	4	5	N.A.	1	2	3	4	5
32. Quality of work you do alone (e.g. better ideas, fewer errors, more thorough work)	1	2	3	4	5	N.A.	1	2	3	4	5
33. Amount of work you are able to do (e.g. more reports, more information reviewed)	1	2	3	4	5	N.A.	1	2	3	4	5
34. Communication with co-workers (e.g. conversations about any topic)	1	2	3	4	5	N.A.	1	2	3	4	5
35. Ability to work in teams or groups (on a project)	1	2	3	4	5	N.A.	1	2	3	4	5

APPENDIX N

THE PERCEIVED ENVIRONMENT



Source: Goodrich, Ronald (1986). "The Perceived Office: The Office Environment as Experienced by its Users" in Behavioral Issues in Office Design (ed.) J. D. Wineman. New York: Van Nostrand Reinhold Company.

APPENDIX O

EXAMPLE OF QUESTION SET FOR FACILITIES EVALUATIONS

Instructions

1. Use this form for rating a facility

2. Review the criteria for each consideration and agree on the meaning for the particular building type being evaluated.

3. Enter score from 1 -to 10 for each criterion:

1	Complete Failure	6	Good
2.	Critically Bad	7	Very Good
3	Far Below Acceptable	8	Excellent
4	Poor	9	Superior
5	Acceptable	10	Perfect

4. Add the scores and divid by 6 to get an average score for each major consideration.

FUNCTION

A. THE OVERALL ORGANIZATIONAL IDEA _____
(the big functional concept)

B. EFFECTIVE ARANGEMENT OF SPACES _____
(activities and functional realationships)

C. WELL-PLANNED CIRCULATION _____
(entry, orientaiton, flow)

D. ADEQUATE SPACE ALLOCATIONS/PARKING _____
(net assignable/unassigned area, parking)

E. RESPONSE TO USER PHYSICAL NEEDS _____
(comfort, safety, convenience)

F. RESPONSE TO USER SOCIAL NEEDS _____
(privacy, interaction, sunse of community)

SUM TOTAL _____

DIVIDE BY SIX 6

AVERAGE FUNCTION SCORE _____

FORM

A. CREATIVITY AND EXCELLENCE IN DESIGN _____
(imagination, innovation)

B. PERFORMANCE OF BUILDING SYSTEMS _____
((structural, mechanical, electrical, signal)

C. RESPONSE TO SITE CONDITIONS _____
(physical, climatic, aesthetic)

D. PROVISION FOR ENVIRONMLENTAL CONTROLS _____
(light, sound, temperature, ventilation)

E. RESPONSE TO USER PSYCHOLOGICAL NEDS _____
(order, color, variety, views)

F. APPROPRIATE SYMBOLISM _____
(image, character, scale)

SUM TOTAL _____
DIVIDE BY SIX 6
AVERAGE FUNCTION SCORE _____

ECONOMY

A. REALISTIAC SOLUTION TO A BALANCED BUDGET _____
(initial cost control)

B. RETURN ON INVESTMENT _____
(most for the money)

C. MAXIMUM EFFECT WITH MINIMUM MEAQNS _____
(elegance, multiple purpose)

D. EFFICIENT PLAN AND SHAPE _____
(unassignable area, volume)

E. EASE OF MAINTENANCE _____
((materials and building systems)

F. COST-EFFECTIVE OPERATIONS _____
(energy efficiency, minimum upkeep)

SUM TOTAL _____
DIVIDE BY SIX 6
AVERAGE FUNCTION SCORE _____

TIME

A. CONVERTIBLE SPACES FOR CHANGES IN FUNCTION _____
(dynamic activities, universality)

B. FIXED SPACES FOR SPECIFIC ACTIVITIES _____
(major static activities)

C. PROVISION FOR GROWTH _____
(expandibility, shell space)

D. VITALITY AND VALIDITY OVER TIME _____
(sustaining quality, holding power)

E. HISTORICAL AND CULTURAL VALUES _____
(significance, continuity, familiarity)

F. USE OF MATERIAL _____
(expression of the times or advanced systems)

SUM TOTAL _____

DIVIDE BY SIX _____6

AVERAGE FUNCTION SCORE _____

APPENDIX P

BUILDING

- 1. General
- 1. Flexibility
  - 1. Vertical Zone Layout
  - 2. Horizontal
    - 1. Structural
    - 2. Construction
    - 3. Demountability
    - 4. Installations
  - 3. Access to Building
  - 4. Main Structure
  - 5. Load(s)
  - 6. Design Module Subdivision
  - 7. Self-Contained Unit
- 2. Main Entrance of the Building
  - 1. Recognition
  - 2. Ease of Operation
  - 3. Draft Prevention
  - 4. Access for the Disabled
  - 5. Spaciousness
  - 6. Visitor Reception
  - 7. Reception Facilities
- 3. Transport/Movement
  - 1. People
    - 1. Route from Parking Area
    - 2. Sense of Direction in the Building
    - 3. Lifts
    - 4. Main Staircase
      - 1. Capacity
      - 2. Walking Comfort
    - 5. Secondary Stairs
      - 1. Access
      - 2. Walking Comfort
    - 6. Excess Front Space Compared with Area Near Lifts on the Differrent Floors
    - 7. Walking Distance on Busiest Floors
  - 2. Goods
    - 1. Access
    - 2. Access to Building
    - 3. Vertical Movement
- 4. Communication
  - 1. Company Sign Attached to or on the Building
  - 2. Multi Media Facilities
    - 1. Central Network Room for Telephone and PCs
    - 2. Clear Height in the Central Network Room
    - 3. Permitted Floor Load in the Central Network Room
    - 4. Communication Distribution Facilities
    - 5. Flexibility
      - 1. Main Structure
      - 2. Movability
      - 3. Connection Point Density
    - 6. Network Cabling
    - 7. Utilization of the Cabling
- 5. Maintenance

	1. Cleaning	
		1. Premises/Site
		2. Facade/Elevation
		3. Inside the Building
		4. Separation of Waste Products
		5. Waste Removal
6. Energy Management		
	1. Thermal Insulation Index	
	2. Alternative Energy Sources	
7. Security		
	1. Access	
		1. Parking
		2. Buildings
	2. Burglary Prevention	
	3. Fire	
	4. Potential Problems	
		1. Lighting
		2. Vandalism
II. Working Area		
1. Clear Height		
2. Privacy		
3. Indoor Environment		
	1. Thermal Comfort	
		1. Average Thermal Rating Applied to Indoor Climate
		2. Temperature In Summer
		3. Temperature In Winter
		4. Air Flow (Summer/Winter)
		5. Temperatures in Excess of 25 Degrees Celsius
		6. Temperature Change in the Living Zone
		7. Reduction of Solar Radiation by the Facade Elevation
		8. Maximum Permitted Heat Load Generated by Equipment
		9. Relative Humidity
		10. Thermally Active Mass
		11. Radiation Temperature Difference Between Different Walls
	2. Light	
		1. Access of Daylight
		2. Artificial Light in the Working Area
		3. Entry of Daylight
		4. Reduction of Solar Radiation
		5. Color Coding
		6. Light Beam Angle From Fittings
	3. Air Quality	
		1. Ventilation (Fresh Outside Air)
		2. Recirculation
		3. Quality of Air Filters
II. Working Area		
	4. Acoustic Qualities/ Noise	
		1. Noise from Outside
		2. Noise Insulation Between Rooms/ Sound Proofing
		3. Background Noise Generated By Installations
		4. Reverberation Time

		5. Noise Load on the Facade/ Elevation
	5. Ease of Operation	
		1. Sun Blinds
		2. Ventilation
		3. Heating
		4. Cooling
		5. Lighting
		6. Windows that can be Opened
III. Facilities		
1. Sanitary Facilities		
	1. Number of units	
	2. Layout	
	3. Finishing	
	4. Flexibility	
	5. Toilet for the Disabled	
2. Catering Facilities		
3. Plant Room		
4. Non-Utilized Space, in Cellar, Under Roof, etc.		
IV. Items for Consideration		
1. Orientation/ Sun Angle		
2. Environmental Impact		
3. Environmental Impact When Demolished		
4. Reduced Water Use		
5. Energy Saving Facilities		
6. External Transmission Facilities		
7. Use of Toxic Materials		
8. Structural Energy Requirements		
9. Reception Desk in Entrance Hall		
	1. Space Requirements	
	2. Surveillance Zone	
	3. Suitable of Indoor Climate	
10. Financial/ Economic Aspects		
	1. Insurances	
		1. Furniture
		2. Buildings
		3. Glazing
	2. Investment Return	
	3. Rental Period	
	4. Rent Indexation	
	5. Type of Lessee	
	6. Choice of Material	
		1. Life Span
		2. Energy Consumption
		3. Cleaning
	7. Design Factors	
		1. Structural Area
		2. Lettable Area
		3. Facade/ Elevation
		4. Glass/ Glazing
		5. Daylight

LOCATION

I. Surroundings	
1. Representativeness	

	1. Urban Classification	
	2. Town Planning	
	3. Image	
	4. Landscaping	
2. Accessibility		
	1. Car	
		1. Proximity to Highway
		2. Traffic Flow
	2. Public Transport	
		1. Proximity to Railway Station
		2. Type of Railway Station
		3. Proximity to a Fast Tram or Metro Stop
		4. Proximity to a Bus Stop
		5. Bus Routes
	3. Air Transport	
3. Services/ Amenities		
	1. Shops for Daily Needs	
	2. Restaurants for a Business Lunch or dinner	
	3. Hotels	
	4. Banks	
	5. Post Office	
	6. Relaxing or Recreational Facilities During Lunchtime,	
	Such as Parks, Sports Facilities, Libraries	
4. Public Safety		
	1. Social Climate	
5. Potential Personnel Pool		
	1. Educational Level	
6. Available Housing		
	1. Housing Facilities	
II. Site		
1. Visual Aspects		
	1. Prominence to Passers-by	
	2. Obstruction of the View	
		1. View
		2. Frontage
2. Accessibility of the Site Entrance from the Main Road		
3. Parking		
	1. Public Parking	
	2. On Site Parking	
		1. Type
		2. Capacity
		3. Dedicated Spaces
		4. Size
		5. Use of on Site Parking Spaces
		6. Maneuvering Space
		7. Prevention of Unauthorized Parking
		8.Moped and Bicycle Storage
4. Site Characteristics		
	1. Potential for Extending Premises on Site	
	2. Landscaping	
5. Security		
	1. Public Accessibility	
6. Levels		

7. Soil Pollution		
III. Items for Consideration		
1. Surroundings		
	1.Alternative Energy Sources	
		1. District Heating
		2. Solar and Wind Energy
		3. Storage Method of Heat and Cold Sources
	2. Security	
		1. During Office Hours
		2. Outside Office House
	3. Schooling	
		1. Administrative/ Support Staff
		2. International Educational Facilities
	4. Communication Network	
2. Site		
	1. Availability	
	2. Site Measurements	
	3. Site Preparation	
	4. Soil Condition	
	5. Ground Water Level	
	6. Orientation to the Sun	
	7. Topography	
	8. Public Service Connections	
	9. Easements	
	10. Chain Clause	
3. Laws and Regulations		
	1. Local Government Cooperation and Planning Policy	
	2. Administrative Competence and Continuity of Local Authorities	
	3. Zoning Plan	
	4. Development Potential	
	5. Protected Urban Area/ Listed Buildings	
	6. Environmental Legislation	
4. Financial and Economic Aspects		
	1. Land Prices	
	2. Subsidies	
	3. Type of Ownership	
	4. Real Estate Tax	
	5. Ground Rent	
	6. Sufferance Dues	
	7. Street and Sewage Tax	
	8. Pollution Levy	
	9. Polder and water taxes	

APPENDIX Q

References for Table 1.

1. Zimring, C. & Reizentstein, J. (1980). "Post-occupancy evaluation: An overview." Environment and Behavior, 12 (4), 429 - 450.

   Zimring, C. & Reizentstein, J. (1981). "A primer on post-occupancy evaluation: Uses and techniques of an increasingly valued tool." AIA Journal, 70 (13), 52-58.

   Zimring, C. & Welch, P. (1988). "POE: Building on 20 - 20 Hindsight." Progressive Architecture, 69 (7), 55-56,58, 60.

   Zimring, C., & Wener, R. (1985). "Evaluating Evaluation." Environment and Behavior, 17 (1), 97 - 117.

   Zimring, Craig (1989). "Evaluation of Designed Environments: Methods for Post-Occupancy Evaluation." in Building Evaluation, (ed.) W. F. E. Preiser. NY: Plenum Press.

2. Johnson, Lena (1994). "GAMSA: A Quantitative Assessment Model for Sustainable Architecture." in Environmental Quality: Programming, Design, Construction, Management.

3. Preiser, W., (1989). Building Evaluation (. New York: Plenum Press.

   Preiser, W.F.E., H.Z. Rabinowitz, and E.T. White. (1988). Post Occupancy Evaluation. New York: Van Nostrand Reinhold Co.

4. McLain-Kark, J. (1985). User aParticipation in Passive Solar Housing Design, Ph.D. Dissertation. University of Tennessee, Knoxville, Tennessee.

5. Sundstrom, E. (1986). Work Places. New York: Cambridge University Press.

6. Marans and Sprekelmeyer, 1986. A conceptual model for Evaluating Work Environements, in J. D. Wineman, Behavioral issues in Office Design. New York, Van Nostrand Reinhold, pp. 678 - 84.

   Marans, R. W., & Sprekelmeyer, K (1982). "Measuring overall architectural quality: a component of building evaluation." Environment and Behavior, 14(6), 652-670.

   Sprekelmeyer, K. (1993). "Office relocation and environmental change: A case study." Environment and Behavior, 25(2), 181-204.

7. Kirk, S. (1989). "Post-occupancy value engineering. Ekistics, 58(336-337), 141-146.

8. Wener, R., (1989). " Advances in Evaluation of the Built Environment." in I. Zube & G. Moore (eds.) Advances in Environment, Behavior and Design. Vol 2, New York: Plenum Press.

   Wener, R., Olsen, R., (1980). "Innovative Correctional Environemtns: A User Assessment." Environment and Behavior, 12(4), 478-493.

9. Wineman, J. (1986). Behavioral Issues in Office Design (New York: Van Nostrand Reinhold Company.

   Wineman, Jean D. (1982)."Office Design and Evaluation: An Overview". Environment and Human Behavior. Vol. 14 No. 3, May .

10. Al-Saleem, Y. (1992). Evaluating the Performance of Goeernment Office Buildings from the Users' Perspective: A Case Study of the Ministry of Foreign Affairs Headquarters Building in Saudi Arabia. A Ph.D Dissertation, Texas A & M University, College Station, Texas.

11. Hartkopf, V., Loftness, V., Mill, P. (1986). "The Concept of Total Building Performance and Building Diagnostics." Building Performance: Function, Preservation, and Rehabilitation, ASTM STP 901, G. Davis, Ed., American Society for Testing and Materials, Philadelphia, 1986, 5-22.

Loftness, V., V. Hartkopf, & P Mill (1989). "Critical Frameworks for Building Evaluation: Total Building Performance, Systems Integration, and Levels of Measurement and Assessment." in Building Evaluation (ed.) W. F. E. Preiser. New York: Plenum Press.

12. Vischer, Jacqueline. (1989).Environmental Quality in Offices. New York: Van Nostrand Reinhold.

13. Davis, G., Szigeti, F., Blair, L., (1994). Serviceability Tools and Methods (STM). Ottawa, Ontario: International Centre for Facilities.

14. Building Environmental Performance Assessment Criteria, 1993. Office Buildings. British Columbia.

15. NACORE, Deloit & Touche Benchmarking Study. West Palm Beach, Florida: International Association of Corporate Real Estate Executives.

16. Building Quality Assessment Operational Manual. Centre for Building Performance Research, School of Architecture, Victoria University of Wellington, September, 1993.

17. Daish, J., Gray, J., & Kernohan, D., (1983). "Post Occupancy Evaluation." Architecture New Zealand, (July - August), 20 - 21.

Daish, J., Gray, J., Kernohan, D., & Salmond, A., (1982). " Post occupancy evaluation in New Zealand. Design Studies, 3(2), 77-83.

Daish, J., Gray, J., Kernohan, D., & Salmond, A., (1983). "Post occupancy evaluations of government buildings." Architectural Science Review, 26(2), 50-55.

18. Brill, M., Margulis. S., Konar, E. ,and BOSTI. (1985). Using Office Design to Increase Productivity, Vol. 1 & 2. Buffalo, NY: Workplace Design and Productivity, Inc.

19. Becker, F. D. (1990). The Total Workplace: Facilities Management and the Elastic Organization. New York: Van Nostrand Reinhold.

Becker, F., Steele, F., (1994). Workplace by Design: Mapping the High-Performance Workscape. San Francisco: Josey-Bass Publishers.

20. oodrich, Ronald (1986). "The Perceived Office: The Office Environment as Experienced by its Users" in Behavioral Issues in Office Design (ed.) J. D. Wineman. New York: Van Nostrand Reinhold Company.

21. Farbstein,J., Wener, R. (1982). "Evaluation of Correctional Environments," Environment and Behavior, 14(6), 671-694.

22. Kennon, P.,Bauer, J., Parshall, S. . (1988). "Evaluating Health Care Facilities." The Journal of Health Administration Education, 6(4),, 818-831.

Parshall, S., (1988) "A Hospital Evaluation: The Problem-Seeking Method." in in E. Zube and G. Moore (eds.) Advances in Environment Behavior and Design, vol. 2 207-220. New York: Plenum.

23. "Building Commissioning". Architecture, June 1995, 123-127.

24. Real Estate Network, an unpublished manuscript, author unknown.