RESEARCH&DESIGN

The Quarterly of the AIA Research Corporation

POST-OCCUPANCY EVALUATION

Holding the Mirror up to Architecture

COMMENTARY

The evolution of evaluation

Of the three issues published in Research & Design's still short story, this has been the most fascinating to put together. The AIA Research Corporation, where R&D is created four times each year, is by no means the only architectural group-research organization or firm-exploring post-occupancy evaluation today. But the nature of its research in the field has been to assess many of the disparate notions that make up the current state of environmental evaluation. The incredibly broad spread of opinion in that range-running the gamut from disembodied statistical analysis on one extreme to intuitive architecture on the other-gives one working from such a central position what may be the best vantage point on the landscape. It's for this reason that two of the central articles in this issue are the work of AIA/RC President John Eberhard and Senior Researcher Charles Masterson. Both have been involved for years in post-occupancy evaluation and application.

In his article, Masterson calls post-occupancy evaluation "an idea in good currency," quoting urban affairs expert Donald Schon's definition of such an idea as one whose "central core of inquiry" is accepted by all. POE's central core of inquiry appears to be the only facet of the subject upon which its major actors—members of both the architectural and social science communities—can agree. That the perceptions of building users are valid and valuable to design, no one disputes. The bone of contention, as the articles in this issue make clear, is the development of a system for discovering, defining, and channelling those perceptions back into the design process.

As a generic concept, the post-invention evaluation of ideas and things in use is as old as civilization. But as an architectural and behavioral specific, POE is brand new, less than 20 years under discussion. Architects and behavioral psychologists involved in the field can argue fiercely when the subject comes up, as our Notebook item on the recent EDRA 9 Conference in Tucson will attest (page 4). At times, the twin disciplines of architecture and social science seem so deeply rooted in opposing approaches, techniques, and languages that synthesis of the two seems out of the question. But in fact synthesis will occur, and not far into the future. Both disciplines are focusing more attention on post-occupancy evaluation. Inevitably, proposals delivered in a spirit of compromise are coming closer and closer to the mark, the mark being a POE system that will satisfy both architects concerned for the integrity of their processes and social scientists concerned for the veracity of their analysis. One such proposal, from Cambridge, Mass. behavioralist Mayer Spivack, is reported on page 2 of this issue, and both Eberhard and Masterson present rationales for a design-oriented solution to the POE problem in their articles.

The state of architectural research isn't unlike that of post-occupancy evaluation today. If architecture labored for centuries without quantifiable data on human behavior and satisfaction in designed environments, the need for such information hasn't stopped the profession from throwing up defenses when another discipline interjects with findings of its own. But dialogue between the architects and social scientists involved with POE is breaking each discipline's defenses down. The results include shared definitions, broadened perceptions, and, eventually, a synthesis satisfactory not only to professionals but to the users for whom such a system will exist.

Architectural research brings new concepts, new systems, and new technologies to an ancient and venerated art, but the process is an adversary one, as it has been with POE. Progress grows from the fractious conflict of old and new, time-tested and freshly-minted, and only dialogue can cool that conflict when it overheats. Research in a vacuum is pointless, and architecture in a vacuum progresses not at all. Exposed to one another, though, the two catch fire. *Research & Design* will be serving its purpose as long as it serves as a forum for this kind of dialogue, a forum in which architecture and research can encounter, influence, catalyze one another, and catch fire.

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Kevin W. Green Editor, Research & Design

RESEARCH a Design

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Cover: Photograph of Virginia's Dulles International Airport Terminal by James H. Pipkin Jr., a Washington, D.C. photographer who often focuses his eye for the kaleidoscopic on architecture. Other examples of his work appear on pages 6 (Boston's Christian Science Center), 8 (Minneapolis' IDS Center), and 16 (New York's Guggenheim Museum) of this issue.

NOTEBOOK

Spivack's new Design Log Method may be POE's key

The first thing you realize when you talk to architects and social scientists about post-occupancy evaluation is that everyone agrees that behavioral studies of human reaction to a given environment are good for design, and they should be done. But few agree on who should handle the job—architect or social scientist—and no one seems able to agree on a mutually acceptable method.

A new system proposed by Cambridge, Mass. behavioralist Mayer Spivack may be the solution both disciplines have been looking for.

Spivack, 41, is director of the Unit of Environmental Analysis and Design at the Laboratory of Community Psychiatry in the Department of Psychiatry, Harvard Medical School. He is also a city planner (master's from MIT), inventor (three U.S. patents, one Canadian), engineer (intertial guidance equipment at MIT), lecturer, sculptor, writer, researcher, and, for the past 15 years or so, highly successful consultant to a number of design firms interested in linking behavioral analysis and architectural design.

Spivack is a peculiar specimen, not only because his background encompasses both social science and design, but because his collaborations with practicing architects haven't ended with the ill feeling that characterizes so many such ventures. He appears to be one of a very small number of social scientists whose work with architects has been happy, although his techniques weren't always what they are now.

"I spent several years trying to do laboratory research for architecture," Spivack says, "setting up experimental designs and experimental situations, hiring subjects, putting them through very carefully controlled protocols. We went through a lot of that and, I must say, wasted a lot of time and energy on it. It became apparent after several such experiments that, while we might be able to get some data together, the data in no way predicted the behavior of people in real situations."

Laboratory social science doesn't work for design, Spivack says, because things are missing. For one, if you pay a subject to come in and perform like a human being for you in a psychological experiment, he isn't motivated the way he is when he's trying to get from here to there in a building.

"When you're moving around in a building, you're not aware of the building," says Spivack. "But when you're in a psychological experiment, you're very aware of the experiment. You're a self-conscious beast. Your perceptual thresholds change; it's not the same kind of casual, everyday experience." Environmental analysis in the laboratory, Spivack concluded, "was the long way around. So I started looking for ways to do good inquiry not necessarily the most rigorous science—but the best possible inquiry and the most rapid data retrieval that I could find. As far as I'm concerned, science is only valuable if it's checked by reality, and in architecture, reality is the building. The simple conclusion I came to was that every building must be an experiment."

Spivack's rejection of "standard" social science techniques and jargon set him apart from most of his peers, though he says he struggled with several kinds of consultation methods before coming up with something that satisfied him. The stumbling block, and the thing that stands in the way of most social scientists who want to work with architects, he says, is translation.

"The fact of the matter is that if you try to distill a typical body of scientific data from a laboratory situation or a standard research method, you find that it's really difficult to translate that into design specs. It may be because the person doing the research has never developed the ability to write a design spec. It may be that simple. I think quite frequently architects find that they've got a beautiful piece of research, but that it seems to be up to them to translate this beautiful piece of research into bricks, or into poured concrete. And it's not easy to do.

"I think that the way around this is not to get involved in classical research, but to regard the process of design and the building itself as the research issue. Instead of trying to produce hard data that then gets designed into the building, we have to assume that the building will have a certain amount of information that can be sifted and sorted in a fairly rigorous way, and that that information exists either in the environment to be rehabilitated or in another building very similar to the one you wish to build from scratch."

What Spivack finally developed is a system that allows "an architect, a client, the ultimate users, or all of the above, to participate together in a process which makes all of the information they can bring to bear on a new piece of work available, so that it can be incorporated into a program."

The system, developed by

Spivack with associate Joanna Tamer, is called "The Design Log Method," and for all the complexity of architectural and behavioral discipline it embraces, it's a very simple thing.

"The Design Log is a log that follows the whole process of design from the first meeting right on through," Spivack says. As each part of a design project comes up for discussion, the architect jots down its particular design requirements. The client is often working closely with the architect at this stage, so the design requirements are set jointly, and the client is fully aware of what's going into his/her project. Then the architect notes the "treatment" that satisfies the particular requirements of the space, and the client knows exactly how and why the design is taking shape. The system is based on a medical model, progressing from

"observation" to "diagnosis" and then to "prescription".

The architectural program for a project, Spivack feels, should be a traditional program, written parallel with the project's Design Log. "Then," he says, "when the program is finished and we get into actual design on the drawing board, every design decision that has any significance at all has a reason. There's always a reason for a design decision, and the architect simply notes what that reason is by writing it down in the Design Log. This allows us to take those decisions through to final design, knowing all the time why we're doing these things.

"It allows us then to go to postoccupancy evaluation, never forgetting from the moment we began what we were trying to do in the program. Which means that, for the first time, post-occupancy

Solar in the city (and elsewhere)

Three new resources on passive solar design and urban solar applications are on their way to designers, due to arrive by fall.

Last March, during the second annual National Passive Solar Conference in Philadelphia, the AIA Research Corporation held (with Department of Energy support) a mini-conference focused on solar applications in the city. Ralph Knowles was among eight speakers who addressed the design, legal, biological, political, and economic ramifications of urban solar energy, and the eight papers given there have now been collected for publication. They'll appear first in the Mid-Atlantic Solar Energy Association's proceedings of the general conference, due out this summer.

In another DOE-supported project, AIA Research has compiled a Passive Solar Bibliography scheduled for fall publication. Currently in draft form, the bibliography is a comprehensive list of passive solar resources in 22 categories, ranging from general design concepts to specific scientific subjects. For researchers, it will be an invaluable tome; for practitioners, the more valuable resource will be a special



Illustration by Peter Hasselman

abridged version limited to designrelated concepts, also due out this year.

Last but no less useful is a Survey of Monitored Passive Solar Dwellings, a third DOE-supported effort, also now in draft form. Divided into two sections, the survey describes 28 passive solar dwellings whose energy performance has been monitored, and 32 dwellings now being monitored or slated for it in the near future. The survey is an up-to-date collection of passive solar designs; look for it by late fall. evaluation is organically linked to program."

Spivack says that post-occupancy evaluation isn't the Design Log's only purpose; it's also a good way to integrate information on human needs and behavior into the design process, when such stuff is most timely.

"A lot of the time, I find that when we first involve ourselves in writing a Design Log, there is a good deal of vagueness among the clients about what they'll be doing in the new space. As we begin to work with them, they become much firmer and much more clear about what they'll be doing, and as a result of that we begin to write an architectural program. I've been in situations where the architect and the client were at loggerheads. Because we had this kind of Design Log analysis of what the design decisions were, we were able to show that the decisions were highly rational and designed to meet the needs of the client. The client sits back and listens to the most orderly recitation of reasons for the major decisions in his building that you can imagine."

A Design Log has yet to be written without Spivack's input, but he doesn't see himself or any other social scientist as a required participant in the system. "I think that architects are fully qualified to become their own social scientists in this sense," he says. "And architects need support in this. There's a lot of feeling among architects that they can't do this at the kind of level they need to, so they want social scientists to come and work with them, which is fine. But I think the real job of the social scientists-especially right now, in this decade-isn't only to bring data to architects so that the architects can encapsulate it in a building. The social scientists should work with the architect, support the architect's own observations, deepen the method that the architect uses to get those observations, and help develop-with the architect-the skills to translate those kinds of social and psychological perceptions into design criteria."

Watch for Spivack's own Design Log report in the September AIA Journal.

EDRA 9: Designers quiz researchers

The University of Arizona's Department of Psychology and College of Architecture were hosts last April for the ninth annual Environmental Design Research Association (EDRA) conference. Nearly 400 participants, most of them from the academic community, attended the Tucson conference; but the outnumbered design professionals who did attend made their presence felt. Especially in workshop sessions, designers engaged the academicians in intense discussions of research results, methods, and the practicality of applying research in the design process.

The number and variety of plenary session and workshop topics was so great that it was mentally as well as physically impossible to attend all meetings of interest. But despite the variety, a key issue surfaced at the start of the conference and managed to insinuate its way into nearly every discussion.

Michael Brill of BOSTI Inc. (for Buffalo Organization for Social and Technological Innovation) delivered a key opening address advocating that researchers pay attention to the "squishy middle" between the clean calculations of research and the prosaic problems alive on designers' drawing boards. The middle is squishy, Brill said, because no one seems able to define exactly where research leaves off and application begins; but the necessity for operating in the squishy middle is evident.

Brill said that too many researchers have assembled large tables of data and debated the value of highly technical environmental rating procedures, without pointing the way to actual application of research results.

The problems of the squishy middle were crystallized when one designer gave strident voice to his doubts during a workshop on elderly housing research. The workshop participants had been given a list of ostensibly "bottom line" research results from gerontological research journals. Topics included social interaction and user preferences, and such variables as privacy



Seismic Update: San Francisco, 1906

A new report detailing research into earthquake-induced ground failure in northern California from 1800-1970 has been released by the U.S. Geological Survey, and it includes some interesting new correlations on the 1906 San Francisco earthquake (*Research & Design*, Vol. I, No. 2).

Since wet ground is more likely to fail under seismic stress, USGS researchers T. L. Youd and S. N. Hoose documented San Francisco's rainfall pattern for 1905-06 and discovered that in the months preceding the April earthquake, rainfall ranged from 7 to 76 per cent heavier than normal in varying locations. The month of March, 1906 was 50 to 200 per cent wetter than normal. So San Francisco was relatively satu-

and optimum density in housing for the elderly. The designer said, "I don't know if I believe these research results, and even if they are somehow true, I can't begin to think how I would design an apartment complex around them." The ensuing discussion revealed a well of sympathy for designers in the research community; but it also became clear that concrete suggestions could in fact be made about housing for the elderly. Where the designer's dissatisfaction was justified, it could often be shown that further research would make the vague conclusions of present-day research more positive, definite, and practical.

Many listeners concluded that it

rated when the estimated Richter 8.3 earthquake struck; the city suffered extensive ground failure on steep slopes, sand dunes, landfill, and other areas of uncompacted soil. Ground shifts of up to 7 feet horizontally and 6 feet vertically occurred on the waterfront at the foot of Market St. and in the filled areas south of Market, shattering many of the city's water mains. Which is why 85 percent of the awesome post-earthquake damage resulted not from shaking, but, ironically after so much rainfall, from fire.

The report, "Historic Ground Failures in Northern California Associated with Earthquakes," is available from USGS, 1200 South Eads St., Arlington, Va. 22202, for \$5.25.

isn't just the need for precision that has kept researchers from joining designers, but also the researchers' oath to be value-neutral in their research. When the designer made his pointed statement, he was reacting to the nebulous comparisons research conclusions often generate. One study may imply that more privacy is better for the aged, while another may emphasize the beneficial effects of social interaction. The sharp follow-up questioning seemed to point out that the integration of clients' and users' values in the middle of the programming process is just what makes the middle squishy.

Notes ...

In Sweden, where the quality of life is rated the highest on the planet's surface, subsurface construction techniques are more highly developed than anywhere outside Scandinavia. Energy conservation potential is the obvious motivation, and Sweden's numerous projects in the field presage a trend of growing activity in the U.S. and other nations. The Swedish Council for Building Research has just published a monograph on the subject by Birger Jansson and Torbjorn Wingvist, called The Planning of Subsurface Use (SCBR document #D7L1977). It's available, in English, from Svensk Byggtjanst, P.O. Box 1403, S-111 84 Stockholm . . . At Stockholm's Royal Institute of Technology, a research project called Planning for Color is now developing a new planning process designed to involve users in color selection. Two guides, one for users and one for architects, interior designers, and color consultants, are expected to result. Contact Harriet Ryd and Birgitta Lindahl at the Royal Institute, Fack, S-100 44 Stockholm . . . And just released, four Swedish building research publications recently translated into our native tongue. Subjects are steel construction, heat/ moisture research, floor research, and fire research. Write the International Secretariat, Swedish Council for Building Research, S:t Goransgatan 66, S-112 30 Stockholm . . . Back in the U.S.A., Mechanical Technology Inc. of Latham, N.Y. has signed an \$8 million cooperative agreement with the Department of Energy (DOE) to develop commercial systems to recover and use waste industrial heat. The firm will design, build, and install four waste heat recovery systems at industrial sites to be picked from the electric utility, chemical refining, and metal processing industries . . . A similar agreement was signed earlier this year with Sunstrand Energy Systems of Rockford, Ill . . . At the University of Cincinnati, Stephen Vamosi is researching mechanical retrofit techniques for historic structures. He hopes to develop environmental control systems capable

of bringing historic structures up to modern requirements while preserving them as much as possible in their original forms. He can be reached at the school's Department of Architecture, Mail Drop 16, Cincinnati, Ohio 45221 . . . Proceedings of the ninth annual Environmental Design Research Association Conference held in Tucson last April are now available. Strong collection of current environmental design research includes papers on housing and residential environments, educational and play facilities, and designer/researcher collaboration. Cost is \$12. Order from EDRA, P.O. Box 23129, L'Enfant Plaza Station, Washington, D.C. 20024 . . . PEDNET, the nationwide network of pedestrian behavior/design researchers which functions primarily as an information exchange system, is looking for more input. Talk to Michael Hill, Department of Geography, University of Nebraska, Lincoln, Neb. 68588 . . . And from the unsubstantiated rumor department . . . Disenchanted with DOE's preference for nuclear research funding

Coming Up:

28 July-4Aug.: Cambridge, Mass. Summer Institute on Energy Conscious Design, for faculty from U.S. schools of architecture, at Harvard Graduate School of Design (no openings left at this writing). Contact: Peter Smeallie, AIA Research Corp., 1735 New York Ave., N.W., Washington, D.C. 20006. 15-30 Aug.: Varna, Bulgaria. Sixth Regional Seminar on Earthquake Engineering. Contact: Academy of Sciences, Government of Bulgaria, Varna, Bulgaria.

15 Aug.: Entries deadline, Owens-Corning Energy Conservation Awards Program. Contact: W. N. Meeks, Owens-Corning Fiberglas Corp., Fiberglas Tower, Toledo, Ohio 43659.

20-25 Aug.: Palo Alto, Calif. Summer Seismic Institute, for U.S. architectural faculty, at Stanford University (no openings left at this writing). Contact: Earle Kennett, AIA Research Corp., 1735 New York Ave., N.W., Washington, D.C.

over solar, some DOE staffers are said to be sporting T-shirts which feature the eagle on DOE's logo manifesting an unsociable gesture with one claw and holding a screw in the other . . . "Trust us," the T-shirts allegedly say, adding "Would we lie to you?" . . . Also from our bank of less-than-deadlyserious solar news . . . Poet and novelist James Dickey was among the speakers at Washington's Sun Day celebration on the Mall. Dishevelled, exuberant, hardly in tune with the line-up of DOE officials and solar think-tankers who preceded and followed him at the podium, Dickey nonetheless pleased the Woodstock-like crowd of 10,000-plus celebrants with his joyous and optimistic tribute to solar energy and the Sun itself. The Georgia poet read one of his own verses, "Sunburned Lovelies," to the crowd and closed with what was easily the most memorable quote of the day. Face turned upward, arms outstretched, he spoke to the brilliant, cloudless sky and said "Keep that golden buggy drivin'/We'll do the rest."

20-26 Aug.: Ottawa, Canada. Seventh World Conference of the International Playground Association. Contact: Canadian Parks/Recreation Association, 333 River Rd., Vanier City, Ottawa, Canada K1L 8B9 (tel. 613/746-7740).

28 Aug.-1 Sept.: Toronto, Ontario. Annual meeting of the American Psychological Association. Contact: Candy Won, APA, 1200 17th St., N.W., Washington, D.C. 20036. 13 Sept.: Deadline for papers submitted for the sixth annual Energy Technology Conference, to be held in February, 1979. Focus is on the application of technology to satisfy the world's energy needs. Contact: EXPO 79, 4733 Bethesda Ave., N.W., Washington, D.C. 20014. 25-28 Sept.: Salvador, Brazil. World Congress of the International Federation of Landscape Architects. Contact: IFLA, Arco Velho, Ramalhao, Sintra, Portugal.

23-27 Oct.: Mexico City. World Congress of the International Union of Architects. Contact: Maurice Payne, AIA, 1735 New York Ave., N.W., Washington, D.C. 20006.



POE: The State of the Art

"Be not too tame neither, but let your own discretion be your tutor . . . for . . . the purpose . . . is to hold, as 'twere, the mirror up to nature."

William Shakespeare

Post-occupancy evaluation, at least by that name and by the psychological and sociological implications it now carries, is a modern invention. Less than 20 years old, it has grown tremendously as a subject of interest, study, and application among architects and social scientists alike. POE has become a discipline of its own, according to researchers gathered in Tucson last April for the ninth annual Environmental Design Research Association conference. Its aim, in Shakespeare's phrase, is to hold the mirror up to architecture, to see if the environments we design to shelter and satisfy accurately reflect the needs of their occupants.

As a discipline, post-occupancy evaluation is marked by more than the usual quotient of disagreement among its practitioners, largely because they come from the distinctly different worlds of architecture and social science. But after two decades of experimentation, the field has finally matured to such an extent that common practices and techniques are emerging.

Last February, behavioral researchers Robert B. Bechtel and Rajendra K. Srivastava (acting as principal investigators for Tucson's Environmental Research and Development Foundation) delivered to the Department of Housing and Urban Development their final report on a research project focusing on post-occupancy evaluations of housing. Bechtel is an environmental behavioralist whose work in post-occupancy evaluation has been both important and controversial. He brings what many designers call an overly scientific bias to the evaluation of design, but his POE report to HUD is a landmark work in terms of both breadth and moderation. It comes closer than any previous work to setting out the basic premises of good evaluation, and it includes a model POE process that, while not free of controversy, architects and social scientists can still agree to in large measure.

Crucial to any post-occupancy evaluation is that it be part of a larger system of design feedback, Bechtel's report says. An evaluation aimed solely at fine-tuning a completed, occupied building ignores the potential for applying such newly-accumulated information on man/ environment interaction to upcoming design projects. Bechtel believes, as do most POE proponents, that POE's ultimate value lies in its capacity to systematically raise professional design expertise. Thus, the ideal POE is done on a completed building (two years after occupancy, optimally) so that the results can be applied to a new design project. The flow of information from completed projects to those still on the drawing board is the essence of post-occupancy evaluation, not simply the fine-tuning of an existing environment.

Equally important, post-occupancy evaluation should be a team effort. That both architectural and social science expertise are requisite in the behavioral analysis of environment no one disputes. The line between each discipline's responsibilities, however, is drawn differently by almost everyone. Bechtel's emphasis on scientific methods of information-gathering calls for the major involvement of a social scientist, but not all proponents of POE including Bechtel's peers—fully endorse that emphasis. Bechtel suggests a POE team comprised of an architect familiar with the jargon and techniques of social science, and a social scientist comfortable with the constraints of design. The architect should be, in Bechtel's words, "first among equals" on the team, if for no reason beyond the architect's legal liability for design.

Also crucial is the notion that all POEs are limited in scope. An architect manipulates an infinite number of variables on any given design project, in contexts that range from site, exterior appearance, interior space, and furniture configuration to the interaction of all these elements. An evaluation aimed at measuring design success must be limited to the elements of greatest importance, Bechtel says. He also notes that the client and/or the architect on the POE team are responsible for setting such a limitation.

Based on these fundamentals—that any POE be carefully drawn, interdisciplinary, and part of a feedback system for new design—Bechtel's report sets out an 11step model POE process. Though unnecessarily heavy on the statistical techniques of behavioral science to many minds, the basic process represents the state of the design evaluation art today. (continued on page 32)



Evaluating Design

By Charles Masterson

"The gods did not reveal, from the beginning, all things to us; but in the course of time, through seeking, men find that which is better"

Xenophanes

I. The Evaluation of Architecture

Architecture today is practiced in a complex and critical society. New design problems and opportunities emerge and new design solutions are generated in the face of increasing litigation, challenges to professional codes of ethics, and questionings of competence and credibility. Within this turmoil, large scale public building programs have become powerful negative symbols. Over the past five years Pruitt-Igoe has become the exemplar of failure. There, public money paid for the dynamiting of a large portion of a public project built upon what was seen to be the best building policy, developed upon the best of social research and architectural theory. The journals of architecture, planning, the social and psychological sciences, and public administration are scattered with partial explanations of where Pruitt-Igoe went wrong. But the public do not read this literature; architecture touches upon their experience more directly, and they prefer to question the authorities of the professions that collaborate in the development of the built environment.

That questioning has an effect. Above a certain scale public architecture cannot be implemented without passing through a gauntlet of economic, social and environmental impact statements. These are, in large measure, part of an adversary process that evaluates the quality of potential environments. Sometimes the process works and sometimes it doesn't. Public design guidelines are also being challenged and pushed to reflect a responsiveness to human issues that have been neglected in the past. These too constitute a screen of evaluation through which architecture must pass, a screen that increasingly specifies the physical characteristics that architecture must possess rather than the diverse expectations and desires of people who will occupy the architecture once completed. In such an atmosphere, the notion of post-occupancy evaluation has been recieved with strongly mixed emotions.

Post-occupancy evaluation (POE) is, to borrow a term from MIT professor of urban affairs Donald Schon, an idea in good currency. POEs are, quite simply, judgements about the quality of architectural environments from a human perspective, from the viewpoint of their occupants. Such evaluations go substantially beyond the common technical reviews of product performance; they move into the realm of human affairs, into the questions American society is asking about the linkages between the designed environment it constructs and the quality of life this environment embodies.

Ideas are in good currency when few people disagree with their central core of inquiry. Few people today believe that architectural environments are not capable of improvement along human dimensions, and it's clear that the drive toward post-occupancy evaluation has been generated by public demand. Still, architects find relevance in the notion because many believe that an increased responsiveness to human issues is a path of professional growth. Institutions responsible for continuous building programs seek continuous improvement, and they find within post-occupancy evaluation an opportunity to learn from experience. Social and psychological scientists are attracted to the notion because it offers a chance to move their skills from academia to the sphere of practical action.

Ideas in good currency take substantial time to emerge and gain acceptance. Consequently, they lag behind the sets of problems or states of affairs that they are designed to resolve. Humanistic questioning of the experienced quality of the built environment isn't a new theme within the intellectual community of architecture; it spans the centuries from Vitruvius' "firmness, commodity and delight" to Greenough's "form follows function." Yet it has always seemed (at least to the pragmatic members of society) to be the soft and squishy part of architecture. For years the notion that broad research into the human component of architecture could and should be incorporated into the larger body of architectural science found little financial or political support. But times change. The notion is on the ascendency.

Ideas in good currency also frequently devolve into rhetoric rather than become reality. They become the right set of words to discuss problems rather than a conceptual apparatus with the capacity to resolve them. Ideas emerge, survive, transform, and die, countered by



what Schon calls dynamic conservatism—society's fight to remain the same, to dilute the new ideas into notions that are compatible with existing theory, structure, and technology.

"Ideas in good currency take substantial time to emerge and gain acceptance. Consequently, they lag behind the sets of problems or states of affairs they are designed to resolve. Humanistic questioning of the experienced quality of the built environment isn't a new theme within the intellectual community of architecture; it spans the centuries from Vitruvius' 'firmness, commodity, and delight' to Greenough's 'form follows function.' Yet it has always seemed to be the soft and squishy part of architecture."

This phenomenon is clearly apparent in present discussions of post-occupancy evaluation. An early version of the POE concept was developed by sociologist John Zeisel as a diagnostic evaluation. Along with many others, Zeisel commiserated with architects on the rigors of designing for people about whom architects know little, people whom he called the "non-paying clients." The most an architect had to work with, beyond his or her own knowledge, was the "paying" client's version of this group's needs, desires, and expectations, and the track record of public building suggested that institutions were seldom in tune with the people they represented. So the evaluations proposed by Zeisel focused on obtaining multiple perspectives on the quality of both programmatic and design intentions. Zeisel's objective was to "broaden the predominant technological orientation of most programming, add another dimension to the largely intuitive design synthesis of most architects, and modify the highly aesthetic and ideological bias of most evaluation efforts." Evaluation was seen as a new mode of research focusing on new problem areas with new methods-a cooperative

effort between designers, researchers, building clients, and users.

Today, however, some members of the research community (pressured by the dynamic conservatism of the building industry) are patterning post-occupancy evaluations on the familiar model of building product testing. One behavioral scientist has said that the "primary purpose of evaluating buildings in use is to identify the design and construction elements that are not working out in accordance with expectations."

Post occupancy evaluations have been likened to building safety inspections by a specialist in ecological psychology, Robert Bechtel. He also feels that evaluations must be done by impartial outside observers employing as standard universal criteria the process of scientific measurement. Bechtel says that building occupants themselves cannot play a meaningful role in this process because "people simply do not know how they respond to a design feature."

Such statements generate great controversy, and this in turn puts into extreme question the worth of the postoccupancy evaluation concept altogether. Architects examine the results of narrowly drawn evaluations and call them trivial and irrelevant. Researchers respond by applying even more precise measurement techniques. The two communities become more divided by jargon, technique, and objectives. Research sponsors become reluctant to fund research that little interests practitioners. Public laws, a common channel of research utilization, apply research findings in a prescriptive fashion, reducing the variety and richness of the built environment. And so, in this Vonnegutian world, it goes.

A look at the current model

The current model of post occupancy evaluation is itself problematic. Every building is assumed to have a program—a definition of the requirements it must meet is the first stage of the building process. This is followed by design, which generates a solution to the programmatic requirements and develops a set of instructions for the construction of a building. Design proceeds in the constrained environment of building codes and standards, economics, site conditions and restrictions, trade practices, and technological availabilities. For all intents and purposes, these constraints have the same implications for design as programmatic requirements—they must be met.

The evaluation that follows construction and use is often considered negative feedback, rather than the positive feedback that characterizes learning and development. The design is examined in use and an assessment is made of how well it meets the programmatic requirements, with allowances made for the contextual constraints. A few researchers extend this assessment to measure how accurately the programmatic requirements actually conveyed the real requirements of the building.

Design is seen in this model as a prediction that a certain solution will resolve a certain problem. In an ideal evaluation, a yes or no answer to that prediction is expected. What is assessed is usually described as the fit between design elements and human responses. These results are stored in a data bank so that a body of knowledge is built for future use.

Evaluation techniques are limited to those broadly accepted as standard measuring devices by the scientific community. Behavioral scientists, for example, find only the measurement of observable behavior acceptable. So the technique ends up defining what can be assessed. As data is collected through these techniques, hypotheses of more effective ways of linking design solutions to user requirements may be developed. These hypotheses may be tested in future design projects to confirm or refute their value as scientific theories. These theories can then be substituted for the designer's intuition as the results of objective evaluations can be substituted for value judgements.

When confronted with such a model, practicing architects make a number of critical observations: It is an inadequate representation of design. Intuition cannot be eliminated without eliminating architecture. Given the complexity of design problems, it is more reasonable to view architecture as facilitative rather than predictive. If a focus is placed on only those parts of the designs that are measureable through standardized techniques, the evaluation will be unbalanced.

But there are other, more public problems. The 1970 Privacy Act has placed large restrictions on data collection for public purposes. It has also generated a large ethical debate within the research community since it calls into question many of the covert and non-obtrusive measurement processes of the social and psychological sciences. In addition, many people demand a return for their participation in a study. The *quid pro quo* in post-occupancy evaluation could go beyond simple personal remuneration to a voice in the research, to demands for the correction of discovered problems or untaken opportunities. On the other hand, most public institutions complain that they are already required to collect amounts of data too large to process and analyze in a timely fashion.

Can this model of post-occupancy evaluation, limited and fraught with problems for the designer, be rescued? Can it somehow be reexpanded to its proper proportion?



Evaluation Data

The key to such reconstruction lies in shifting the focus away from architecture-as-product to a more inclusive image of architecture-as-process.

II. The Architecture of Evaluation

Consider architecture as a process—as a rich body of knowledge being systematically developed and applied by people to create places that meet their purposes. Focus not on buildings but on people; on design as an intentional process of identifying desires, imagining ways of achieving them, and acting upon those images. Think of architecture as a continuous stream of human activity, reconstructing, extending, and enhancing an integrated array of artifacts; a creative process continually unfolding an everdesign and research make any sense at all.

Design begins with observations. The observations of designers, clients, and building occupants are evaluations of existing conditions, of artifacts that meet or don't meet their purposes. Observations are human judgements. Not long ago, men believed that observations were the collections of pure facts. As Francis Bacon, the 17th century English philosopher, put it, "All depends on keeping the eye steadily fixed upon the facts of nature and so receiving their images simply as they are, for God forbid that we should give out a dream of our own imagination for a pattern of the world." That, of course, was before science found out that the eye is not a camera recording the facts of nature simply as they are; the eye receives only coarse grained images, photons impacting and altering the en-



changing human environment.

All this frenetic intellectual and constructive activity is much less visible than the concrete record of architecture itself. One might be tempted to try to understand what is going on in architecture by applying scientific measures to the actual physical elements of architecture. But the knowledge so obtained would be woefully incomplete. As psychologist Herbert Simon has pointed out, architecture is an artificial science; it can only be understood through a science that is large enough to accept the notions of human purpose, imperfection, and progress. A scientific understanding of an architectural artifact may provide a solid foundation for making inferences about purpose. But when the people who made and use the artifact are alive, well, and kicking, it is much simpler and infinitely more accurate to ask them.

Simon says that an artificial science must have the capacity to link in a functional manner three elements: the artifact, its purpose, and the environment in which the artifact is expected to perform. Making these functional connections is intrinsic to the process of design; defining what they are and how they work is the essential nature of research; and evaluation is necessary to tell whether or not

ergy levels within the cones and rods, so the eye has been hard wired by nature to infer patterns. How observations are made and evaluated is guided by what human beings are taught, so observations are also shaped by social learning. Heisenberg's Principle of Uncertainty questioned the Baconian myth and laid the classic measurement assumptions of science to rest. The observer cannot be disconnected from the observed.

Design takes the observations and, through the imaginative leap of hypothesis, creates a synthesis. Men also believed not long ago that design could be reduced to pure reason; that the path to true synthesis could be found solely through the application of logic to factual observations. But that was before Kant, Turing, and Godel; before Neil Bohr's Principle of Complementarity demonstrated that it is reasonable to interpret the same set of facts in different ways, depending upon human purpose. Theories are human inventions and facts are theory laden. Theories are neither perfect nor true, but they do seem to get better through experience. A synthesis is reached by evaluating, through artifice and imagination, whether or not a design meets its purpose in its environment. So evaluation is integral to design. Christopher Alexander, a research architect, has described design as a process of resolving misfits between two entities; a context, which defines the design requirements, and a form, which meets the design requirements. Alexander stresses that, given the complexity of design projects, a complete and adequate description of any context is impossible. It is a common experience for most designers that crucial design requirements frequently aren't discovered until the client actually sees the design. Design seems to proceed by recognizing misfits simply because what is wrong stands out more clearly than what is right. As Alexander puts it, "It is the departures from the norm which stand out in our minds rather than the norm itself."

Alexander describes a process of approaching complex design problems that depends heavily on the development of constructive diagrams. These form a bridge between form and context, between the design and the programmatic requirements, by describing the physical and functional implications of the requirements in a manner that can be transformed into the physical and functional characteristics of the solution. Understanding the context and inventing a form to fit it are two aspects of the same process, and the resolution of misfit is guided by the tacit evaluative criteria of the designer and the client.

Two modes of knowing

This view of design is a crucial link between what are generally presumed to be the seperate artistic (or synthetic) and scientific (or analytic) skills of architecure. Geoffrey Vickers, a policy scientist, calls them two modes of knowing.

"One of these modes is more dependent on analysis, logical reasoning, calculation, and explicit description," says Vickers. "The other is more dependent upon synthesis, recognition of pattern, context, and the multiple possible relations between figure and ground. The first involves the abstraction and the manipulation of elements, irrespective of the forms in which they are combined. The other involves the recognition or creation of form, irrespective of the elements which compose it. Both are needed and both are used in most normal mental operations."

Vickers believes that our modes of thought must involve both rationality and intuition, the latter organizing experience through the development of schemata systems of recognizing, classifying, and valuing; the former is employed to test those schemata against experience. Simple schemata are part of our genetic endowment in the architecture of the eye and the nerve net of the brain; complex schemata are learned through repetitive experience and persuasive contact with people.

Vickers suggests that two systems of schemata play an

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interlocking role in design. The first he calls a reality system, which encapsulates concrete experience and has the capacity to represent the future and the hypothetical as well as the past and the present. This is the system through which Alexander's form and context are developed from experience. The second set of schemata Vickers calls the appreciative system, encompassing the norms and values built through experience that define the implications of the form and the context for human beings.



Vickers sees design as the interaction of two logically distinct but reciprocitating processes.

"One is the creative process," he says, "which presents for judgement a work responsive to many explicit and tacit criteria. The other is the appreciative process which judges the work by the criteria, tacit as well as explicit, to which it appeals, and finds it good or wanting, better or worse than others."

With this balance, misfits are identified through the comparison of expectations to aspirations and by comparing the designs of the reality system to the values of the appreciative system as both are extended imaginatively into the future. The interaction of the two processes is of critical importance. The recognition of new potential realities engenders the development of new forms of appreciation. The evolution of new values excites the development of new realities. Designing cannot be separated from appreciating, nor creation from knowing.

Here lies the hint for a system of post occupancy evaluation that fits the context of design. Our existing POE model fails because it puts technique before ideas; it employs methods of classical science which rule out the human agent. Building clients make assumptions about what they want usually through reference to their experience. Designers conjecture from their experience solutions responsive to their requirements. Evaluations focus on the ability of those requirements to articulate human desires as well as on the capacity of design to meet them.

Evaluation is itself a design process, in which assumptions and conjectures are translated into an examinable format. This process can be explored through a simplistic example from architectural psychologist David Canter. Suppose that one of the key requirements of a design was to convey an image of friendliness. The designer and client together determined that a plausible way of doing this was through the minor articulation of architectonic form—the use of sloping ceilings instead of flat. The conjecture contains two assumptions: that form is related to friendliness and that sloped ceilings will be judged more friendly than flat (of course, it's much more complicated than that, but let's suppose these really were the limits of our knowledge and imagination).

An evaluation that tests these kinds of assumptions is usually called a factorial design. To test the conjecture, it must elicit human judgements of the friendliness of spaces that have both flat and sloping ceilings. More than one design and more than one set of assumptions must be evaluated. More than one person should judge both situations. Human judges should be diverse (the occasional as well as the permanent resident). People with impaired vision may not be good judges of perceptual effects, while children may be better than adults.

Methods must be developed of ascertaining the potential relationships between form and friendliness; these have been articulated in extensive ways in the design and evaluative assumptions that have already been made. There exists a large body of techniques that may be brought to bear: questionnaires, interviews, rating scales, direct and instrumented observation. All these tools measure, and since all measurement is theory laden, the tools and the consultants skilled in their use must be carefully chosen by the designer.

The methods of analyzing the results are, at first cut, statistical processes. These aim at identifying the correla-

Resources and good reading

For the architect interested in exploring post-occupancy evaluation in some depth, there is a host of good reading in the field, ranging from complex discussions of behavior in environment to recently-completed POE reports.

Psychology for Architects by David Canter (1974, Halsted Press, New York City), and **Sociology and Architectural Design** by John Zeisel (1975, Russell Sage Foundation, New York City) provide good, brief introductions to post-occupancy evaluation on the building scale.

For more depth, try Man and His Urban Environment by William Michelson (1970, Addison Wesley Co., Reading, Mass.), The Human **Context: Environmental Deter**minants of Behavior by Rudolph Moos (1976, John Wiley & Sons, New York City), Environmental **Psychology: Man and His Physi**cal Setting by Harold Proshansky, William Ittelson, and Leanne Rivlin (1972, Holt, Rinehart & Winston Inc., New York City), and Environmental Planning: Perception and Behavior by Thomas Saarinen (1976, Houghton Mifflin, Boston).

At the urban and regional level, the best sourcebook is Kevin Lynch's **Managing the Sense of a Region** (1976, MIT Press, Cambridge, Mass.).

For some different views on the general role of evaluation in the design process, Christopher Alexander's Notes on the Synthesis of Form (1964, Harvard University Press, Cambridge, Mass.), Geoffrey Broadbent's Design in Architecture (1973, John Wiley & Sons, New York City), and Herbert Simon's The Sciences of the Artificial (1969, MIT Press, Cambridge, Mass.) are good sources.

Beyond the Stable State by Donald Schon (1971, Random House, New York City) and "Rationality and Intuition," an article by Geoffrey Vickers in On Aesthetics in Science edited by Judith Wechsler (1978, MIT Press, Cambridge, Mass.) provide overviews of the relationships between evaluation, social learning, and public policy.

For an introduction to applicable post-occupancy evaluation techniques, read William Michelson's Behavioral Research Methods in tion between form and friendliness and the variances between the judgements of different human beings as they evaluate different situations. Care must also be taken by the designer to direct this analysis at the questions that are the most important to answer, and to preserve the differences of multi-valued judgements so that the relation of form and friendliness may be more richly articulated.

In this manner, evaluation may be used to overcome what historian Charles Jencks has identified as a key problem of architecture—its employment of a singlevalued structure of classical rationality. The programs that generated modern architecture were based on responding to the needs of the average modern man. They reduced the contexts of the human condition to a statistical profile. The only forms that could fit these programs also conveyed a singular appreciative system—a mechanical image of architecture substituted for a rich and diverse human tradition.

Multi-valued appreciation

The opportunity of post-occupancy evaluation lies not in finding out what architectural elements are good or bad, right or wrong, but rather in developing a rich, informative, multi-valued appreciative system that is related to architecture's vast potential and which drives toward more creativity. This opportunity can be severely diminished by a hardware focus, and through the restriction of research methods, through scientism—the blind use of scientific measurement independent of the scientific method. The hypotheses to be tested, which are the designs themselves, have been made by practicing architects, and it is their responsibility to define the parameters of the crucial tests.

Care must be taken not to place architecture in a neat conceptual box; in a democratic society architecture is done not only for but also by and with the people. Care must also be taken not to reduce the relevant human dimensions to the easiest measureable denominator. Symbolic, cultural, cognitive, and perceptual dimensions must also be considered along with the more accessible behavioral and physiological dimensions. Indeterminacy and complementarity must be accepted in the results. Different people will value the same thing differently, and it is the task of design—not evaluation—to resolve these misfits.

Post-occupancy evaluation gives architects an opportunity to build a rich body of evaluative knowledge. But for knowledge to be useful it must be communicable. The problem we face within this opportunity is to develop an evaluative language that different people can share, to develop an ability to render explicit multi-valued judgements that can be attached as the appreciations of alternative architectural realities. The development of this evaluative language will require the recording of the decisions that human beings make or are willing to make; these are the values to be attached to the facts of experience.

The interaction of creativity and appreciation in an iterative process of observation, hypothesis, and testing is both a model of design and a model of the scientific method. It is the only communicable way of knowing about the implications of their actions that human beings have open to them. Knowledge is not a body of facts placed in an accessible container; it is the enlightenment that blazes the path of human progress.

Environmental Design (1975, Dowden, Hutchinson & Ross Inc., Stroudsburg, Pa.). J. A. Barnes' The Ethics of Inquiry in Social

Science (1977, Oxford University Press, Oxford, England) offers an excellent critique of POE techniques.

Reports on completed postoccupancy evaluations are plentiful, and they're probably the best source for state-of-the-art information on POE today. Robert B. Bechtel and Rajendra K. Srivastava were the principal investigators for the Environment Research and Development Foundation's landmark research 1 project on Post-Occupancy Evaluation of Housing for the Department of Housing and Urban Development. The final project report is available from HUD, Washington, D.C. 20410.

The AIA Research Corporation's **Post-Occupancy Evaluation** is the final report of an interagency project

supported in part by the National Endowment for the Arts. The report includes overviews of POE from both the architectural and social science viewpoints, and details four separate POE case studies.

Other good POE examples: Franklin Becker's User Participation, Personalization, and Environmental **Meaning: Three Field Studies** (1977, National Science Foundation, Washington, D.C.); Clare Cooper's Residents' Attitudes Toward the **Environment at St. Francis Square** (1970) and Some Social Implications of House and Site Plans at Easter Hills Village (1965, Institute of Urban and Regional Development, University of California, Berkeley, Calif.); Planned Residential Environments by John Lansing, Robert Marans, and Robert Zehner (1970, Institute for Social Research, University of Michigan, Ann Arbor, Mich.); Vera Hole's Houses and

People: A Review of User Studies at the Building Research Station (1966, HMSO, London); Peter Manning's Office Design (1966, Department of Building Science, Liverpool University, Liverpool, England); User Generated Program for Lowrise Multiple Dwelling Housing by Robert Beck and Pierre Teasdale (1977, Centre de Recherches et d'Innovation Urbaines, Universite de Montreal, Montreal, Canada); Plazas for People by Don C. Miles, Robert S. Cook, and Cameron B. Roberts (1978, Project for Public Spaces Inc., 1270 Avenue of the Americas, New York, New York 10020); Charlesview Housing: A Diagnostic Evaluation by John Zeisel and Mary Griffin (1975, Office of Architectural Research, Harvard University, Cambridge, Mass.), and Dorms at Berkeley by Sim Van der Ryn and Murray Silverstein (1967, Educational Facilities Laboratories, New York City).



Definitions

By John P. Eberhard, FAIA

"The manifestation of the wind of thought is not knowledge. It is the ability to tell right from wrong, beautiful from ugly."

Hannah Arendt

hose architects and architectural critics who are observers of architectural style today are caught in a debate regarding the passing of modern design, and they are toying with new definitions and new labels-postmodernism, post-functionalism, neo-nationalism-to describe the current state of the art. Many practitioners see these debates just as so much intellectual posturing, but I accept them as signals that the architectural community is in the throes of a fundamental shift as great as the transition that spawned Louis Sullivan, Frank Lloyd Wright, Le Corbusier, and Mies van der Rohe. These pioneering geniuses of the new architecture broke with the past, with the rules of previous design, and created in the process a new kind of architectural freedom that placed its major emphasis on the creative originality of an individual. The buildings which they and succeeding generations of architects have created over the past 70 years range from commonplace to great, but they share one common trait: the buildings, like pristine objets d'art, have come to be viewed as artifacts, as "works" by "masters." Photographed and modeled in countless exhibitions and publications, the buildings have become central to the present-day criteria by which the public and our peers judge our own buildings. The buildings have come to symbolize architectural product as artifacts, not as living systems or stage-sets for human behavior. And as artifacts, the buildings have become the source of increasing litigation and the focus of regulations now so numerous as to be a genuine burden to society.

This conception of architecture as a collection of artifacts by architectural masters seems now to be a limited—and perhaps limiting—view of what we should be up to as a profession. Those of us who visited the city of Dallas for the AIA Convention in May saw the kind of limitation that can result when a few architectural jewels are distributed at random in the midst of an otherwise undistinguished collection of urban artifacts. Deep in the heart of Texas, I had no sense of anything resembling a fit place for the family of man, no sense of Southern charm or a gracious way of life, no sense of concern for the visitor who might want to walk about and bask in the ambience of a special place. Dallas reminded me of downtown Buffalo. Others I spoke to thought it resembled Chicago or Cleveland or Los Angeles.

The essence of good architecture is human satisfaction, and it is ironic, in this connection, that most of us see the work of our peers and our predecessors not firsthand, but through photographs in the pages of architectural publications. Rather than experiencing the architecture of the day, we experience photographs of that architecture, two-dimensional representations that show us nothing of the way people use and appreciate the buildings they live and work in. We need an instrument to tell us how well buildings work in terms of human satisfaction, an instrument we can understand. That instrument already exists, actually, in the form of post-occupancy evaluation. But post-occupancy evaluation is still in its formative stages; we have no real common understanding of what it is or how it should be used. I think POE can and will become the instrument that we need, but before it becomes an effective tool it will have to be satisfactorily defined. I think the definition should work something like this: Rather than knowing enough to create building spaces that meet regulations, POE must offer a means of thinking through a design in a controlled way.

Creation and design

Creation is an act of originality. It calls for the making of something that has never existed before, for a solution that is original. Each time one creates, one starts from the beginning, formulating new concepts and new responses to those concepts. Creation is a supremely individual process, and it's difficult to know if what has been created is capable of being examined by anyone else who has not shared in the creative process. Architecturally, creation is usually practiced by a major innovator and a band of disciples who share the innovator's original vision. The products of this kind of creation can be admired by others—and misunderstood by others—but those who attempt to imitate the form of such products are seldom successful, because they cannot recreate the original clarity of vision. Constant originality of this sort can be exciting. It can be ego-reinforcing and exhilarating for those engaged in the process of creation, and it's unlikely that those who are good at original creation are going to be willing, voluntarily, to discipline themselves within constraints imposed by others. Constant originality produces a series of individual—and often outstanding—creations,



each one seeking new ground. But by definition—at least the definition I employ here—there is no system, no commonality to such a string of original creations. These acts of creation have no part in a larger scheme of things.

Design, on the other hand, is an act of synthesis. It brings together sets of requirements, bodies of knowledge, and external constraints in a disciplined manner in order to generate a design solution. The solution may be unique, and it most certainly may be creative-but it need not be starkly original. If, on a given design project, the requirement-set is similar to one with which the designer has dealt before, and if no "new" knowledge is required for the solution, and if the external constraints have been experienced before, then the designer may be most professionally responsible if his or her new solution is more or less identical to the earlier solution. Design has something to do with objets d'art, but more to do with systems. It can be taught to the novice; it can be objectively judged by others; it can be responsibility shared by the members of a team of professionals. A design, thoughtfully and carefully executed, can be elegant in terms of the way it fits pre-existing conditions; it can be a thing of beauty not solely in the visual sense, but in terms of its embodiment of all the preconditions the designer was required to synthesize in the project. To a good designer, the discipline imposed by constraints and requirements is a challenge, not a burden.

This approach to the external controls imposed on design is a critical concept. Regulations are the constraints a society imposes on the actions of its citizens, and building regulations, incorporated into building codes, OSHA requirements, state health regulations, and so on, are intended and enforced to provide for the health, safety, and welfare of building users. Our society regulates many facets of public life because the free marketplace doesn't always respond well to things like safety issues, and because professionals are not always seen as responding for the public good. Doctors, lawyers, engineers, and archi-

"Control can be part of the intrinsic structure of a system, a sensing mechanism that evaluates surrounding conditions and feeds signals back to the operating parts of the system whenever a correcting response is required."

tects today are finding themselves subject to more regulation than they've ever seen before. It seems that society is trying to force a more egalitarian response from professionals whose services, historically, have been the preserve of the wealthy and the powerful.

Controls may be imposed on a set of activities through the external pressure of regulations, as building regula-



tions are imposed on design. But control can also be part of the intrinsic structure of a system. A system that is under control has a sensing mechanism that evaluates surrounding conditions and feeds signals back to the operating parts of the system whenever a correcting response is required. When a process or a system operates under this kind of control—and does so because it has been well designed—there should be little or no reason for external constraints to become a burden.

The design process can—and does, in the best circumstances—operate under this kind of feedback control. Post-occupancy evaluation is the feedback mechanism itself, and it's a mechanism that has been around for a long time. Only in the last 10 to 15 years has it come under scrutiny as a discreet part of the design process, and that has happened both because it hasn't always worked well as a control device and because there is substantial disagreement between the disciplines of architecture and behavioral science regarding whose province the study of human behavior in the designed environment actually is.

Thinking and knowing

Today, as POE is more hotly debated than ever, and as it becomes a process of growing interest for designers, there is an important distinction to be made. "The manifestation of the wind of thought is not knowledge," Hannah Arendt has said. "It is the ability to tell right from wrong, beautiful from ugly." The distinction between thinking and knowing is crucial to design because we cannot know if something is right or wrong, or ugly or beautiful, in the same way we know what time it is, or how much something weighs. Knowledge is the result of the scientific process; it is finite, and once produced it can be shared with others, taught to students, and built upon with further experimentation. Thinking doesn't yield the same kind of knowledge. Thinking involves imagination and judgement; most of the time we think to add meaning to what we do.

Design is not a process of knowledge, but a process of thought. Specific and finite pieces of knowledge are part of design, but they are only fragments that a designer must assemble into a whole. And as surely as design is a process of thought, as surely as it assembles scientific knowledge through a thoroughly unscientific process, post-occupancy evaluation should be considered a part of



design and not of science. We can never know with scientific certainty that we have produced a satisfactory setting because neither design nor evaluation of design lends itself to the scientific method of reasoning.

Post-occupancy evaluation has been, for social and behavioral scientists, primarily an experimental area. They have made contributions for which architects should be grateful and on which architects should build, but their work to date has suffered significant flaws. They have attempted to use the scientific method to establish "knowledge" in an area where "right and wrong" do not apply in a scientific sense, and their attempts at quantification of environmental impact on human behavior have been largely sterile and of minimal use to building owners or designers.

Architects, on the other hand, tend to fear that postoccupancy evaluation will lead inevitably to further regulation and constraint, so there is a natural antipathy to the POE concept in the design community. But there lies the flaw in our own outlook. Too many of us have chosen to think of ourselves as creators of original solutions, and not as designers of satisfactory buildings. Architectural



schools and the architectural press reinforce this egotism. Gold Medals from AIA, national design competitions, student awards all tend to focus on creativity. Yet most designers really are designers in the more modest sense. Only a few of us are capable of being—or arrogant enough to believe ourselves—creators of starkly original work. If we were to recognize that the professionalism of good design lies in the controlled synthesis of design requirements and imagination, then we would be close to what most practitioners do now.

Post-occupancy evaluation should be a part of this design process. And if the process of evaluation and determining design response is to be effective, the designer of record—not a social scientist—should be the principal actor in a post-occupancy evaluation. As architects, we should open ourselves to the learning social science offers us, and heighten our sensitivity to human needs and human reaction in designed environments. We should also act to ensure that design evaluation will remain part of the design process—the part that serves to correct design when it begins to go astray, when it ceases to give its users the kind of satisfaction that we, as professionals, are responsible for delivering.

ABSTRACTS

The following abstracts of recent architectural research are drawn from the AIA Research Corporation's Research Information Retrieval System (RIRS), an architectural data bank containing information on research projects and reports touching on every aspect of architectural practice.

The RIRS system exists to be used by practitioners in need of current and often specialized information. Only recently developed by AIA/RC, the system is accessed through a keyword list, and its resources are available for quick retrieval upon request. References are being added—and the keyword list expanded almost daily.

In addition to drawing abstracts, reports, and publications from RIRS, practitioners are also encouraged to contribute to the system. If you or your firm have recently completed work that may advance the expertise of the profession as the work detailed here and elsewhere in this issue of *Research & Design* has, you are invited to summarize and submit it for inclusion in the RIRS system.

All submissions, requests, and other inquiries should be addressed to Ella Hall, AIA Research Corporation, 1735 New York Avenue, N. W., Washington, D. C. 20006. Tel. 202/785-7843.

Greenhouse Structures: Requirements and Examples

Considerable problems arise for the individual horticulturalist when building greenhouses because of the lack of design data. In order to improve the basis for agreements between growers and building contractors, and to reduce the risk of conflict, it has therefore been regarded of value to draw up complete drawings and documents of standard solutions that can be referred to by both sides.

The purpose of this project has been to determine the requirements that greenhouse frameworks must meet, as well as to draw up representative examples of different types of greenhouses.

RIRS #780803

This abstract refers to: Greenhouse Structures: Requirements and Examples, by Sven Axel Svensson, 1975.

This publication can be ordered from: Swedish University of Agriculture, Box 624, S-220 06 Lund 6, Sweden.

Physical Security Symposium Proceedings

This document contains the proceedings of a two-day Symposium held in April, 1976 on the application of behavioral science to the problems of physical security. The formal papers are divided into three topical sections: (1) Threat Analysis: Behavioral Factors and Consequences, (2) Human Reliability: Response Forces vs. Adversary, and (3) Methods of Measuring Behavioral Impact: Quantitative vs. Qualitative. Timely questions and challenges were explored in open discussion sessions following many of the presentations. The volume concludes with a brief summary of the paneltype workshop on the subject of threat analysis held on the second day.

RIRS #780336

This abstract refers to: The Role of Behavioral Science in Physical Security, by the National Bureau of Standards, November 1977.

This publication can be ordered from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price is \$3.00. Stock #003-003-01868-6.

Performance Design of Safer Windows

This study, entitled Performance Design of Safer Windows, an analysis of window and glazing safety, was prepared for the U.S. Consumer Product Safety Commission. The purpose of this study is to develop, analyze, organize, and present all the information needed for the CPSC to make a decision on what to do about window injuries. The Buffalo Organization for Social and Technological Innovation (BOSTI), which conducted the study, was involved not only in engineering and remedial product design, but also epidemiology, economic analysis, and informational material development. The project recently won an award for research in Progressive Architecture's 25th Annual Awards Program.

The final report contains a quantitative description of window and glazing injuries, victims, environments, and products involved; the data supplied by CPSC and its analysis and organization into a manipulable data base; scenarios-a method of organizing many accidents into meaningful patterns; ways to alter the injury-producing sequence of events in each scenario; performance guidelines to record necessary properties that any design solution must have to be successful; designs for suggested new and add-on products and for public education programs; an evaluation of the costs of design solutions against the cost of the accidents they would prevent; a set of proposed changes in current window standards; a set of recommendations about how hazard analysis research could be done better, and two sets of illustrated guidelines about window safety for architects and homeowners.

RIRS #780639

This abstract refers to: Final Report: Performance Design of Safer Windows, by BOSTI, October 1977.

This publication can be ordered from: National Technical Information Service, Springfield, Va. 22151 for \$6.50. Ask for report No. PB275072-AS.

Pedestrians and Wind in the Urban Environment

In recent years the problem of extreme winds in and around tall buildings has drawn increasing public attention. Spectacular wind problems have occurred at new high-rise buildings in New York, Chicago, and Boston, for example.

Although wind-tunnel experiments have determined that all buildings can cause ground-level wind speeds that are two or three times faster than ambient speeds, no study has examined the effects of these conditions on pedestrian behavior. Obviously, these accelerated winds can drastically affect pedestrian behavior and cause great inconvenience to those people negotiating doors, steps, walkways, or simply going about their daily activities. This study documents some of these effects on pedestrian behavior, and identifies and establishes acceptable levels of wind activity (speed, ranges, and frequency of occurrences) for a variety of locations. It also provides information that could ultimately influence policy decisions regarding the location and design of structures in urban areas.

RIRS #780349

This abstract refers to: Pedestrians and Wind in the Urban Environment, by Cohen, McLaren, Moss, Petyk, and Zube, December 1977.

This publication can be ordered from: Environment and Behavior Research Center, Institute for Man and Environment, Blaisdell House, University of Massachusetts, Amherst, Mass. 01003.

Testing Cooling System Performance

In order to estimate the seasonal performance of an air conditioner or heat pump operating in the cooling mode, its capacity and input power must be known at outdoor temperatures other than 95°F (35°C). This information is required since air conditioners and heat pumps are utilized at such temperatures for many hours in various regions throughout the United States. Furthermore, experimental investigations have been conducted which indicate that the cycling "on" and "off" that these units undergo to satisfy comfort requirements also may have significant effect on the performance of the unit. The test procedure recommended in this publication addresses the above factors; it does not, however, take into account the effect of consumer usage patterns on annual energy consumption since very little information is currently available on how consumers use central air conditioning equipment.

RIRS #780641

This abstract refers to: Method of Testing, Rating and Estimating the Seasonal Performance of Central Air-Conditioners and Heat Pumps Operating in the Cooling Mode, by G. E. Kelly and W. H. Parker, Jr., April 1978.

This publication can be ordered from: National Technical Information Service, Springfield, Va. 22151, for \$5.25. Ask for report No. NBSIR 77-1271.

Earthquake Response of Buried Pipelines

The earthquake response of buried water and sewer lines is receiving attention because of the impact of these lifelines upon the health and safety of the people served by these systems. Because of the geographical extent of buried pipelines, analysis design procedures for buried pipelines are quite different than the standard procedures developed for building type structures. Seismic design procedures for buried pipelines



Boston's City Hall Plaza, studied to document the effects of high winds on pedestrian behavior.

are based upon two assumptions dealing with the relative motion between the pipe and the soil and also with the character of the seismic waves. Specifically, it is assumed that there is no relative motion between the pipe and the soil and that the shape of the seismic waves does not change as it traverses the pipeline. The purpose of this paper is to investigate these assumptions which form the basis for presently available seismic design procedures for buried pipelines subjected to ground shaking.

RIRS #780352

This abstract refers to: Earthquake Response of Buried Pipelines, by Michael J. O'Rourke and Leon Ru-Liang Wang, March 1978.

This publication can be ordered from: AIA Research Corporation, 1735 New York Avenue, N.W., Washington, D.C. 20006. \$1.50.

Use of and Attitudes About Two Play Areas

The primary objective of this study was to establish guidelines to improve or increase the quality and variety of potential play experiences at play areas for grade school children. The site of the study was a neighborhood park in a small midwestern city with two play areas to serve this age group. One area consisted of traditional late-1950's catalog equipment; the second, more "contemporary" area was designed by the author and others. A multi-method approach to data collection was implemented. The author kept a diary to record design decisions; direct observation recorded children's voluntary use of both areas, and a questionnaire collected children's assessments of the play areas. Differences between uses and evaluations of boys and girls reported. The data was analyzed and discussed in terms of design implications.

RIRS #780806

This abstract refers to: The Design Implications of Grade School Children's Use of and Attitudes About Two Play Areas in Carle Park, Urbana, Illinois, by Michael R. Van Valkenburgh, 1977.

This publication can be ordered from: AIA/RC, 1735 New York Ave., N.W., Washington, D.C. 20006.

Effects of Physical Characteristics on Users' Perceptions and Experiences

A comparative study of two downtown San Francisco open spaces -Giannini Plaza and Transamerica Park-was undertaken in 1976 to: 1) Identify the open space needs of the downtown community; 2) examine the extent to which the areas studied fulfilled the community's social, physical and psychological needs, and 3) translate findings into a format useful to design professionals and policy makers in the planning, design, and protection of San Francisco's downtown open spaces. It is one of the few urban open space evaluations addressing how users' environmental perceptions shape their behavior, preferences, and the quality of experiences. This paper discusses findings, drawn from interviews with site users, reflecting their motivations for using the space and the behavioral effects of each site's characteristics. Comparisons

are made here between the sites' environmental qualities, focusing on natural elements, site orientation to the street and to surrounding activity, exposure to sunshine, and seating placement and design. Results indicate sites fulfilled users' need for relief and contrast to their office work places and from the sterility and congestion of the urban environment. Sites' organic elements offered opportunities to associate with natural life forms and to partake in or retreat from social interaction and activity. Findings provide an information base for design professionals and policy makers on the needs of downtown community members and on social and physical features satisfying those needs.

RIRS #780804

This abstract refers to: Giannini Plaza and Transamerica Park: Effects of Their Physical Characteristics on Users' Perceptions and Experiences, by Laurie Burman Share.

This publication can be ordered from: Laurie Share, 2870 Sacramento Street, Apt. 4, San Francisco, Ca. 94115. Price is \$2.00.

Representation of Design Problems and Maintenance of Their Structure

Many large projects are now underway to develop integrated design databases. These systems support automatic interfaces to a number of previously independent application programs. This paper introduces some conceptual tools for organizing such systems. A structure for integrated design databases is proposed



Architect Richard Datner's sketch of play facilities planned for Washington, D.C.'s new National Children's Island. that supports a variety of development sequences. It also allows implementation of automatic integrity management of a number of design functions.

RIRS #780637

This abstract refers to: The Representation of Design Problems and Maintenance of Their Structure, by Charles M. Eastman, February 1978.

This publication can be ordered from: Carnegie-Mellon University, Institute of Physical Planning, School of Urban and Public Affairs, Schenley Park, Pittsburgh, Pa. 15213, for \$1.00. Ask for Research Report No. 73.

Thermal Analysis— Human Comfort— Indoor Environments

A symposium on "Thermal Analysis—Human Comfort—Indoor Environments" was held at the National Bureau of Standards, Gaithersburg, Md., February 11, 1977.

The symposium was prompted by the increasing emphasis on energy conservation practices in existing buildings as well as new building designs that emphasize energy conservation. Some of the practices have no effect on the thermal comfort of occupants. Others, such as limiting the use of both cooling and installed capacity of heating, ventilating, and air conditioning equipment, lower thermostat settings in winter, higher thermostat settings in summer, and eliminating climate control in halls, entryways, and storerooms may have an adverse effect on occupants, however

The purpose of the symposium was to bring together leading scientists, engineers, architects, physiologists, and government officials who were interested in how new energy conservation strategies in buildings will affect human comfort. The symposium was successful in identifying and reviewing the vast amount of research work done in this field over the past fifty years. In addition, material on new and current research was presented as well as some specific suggestions for work that should be undertaken in the near future. It is hoped that the proceedings will stimulate a desire on the part of government organizations conducting major research programs to recognize the need for additional research in this field.

The proceedings of the conference reflect, in chronological sequence, the main presentations by the speakers. Every effort has been made to minimize the editing and to reflect each author's original material as submitted prior to the symposium.

RIRS #780335

This abstract refers to: Thermal Analysis—Human Comfort—Indoor Environments, by B. W. Mangum and J. E. Hill, September 1977.

This publication can be ordered from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price is \$3.25. Stock #003-003-01849-0.

Residential Electric and Gas Water Heaters

This report provides performance data for electric and gas-fired residential water heaters. Performance characteristics investigated include unit full-load, part-load, and overall efficiencies and detailed examination of standby losses. Also included are brief discussions of energy-conserving options, such as lowering thermostat settings, increasing insulation thickness, and reducing pilot rate.

RIRS #780645

This abstract refers to: Residential Electric and Gas Water Heaters, by Ebrahim Faraham, August 1977.

This publication can be ordered from: National Technical Information Service, Springfield, Va. 22161, for \$4.50. Ask for No. ANL/CES/ TE 77-2.

Some Findings From Washington Environmental Yard

A multi-method, ecological approach has been taken toward assessment of the evolving Washington Environmental Yard near San Francisco. Summary findings are reported, focusing on indicators of behavior/environment quality generally applicable to the evaluation of places inhabited by children. Operational, conceived, and subject/object value realms form an analytical framework. Behavior-mapping data define the Yard's multi-level operational structure, consisting of three Primary Zones (Asphalt, Main Yard Systems, and Natural Resource Area), subdivided into ten Behavior/Environment Ecosystems and 58 activity places. Conceived values are indicated by graphic simulations, supported by questionnaires. Selected "behavior episode" records illustrate qualitative shifts of subject/object behavior in different locations.

RIRS #780805

This abstract refers to: Meanings and Measures of Children/Environmental Quality: Some Findings From Washington Environmental Yard, by Robin C. Moore, 1977.

This publication can be ordered from: AIA/RC, 1735 New York Ave., N.W., Washington, D.C. 20006.

Seismic Evaluation of Buildings

This manual describes a method of structural analysis, design, and analysis of costs for the determination of strengthening of existing multistory residential buildings to conform to the basic earthquake force requirements of the 1973 Uniform Building Code. The report is presented in three volumes, namely, Volume 1: Methodology; Volume 2: Computer Users' Manual, and Volume 3: Examples. The examples in Volume 3 illustrate both simplified and more complex evaluation of stress distribution in different types of multi-story residences.

RIRS #780800

This abstract refers to: A Methodology for Seismic Evaluation of Existing Multi-story Residential Buildings, by Clarkson W. Pinkham and Gary C. Hart, June 1977.

This publication can be ordered from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock #023-000-00441-1 (Vol. 1), #02300-00442-9 (Vol. 2), and #023-000-00443-7 (Vol. 3).

THE MARKETPLACE

Profile:

The National Endowment for the Arts

Design creativity in America is at a high level—but it ought to be much higher."

The voice is Roy Knight's, acting director of the Architecture, Planning, and Design Program (formerly Architecture + Environmental Arts) at the National Endowment for the Arts (NEA), assessing the state of American creativity in the design arts today. Creativity-finding it, funding it, advocating its importance in a technological world-is the charge of the Endowment and its 12 program areas. When NEA was established in 1965 its Congressional charter stated that, while support of the arts is primarily the business of "private and local initiative," the federal government should also help create and sustain a national climate of artistic inquiry. And for close to 13 years, NEA has done just that.

The primary NEA vehicle used to sustain that climate is the grant: Grants worth \$114.6 million in Fiscal Year 1978, out of NEA's total budget of \$123 million, have been disbursed to individuals and organizations active in a creative spectrum that extends from architecture to choreography, from jazz to opera, from photography to creative writing. Competition for NEA's money is stiff: According to Endowment figures, only one in four or five proposals gets funded. NEA takes great care in awarding its funds as it aims at making the arts available to the people, supporting and encouraging excellence in cultural institutions, and ensuring that American creativity has a future while preserving the best of its past.

With a \$3.5 million share of NEA's total grants budget, the

Architecture, Planning, and Design Program headed by Knight is the smallest of NEA's program areas, but it's busy, and it may have the greatest impact on the environment in which most of us spend most of our time.

Design professionals can compete for support from the Architecture, Planning, and Design Program either as individuals just entering the field (top award: \$5,000) or as accomplished professionals wishing to reevaluate their careers or take time away from the press of business to recharge their creative batteries (top award: \$10,000).

Organizations are eligible to compete in a number of programs. One, Livable Cities, aims at showing how



careful design in planning and preserving the built environment can make cities and towns better places for people to live. Research on new design concepts and dissemination of outstanding design ideas are the twin goals of the Design, Communication and Research program. Architecture, Planning and Design lends a hand to NEA's other program areas with its Cultural Facilities Research and Design program, where special emphasis is placed on cultural facilities projects where compelling need for a concert hall or museum can be demonstrated, rehabilitation or adaptation of existing buildings is contemplated, and community support is evident. Architecture, Planning, and Design also supports professional and nonprofit organizations directly with its Services to the Field projects, which use local talent and manpower to integrate design excellence into new phases of human life. Services to the Field has a special interest in improving community design and strengthening designers' roles in their home communities. And there is an additional catch-all program, called General Programs, where design projects not fitting into the preceding categories are reviewed. This coming year some General Program funds have been specially reserved for projects that will raise public awareness of the built environment and highlight public involvement in planning decisions.

How has creativity fared under NEA's aid? Some raw figures signal its progress. Under Architecture, Planning and Design's predecessor program, familiar to many of us as Architecture + Environmental Arts, \$17 million has been disbursed to some 1400 grantees from 1967 through 1976. The average grant today weighs in at around \$20,000; now and then a grant exceeds \$50,000. It's worth remembering that all Endowment grants to organizations must be matched, at least to 50%, by funding from another source or sources, in the form of a cash donation or a gift of money or property to a special U.S. Treasury Fund.

But numbers alone don't say much about the quality of NEA-prompted creativity. Better to explore the broad range of architectural and design areas the Endowment has shown an interest in funding.

Livable Cities is the latest in a series of National Theme Programs whose predecessors—City Edges, City Options, and Cityscale—supported innovative approaches to improving the urban environment.

The series began in 1973 with City Edges' 37 programs concentrating on urban boundary areas—railroads, waterfronts, inner city "border line areas," and the city's vertical boundary, rooftops.

The \$3 million City Options effort funded 143 projects in a range of cities and towns with populations of 2,500 or more. City Options aimed at preserving each town's own distinctive character—ethnic, cultural

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Sketch of the glass-enclosed interior court planned for the old Post Office Building in Washington, D.C. NEA, a future tenant, supported mixed-use facility research for the project.

or topographical—in the face of coast-to-coast homogeneity. New York City's Jamaica Avenue Elevated transit line got a new lease on life in a plan to use, the old "El" to link residential and business areas. Washington, D.C. developed designs for 40 areas around its then-hypothetical subway stations.

The Cityscale program concentrated on the cement that bonds the pieces of a city's built environment—not grandiose urban planning or massive new construction, but street pavement design and lighting, vest-pocket parks, park benches, and street sign design.

NEA grants are small, but in the right hands they provide the leverage needed to revitalize whole downtown areas. Noted preservationist and author Arthur P. Ziegler Jr., president of the Pittsburgh History and Landmarks Foundation, described in 1977 Congressional testimony how NEA seed money can work: "A small grant-\$8,000, \$20,000, \$40,000 -creates a major survey that in turn results in a book that in turn creates civic pride that in turn leads to the formulation of an historic district that in turn elicits private and public funding that in turn triumphantly concludes in a revitalized neighborhood. But without the initial small grant, the series would never begin. . . . With an initial grant of \$10,000 we created a commercial renewal program that currently has a value of \$30 million and ultimately of \$250 million."

In fact, the small size of NEA's grants may be a definite plus to stimulating creativity in urban design. Edmund N. Bacon, FAIA, former director of the Philadelphia City Planning Commission and an AIA Medalist, wrote last year that "urban design can create a dignified



setting for old [urban] symbols and give people a new sense of belonging. . . . The press has asked why HUD is not doing this. The crucial point here is that the Endowment's Livable Cities program is free of all the entrapments and impediments to clear thinking which encumber a great institution like HUD. It will be the Livable Cities program which will generate future policies for HUD. Certainly, we have learned that the massive programs such as HUD generates do not solve the whole problem."

Creative Research

In physical sciences like chemistry and physics, research work has always been the test of creativity. Neophyte researchers cut their teeth on the puzzles of "normal" science before moving on to advanced research problems. In the arts, on the other hand, the test of creativity is creation itself. So when Acting Director Knight speaks of the Endowment's hope that the design community will "stretch" itself creatively, it's clear the Endowment recognizes the special demands creative design research places on practitioners, and that NEA is willing to

move to support such research. Nancy Hanks, former chairman of the Endowment has said that, "for the individual architect (and other designer) who has a research or demonstration idea and wants to get it funded, the Endowment probably offers the best prospect."

Research in design communications plays a big role in the Endowment's research interests. Under NEA funding, researchers John McRae and Larry Peterson at the University of Florida have investigated the representational potentials-and limitations-of slides, movies, videotapes and large scale models. Researchers at Cornell University have evaluated the effectiveness of a new rear-screen projection system in teaching designer-client communication; the system permits designers to explore design alternatives by creating composite images at will. The Black Environmental Studies Team in New Haven has explored user behavioral patterns in three-dimensional spaces, using computers, time-lapse photography, and videotape. An \$8,500 NEA grant supported evaluation of "talking" traffic advisory signs on the Santa Monica Freeway in Los Angeles. Carnegie-Mellon Univer-

sity researchers have worked on the effect of city illumination on our perception, enjoyment, and memory of the city. In another study, hundreds of interviews with city dwellers helped identify the problems people had in using and enjoying the city after dark, including their need for "environmental information" not made available simply by raising the level of illumination. A study based in Massachusetts resulted in guidelines for the location and design of fountains as sources of "white noise" to mask unpleasant traffic and other urban noise pollution sources. A study on the manufacture of furniture responsive to the economic and dimensional restrictions of lowincome housing, a competition on low-cost furniture design, a consumer-preference conference, and



a HUD publication. Focus on Furniture, were the results of a \$90,000 HUD grant to interior designer Erma Striner and the Washingtonbased Center for Metropolitan Studies. That grant was follow-up funding to Striner's \$5,000 individual Endowment grant to study the use of interior space in low income housing, using tools and concepts from the social and behavioral sciences. And a consumer's guide is planned on the basis of an NEAfunded New York study on how the design of household appliance controls-knobs, buttons, and covers-affect their performance and convenience.

Some projects, like the after-dark study, fall into the broad category of post-occupancy evaluation, as did another project in which the spatial pattern of the urban child's play was studied at the University of Kansas. Architects who sometimes suspect that they don't visualize the environment the way their clients do might consult the NEA-supported work of Yale professor and architect Donald Watson. Under a 1970 grant, Watson, well known for his solar design work, studied the "cognitive structures" that filter designers' perceptions of the built environment.

Administration and Advocacy

NEA's chairman is appointed by the President to a four-year term. The current chairman is Livingston Biddle, 60, a former Philadelphia newspaper reporter, aide to Sen. Claiborne Pell (D-R.I.), and head of Fordham University's Lincoln Center liberal arts college. He was the Endowment's deputy chairman (1965-67) under Chairman Roger Stevens, and he helped draft the legislation that shapes the agency he now directs.

At the time of his confirmation in November, 1977, Biddle was caught in gusts of controversy over the "politicization" of the arts his appointment allegedly represented. A novelist four times over (two, Main Line and The Village Beyond, were best-sellers), he comes from a blueblood Philadelphia background. His experiences as a World War II American Field Service ambulance driver kept him from becoming "a rather stuffy Philadelphian," he says, and were instrumental in his being a "populist" when it comes to American cultural institutions. Researchers who have a tendency to wax stratospheric might do well to listen to Biddle when he says "I am all for elitism, and by that I mean supporting the major institutions , and upholding high standards of quality . . . but if we don't have concomitant with that the development of the arts at a more localized level throughout the country, or populism, then standards of quality will not reach the levels they should." State arts councils, Biddle notes with approval, today have \$70 million in appropriations-up from just \$14 million twelve years ago.

The Endowment's "board of directors" is the National Council on the Arts, a Presidentially-appointed group of 26 private citizens whose present members include Harry

Cliburn, James Wyeth, and Clint Eastwood. There is also a Federal Council on the Arts and Humanities recently revived by President Carter and headed by honorary chairman and arts proponent Joan Mondale. But Endowment Chairman Biddle has been hard pressed lately by Congressman Sidney Yates (D-III.) to justify the Federal Council's admittedly obscure functions, its \$100,000 budget, and its staff of three. The sharp questioning occurred in the first line-item-by-line scrutiny of the Endowment's \$150 million FY 79 budget request. That will be a record budget, if approved. and significantly up from NEA's founding 1965 budget of \$2.5 million.

Weese, FAIA, Martina Arroyo, Van

Although grant review is the province of the National Council on the Arts, the all-important recommendations on incoming grant proposals are made by the program office Advisory Panels, which change on a yearly basis. Architecture Program Officer Tom Cain emphasizes that the turnover in panel membership keeps aesthetic preferences from becoming ingrained in the design programs. One person's creativity, the theory goes, may be another person's eccentricity.

Although grants for creative work are the most visible Endowment activity for architectural researchers, they are only half the story. Advocacy of the arts—both at the individual program level and at the Endowment level—is a major concern. "Advocacy" is the term the Endowment uses to describe its encouragement of arts appreciation by the public—especially the business

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community and government. Highlighting such surprising survey results as the fact that symphonies are better attended than football games in 10 out of 17 major U.S. cities, and that in 20 cities arts performances from 1973 to 1975 attracted 201 million people as compared to 133 million major league baseball spectators, the Endowment has produced TV spot commercials featuring New York Yankee Manager Billy Martin and a theater-entrance hot dog vendor. Their punchline: "Support the arts. That's where the people are."

The old Architecture + Environmental Arts program played its part in advocacy through such programs as the Federal Design Improvement Program, the Federal Graphics Improvement Programfor easier-reading federal forms and documents-and the Federal Architecture Study. The paradigmatic product of the FAS project is the Department of Transportation's policy document, Design, Art and Architecture in Transportation. NEA policy analyst Elizabeth A. Reid, who acted as a design consultant on the DOT design task force, says that DOT is expected to implement

vironmental arts" meant. But more substantial problems than finding the right name beset NEA in its quest to support creative design. The South, Midwest, Southwest, and Plains states are still under-represented in the rosters of grant recipients. NEA also finds that too many proposals are aimed at too few concerns—like energy and most designers build on established conventions. The proposal for a redesigned windmill has become a kind of cliché, says Cain.

vigorously 11 task force recommen-

dations for integrating design con-

cerns in the planning process, fund-

ing design projects, and raising de-

partmental awareness of design

quality. Similar work is being dis-

cussed at HUD, according to Reid.

As NEA moves through what con-

gressional observers call a "water-

shed" year, its staff is especially sen-

sitive to the winds of change in the

design community. And it seems

that for its own part, the design

community is sensitive to NEA's

priorities-perhaps too sensitive,

says Knight, to priorities that aren't

really there. One reason for the

name change in the architecture

program-from "Architecture +

Environmental Arts" to "Archi-

tecture, Planning, and Design"-is

to put other design professions-

like industrial design, urban plan-

ning, landscape architecture, and

graphics, among many others-on

an equal footing with architecture.

Another reason for the change, says

Tom Cain, is that people weren't

really sure what the words "en-

The Future of Creativity

To spur more originality in 1978-79, the Livable Cities program has dropped the "Theme Program" attitude of its City Options and Cityscale efforts. NEA found that the Theme Programs' proposal guidelines were too suggestiveproposals came right back to NEA with guesses suspiciously similar to the guidelines' own examples. This time around, Architecture, Planning, and Design will leave the Livable Cities guidelines vague in hopes of receiving more freewheeling proposals. Then too, without discouraging projects with a long-term payoff for arts users and the general public, NEA would like to see more 1978-79 projects with high-visibility, short-term results -projects with an immediate impact on people's perceptions of the built environment. These stumbling blocks to creativity were summed up by former Endowment Chairman Nancy Hanks this way: "Where design matters are concerned, the United States is in many ways a 'developing country.' " But in the past ten years, she says, designers have displayed "a truly marvelous concern for the nature of the world we build ourselves."

If you're interested in NEA's arts advocacy efforts or its funding, write for a description of NEA's dozen program areas to NEA, Office of Program Information, 2401 E Street, N.W., Washington, D.C. 20506 (tel. 202/634-6369), or directly to Knight's office (tel. 202/ 634-4276) for the Architecture, Planning, and Design Program's grants application guidelines.

-Evan M. Dudik

ACTIVE AC

Architect Joseph Passoneau's rendering of two busy downtoum corridors, 19th and K Streets, in Washington, D.C., redesigned to favor pedestrians and public transit as part of an NEA-supported [easibility study.



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Grantsmanship

The challenge of our time is how to get the money to the crackpots who have creative ideas," says Craig Smith, director of a nonprofit West Coast grantsmanship organization called Grantspeople. "Basically," says Smith, "the American public and private philanthropy system is designed to put money into the hands of creative people and let them come up with new ways of doing things."

However true that may be of the American grants system, potential crackpots must also do their share of homework in order to be considered for the aid they seek in the form of research grants and contracts. A big piece of that homework involves keeping up-to-date on how research and development agencies and foundations shift in their assessment of national needs, and a look at the rapidly changing winds of national solar energy policy bears that out.

In testimony before Congress earlier this spring, Energy Secretary James Schlesinger was accused by Sen. Jacob Javits (R-N.Y.) of "pussyfooting" with the Carter Administration's voluntary approach to solar energy. Schlesinger responded with what Energy Department spokesman Jim Bishop later called a major shift in administration thinking on solar energy. "We could go along the route you suggest and mandate use of solar heating and cooling," Schlesinger said. What form would such "mandating" take? Most likely, requiring homes which are to become eligible for Federal Housing Administration financing to have passive solar heating systems. Since efficient passive designs are very climate- and sitespecific, architects will be high on the list of beneficiaries if Schlesinger's comment solidifies into a federal commitment.

Such a mandatory approach would indeed be a shift for the Carter Administration. In its Fiscal Year 1979 budget request to Congress, DOE's total solar energy budget comes to \$750 million-down 7 percent from FY 78. At the same time, Schlesinger, who is a former Atomic Energy Commission chairman, has proposed \$1.7 billion in research and development funds for nuclear power. Except for some aspects of photovoltaic manufacturing work and other special research problems, solar energy is generally considered a "lower" or "softer" form of technology than nuclear, presumably requiring less research and development funding.

As the DOE appropriations bill heads toward its mid-year hearings on Capitol Hill, a Congressional Solar Coalition consisting of 27 senators and 67 representatives has been formed to push for a shift in the nation's energy priorities. The coalition, as yet without a formal structure, has introduced a barrage of 13 bills and resolutions, some of them of great interest to architects. Rep. Stephen Neal (D-N.C.) is the main sponsor of a \$5 billion Solar Energy Bank proposal which would help finance the installation of solar equipment in commercial and residential buildings with low-cost, long-term loans. At this writing, the bill is now under study by the House Banking and Currency Committee. Two different bills would involve the Small Business Administration-a \$35 million program to help businesses install solar equipment, and a bill cosponsored by Reps. Berkley Bed-

dell (D-Iowa) and Alvin Baldus (D-Wis.) which would lend a \$175 million helping hand to small, struggling solar energy and energy conservation companies. A similar bill (S. 2733) sponsored in the Senate by Small Business Committee Chairman Thomas J. McIntyre (D-N.H.) is aimed at easing the burden of capital formation for small solar corporations. That's the "chief obstacle," he says, to getting solar energy into actual use. Further, McIntyre notes that small, innovative companies are in danger of being snuffed out of the solar market by corporate giants. Large companies with other on-going profitable ventures have an easier time attracting risk capital on Wall Street. Reps. Richard Ottinger (D-N.Y.) and Andrew Maguire (D-N.J.) are supporting the Solar Energy Transition Act, which would direct federal facilities' conversion to solar energy by the year 2000; since the federal government is the nation's largest building contractor, procurement-oriented A/E firms will want to keep track of this one. Finally, the Foreign Mission Solar Energy Demonstration Bill would get our embassies abroad into the act by authorizing \$5 million for solar demonstration projects. Firms with international connections-or those wanting to make some-might be advised to contact the bill's main sponsor in the House International Relations Committee, Rep. James Jeffords (R-Vt.). And to top off Congressional activities, the House Science and Technology Committee has neatly overridden DOE's 7 percent solar cut by recommending that \$160 million in additional appropriations be added to the DOE request.

Meanwhile, at the other end of Pennsylvania Avenue, next door to the White House, the President's Council on Environmental Quality has issued its own evaluation of what reasonable national solar energy goals could be. In a widely quoted report, *Solar Energy: Progress and Promise*, CEQ states flatly that "solar technology could meet a quarter of our energy needs by the year 2000" and that "it is now possible to speak realistically of the United States becoming a solar society" in the era beginning in 2020.

CEQ Chairman Charles Warren, with Yale training in economics and

experience as a California state assemblyman, pays special attention to the economic factors which would bring the United States around to a solar orientation. He and report coauthor Gus Speth write that "in comparing solar energy to coal and nuclear, a full and fair analysis should include such frequently ignored cost items as occupationallyrelated deaths and injuries, environmental damage, the ecological and aesthetic impacts of transmission lines, security and accident risks, government assistance, insurance, and tax subsidies. . . ." The implication is that most alternative energy sources don't share as greatly in these peripheral but extensive expenses as do fossil fuel and nuclear sources-costs often ignored in cost-comparison studies. Then, too, CEQ says, "capital investment in solar heating or wind power systems will generate between two and five times as many jobs as . . . electric power plants."

Is CEQ's proposed goal of meeting one-quarter of our power requirements by the year 2000 through solar sources too optimistic? A 1977 Stanford Research Institute report says that solar heating and hot-water technology could save 9 quadrillion BTUs (quads) per year by 2000. A joint National Aeronautics and Space Administration/ National Science Foundation report estimates solar potential for space heating and hot-water at 2-8 quads. That puts the heating and cooling portion of CEQ's year-2000 projection at 2-4 quads into the conservative range when compared with these other studies.

Special mention is made by CEQ of a report on California's energy prospects prepared with DOE support by the University of California and two DOE laboratories. "It should be possible to operate an advanced society in California solely shifts in the foreign policy climate, would hold energy demand growth to only 10-15 per cent in the 50-year period between now and 2025.

So much for high-altitude futurology. Back on earth, specifically in Golden, Colo., DOE has set up the Solar Energy Research Institute, a new facility designed to function as headquarters for DOE's research, development, and demonstration activities, market analysis, and "management and performance of assigned solar R&D programs." SERI will probably have primary responsibility for the new passive solar energy initiative DOE is gearing up (contact Program Manager Michael

20545, tel. 202/376-9642). SERI Director Paul Rappaport (303/ 234-7171) has indicated that SERI's FY 79 budget should be about \$17 million, and should increase by 50 per cent the following fiscal year. Located at 1536 Cole Blvd., Golden, Colo. 80401, SERI would also have responsibility for managing regional solar research laboratories as well as conducting research of its own. As construction of SERI's solar-

Maybaum, DOE, 20 Massachusetts Ave., N.W., Washington, D.C.

As construction of SERI's solarheated headquarters proceeds, other energy-related activity has occurred at aptly-named Golden. On May 3, President Carter visited the town to speak in support of Sun Day and to announce an unexpected \$100 million shift of funds out of other unspecified energy projects and into solar programs. Golden was also the site of a demonstration on April 24-30 by 5,000 protesters opposed to the local Rocky Flats nuclear facility run by DOE.

-E.M.D.

sources'-even with a population nearly twice the present size and an economy nearly four times as great," the report states. DOE's comments on the same report are in grudging agreement; but DOE warns that the report does not take into account the economic, social, and political difficulties of making California a solar society by 2025, the possible need for "interim" fuel sources such as coal and nuclear, and the large land requirements of centralized solar systems. And, DOE notes, the report assumes that a strong conservation movement, centered on the automobile and spurred perhaps by

on 'indigenous renewable re-

Prospects

A ppropriate technology. The concept may be as old as the hills, or at least as old as mankind, but it took an energy crisis and a consciousness-raising book on the subject—the late E. F. Schumacher's *Small is Beautiful*—to make such an age-old notion a household phrase. Now appropriate technology is getting the kind of attention that will root it firmly into the mainstream, and for architects—who should be very interested in the subject—that bodes well in terms of research prospects.

In Congress, the House Committee on Science and Technology has recommended that \$250,000 be set aside in the National Science Foundation's FY 79 budget for development of a plan to program the agency's future activity in appropriate technology. The mandate is indicative of strong Congressional support for the low-level technology notion, largely because the committee at the same time blasted NSF's "unsatisfactory" performance on two previous appropriate technology studies, both authorized by the committee. Under the new appropriation, NSF is supposed to solicit public participation in the planning of a national appropriate technology program, as well as testimony from the scientific, professional, and small business communities.

The House committee also came up with a definition for appropriate technology, and among its criteria are low capital investment, decentralized production, conservative use of resources, and the ability to be user-managed. If you're interested in participating in the study or keeping an eye on future government plans for small, beautiful systems, contact Dr. Larry Tombaugh (NSF, 1800 G St., N. W., Washington, D.C. 20550, tel. 202/632-1825) or John DelGobbo (Office of Problem Analysis, Rm. 1110, tel. 202/632-6684. Precisely which NSF office will perform the study is not yet clear.

The Department of Energy is also considering implementation of a small grants program in appropriate technology. The new program, which would be implemented regionally, flows from the tremendous public response to DOE's initial FY 78 \$3 million pilot program. Grant cooperative agreements and contracts for up to \$50,000 for a twoyear period would be made to nonprofit, governmental institutions and small businesses, for concept development, practical development, and demonstration of solutions to a broad range of energy problems. The directing office as of this writing is that of Donald Beattie, assistant secretary for Conservation and Solar Applications. DOE's regional program managers will advertise specific program announcements; a synopsis of these announcements will be published in the Commerce Business Daily. For more information on this nascent program, contact Jerry D. Duane, Buildings and Community Systems, Office of Conservation and Solar Applications, DOE, 20 Massachusetts Ave., N.W., Washington, D.C. 20545, 202/376-4711.

National Energy Policy Institute

A non-profit institute for long-range energy analysis would be established

by the National Energy Policy Institute Act of 1978, a bill sponsored by Rep. John Dingell (D-Mich). Under the plan, the institute would have appropriations in FY 79 of \$2 million, \$6 million in FY 1980, and \$10 million for every year thereafter. Since it would be independent of the federal government, the institute would have a long-range viewpoint free from changes in the year-to-year political climate. The institute would have the authority to receive grants and contracts from Federal agencies, and to contract nationally for work by private, governmental, and educational institutions. As well as being of interest to public interest groups favoring such an independent policy-research body, architects might be interested in one of the Institute's specific charges: "Developing and analyzing policy alternatives . . . as they relate to such factors as environmental quality and the availability of natural resources."

DOE Assistant Secretary Alvin L. Alm agreed in House hearings on the bill that the need for long-range planning exists, but that Congress might well consider beefing up current DOE policy studies or transferring such analytical work to the National Science Foundation. The fate of the bill will be decided late in this Congressional session and depend partly on the voices of the energy policy-making constituency outside government.

Urban Reinvestment Task Force

The Urban Reinvestment Task Force (URTF), a quasi-governmental organization, has two programs which may be of considerable interest to architects. Under its Neighborhood Housing Services program (NHS), the task force coordinates efforts to develop local partnerships of lenders, community residents, and local government agencies who set up and fund local, private, non-profit NHS corporations. The NHS corporations, in turn, provide financial and rehabilitation services to local residents. The task force emphasizes that the NHS corporations-located now in nearly 50 cities-pick their own neighborhoods to revitalize. NHS is now in the first year of a threeyear Department of Housing and Urban Development evaluation.



Researchers will be especially interested in the task force's second program, the Neighborhood Preservation Program (NPP). In this case "preservation" means something more like "revitalization" as opposed to rescue of historic buildings and districts. The purpose of its 21 experimental preservation projects is to provide a sampler of revitalization strategies whose methods and success can be evaluated for national application. Five successful strategies have presently been selected for duplication in other cities. They will first appear as demonstration programs. Eventually these programs are intended to become models for a nationwide revitalization effort.

One example of a neighborhood preservation program is the Yonkers Apartment Improvement Program. Plans tailored for individual buildings and their residents are directed at stabilizing and improving blighted neighborhoods. The Yonkers program has become the Apartment Improvement Program as it moves into a demonstration phase in Hartford, Conn., where it is now in its first year.

In legislation now pending before Congress, URTF is expected to become a non-profit, federally-funded corporation. Its new name will be the Neighborhood Reinvestment Corporation, but the nascent corporation's board of directors will remain the heads of five federal financial regulatory agencies and the secretary of the Department of Housing and Urban Development. The new corporation is expected to have a FY 79 budget more than double the task force's FY78 allocation of \$4.5 million.

URTF is located at 1120 19th Street, N.W., Suite 600, Washington, D.C. 20036 (tel. 202/634-1689), and information on NHS and NPP can be obtained from Myra Peabody, assistant director for communications (202/634-1686).

Department of Housing and Urban Development

Undergoing evaluation now is HUD's Urban Homesteading Demonstration Program (UHDP). In its two-year history, the program has sold abandoned HUD properties for \$1 to pioneering investors, assisted in the purchase of abandoned but privately owned commercial properties, and provided technical assistance to urban "homesteaders." Sources say that UHDP will continue its work through 1978 and that demonstration projects involving homesteading by multi-family cooperatives will be studied. While the program is under evaluation, purchase orders (limited by law to a value of under \$10,000) are being

contemplated to study displacement of neighborhood populations. Part of HUD's worry is that increasing the value of blighted urban areas by renovation or investment merely displaces the indigenous population which cannot afford the increased tax burden or can't buy into the newly renovated districts. If you're interested in following the future of this program, contact Ramona Harrison (tel. 202/755-6330) at HUD and follow legislative proceedings in the Senate and House Subcommittees on HUD and Independent Agencies, chaired by Sen. William Proxmire (D-Wis.) and Rep. Edward Bolan (D-Mass.), respectively.

Another HUD program whose fate hangs in the balance is the Innovative Projects Grants Program. IPGP offers grants to state and local governments aimed at supporting local initiatives in housing and neighborhood preservation. The accent here is on innovative means of encouraging historic preservation of neighborhoods, training prospective homesteaders in rehabilitating housing, acquiring and then reselling abandoned property, and using public investment to attract private capital to distressed areas. Interested architects can contact Robert Blake in the Office of Community Development (tel. 202/ 755-5620).

POE (from page 7)

Bechtel's POE process: **1**. Before moving in on the building (or larger environment) it will evaluate, the POE team conducts a literature search to find earlier evaluations of similar projects. Bechtel numbers completed evaluations at close to 1,500, most of them done since 1973, and suggests that the researchers look for earlier work indexed by building type, user population, or specific design features.

2. The team meets and talks with including management, maintenance staff, and day-to-day users, getting its first picture of the total environment.

3. The team walks through the building, first with the original project architect, then with management and maintenance, finally with a group of users. The object is to develop an understanding of original design parameters and intentions, and of the way the building actually functions to meet user needs.

4. With a working knowledge of the building's user population, the team defines the statistical sample it will survey for the POE. Since Bechtel emphasizes scientifically valid surveying and analysis techniques, the role of the team's social scientist becomes preeminent on this and the following four steps in the process.

An information-gathering 5. method is chosen for the POE survey. Questionnaires are the most common tool, but Bechtel's list of typical methods includes open and structured interviews, behavioral and cognitive maps, diaries, direct and participant observation, timelapse and motion-picture photography, and psychological testing. The methods range from casual to very formalized, and two or more may be employed on a single evaluation. All of them, it should be noted, are being employed by designers and researchers conducting POEs today, with varying degrees of formality and scientific accuracy.

6. Pretesting. If the team will gather its information by

using a questionnaire or through interviews, the wording of the questions is pretested on a percentage of the sample that will actually be surveyed, to be sure the wording neither leads nor misleads users to predetermined conclusions.

7. The information-gathering method is administered to the environment's population or to the statistical sample.

8. The results of the information-gathering process, now in the POE team's hands, are analyzed and written up. In Bechtel's view, the structuring of the process and the analysis of the results are both tasks for the social scientist on the team. He stresses, however, that the scientist has failed in the most critical aspect of his job if the analysis and the results themselves are not clear to the designer.

9. The research is reviewed by the POE team and the POE client, with its implications understood by all parties. If fine-tuning of the evaluated project is part of the evaluation's general goal, requirements should become clear at this point.

The findings of the POE are 10. applied to the client's new project. The architect of the new project (who ideally has been the architect on the POE team) bases his preliminary design on the POE research wherever appropriate. By comparing the preliminary design with the POE research, new design priorities may emerge. When the project enters construction, where costs often weigh against "inessential" design features, the POE research may bolster the controversial design decisions on the strength of life-cycle costing and long-range benefit to both client and users.

11. The research is entered into what Bechtel envisions as an archive for POE information, to serve as intellectual capital for future evaluations and future design projects of similar scope and nature.

There are two sticking points to this state-of-the-art process. Both involve the interface of architectural and behavioral disciplines. Bechtel is firm



on the notion that a POE, to be accurate, must rest on scientifically-gathered information, and that architects, as a profession, lack the necessary expertise to accomplish this. A good many architects, on the other hand, feel the highly statistical approach amounts to overkill; they are fully satisfied with behavioral observations gathered in more casual ways. Many social scientists also feel that architects can, with proper training, become more fully qualified as behavioral observers, to the extent that post-occupancy evaluation can, in the near future, be handled solely by a responsible architect without extradisciplinary assistance.

The second sticking point concerns end uses of evaluation results. The architects currently engaged in POE endorse it as a system of cumulatively improving design expertise. But they and other architects who have thus far shied from POE fear that evaluations over which they have minimal control cannot reflect the design process accurately. They anticipate groundless and dangerous criticism of the profession and eventual diminution of the professional's role.

As a discipline, POE is clearly here to stay. It is logical to assume that resolution of its problems-in a manner satisfactory to architectswill hang on further architectural involvement in the field. A number of design firms and research groups are engaged in POE activity now, conducting evaluations and creating systems of analysis and language that will better bridge the gap between architecture and social science. But the state of the art is in radical flux; the most telling factor will be larger involvement by the profession as a whole.



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