

ASSESSING BUILDING PERFORMANCE: ITS EVOLUTION FROM POST-OCCUPANCY EVALUATION

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Abstract

*This article chronicles the evolution of the field of post-occupancy evaluation and visual quality (aesthetic) programming and evaluation from their origins in the 1960s, and describes their transformation into current developments in systematic building performance and visual quality assessments. Major components of post-occupancy evaluations are highlighted, and examples of outcomes presented. This consumer-oriented approach is part of a new democratic paradigm embodying autonomy, self-organization, ecology, sustainability, adaptation, and continuous improvement. Methods range from qualitative self-reports of likes and dislikes to quantitative multivariate analyses, from verbal scales to observations of use, and last but not least, expert judgments. The paper discusses questions about the future of this field, its viability, cost-effectiveness, and benefits for all stakeholders. It concludes with the examination of a recent project, reported in the book *Designing for Designers that used distributed technology to systematically evaluate the performance of 17 contemporary architecture school buildings from around the world. The approach is discussed, as well as methods, lessons learned, and ways in which the methodology and findings apply to other kinds of facilities and future developments in the field.**

Keywords

Building performance evaluation; environmental aesthetics; post-occupancy evaluation; performance concept; visual quality programming; POE training workshop

Introduction: About Interdisciplinary Collaboration

Over the years, the authors, who are both graduates of the Ph.D. program in Man-Environment Relations (MER) at the Pennsylvania State University, have collaborated extensively on topics ranging from post-occupancy evaluation to design review and aesthetic evaluations of buildings, as well as universal design. Teaching at universities a two-hour drive apart, they exchanged lectures with one another in their classes on building and visual quality evaluation and programming; and they met regularly at conferences. In 1992, Preiser and Lightner hosted a conference on Design Review, which Nasar attended. Preiser and Lightner included his paper on urban design aesthetics in the proceedings, and in revised form in a guest edited issue of *Environment & Behavior* in 1994. Nasar included a chapter

by Preiser and Lightner in his 1988 book *Environmental Aesthetics: Theory, Research, and Application*. Interactions between Nasar and Preiser led to two edited books. In 1999, Nasar and Preiser published *Directions in Person-Environment Research and Practice* (Ashgate), which covered person-environment theory (John Archea, Harry Heft), sociological and psychological findings (Romedi Passini, Jack Nasar, William Rohe, and Richard Titus), and design and planning applications (Wolfgang Preiser, Fahriye Hazer Sancar). When Nasar ran a conference on Universal Design and Visitability (Nasar and Evans-Crowly, 2007), he turned to Preiser, who had edited the *Universal Design Handbook* (Preiser and Ostroff, 2001), for advice on speakers and as a keynote speaker. When, due to illness, Preiser could not travel to the conference, he provided his notes and powerpoint to Nasar, who presented it for him, though with a somewhat different accent. In 2007, a 15-year collaboration culminated in the book *Designing for Designers: Lessons Learned from Schools of Architecture* (Fairchild), which evaluated the performance of new buildings for schools of architecture and design. More on it later. First consider some of its precedents.

The Evolution of Post-Occupancy Evaluation

In the late 60s, evaluation case studies of university dormitories were carried out by Sim van der Rijn of the University of California, Berkeley, and Victor Hsia of the University of Utah. While not called post-occupancy evaluations (POEs), these evaluations were among the first systematic attempts at assessing building performance from the building

users' point of view. A bibliography published by the Department of Housing and Urban Development (HUD) (Bechtel and Srivastava, 1978) claimed to list 700 POEs, starting in 1913. But upon careful examination, there was only one entry that had the term "post-occupancy evaluation" in its title. It dealt with military postal facilities, and was commissioned by the AIA Research Corporation (Connell & Ostrander, 1976).

Inspired by van der Rijn and Hsia, Preiser's Master's thesis also focused on evaluating dormitory performance, i.e., at Virginia Tech (the very dormitories where the horrendous mass murder of students took place in 2006). It employed political science rating scales (the Thurstone Scale of Equal Appearing Intervals), which have an error rate of no more than 3% to 5%. These rating scales were used to create quality profiles, as perceived by the students living in three very different types of dormitories. The newest ones looked like high-rise prisons, and the oldest looked like Oxford-style, two-story walk-up structures. Not surprisingly, they scored highest. The results of this study were presented at the first conference of the Environmental Design Research Association (EDRA) at NC State (Preiser, 1969). Then in 1973, the author organized the EDRA 4 conference, at which the movement of assessing building performance gained momentum. Preiser's Ph.D. dissertation at Penn State focused on the evaluation of public spaces in the then new Columbia Mall in Maryland (Preiser, 1974).

By the mid-1970s, the first publications with term "POE" in their title appeared: according to Preiser's extensive literature searches, the very first one was authored by Herb McLaughlin of

KMD Architecture in San Francisco in the *AIA Journal* issue of January 1975. He and a team of consultants had done POEs on hospitals in Utah and in San Francisco.

Over the past 30 years, Herb has been an ardent supporter of POE as a tool for in-house knowledge building in architecture and design firms (McLaughlin, 1997). Thus, in all likelihood, his was the very first publication on POE, although during the year prior, the Veterans Administration in San Diego had conducted systematic POEs of their hospital facilities, but they were not published until later in 1975. There was the first methodological review of POE techniques that was, again, commissioned by the AIA Corporation under John Eberhard's directorship (Connell & Ostrander, 1976). In the 80s, lots of POE activity was going on in the UK, Canada, New Zealand, Australia, and the US on public works projects, government buildings, airports, etc., resulting in very sizeable and significant POE studies.

In 1986, John Eberhard was responsible for putting together committees on opportunities for improvement in the practices of programming, post-occupancy evaluation (Committee on Post-Occupancy Evaluation Methodology, 1987), as well as the element that links the two conceptually; i.e., database development. Preiser was asked to chair both the programming and POE committees, and the reports came out in 1987, published by the National Academy of Sciences. What is really interesting to know is whether the recommendations of the reports have come true? Yes, indeed they have, especially in the information technology (IT) arena, which was in its infancy at that time.

Preiser, Rabinowitz & White (1988), wrote the first POE textbook, which has since been translated (illicitly!) into Japanese, Korean, and most recently, Arabic. Interestingly, when the author visited major construction companies in Japan, including Shimizu Corporation, for POE presentations in 1993, someone came up and proudly said, "Hi, we translated your book". Whereupon Preiser said, "How can one get a copy?" He answered, "Well, I have to get permission from my company first." So much for the protection and integrity of intellectual property rights. The appendix of that book is perhaps the most interesting part, because it presents measurement techniques for getting feedback on the quality of facilities. Considered to be a companion volume to *Post-Occupancy Evaluation*, the book *Building Evaluation* was published a year after it (Preiser, 1989), with case studies from around the world.

Evolution of Aesthetic Programming and Evaluation

Although the earliest empirical research in psychology examined aesthetic phenomena—preference for the golden rectangle (Fechner, 1876), the field stayed largely forgotten until the 1960s when Daniel E. Berlyne (1960) launched the new empirical aesthetics. He, as did psychologists after him, operationalized aesthetics as favorable affect in response to stimuli, and he developed a motivational theory relating preferences to the curiosity and uncertainty generated by collative variables (such as complexity, novelty, and ambiguity), which he and others tested (Berlyne, 1972). In the 1970s, Wohlwill (1976) expanded Berlyne's ideas to include structural properties of the

stimulus array and applied them to the molar environment. The Kaplans (1972) also began to investigate environmental preferences. From the design direction, Oscar Newman (1972) saw milieu (appearances) as one of four aspects of crime prevention through environmental design. Though Newman focused on one dimension—crime, he took a post-occupancy approach, in evaluating the performance of public housing from the occupant perspective.

Influenced by his masters work with Newman and doctoral work with Wohlwill, Nasar designed a dissertation to evaluate the perceived visual quality (environmental aesthetics) and fear of crime in relation to real neighborhoods. In a two-phase study, he first uncovered the salient dimensions of perception in relation to 40 streets in Pittsburgh; and then related them to people's ratings of preference and fear of crime, summarized in an article in *Environment and Behavior* (Nasar, 1983). For the 1983 conference of the Environmental Design Research Association (EDRA), he sent out a request for people to participate in a symposium on environmental aesthetics. The call for papers led to two symposia and two workshops. Preiser participated in those sessions. (Nasar subsequently participated in a conference Preiser and Lightner organized on design review). The field of empirical aesthetics had indeed expanded to include theory, research, and design/planning applications. Many of the papers from these sessions emerged in revised form along with other new and classic papers in his edited book on environmental aesthetics (Nasar, 1988).

A call from the City of Knoxville asking for urban design guidelines for the planned international

exposition led to a study of the perceived visual quality of the city (a visual quality post-occupancy evaluation and program). Follow-up research in other contexts led to Nasar's 1998 book *Evaluative Image of the City*, in which he proposed procedures for conducting post-occupancy evaluations or programs for aesthetics (visual quality) and meaning. Other research applied the idea of post-occupancy evaluation to assessing a jury's design competition decision (Nasar, 1989a), which he found tied to meanings they expected the building to convey to users. He also evaluated user reactions to the site in terms of features likely to evoke fear of crime (Nasar and Fisher, 1993). Those studies led him to a series of studies evaluating the results of design competitions over time, differences in aesthetic responses to and meanings conveyed by buildings to architects and laypersons (Nasar, 1989b; Nasar and Devlin, 1989), and to a post-occupancy evaluation of the competition winning building. This research culminated in his book *Design by Competition: Making Design Competition Work* (Nasar, 1999), that evaluated the design for the Wexner Center i.e., "Eisenman's deeply flawed design" and the design competition that preceded it. *Design by Competition* expands the procedures for conducting visual quality post-occupancy evaluations and programs, and in general, it is intended to derive better approaches for planning design competitions in architecture.

Both the Preiser and Nasar measurement techniques rely on verbal responses from relevant stakeholders, i.e., building users or occupants, with instruments that have been developed and refined over time. However, their approaches go beyond verbal scales

to embrace multiple methods, including observational and archival data. And they have extended their work to make it available to others and to help shape policy.

Over the years, Preiser has developed a 3-day POE Training Workshop format, which empowers participants to carry out evaluations on their own facilities without having to hire a POE consultant (Preiser, 1996). This format provides for: Day 1: POE instruction on methodology and case study examples; Day 2: Field data gathering using quick surveys (for larger facilities it is recommended to administer POE surveys and analyses ahead of the site visit), interviews, observation, plan annotation and photography; and, Day 3: Drafting of executive summary report and presentation to senior management. Clients for these workshops have included: Carnegie Mellon University; Duke Medical Center; the University of Melbourne, Australia; the Building Management Agency and the University of Western Australia; Kaiser Permanente in California and the State of Washington; Bar-Ilan University, Israel; and Helsinki University of Technology, Finland.

Nasar's consumer-based studies of the evaluative image of the city and on retail signscapes had direct effects on policy, shaping city plans and controls for appearance. His books include tools to enable others to use and adapt his methods for their context. He has given invited addresses around the world on visual quality programming and evaluation; and in 2001 was hired by *The New York Times* to create a visual quality program for the new corporate facilities.

To better understand the conceptual and

theoretical basis for post-occupancy evaluation/building performance and aesthetic evaluation, it is necessary to briefly address some underlying issues. There is even a sub-field called "building pathology" in the U.K., which focuses primarily on the physical diseases of buildings, especially historic structures. One has to have criteria for evaluation: since the term 'evaluation' includes the notion of 'values', one has to clearly establish whose values are involved, and what one does to compare/benchmark findings in this field with.

Research shows that architects and the public differ in their values or taste standards for the way buildings should look. These differences represent two sets of conflicting norms. So, whose values take priority, the designer or the public? Ultimately, this becomes a question of audiences; and part of the problem in answering the question involves treating architectural appearance as a question of "aesthetics." Doing so treats good architecture like a photograph framed in a gallery or displayed in a magazine or book. It transforms the architect and juror into a kind of priest, who delivers cultural knowledge to the uneducated masses. The intimidated public often goes along, lacking confidence in their "aesthetic" judgment and feeling uneasy challenging the expert. Treated as aesthetics, architecture need only appeal to an elite audience; it can function poorly, look ugly, or require the viewer to have a special knowledge to appreciate.

The 21st century has seen a new paradigm replacing the hierarchical, command and control, top-down approach with a consumer-oriented democratic approach, one that is autonomous, self-organizing, ecological,

to sustain adaptation and continuous improvement (Preiser, 2007). Nurturing and empathy replaces obedience and authoritarian solutions. It replaces design heroes with equality and bottom up evaluation. It calls for fairness, open, two-way communication, community building, cooperation, trust and honesty. For places experienced by the public (building exteriors, and interiors used by many people), the values of the public (the consumer) take priority.

When a design involves public money, public property, or becomes visible to the public (as are most buildings from the street), it becomes a societal concern. Unlike the "high" arts that need appeal to only a narrow audience who chose to experience it (in a gallery or theater), architecture surrounds people and does not afford them the choice of avoiding it. For this audience, design appearance does not require a special "priestly" knowledge to interpret. As adult humans in a culture, we have shared meanings. Design should appeal to the way the broader public who experience it feels about it. Building performance evaluations need to replace the metaphor of aesthetics with that of affective meanings conveyed to the public.

Some people claim that differences between architects and the public are irrelevant and that heeding popular meanings gets mediocre solutions, the average of an inexperienced public. They give higher priority to designer standards of taste, arguing that designers lead popular taste (Punter, 1994). If designers lead popular taste such that initial public scorn changes to appreciation, why bother with popular preferences? The argument raises an important empirical question. Do designers lead public taste?

A hallmark of science involves multiple testing of hypotheses through different methods. Each method may have unique biases, but if several methods converge on the same finding, one can have more confidence in the accuracy of the findings. Thus, Nasar (1999) employed multiple-methods in a series of studies to examine many buildings and masterpieces (buildings that have stood the test of time) over hundreds of years. Those studies consistently showed that the taste standards of designers did not lead popular taste. Popular values (not high-art values) led future standards of taste. One study found that competitions juries of experts seldom picked designs that became masterpieces; two studies of historical design awards programs and competitions found that both architects and non-architects more often favored losing to winning entries; and other research showed that people have strong consistencies in what they notice and prefer in buildings, that popular taste has stability over time; and is a better predictor of future popular taste than judgments of design experience. The public brings personal knowledge about their experience of places. In sum, the results highlight the value of integrating popular values into designs and building evaluation procedures. To gauge popular values, one must ask the public.

The early POE framework (Preiser, Rabinowitz and White, 1988) provided for three levels of effort, degrees of sophistication and data-gathering techniques, cost, manpower, etc.: indicative, investigative and diagnostic POEs. The 3 POE phases with 3 steps each were: (1) Planning: reconnaissance and feasibility, resource planning, research planning; (2) Conducting: initiating on-site data collection

process, monitoring and managing data collection procedures, analyzing data; and, (3) Applying: reporting findings, recommending actions, reviewing outcomes. Finally, the 3 categories of performance criteria were: people, settings and relational concepts. Later, this framework was considered to be quite simplistic, and, in many ways, inadequate.

Toward Building Performance Evaluation

In the mid-90s, the Preiser had the opportunity to collaborate with a German visiting scholar, Dr. Ulrich Schramm, who had received his Ph.D. on the topic of cross-cultural POEs (public health clinics in Egypt) from the Technical University of Stuttgart in Germany. Issues pertaining to

the building delivery cycle, as well as the life cycle of a building – a meta level approach to building evaluation, were investigated jointly, and subsequently, an integrative framework for building performance evaluation was developed. In this framework, post-occupancy evaluation represents only one of six internal review loops, and the framework focuses on the entire life of a building, as well as the notion of feed-forward into the next building cycle (see Figure 1).

The key concept was a gradually evolving knowledge base that is translated into building performance criteria. They cover: issues like health, safety, security; issues addressed by building codes; functionality and guideline

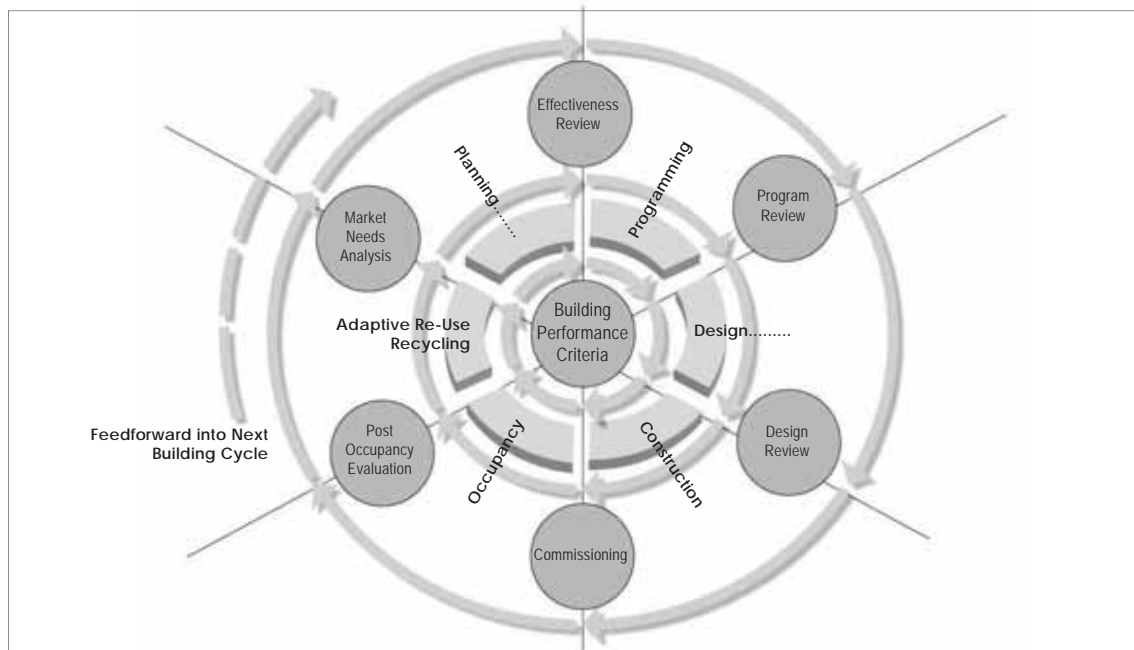


Figure 1: Building Performance Evaluation (BPE) Process Model. (Source: Authors).

materials; and last, but not least, the social, psychological, cultural aspects of building performance. A key component of the social, psychological and cultural aspects of building performance. In fact, the overall performance, includes the building's appearance, its evaluative quality, the meanings and evaluative responses it conveys to the users. Research has consistently shown that vision dominates human experience, and that appearances, aesthetics or the invisible mental image places convey takes first priority in human's experiences of places (cf. Nasar, 1994). Contrary to the conventional wisdom about individual differences, research shows widespread agreement on evaluative appraisals and meanings. Understanding perceived visual quality and incorporating that understanding in building performance evaluation can help shape more humane surroundings for people. Meanings and aesthetics are not separate from function. Appearances can draw people in or repel them. For example, Nasar's (1999) post-occupancy evaluation of the Wexner Center for the Arts, a facility intended to attract students, found that many students never went inside, because they believed the staff were uppity. They had not entered the facility, but the meaning conveyed by the exterior disrupted its intended function. Successful designs must convey the desired meaning, a meaning that is supportive of the function, and both to users and occupants. For example, a gambling casino should probably look exciting to work in, while a dentist's office should probably look calming. Research also indicates that designs that look good work better (Nasar, Preiser, and Fisher, 2007; Norman, 2004).

In 2001, the National Academy of Sciences

revisited the topic of POE in a day-long symposium, dealing primarily with POE in U.S. Government agencies. A book resulted, entitled *Learning From Our Buildings: A State-of-the-Practice Summary of Post-Occupancy Evaluation* (National Academies Press, 2001). It was interesting to note that government is getting increasingly involved in this activity, and has gathered a lot of experience, such as the General Services Administration. Another example is the State Department, which has commissioned many POEs on embassy facilities. Given the phenomenon of terrorism, it can be assumed that they will continue to be carried out, not just in government, but also in the private sector.

More recently, the National Council of Architectural Registration Boards (NCARB), commissioned Preiser to write a monograph on 'Improving Building Performance' for their Professional Development Series (Preiser, 2003). They publish monographs on sustainability, ethics and other timely topics. Architects can get tested on that material, and earn recertification/continuing education credit. This may be the most important publication Preiser has ever written, because now every architect can learn about this topic and use it in his/her practice. Included were four case studies from major firms who are engaged in building performance assessments, primarily for in-house learning and knowledge building: NBBJ in Columbus is considered to be the world's premier health-care facility design firm. They did a case study on a hospital in Iowa with the idea of knowledge building, whereby some key programming and research personnel were nurses turned programmers. They were truly interested in establishing whether the

operational performance of the hospital was good. The second case study was by KMD Architecture in San Francisco. They had done a project on transitional housing, and they went back and evaluated it. Then there was Jay Farbstein Associates in Los Angeles with a POE project on post office facilities, a huge project. And finally, there was the Cincinnati firm of Steed-Hammond-Paul (SHP), showcasing a high school evaluation. Case study examples like these are very encouraging. If one can identify major architecture firms in the USA,

who are availing themselves of techniques that help them build their knowledge base (see Figure 2), then that can be considered progress. Some firms are posting the evaluations on the Web, but in so doing, they don't reveal all the information, in order not to give away their trade secrets. They just want to demonstrate that they are conscientious about knowledge building, and that they work closely with their clients to accomplish this goal.

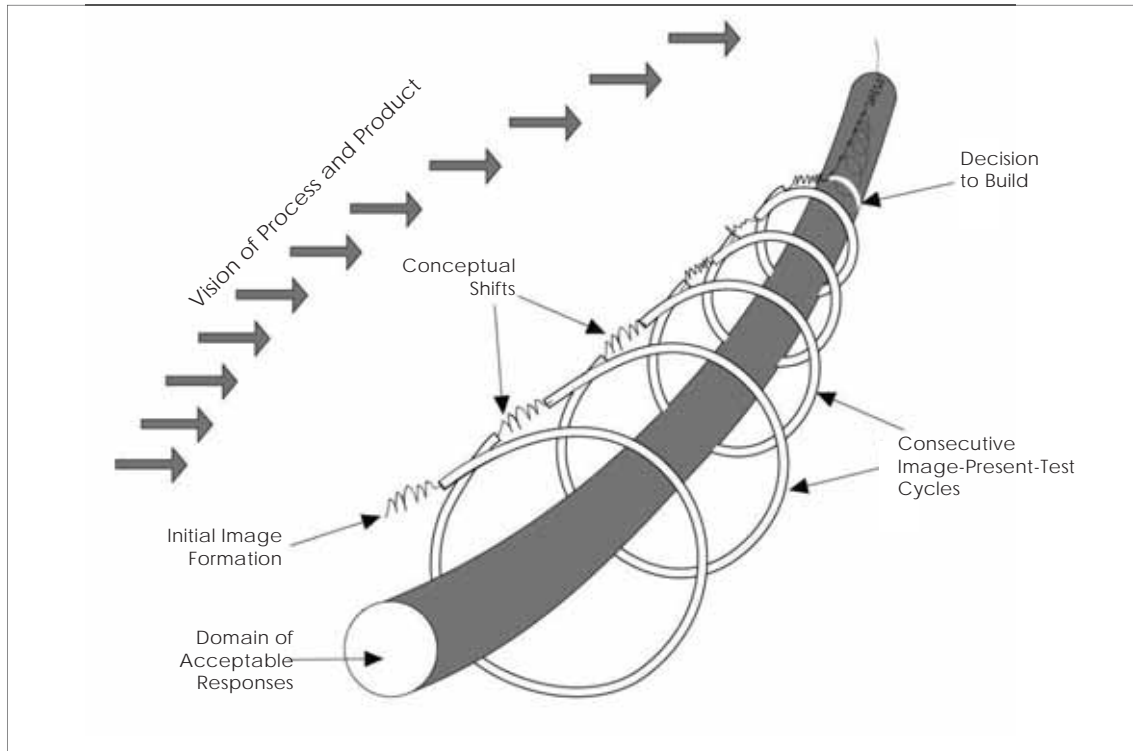


Figure 2: Continuous Quality Improvement. (Source: J. Zeisel, 1981).

Recent Developments

Starting in 1995, the efforts of the International Building Performance Evaluation (IBPE) consortium evolved into the Integrative Framework for Building Performance Evaluation (BPE) and was published in *Time-Saver Standards* (Preiser & Schramm, 1997). Ten years later, the group's work culminated a publication by Elsevier (Preiser & Vischer, 2005). It is a book about the conceptual basis for building performance evaluation, and it includes BPE case studies from around the world – from Japan, Hong Kong, the Netherlands, Germany, the UK, Canada, Brazil, etc. Here again, perhaps a very interesting feature is the appendix which contains 'tool kits' of measurement techniques and instruments, which readers can adapt for their own purposes. A second edition of that book with new case studies is presently in the planning stage. Readers can find a newer tool kit in the appendix of a book evaluating 17 contemporary schools of architecture around the world (*Designing for Designers*, Nasar, Preiser, and Fisher, 2007). This tool kit includes recommendations for evaluating overall functional performance, meanings and visual quality of building interiors and exteriors, as well as entire facilities at the urban design scale, such as a university campus. While case studies in the book offer alternative methods, the tool kit in the appendix grew from an e-mail exchange initially among 40 scholars from around the world to a smaller group of ten who applied the evaluation methodology.

Finally, can cost benefits of BPE be demonstrated? The answer is yes. In an evaluation of 42 libraries in Hamilton County, OH, BPE and GIS methods were combined to

measure the libraries' productivity/efficiency regarding circulations per annum, plus 7 other key performance indicators, including population demographics, service areas, and building capacity, to name just a few (Preiser and Wang, 2005). This new productivity algorithm may well point the way to the future for BPE. As for visual quality, we need better knowledge of the performance-related outcomes associated with appearance. Do places that look good make workers or visitors feel better in them? Does that, in turn, improve creative thinking, productivity, or the bottom line. Do aesthetic appearances affect property values? Research has tied aesthetics to health outcomes. Nature, an aesthetic variable, has been shown to have restorative and healing effects, leading among other things to shorter hospital stays. Other research has tied aesthetics to health outcomes. People are more likely to walk in areas that they see as pleasing to the eye (Ball, Bauman, Leslie, and Owen, 2001; Cerin, Saelens, Sallis, and Frank, 2006; Humpel, Owen, Iverson, Leslie, and Bauman, 2004; Saelens, Sallis, Black, Chen, 2003). As a physical activity, walking reduces obesity, which has well documented health benefits including prevention of cardiovascular disease, some cancers, Type 2 diabetes, osteoporosis, injury falls, premature mortality and mental disorders (US Department of Health and Human Services, 1996), and recall the finding that designs that look good also work better (Nasar, Preiser, and Fisher, 2007).

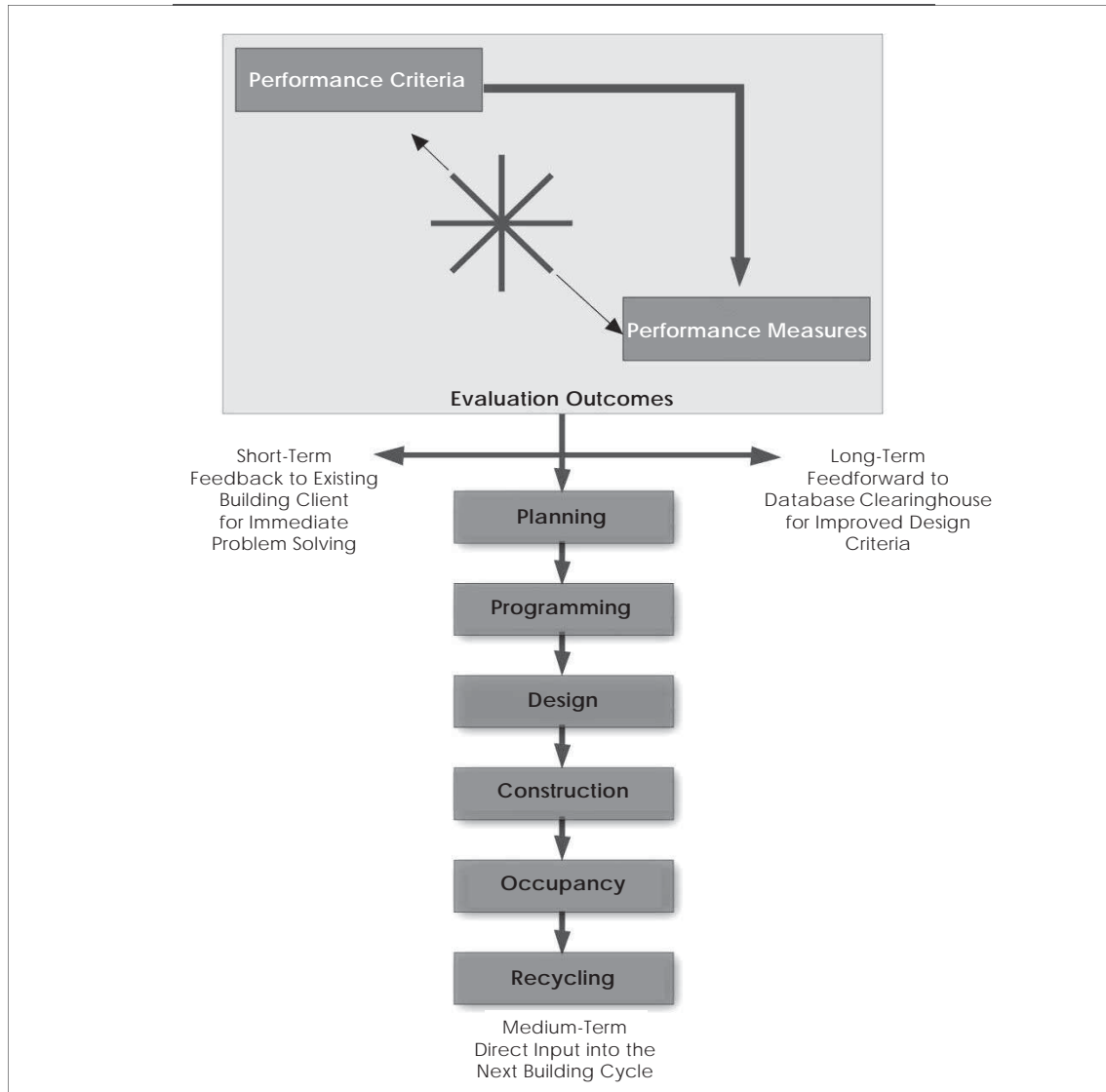


Figure 3: The Performance Concept in the Building Process. (Source: Authors).

What is Next?

The question has to be asked: What is next? Should one advocate more investment in knowledge and data base building? Is litigation an unwanted but likely consequence of critical scrutiny of building performance? Should one move closer to facilities management? Is design-build the answer? Who is in control of the building delivery process? The architect certainly appears not to be.

In 1992 we began discussing the need for a better knowledge base to guide the design and design process for schools of architecture. Preiser was in a building undergoing renovation for a design by Peter Eisenman, designer of the Wexner Center, the focus of Nasar's (1999) competition book. Nasar's faculty was planning a new building, and visited several recent buildings to get ideas. Such visits, while common, do not offer the systematic information, which is made possible through a systematic and comprehensive building performance evaluation. We saw a need for a knowledge base to guide such designs; and we decided to collaborate on a project which obtained systematic evaluations of contemporary facilities to develop guidelines for future designs for these buildings, and many others.

Architecture schools often seek designs by "star"-chitects. Universities have become patrons, seeking signature buildings and design competitions. An e-mail survey (reported in the book) of university architects at 25 campuses found that most of them had built signature buildings or held design competitions in the past five years. While such buildings may win awards

and praise from the critics, they often perform poorly for the occupants.

Designs for schools of architecture receive special attention. Just as universities try to create world-class science labs, new buildings for schools of design should reflect the state-of-the-art in design for all stakeholders, i.e., the students, faculty, alumni and the university, as well as the wider community. Oddly enough, in the past, this significant building type—schools of architecture—has received little critical discussion and no systematic evaluation to guide future designs.

In 1999, we sent out queries on listservs asking for participation in a project to do post-occupancy evaluations of new buildings (or additions) for schools of architecture. To our pleasant surprise, more than 40 people responded. Each then received a draft instrument (drawn from work by Preiser et al., 1988 and Nasar, 1998) for them to review. After several revisions, we arrived at a common instrument and set of procedures. The shared method allowed for comparison across the schools. Later additional participants joined the project, using different methods, which allowed us to identify convergent findings across methods and schools.

We eventually gathered post occupancy evaluations of 17 schools of architecture. Ten post-occupancy evaluations used the same instruments and coding procedures, allowing statistical comparisons across the evaluations. Looking in depth at many schools, the book found out what makes a good design for designers, and what lessons about design and process one can apply to other kinds of buildings and places to get better

performance. Although we identified many issues, the evaluations pointed to five concepts leading to high performance designs. Better designs tended to have:

1. A well-managed process.
2. Compatible exteriors and warm interiors.
3. A gathering space (Atrium) with lots of natural light.
4. Layouts and signs that made it easy for people to find their way around.
5. Some focus on basics to ensure good acoustics and HVAC.

With the digital revolution and on-line surveys, the prospect for low cost building evaluation for continuous improvement in architecture seems more and more feasible. And with the boomburbs (Lang and Lefurgy, 2007) in the southwest, globalization, the booming development in China, dwindling non-renewable energy resources, global warming, and sustainable and smart growth development, the need for such information is growing more urgent. As with design awards, the independent eye of a BPE on the design can uncover new ways of looking at a design. More than that, a rigorous systematic assessment of past successes and failures can build knowledge, improve future designs, and demonstrate the contributions of the design professions to the community. Professions, such as medicine, law, and business, have advanced, because of their rigorous use of evaluation and feedback in assessing past successes and failures. We believe that advances in building performance and aesthetic evaluation can lead to continuous improvement in the quality of designed environments.

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