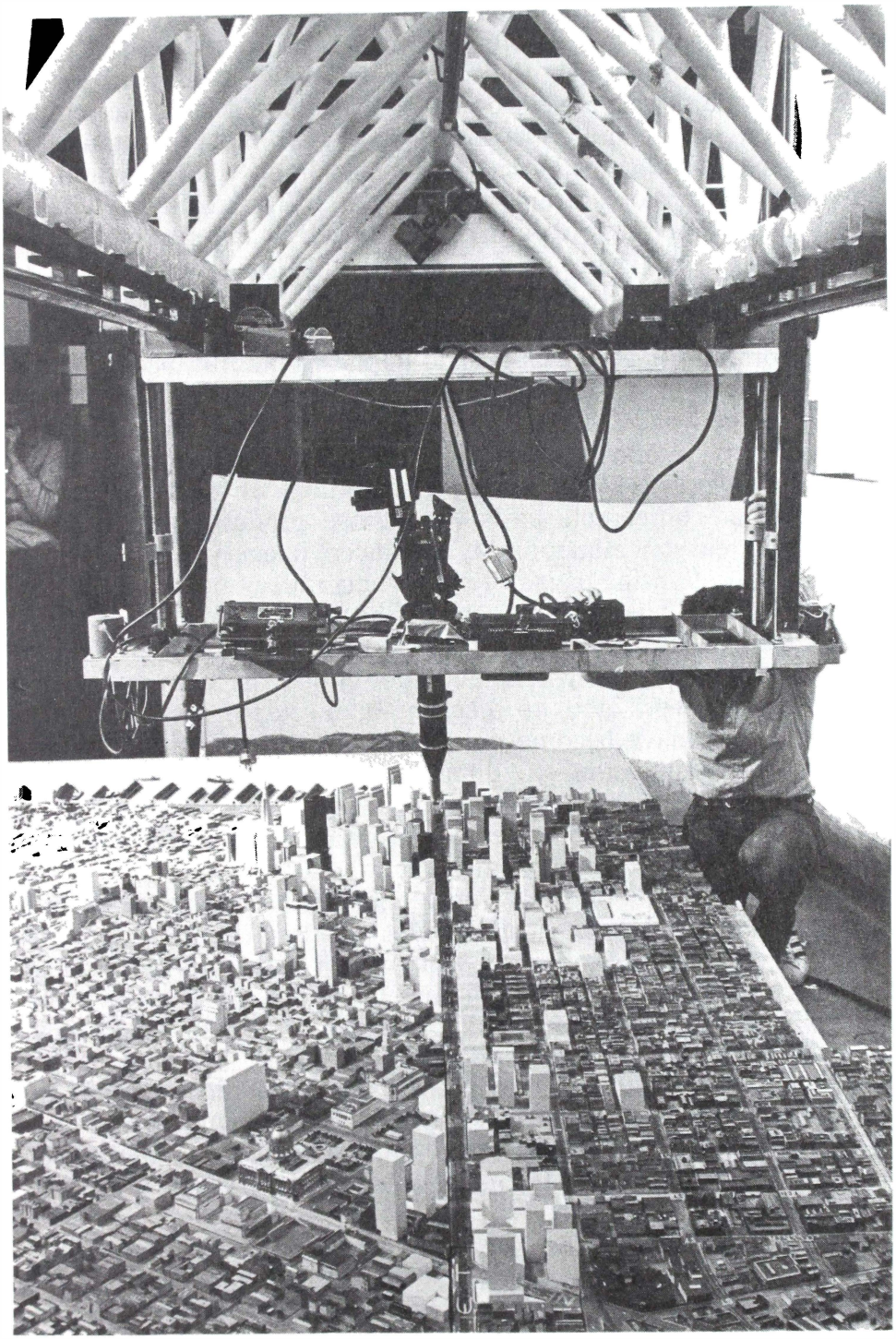
THE BERKELEY ENVIRONMENTAL SIMULATION LABORATORY: A 12 YEAR ANNIVERSARY

Peter Bosselmann

When, in 1972, Donald Appleyard, together with Kenneth Craik, received funding from the National Science Foundation to update what had been a rather simple environmental simulator purchased from Yale, both of them had been working in the field of environmental cognition for several years. Appleyard's opportunity to work on the Image of the City project with Lynch and Myer had resulted in the book *The View from the Road.* During the course of that project he had experimented with three ways of simulating the experience of driving along highways: notation systems, perspective sequences and films produced through a modelscope. The notation system describing the environmental experience was the easiest to develop, and it became common practice in urban design throughout the world. Although they do describe components of the experience, notation systems do so in an abstract way—and they are idiosyncratic. Only the inventor understands his system and no one else uses it. To the public, esoteric notation systems are incomprehensible. Sequences of perspectives are much more understandable. They are not used as much, perhaps because the method is still rather abstract and it takes some work to visualize the sequences as a continuous movement experience. Static perspective renderings remain the most common way of simulating environmental experience. However, modelscopes, motion picture cameras, and realistic scale models have the most promising prospects of accurately and realistically simulating an experience of the environment.

In the late sixties Appleyard teamed up with Kenneth Craik, who had started to examine the psychological research issues involved in studying how persons comprehend the everyday physical environment, to explore the utility of psychological assessment concepts and methods for conducting research on environmental perception, cognition, and impression formation. The way in which persons encounter places and the means by which places are presented to observers (e.g. using simulation techniques) were among the principal objects of their inquiry.

Karl Mellander, a mechanical and optical engineer, designed the environmental simulation equipment. The centerpiece is a modelscope with a tiny set of movable prisms and lenses that can be walked, driven, or flown through small-scale physical models, with movie, video, or still cameras attached. Together with Appleyard and Craik, Mellander produced a very realistic model film of a site in Marin County. This film was made to validate the simulator as a research tool.[1]



Assessing Growth Control Regulations with the Environmental Simulator in the San Francisco Model

My own interest in simulation started during work on a new town project in Germany. When our scheme was presented to the council members for approval, they confessed their inability to assess the appearance of the project based on our colored land use, circulation, open space, and form diagrams. After the presentation, I drew perspective sectors in sequence, explaining what it would be like to drive or walk through our project. C.A Acking, a visitor from Sweden who came to our office, looked at my sequences and asked me whether I had heard of Appleyard's simulator in California. [2] That was in 1973. Donald Appleyard's offer to manage the Laboratory in 1976 came as a welcome opportunity to engage in work in community participation and public communication.

Now, almost 15 years after the laboratory was established, we have developed ways of producing simulations with relative ease and cheapness. Also, the explosive development of computer technology has not succeeded in making simulations of higher experiential quality at comparable costs than those produced in the Lab. Eventually, realistic electronically produced imagery will be available. The question for us is not one of technology but of quality of communication. The development of the facility and the challenge of each project undertaken has focused our thinking on all aspects of simulation, and has prompted continuous questioning of the validity of our work and its relation to developments within the profession. We have become more aware of the politics of simulation, its role in education, the difficulties of giving a good presentation, the varying effects of simulation settings, the relative utility of different media, and the hidden power that media have over our designs, decisions, and environment. [3]

Besides, it is a lot of fun. People do understand models; they light up when they see movies of model worlds. It relieves some of the grimness and seriousness with which many planners and designers treat their work. Film makers like John Dykstra, who went on to make "Star Wars," have worked in the Lab. The visual media of this century, film and television, have spawned a vast public culture, but design professionals have hardly noticed the potential of these new technologies. The planning and design profession has stayed in the backwater, not only because of lack of resources, but due to an innate conservatism that ties us to the drawing boards.

Initially, the work in the Lab was carried out on a fairly small scale. However, over the years, the amount of work done in the Lab has expanded to match the original scope and range of activities envisioned at its inception.

In the years from 1976 to 1982, all of our projects explored simulation as a medium in participatory planning. Models, videotapes, and model films were used to generate community-based design alternatives or to measure community responses to proposed projects. The following sections describe some of these projects.

Berkeley Waterfront

In 1976, we developed a modified Delbecq land use game to solicit community responses on the future of the Berkeley Waterfront. At a series of workshops, various groups from the community gathered around a small scale model to generate alternative development scenarios. Only a few elements such as blocks and flags were needed to trigger the participants' imagination. All the ideas of what uses and activities should happen at the waterfront emerged from the people's own creative efforts, and the ideas were sometimes quite fantastic. On the other hand, there were many real possibilities nobody had thought of. Realistic models of a selected number of ideas —the players were asked to vote on their ideas— were then constructed. Videotapes of the realistic models were edited together with activities taped live in similar waterfront locations. The real world footage provided emotional relief from the more prosaic design work; some of the taped activities, such as two lovers in a park, leavened the educational atmosphere with some wild humor. But the live scenes alone could not be connected easily to the site we had available. The best videotape would televise models of a range of basic activities that could be potentially located on the site and include within each model image scenes of activities that might take place within such an area. Thus, location, physical form, and size would be supplemented with live scenes of what each would be like when used and experienced.

Berkeley on the Barricades

In 1975 Berkeley instituted one of the most ambitious traffic management plans in the country. It was the result of an intensive citizen participation program and resulted in the city-wide installment of various traffic control devices, mostly of the bollard and barrier variety. Some citizens were annoyed and wanted to remove the barricades. Other neighborhood groups liked the reduced traffic, but decided to explore better solutions to street design. We interviewed neighbors in one of the Berkeley neighborhoods. Large-scale models were built of two typical streets. The first videotape of the model was black and white. It begins with an outrageously loud "soul" song beating out "Let's do it in the road" to a scene of the street model being put together, adjusted, and cleared for filming by many hands. For more formal audiences we have always had to keep the sound low during this part of the presentation, but most audiences usually break out into chuckles immediately. As the interview results are being described, the street is transformed from the existing street to a street with narrowed entrance, pillars, and a street ramp creating a gateway to a cul-de-sac with a mini-park and diagonal parking. At this scale the camera can easily drive down the street live and other vehicles can be animated by pulling them along with cotton.

This videotape was very popular and it has been shown as an outreach to many community groups and has been used to trigger a discussion of traffic management around a model of specific neighborhoods or streets. [4]

Simulating Parking, Street Furniture, and Vegetation Alternatives for Neighborhood Assessments

Downtown San Francisco

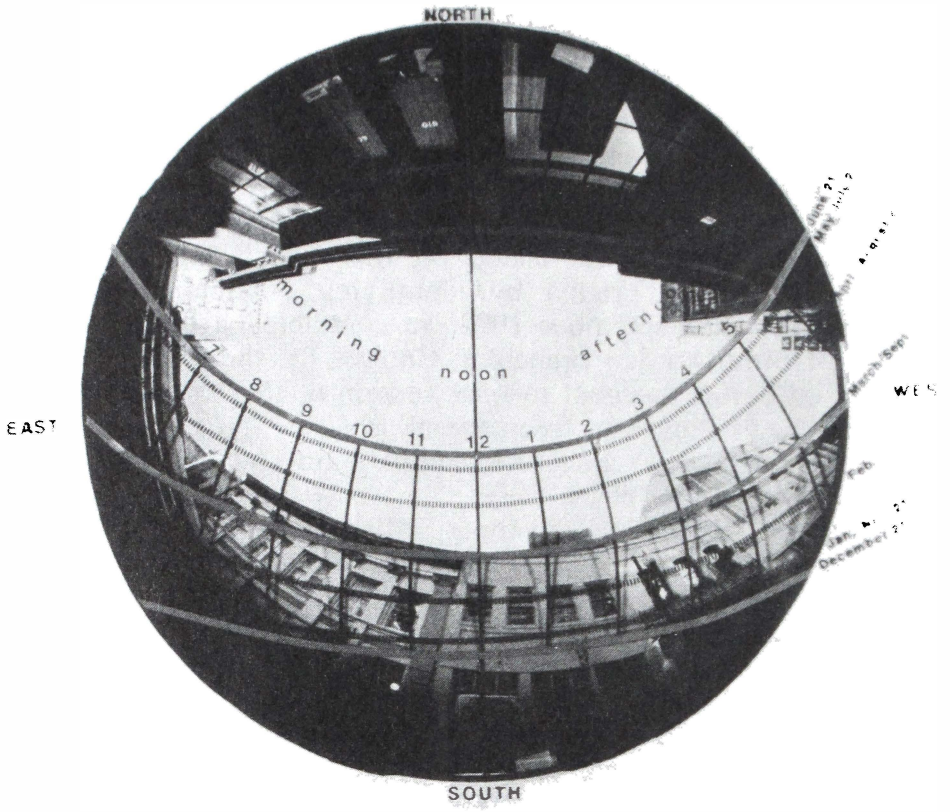
Many environmental issues are of concern to a wider public than that which attends public hearings. Issues of metropolitan, regional, and national consequence are communicated by newspapers, television, and exhibits. On these scales, it is much more difficult to get active participation of citizens. The communication tends to be more formal and one way. Occasionally, people are offered opportunities to express their preferences. During the last five years, the Laboratory has assisted the Department of City Planning in San Francisco in simulating new downtown zoning controls. In 1979, in the midst of the highrise controversy, we modeled the "Conservation and Development Plan, Phase I." Using our updated 1935 model of the city of San Francisco, a short film, "How Will San Francisco Look," was produced. It juxtaposes views of the existing city with two alternative future scenarios: the 1979 Conservation and Development Plan, and the Continuation of Existing Controls. The film was made available to the news media at a press conference. One public television station incorporated our film into a report on the highrise controversy. A debate, carried out by opponents and proponents of the measure, followed.

The debate format and the visualization of what the initiative would do to the San Francisco skyline allowed a large audience to identify with one side or the other. The referendum to limit highrise development in downtown San Francisco was narrowly defeated. During the following years, we modeled and simulated the evolving downtown plan. Frequently, we were asked to present to the planning staff and commission a modeled version of height, bulk, and density controls. We also tested on the model the concept of transfer development rights by identifying possible donor and receiver sites. In September 1982 we completed a two part film entitled "Downtown San Francisco: Choices for the Future." The first part illustrates the next to final version of the downtown plan. The second part illustrates five general urban design goals: mixture of uses, street scale, architectural compatibility, sun and light, and streets with a sense of place.

Throughout the process, planning staff had been cautious in the use of our simulations. Frequently in doubt about their own assumptions regarding the amount and concentration of future growth, the San Francisco planners asked us not to show the final film in the Bay area. One side might think the plan too restrictive, while the other, after seeing the film, might press for more restrictive controls. Objectivity was not the issue. In October of 1982 we tested the film by showing it in New York and Washington. The responses there were very impressive. The New York audience felt our film was helpful and provided an excellent aid to visualize the new controls. Planning staff in San Francisco waited until the two-year overdue Environmental Impact Report on alternative controls for downtown was published. Projections of ridership and person trips generated by future development formed the basis for lowering development potentials in most districts. Now, the planners felt it was appropriate to show our film to support the rationale for lower development potentials and stricter controls on the street-level impacts of highrise development. A film is currently being produced that shows the final version of the downtown plan. It will be shown prior to public hearings during the summer of 1984.

Comfort in the Urban Environment

A new application of the Laboratory has grown out of the growth simulation project. We are currently studying the relationship between pedestrian comfort and urban form. Concerns for a healthy and comfortable living and working environment have shaped city zoning ordinances the world over. The impact of high and bulky buildings at street-level with regard to increased shadowing and adverse wind conditions are known and can be measured. Currently, state of the art in impact reporting only allows for a comparison of before and after conditions. Little is known about cumulative impacts of highrise structures on pedestrian comfort levels. More importantly, criteria for comfort or discomfort at street



Using Fish-Eye View Technique to Assess Sun Access to Downtown Streets for Pedestrian Comfort.

level are vague. In our study we will improve the state of the art by conducting an investigation into performance standards for comfort in the San Francisco climate. As a first step, we have developed and tested sun access preservation standards for open spaces in downtown San Francisco. Growth modeling of downtown districts has allowed us to locate critical areas in the city, areas where the cumulative shadows of highrise building greatly alter the comfort levels park and open space users will experience. We have developed sun access easements called "Solar Fans" which guide the height and form of buildings in the vicinity of open space. [5] The result of our work will be recommendations for performance and prescriptive standards with illustrations of good and bad design practice. This work will be available for use by professionals and neighborhood groups interested in assessing the impacts of new development on pedestrian comfort in their streets and open spaces.

From the beginning, the work in the Berkeley Environmental Simulation Laboratory has focused primarily on the experiential qualities of the environment. The Laboratory represents a successful

alternative to the gradual withdrawal from the use of experiential simulation by the environmental professions (Appleyard, 1976). This withdrawal has caused a gap between the environmental design professions and the general public. With the loss of credibility in the predictions of planners for future projects, the public is demanding more complete information about the impact of such projects.

The value of the laboratory lies in its ability to translate abstract design guidelines into concrete and realistic visual images. Such images then become the basis for the comparison and assessment of alternative development choices, which based on experiential qualities, are transparent and significant to the public, public officials and professionals alike. Thus, environmental simulation is not merely a method for the evaluation of proposed alternative developments, but also and more importantly, it is a strategy for opening up the environmentaldecision—making process to public officials and the public at large. As such I believe it will prove a most powerful tool in generating a public constituency for environmental planning issues.

NOTES

[1] Craik,K ."Psychology of the Large Scale Environment," in Feimer and Geller, *Environmental Psychology,* New York, 1983.

[2] Acking, C.A. *Comparison between Some Methods of Presentation,* Stockholm, 1974.

[3] Appleyard, D. "Understanding Professional Media," in *Human Behavior and Environment,* New York, 1976.

[4] Bosselmann, P. et. al., "Periscoping Future Scenes," *Landscape Architecture,* September, 1980.

[5] Bosselmann, P., Flores, J., and O'Hare, T., "Sun and Light for Downtown San Francisco," IURD, Berkeley, 1983.

APPENDIX

A. *Projects in the Simulation Laboratory 1976 to 1984*

1976 *Berkeley Marina*, Waterfront Advisory Board. We developed a land use game to solicit community responses. A sequence of three videotapes was produced that illustrated how different interest groups viewed the future of the waterfront.
Product: ½ inch videotape

1977 *Residential Streets,* Elmwood Neighborhood Association
We employed models and videotapes to communicate residential street improvements in the Elmwood neighborhood. Published in "Periscoping Future Scenes," Appleyard, Bosselmann, Schmidt, and Klock in *Landscape Architecture*, September 1980.
Product: ½ inch videotape

1978 *Richmond's New Marina,* Richmond Redevelopment Agency
We produced models and a film illustrating the Master Plan. Both were shown at BCDC and City Council hearings.
Product: 16mm film, *Richmond's New Marina.*

1979 *Downtown San Francisco*, City of San Francisco, Sedway Cooke Associates
Growth modeling of Conservation and Development Plan, Phase I. We produced a short film for TV-broadcasting, *How will San Francisco Look?* The film was shown on Channel 9 followed by a live debate on the issues of downtown growth.
Published in "Film and Video in the Planning Process," Bosselmann, Gerdes, *Planning*, December 1980.
Product: 16 mm film, *How Will San Francisco Look?*

1980 *Great Highway*, City of San Francisco, Dept. of Waste-water Management.
A model and slideshow was produced to illustrate the changes of the roadway alignment. Presentation to the Coastal Commission.
Product: Slideshow.

1981-82 *Downtown San Francisco*, City of San Francisco
Growth modeling of "Guiding Downtown Development" I, II, III, and IV. Prior and parallel to the "Master EIR" process we analyzed and modeled the proposed changes to the downtown zoning ordinance. Using the downtown model, we illustrated the effects of Transfer Development Rights (TDR), new bulk and height regulations, and most importantly, the impact of new highrise development at street level.
The product of these studies were frequent informal and formal presentations (Jan. 1982) to planning staff and planning commission.
Product: Final Report.

1982 *Interstate I 220*, near Shreveport, Louisiana, Department of Transportation
A model of a lake in Louisiana and two simulation films were produced for a Visual Impact Assessment Program. The film illustrates the visual impacts of two alternate freeway routings on passive and active lakeside recreators. Final technical report is forthcoming by Jones and Jones, Kenneth Craik, and Peter Bosselmann.
Product: Two 16mm films, 20 minutes each.

1983 *Sun & Light For Downtown San Francisco*, Gerbode Foundation and City of San Francisco.
Sun Access preservation guidelines were developed for important streets in Downtown San Francisco and for 12 parks, plazas and squares.
Report can be purchased for $14 from the Institute of Urban and Regional Development.

1984 *Berkeley Waterfront,* State Coastal Conservancy
A model of the Berkeley waterfront has been constructed to aid citizens groups in the discussion on alternative landuses for the site. Photomontage sequences and a 12 minute film were produced and presented to the Berkeley City Council.
Product: 16 min. film, *Berkeley Waterfront: Restoration, Conservation, and Development.* Report is forthcoming 8/84.

B. *The laboratory has also been made available to researchers in the field of Environmental Psychology.*

1977 Joachim Wohlwill
Conducted a study on the "Aesthetics of Structures in a Coastal Setting." We produced two models of typical coastal environments and structures representing different uses as well as shapes, colors and textures. The product was a three projector slideshow for a Visual Impact Assessment.
Findings were published by J. Wohlwill in "What belongs where, research on fittingness of man-made structures in natural settings," in Daniel, Zube, Driver, *Assessing Amenity Resource Values.*

1978 Victor Regnier, University of Southern California.
Conducted a study of the perception of the elderly in an urban environment. We produced simulation of six loop-trips through a scale model on video tape.
Findings were published as a research paper at the Andrews Gerontology Center, USC, Los Angeles.

1979 Richard Titus
From the National Institute of Law Enforcement and Criminal Justice, Washington, D.C., 20531. Conducted a comparison study of the effectiveness of different media for preconstruction evaluation. We produced models, renderings, graphics, slides and model simulations of an existing housing project in Richmond.

1982 Thomas Garling and Gary Evans, Building Research, Institute of Sweden and U.C. Irvine.
Conducted a study on the perception of landmarks in the Urban Environment. We produced a simulation film with three different trip-configurations through a model of an urban setting.
Publication is forthcoming in Environmental Psychology.

C. *The third application of the simulation laboratory has been in the field of educational films. To date we have produced three films.*

1980 *Tomorrow's World*, a BBC/ESL joint production, written and directed by David Dugan is a short documentary on the Laboratory and on San Francisco's highrise development. It has been shown on BBC-TV in June 1980.

1980 *Liveable Streets*, a 8mm film funded by the Institute of Transportation Studies, written and directed by Peter Bosselmann and narrated by Donald Appleyard. The film draws from the report to the Federal Highway Administration, *Improving Residential Streets,* by Dan Smith and Donald Appleyard. The film was shown at the Transportation Research Board Conference, 1981. It has been broadcast by National Japanese, People's Republic of China, and Yugoslav television and on regional programs in the Bay Area and New York City.

Liveable Streets won a citation at the 1983 International Festival of Film on Architecture and Planning, New York and Lausanne, Switzerland. It can be purchased for $200.00 a print.

1982 *Downtown San Francisco; Choices for the Future*, funded by the National Endowment for the Arts, written and directed by Peter Bosselmann, is a two part film on alternative regulatory scenarios for downtown San Francisco. Part One of the film explains the amount and distribution of highrise building projected for the future. Part Two illustrates five urban design goals: mixture of uses, sunlight, street-scale, architectural compatibility, and sense of place.

Choices for the Future won a NEA Research Award in 1983. The film can be purchased for $380.00 (plus tax and shipping).

Future films will include:

Changing Suburb, a film on people's response to densification and urban infill policies and their impact on residential street traffic management, funded by the Institute of Transportation Studies, U.C. Berkeley.