When setting out to study European Full Scale Labs, my colleagues and I at the University of Maryland (UMCP) were already convinced of the need for and the value of a Full Scale Environmental Design Simulation Laboratory, but we knew little about how to fund, build and run one.

Since no such facility exists in the United States I travelled to Switzerland, Holland, Denmark and Sweden to review experience and operation of Full Scale Environmental Design Simulation Laboratories there.

The need for a hands-on, full scale mock-up facility where elements of the man-made environment can be tried out before being built has recently become of considerable concern to people from a wide range of fields.

This is possibly a result of a more general recognition of all the barriers which crowd our physical environment; the barriers which impede our ability to work effectively and dwell comfortably.

It may also have something to do with the fact that funds are no longer available for the building and production of too hastily conceived designs of the sort which need extensive modification and improvement in order to function in an acceptable manner.

Of course, a general concern for health and safety has also arisen lately, and as a result more attention is being paid to the effect of the physical environment on human beings.

Man and his relationship to the built environment is increasingly under scrutiny.

As a result, we see people demand more of a say in the decisions about their surroundings, while, at the same time, there is a greater emphasis on regulations and legislation.

As designers of products, communications systems, interior environment, buildings and urban/suburban fabric we are forced to meet increasing demands on our ability to cope with complexity. The multiplicity of factors that we may have to integrate into a design solution renders the design process a risky business with endless possibilities of mistakes that may result in undesirable and even dangerous situations. Guido Francescato cites the incidence of the layout of power plant control rooms such as the one which contributed to the difficulties of operating personnel in controlling accidents such as the Three Mile Island episode. Another well known environmental tragedy was the Pruitt-Igoe Housing in St. Louis, Missouri, which was such a failure as a human environment that it was finally decided to blow it up.
These and much less dramatic failures could possibly be prevented if different tools were employed in the design process. Such tools as information banks, computerized information organization, graphic simulation by computer, extensive user involvement, and simulation by full scale modelling and mock-up.

While the computer will, no doubt, be a valuable tool in the design process, it does not involve all the senses required to experience physical environment.

A full scale mock-up tool like a laboratory for environmental design simulation, on the other hand, could provide situations where people might involve all their faculties in experimenting with, testing, inventing and experiencing physical surroundings. A laboratory, where students, researchers, future users, designers, builders, contractors, manufacturers, public authorities and private institutions might have a chance to build, test, touch, smell, observe, handle and solve conflicts in a direct manner, and also have a chance to discover new possibilities.

As a teaching tool, in pre-design courses at UMCP, a Full Scale Environmental Design Simulation Laboratory would be invaluable in introducing students to form, space, volume, outline, proportions and dimensions, structure, materials, light, color, texture, etc. These elements of design would then make sense to them in a really direct fashion.

Later in the educational process students might benefit greatly from being able to build full scale mock-ups of their projects, testing their ideas, understanding the practical as well as the psychological implications of their proposals. They would begin to understand what their designs would really amount to when implemented.

Faculty at UMCP might find it conducive to the testing of research hypotheses — and, maybe more importantly, a Sim Lab might spur new research into pressing environmental problems. As a tool for outreach activities a Full Scale Environmental Design Simulation Laboratory might add a whole new dimension to the abilities of various centers and departments on campus to communicate their knowledge and know-how.

As a service to the community a Sim Lab may offer Maryland citizens opportunities for simulating lay-outs and designs for their homes and their places of work. It may offer corporations, manufacturers, contractors and developers opportunities to rent the lab or commission it to carry out mock-ups of the work environment of factories and offices, mock-ups of new products or mock-ups of parts of proposed buildings.

Practicing designers, architects and engineers may find it most useful to invest in building mock-ups of parts of their schemes before preparing final construction drawings.
The laboratories visited were:

Vakgroep Ecologie van het Wonen Laboratorium, Landbouwhogeschool, Wageningen.

Ruimtelijk Ontwikkelings Laboratorium voor de Woningbouw, Gemeentelijke Dienst Volkshuisvesting, Amsterdam.

Het Laboratorium voor Experimentele Ruimtestudie, Centrum voor Architecturonderzoek, Technische Hogeschool, Delft.

Laboratoire d’Experimentation Architetcturale, Ecole Polytechnique Federale, Lausanne.

Fuldskalaboratoriet, Institutionen for byggnadsfunktionslara, Allskitektursektionen, Lunds Universitet.

I.I. Laboratoriet, Arkitekturkolen, Det Kongelige Danske Kunstakademi, Copenhagen.

The individuals I met with all gave freely of their time and experience and were most generous with help and information:

Hendrik van Leeuwen and Wim van Ingen at Wageningen, Evert Hoogenstraaten at Amsterdam, Herbert van Hoogdalem at Delft, Hans Matti and Roderick Lawrence at Lausanne, Birgit Krantz and Elizabeth Hornnansky-Dalholn at Lund, Peder Dueland Mortensen and Karen Zahie in Copenhagen.

The material collected during these visits: interview notes, questionnaires, catalogs and reports, and the photographs I took or was so generously given by several labs, was then organized and analyzed during the winter of 1984-85. A draft report was prepared in the spring of 85, but the final report: "Study of Full Scale Environmental Design Simulation Laboratories" was not produced until the end of 1985.

Progress was slow. However, that same year I received a research grant from the Division of Human and Community Resources at UMCP; including one semester's release from teaching. This enabled me to concentrate on investigations into needs and possibilities of funding and usage of an American Sim-Lab.

I had come to the conclusion that while much had been learned from studying the European labs, an American Sim-Lab cannot be modelled on these. Like the European labs, its funding and usage will reflect the culture and customs, and the socio-economic system of its environment.

It would, therefore, be necessary to base a proposal for a Full Scale Environmental Design Simulation Laboratory for the U.S.A. in American conditions.
Many other professionals have, over the years, come to the same conclusions. Among them some individuals who took the results of their findings, and instigated formalized settings for full scale simulation.

The first person to do so was Hendrik van Leeuwen who set up a Sim Lab at Wageningen University in Holland in 1960.

In 1965 a Full Scale Environmental Design Simulation Laboratory was built at the University of Lund in Sweden, and in 1968 the City of Amsterdam set up the first municipal Sim Lab in Holland.

Around 1970 experimentation started at the Swiss Federal Institute of Technology at Lausanne, and by 1977 a fully fledged lab in its own building was ready there.

The Dutch Universities of Delft and Eindhoven followed suit during the middle seventies and in 1982 another municipal full scale modelling facility was opened in Holland, in the Hague.

The following year a group at the Royal Academy's School of Design/Planning/Architecture in Copenhagen set out to establish a Danish Sim Lab after having studied the Dutch, Swiss and Swedish labs.

After consultation with the Copenhagen group I picked six laboratories to visit and entered into correspondence with the individuals who run them and use them.

By then it was too late to apply for funding of my study as a research project for the summer of 1984, so I decided to foot the bill for two months of work and a return ticket to Denmark.

Transportation and other expenses connected with travel to the six laboratories were covered by a grant from the UMCP International Travel Fund, and support from the Department of Housing and Design, the College of Human Ecology, the College of Engineering, and the School of Architecture of the University of Maryland.

Contact was established by mail with key people in the European labs well in advance of my visits.

Ten days before our meeting, a list of questions that I would like to air was sent to the labs. This gave the individuals I was meeting with a chance to prepare their answers, while the list also served as a structuring device during our actual face to face sessions.
For government agencies a UMCP Sim Lab may be a conveniently located testing ground for proposals before new legislation is enacted.

In short, a Sim Lab could become a multi-faceted facility. It could become a lab that would accommodate all of the above mentioned parties, or it could be limited to only a few. It could become such a flexible and comprehensive facility that it could cater to even more diverse activities.

The idea of a Sim Lab has already attracted the interest of a number of individuals on campus. When the idea is publicized it will no doubt attract the attention of other faculty in other departments who will see the possibility of using it in their own teaching, research and outreach.

Since the 1984 Spring Semester, interested parties have been sponsoring the idea of a UMCP Sim Lab. They are: Professor Clifford Sayre of the Department of Mechanical Engineering; Assistant Dean Effie Hacklander of Consumer Economics; Chairman and Professor Guido Francescato of the Department of Housing and Design; the director of the Center for Productivity and Quality of Working Life, Thomas Tuttley; and Associate Professor Ralph Bennett of the School of Architecture; and from outside UMCP, Dr. Aase Erikson, architect, anthropologist and principal of Educational Futures Inc., in Philadelphia.

In April 1984 Karen Zahl, who is the founder of a recently established Full Scale Environmental Design Simulation Laboratory in Copenhagen, came to UMCP and led a seminar with this group. Following Karen Zahl's visit, and in order to gain more insight into what a Sim Lab actually is and what it would entail to establish one at UMCP, it was agreed that I should spend two months during the Summer of 1984 investigating problems of location, size, usage, funding, construction methods, simulation and modeling systems, personnel and support services of the existing European laboratories, since there are none in the USA.

I had originally brought the idea to UMCP when the Department of Housing and Design invited me here in the Spring of 1982 to be considered for my present post. Having had successful experiences working with students on details of buildings and interiors at full scale, and having, many times over twenty years, employed full scale mock-ups to solve problems before implementing design/planning proposals as a practicing designer/architect, I suggested that this valuable teaching tool be taken up by HSAD.

Working closely with future users of the physical environments that I planned and designed in my practice in London and Copenhagen for jobs in England, Denmark, Italy, Germany and the USA, I found certain simulation and communication techniques far more effective than others.

The rather abstract traditional drawing techniques, I found, did not communicate well (it at all) to most people outside the design professions. Modelling, however, particularly full scale modelling was a more effective tool for communication and involvement.
To clarify aims and prospects I:

1. Entered into discussions and consultation with other universities about present and future interaction and collaboration.

2. Interviewed practicing design/architecture professionals and representatives of associations of design/architecture professionals.

3. Investigated sources for funding the establishment and construction of a Sim-Lab.

4. Investigated possibilities of financing the running of a Sim-Lab.

5. Established links to non-financing support organizations (the Building Research Board of the National Academy of Sciences, the Architectural Research Centers Consortium, etc., etc.)

6. Consulted with fund raisers.

7. Communicated the idea for a Sim-Lab and what it might do for the University of Maryland (UMCP) (an educational institution with 39,000 students) to its head administration - with supportive reaction.

This whole phase (1985-87) could aptly be named a phase of probing and informing. Investigations into aims and prospects have taken place parallel to "the spreading of the word" about full scale environmental design simulation and its potential as a tool in education, research and development.

To illustrate its potential, and to present it as an integral part of the design of the environment, I spent the summer of 1986 studying results of full scale env. des. simulation as part of a study on influential ideas in architecture and design in the 80s.

This study was presented October 86 in a lecture at the Smithsonian Institution in Washington. It was my first chance of presenting full scale env. des. simulation in context - and to the public.

"The spreading of the word" continues. Another opportunity came when I was asked by the editors of "The World and I, a Chronicle of Our Changing Era" to write on architecture/design for publication March 87.

I chose to write about "The Home and the Place of Work", and have incorporated a good deal on the importance of full scale simulation before implementation of designs.

Unfortunately, there is not much of a tradition for team research in the U.S.A. So, this project has become a sort of "one-woman show", and is taking much longer than first anticipated.
The next step, I think, must, however, be to write and design a proposal for a UMCP Sim-Lab. I have applied for a grant from a national foundation (which is another way of "spreading the word") to support work on such a proposal during the summer of 87.

The Copenhagen Conference on Full Scale Mock-up in Architecture/Design Education in January 87 I welcome as a valuable opportunity for exchange of experience and ideas among interested parties, and for the founding of an international association of Sim-Lab educators and researchers.

"Thanks, Copenhagen 1:1 Laboratorium, for taking the initiative to organize this conference and for taking on all the hard work involved in producing both a conference, and study tour of recently built experimental housing and a large exhibition of full scale mock-ups."

"Before returning to continue the slow progress towards an American Sim-Lab, I would like to bring up two points for discussion and consideration.

First: I think it would be valuable if we monitor the side effects of full scale mock-up a little closer, and possibly take side effects up as an area of research. When visiting the European labs, I noticed how they also acted as tools for the solving of conflicts involving state agencies, unions, employers and employees, etc.

There are, most probably, other side effects that might be interesting to study.

Secondly: I would like to propose that we discuss the degree of abstraction of mock-ups. How far do we go to simulate reality? Do we employ different degrees of reality or abstraction in different situations?

This has been a concern of mine since I visited the six European labs, and I know it is a concern of a number of other people in the professions and among the public."