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THE STATE OF THE DESIGN METHODS GROUP AND ITS PUBLISHING PROGRAM AT THE END OF THE FIRST FIVE YEARS

DESIGN METHODS EDUCATION & RESEARCH & RESEARCH IN ARCHITECTURE AT BERKELEY

SON OF RITTELTHINK

HORST RITTEL ON THE STATE OF THE ART IN DESIGN METHODS. Seven previous entries in this series were carried in the DMG NEWSLETTER during 1971. They were by Alexander, Churchman, Meier, Starr, Gregory, Broadbent and Jones. An overview is planned for a future publication. Comments are invited.

DESIGN METHODS EDUCATION

BERKELEY: THEY GOT ON THEIR TECHNIQUES AND RODE OFF IN ALL DIRECTIONS. Design methods education at seven other schools was described in the DMG NEWSLETTER during 1971. In this report, four approaches to design methods in the Department of Architecture are identified, together with a report on gaming simulations in the Department of City and Regional Planning.

INFORMATION SYSTEMS

Three articles on the place of information systems in design methods, centering around the IBIS (Issue-Based Information System) of Horst Rittel and Werner Kunz.

HUMAN FACTORS

Previous articles on Human Factors were carried in the DMG NEWSLETTER during 1971. This article is on Multivariate scaling by Hugo Blasdel.

HISTORY AND METHODOLOGY

"Looking at What We've Got" by Richard Longstreth

RESEARCH IN ARCHITECTURE

Doctoral programs in Architecture recently initiated or planned at several universities will soon begin to produce a different sort of research and methods oriented professional. The four options in Berkeley's new program are described in terms of the current work of their participants. We hope to publish similar reports on other programs in the future.

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SON OF RITTELTHINK

HORST RITTEL ON THE STATE OF THE ART IN DESIGN METHODS. Horst W.J. Rittel is Professor of the Science of Design in the College of Environmental Design at the University of California, Berkeley. Before coming to Berkeley in 1963, he was a lecturer at and a director of the Hochschule fur Gestaltung at Ulm, Germany. He has worked as a mathematician, physicist, statistician and operations researcher. His article, "Some Principles for the Design of an Educational System for Design", was published in two parts in the DMG NEWSLETTER, December 1970 (Vol. 4 No. 12) and January 1971 (Vol. 5 No. 1) and was later reprinted with permission by the JOURNAL OF ARCHITECTURAL EDUCATION in their Winter and Spring 1971 issue (Vol. 26 No. 1/2). He is co-author with Werner Kunz of the Studiengruppe fur Systemforschung in Heidleberg of the article, "Issues as Elements in Information Systems", appearing in this issue. The comments printed here were made in an interview with Professor Rittel by Jean-Pierre Protzen and Donald Grant in December, 1971. The taped interview was transcribed by Donald Grant.

This statement complements a series of seven such statements on the State of the Art in Design Methods carried in the DMG NEWSLETTER during 1971. That series included articles by Christopher Alexander, C. West Churchman, Richard L. Meier and Martin K. Starr in the March 1971 issue (Vol. 5 No. 3), by S. A. Gregory in the June/July 1971 issue (Vol. 5 No. 6/7), by Geoffrey Broadbent in the August/September 1971 issue (Vol. 5 No. 8/9), and by J. Christopher Jones in the October 1971 issue (Vol. 5 No. 10).

If a successor to the DMG NEWSLETTER is published, an overview of the series on the state of the art is one of the features planned. Readers are invited to submit comments and criticism for inclusion in the overview.

The interview:

Question One: What do you see design methodology as trying to do?

HR: The occurrence of interest in methodology in a certain field is usually a sign of a crisis within that field. When they talked about methods and methodology in mathematics it was due to the difficulties they had run into with the development of set theory; when the social sciences talked about methods it was when the field was in a crisis. The same is true of the design professions. Important design problems have changed their character from almost professional problems to the type of problem where this approach does not seem satisfactory any more, and therefore they have begun to talk about methodology. The main purpose of design methodology seems to be to clarify the nature of the design activity and of the structure of its problems. This role of design methodology seems to me to be much more important than its practical use in dealing with concrete problems.

Question Two: How and why has design methodology emerged as a special interest area?

HR: The reason for the emergence of methods in the late fifties and early sixties was the idea that the ways in which the large scale NASA and military type technological problems had been approached might profitably be transferred into civilian or other design areas. The discovery or the development of the systems approach or mission-oriented approach, as contrasted with the traditional modifying approaches of engineering design, was one of the reasons for the optimism that led to interest in the field.

JPP: Do you think that these people - the military and NASA people - made some effort to propogate this sort of thing in other fields?

HR: Later. But to begin with it was the outsiders who had heard about this and read about this in the emerging literature. I think that in the beginning, outsiders from architecture, engineering, and business heard about the methods of the systems approach and thought that if it were possible to deal with such complicated things as the NASA programs then why couldn't we deal with a simple thing like a house in the same way? Shouldn't we actually look at every building as a mission-oriented design object?

JPP: But then doesn't that raise the supposition that these people had a problem that they didn't know how to approach, and thus wanted to apply some new technique?

HR: They were dissatisfied with their way of doing things. You could observe this in many areas. It was certainly the case in engineering, where production methods had changed, and they had started to look at the product not as a matter of engineering a single product but as engineering a combination of market and production and servicing and the fit between these things. It was also the case in industrial design when they decided that they should deal not just with cosmetic improvements in engineering hardware but also with the interface between user and object, and it was also the case in architecture. It was later, in the mid-sixties, when the big systems people like NASA were looking for civilian applications in order to have an additional justification for their programs that they began to believe in the spin-offs of their work into civilian use. Among the technologies that they wanted to transfer was the systems approach, and this is so even today.

JPP: That is what led them to finance such things as the Churchman seminar at Berkeley.

HR: Yes. A certain segment of their budget was devoted to attempts at the systematic transfer of NASA-generated knowledge.

Question Three: What kinds of problems has design methodology successfully attacked? How important have these successes been to design problem-solving, either in theory or in practice?

HR: If you are asking for examples from architectural design I wouldn't know of any building that has been done discernibly better than buildings done in the conventional way. The same may be so in the other fields, although some inventions and developments are claimed to be due to the application of design methods, like the invention of the hovercraft with the help of morphological analysis. The reason for this may be that it takes considerable time before such methods find their practical application within the professions. Another reason may be that the present state of the art in methodology is such that it has little economizing effect on design work - in fact it makes it more involved and time consuming - and you can get away without applying it in most design fields.

JPP: Except when working with such agencies that require you to apply such methods as cost benefit analysis, like HUD.

HR: Yes; but what effect that has had, or whether the effects if any have been beneficial for the projects involved, I would say cannot yet be determined.

JPP: Do you see any hope that this could ever be established? That is, whether the application of cost benefit analysis or any other technique has had a beneficial effect on the overall project?

HR: I would not be very optimistic with regard to cost benefit analysis if it is applied as it has been applied until now. If you see it as a kind of almost objective means of determining what the best of a set of alternative solutions is, and if you pretend that in this computation all costs and benefits to the various affected parties have found their representation, then I would say that it must fail, or that it cannot contribute anything essential to better solutions. But if you would use cost benefit analysis in a kind of argumentative fashion, that is, by having the proponents of a certain argument or solution offer their cost benefit analysis to the other parties to be countered by their cost benefit analyses, then I could see a beneficial role for this technique in its stimulation of the discourse evolving among the various parties, as a means of structuring the discussion.

JPP: Could one ever claim that something got better because of the method?

HR: In the long run it doesn't matter how something came about; and what is good in one person's eyes may be very bad in somebody else's eyes. On the other hand one could think of experiments where the same problem is approached in different ways and subjected to the same kind of examination. Then it might be possible to show that the results of method A were better than the results of method B relative to the system of examining the results; but for practical purposes it doesn't matter how something was done, and because every non-experimental problem is essentially unique you can never show or demonstrate how it would have been if you would have generated the solution in some other way. Of course it does matter how you design or make a plan while you are making it. The justification of searching for systematic methods is a certain confidence or hope that they might assist in forgetting less by applying them - even at the expense of a more complicated and time-consuming design process. It is the belief that whenever you think about something systematically and expose it to a kind of organized criticism through a debate or discussion, for example, that the probability of forgetting something essential is not increased; and that belief you may not be able to corroborate or prove through experimental data, at least in real projects, because they're unique and irreversible and so on. However, the manner in which solutions come about does matter in another way: that is that the experience of having participated in a problem makes a difference to those who are affected by the solution. People are more likely to like a solution if they have been involved in its generation; even though it might not make sense otherwise.

Question Four: In what areas should future work in design methodology center? Why?

HR: My recommendation would be to emphasize investigations into the understanding of designing as an argumentative process: where to begin to develop settings and rules and procedures for the open-ending of such an argumentative process; how to understand designing as a counterplay of raising issues and dealing with them, which in turn raises new issues and so on and so on. The reason for this is that there is no professional expertise that is concentrated in the expert's mind, and that the expertise used or needed or the knowledge needed in doing a design problem for others is distributed among many people, in particular among those who are likely to become affected by the solution - by the plan - and therefore one should look for methods that help to activate their expertise. Because this expertise is frequently controversial, and because of what can be called "the symmetry of ignorance" - i.e., there is nobody among all these carriers of knowledge who has a guarantee that his knowledge is superior to any other person's knowledge with regard to the problem at hand - the process should be organized as an argument.

JPP: I think that is what you understand when you say "second generation methods" - that it is not that there are methods of the second generation but that there is an attitude toward planning.

HR: It is not only an attitude, it is procedurally different from the first generation.

JPP: Then the change in attitude calls for different procedures, and these procedures if developed you would call "second generation" procedures?

HR: Yes. And these methods are characterized by a number of traits, one of them being that the design

process is not considered to be a sequence of activities that are pretty well defined and that are carried through one after the other, like "understand the problem, collect information, analyze information, synthesize, decide," and so on; and another being the insight that you cannot understand the problem without having a concept of the solution in mind and that you cannot gather information meaningfully unless you have understood the problem but that you cannot understand the problem without information about it - in other words that all the categories of the typical design model of the first generation do not exist any more, and that all those difficulties that these phases are supposed to deal with occur all the time in a fashion which depends on the state of the understanding of the problem. The second feature of the second generation is that it is argumentative, as I explained before. That means that the statements made are systematically challenged in order to expose them to the viewpointsof the different sides and the structure of the process becomes one of alternating steps on the micro-level; that means the generation of solution specifications toward end statements and subjecting them to discussion of their pro's and con's. This process in turn raises questions of a factual nature and questions of a deontic or ought-to-be nature. In the treatment of such factual or deontic questions in the course of dealing with an issue many of the traditional methods of the first generation may become tools, used to support or attack any of the positions taken. You might make a cost benefit study as an argument against somebody else's deontic statements, or you might use an operations research model in order to support a prediction or argue against somebody's prediction. However, I wouldn't say that the methods are the same just in a different arrangement and with a different attitude, but that there are some methods particular to the second generation, and that these are in particular the rules for structuring arguments, and that these are new, and not in the group of methods developed in the first generation.

JPP: There are some other concerns that are new, the crucial one being the question of who is to participate in the debate. One could argue that this is not an entirely new area of concern, since operations researchers have long been concerned with who the clients were, but nevertheless I think that this is a new attitude toward design and requires new techniques of determining who the clients are and how they can be drawn into participation.

HR: Yes. I would say that these would be methods not in the first generation. First generation methods seem to start once all the truly difficult questions have been dealt with already.

DG: Would it be fair to say that a fundamental difference is that in the first generation the difficulties being dealt with were basically technical issues, and in the second generation the basic questions are questions of deontic or ought-to-be statements and of conflicting interests?

HR: The second generation deals with difficulties underlying what was taken as input for the methods of the first generation. For example, to set up a measure of performance or an effectiveness function is a focus in the second generation, while in the first generation that was considered an almost trivial task, or at least a task that had already been solved before the procedures to be applied were set in motion; optimization techniques are an example.

JPP: Wouldn't it be fair to say that in the early writings in operations research, like the Churchman introduction, that in the first chapters they would consider some of these things to be main tasks?

HR: Yes, but only for lip service, for while they mentioned these problems in the first chapters, or more likely, in the introduction, the instruments they offer don't deal with them; however, we ought to consider things like the Churchman-Ackoff technique and similar ones to be steps in that direction.

Another property of the second generation is that upon abandoning the step by step structure of the first generation, the classic problem of the first generation disappears: that of implementation of the solution. That is because of the participation of the affected parties: the implementation grows out of the process of generating the solution. The first generation model works like this: you work with your client to understand the problem; then you withdraw and work out the solution; then you come back to the client and offer it to him, and often run into implementation problems because he doesn't believe you. The conclusion of the second generation is that such a sequence is entirely meaningless, and the client is well advised not to believe you in such circumstances, because at every step in developing such a solution you have made deontic or ought-to-be judgments that he may or may not share, but that he cannot read from the finished product offered in your solution. The nightmare of the first generation, implementation difficulties, should disappear or at least be minimized in the second generation; or at least that should be one of the aims. That should be the case from having the clients as accomplices during the generation of the solution.

JPP: This insight into design problems as being really different from what they were assumed to be in the stepwise processes - did it come to you in the process of applying first generation techniques, or did you develop it independently?

HR: To begin with I became interested in this area because I felt that the methods of the first generation should have some use in other fields than those in which they had been developed, but I got into controversy with the proponents of these methods very soon - 1960 or so - because whenever I'd try to use them, I'd run into trouble. On the other hand, you could observe that many of the proponents of the first generation methods, like operations researchers, in some countries at least, tend to withdraw from attacking wicked problems and concentrate on the art of linear programming and queuing theory as objects for their own sake - an academic discipline- and not bother about applicability any more. And

of course there are some people who still do this, but I would say that the corporations or other planning institutions who seriously tried to accomplish something with the first generation planning methods have been disappointed, and that there is a considerable "hangover" from these methods.

JPP: The same might be said of the computer.

HR: What I have said of methodological software of course also applied to the use of the computer in designing. It is easily seen that design in the sense of forming judgments can never be simulated by a computer, because in order to program that machine you would have to anticipate all potential solutions and make all possible deontic judgments ahead of time before the machine could run. But if you did all that you wouldn't need the computer because you would have had to have thought up all solutions ahead of time. Therefore it is almost ridiculous to claim that there will be a designing machine if design is thought of in this sense. But unfortunately the same kind of optimism with regard to the first generation in design methods included the belief that once you use the computer you will design better. Quite some amount of time, effort and money has been used to demonstrate that the usefulness of the computer is quite limited in the kinds of concerns dealt with by the second generation.

There should be two areas of emphasis in further work in design methodology. One is the further development and refinement of the argumentative model of the design process, and the study of the logic of the reasoning of the designer. What I mean by logic is the rules of asking questions, generating information, and arriving at judgments. There are a great number of identifiable questions that can be dealt with in this area. The second area of emphasis should be work on practical procedures for implementing the argumentative model: the instrumental versions of the model. Some questions are how to get a group going in an argumentative fashion, how to select the group, and the problems of decision rules.

JPP: One might specify at this point that these rules do not now exist. No set of procedural rules, such as are applied in legislative bodies, or Roberts' Rules of Order, or any others, really covers this sort of situation.

HR: Because they are too coarse to deal with the varieties of entities that you have to distinguish in setting up such a rule system for planning, and therefore there is an urgent demand to think up systems of rules and try them out.

JPP: Systems of rules how to debate and decide, or should one separate them into one set of rules for debate and another for decision making?

HR: They are somewhat separable, because the emphasis of the second generation is on those parts of the argumentative process that precede formal decision. Argument stops once a formal decision is reached. One of the arts of the second generation is actually postponement of the formal decision in order to enhance the process of forming judgments. In the ideal case rules of formal decision making wouldn't be necessary at all, because people would become unanimous in the course of discussion. Formal decision has always meant curtailing debate, and therefore the formation of judgments.

And of course there is a third area in importance - that of the technical manner of supporting these procedures. If, for example, you clearly organize a planning process according to such an argumentative model as an IBIS (Issue-Based Information System), you will find that the bureaucratic effort of administering the process is abominable, and therefore one might look for administrative and monitoring computer aids to ease the process.

JPP: Yes, the development of red tape cutters. And there is the fourth area: apply it.

HR: I think the only way to learn something useful about all these foci is through application, and that requires that you look for clients that are willing to go along.

Summary of the characteristics of the second generation in design methodology:

HR: The first characteristic is the assumption that the expertise is distributed as well as the ignorance about the problem; that both are distributed over all participants, and that nobody has any justification in claiming his knowledge to be superior to anybody else's. Thus there is no logical reason or reason of education for saying, "I know better than you." We call this the "symmetry of ignorance." The consequence of this assumption is to attempt to develop a maximum of participation in order to activate as much knowledge as possible.

This is a non-sentimental argument for participation. It is a logical argument. Do you see that? It's important. There are many sentimental and political arguments in favor of participation, but this is a logical one. Whenever you want to make a sentimental or political case, it's good to use a logical argument.

Then the second characteristic is the argumentative structure of the planning process, i.e., looking at it as a network of issues, with pro's and con's. Thus the act of designing consists in making up one's mind in favor of or against various positions on each issue.

The third characteristic is that you can always look at a given issue as a symptom of another one. That means that you can work the problem level "up" to the next level of comprehensiveness, and that this should become a regular part of the discipline, though hopefully not too frequently used. There's a principle of parsimony to applying the principle of raising the level of an issue.

The fourth characteristic of the second generation in design methods is its ideal of the transparence of arguments, because the elemental steps of designing may be judgmental and each additional judgment or deontic question depends on understanding the solution up to that time. You cannot list all the deontic criteria that are to be applied ahead of time, because with every step of the solution the new questions that will come up will be typical of the line of thinking that has brought the solution to that point.

JPP: Can one add here that this relates to the experimental fact that there is no well-ordered or exhaustive set of deontics?

HR: Even if you had a list of all deontics, which of them would dominate another one in a given situation in case of conflict cannot be answered normatively, cannot be judged ahead of time, must be judged in the situation. It is this necessity that underlies the principle that arguments should be transparent.

The fifth principle is the principle of objectification, for the sake of: (a) forgetting less, or reducing the probability of forgetting something that will become important after the fact; and (b) the stimulation of doubt: the more explicitly and bluntly you must state your fundamental objectives, the more readily you are able to cast doubt on them. Another reason for objectification is to increase the probability of raising the right issues, meaning those for which the controversy is greatest, both with regard to the importance of the issue itself and with regard to the divergence of opinion or position on the issue. Thus there are two factors of controversy associated with each issue: its importance and the divergence of opinion on it; weight of importance multiplied by variance of judgment.

The sixth and final principle relates to the control of delegated judgment. If you make a designer or planner or participant spell out what assumptions he has made, then you control his ability to incorporate deontic judgments that the client may not agree with. All kinds of planning are necessarily political, and not merely technical. That seems to be a major difference in assumption between the second and the first generations in design methods.

Perhaps I should add a seventh characteristic, the conspiracy model of planning, that exists to overcome the implementation problem that was mentioned earlier. The implementation problem is only a consequence of the artificial separation between the expert who does the work and the client who has the problem that the work is supposed to deal with. Such an implementation problem naturally vanishes here. The role of the planner in this model is that of a midwife or teacher rather than the role of one who plans for others. Instead, he shows others how to plan for themselves.

JPP: He might also have the role of keeping the group in motion as it plans for itself.

HR: All of which implies a certain modesty; while of course on the other side there is a characteristic of the second generation which is not so modest, that of lack of respect for existing situations and an assumption that nothing has to continue to be the way that it is. That might be expressed in the principle of systematic doubt or something like it. The second generation designer also is a moderate optimist, in that he refuses to believe that planning is impossible, although his knowledge of the dilemmas of rationality and the dilemmas of planning for others should tell him otherwise perhaps. But he refuses to believe that planning is impossible, otherwise he would go home. He must also be an activist.

The aim of the second generation is that of self-elimination: the best world is that one that does not need any more planning, without being subject to the maximum of entropy. Or at least the best world would be one where no planning for others or on the behalf of others or at others was necessary.

The first generation assumes that there is professional expertise about other people's problems, and that there is an assymmetry of ignorance, that is, that one is justified in saying that he is knowledgeable about another's problem and how it can be dealt with. It assumes that the design process is not argumentative, but that during the first phase the planner sits and listens and understands the problem of the client; and then he thinks; and then the client listens to the planner, and is ill-advised if he doesn't follow his advice. Transparence of argument is not necessary because there is something like a professional ethics guiding the planner, telling him to be objective, detached and so on; and objectification (making understandable) is not necessary because there are objective measures; and a conspiracy model is unethical, because one is a professional; a lawyer, for example, does not conspire with the accused. Rather than modesty there is the expectation of all due respect for professional competence; rather than moderate optimism there is great optimism; rather than an aim of self-elimination there is the aim of getting more involved, so that the system becomes dependent on your services. The more you plan in this way, the more future planning becomes necessary.

Question Five: What work are you familiar with that would indicate important future directions?

If you had asked me what developments are most promising for the future direction of design methodology, I would say it is the increasing discontent with the first 15 or 20 years of belief in the first generation approach, and in the computer. It is astonishing how slowly that has come about. People like Churchman warned at least 8 or 10 years ago of the consequences of the illegitimate simplifications of the first generation techniques. But the reaction has been a kind of self-elimination without wanting it. The first generation design methodology had turned into a sort of academic subculture. In a time of economic recession, companies can't afford to maintain operations research departments or computer-aided design departments as symbols of prestige; if it is not paying off, they can't afford to keep it. These are the most promising developments; but that doesn't say anything about work.

Work? Well, Churchman is O.K. And of course there is all kinds of work showing how not to do it - all those glass bead games at conferences, with the next one coming up in January.

What I've observed in the students is very interesting. Within two years they've become very different. All those questions like, "What has it to do with architecture?" have disappeared. They're buying statements that used to be challenged. A few years ago, people seemed to get aroused, either because they were on the first generation side or because they didn't believe in it at all. Now they are openly receptive. It's hard to find any student who opposes our approach now; it's like forcing an open door.

DG: That seems to cover our five questions pretty well. Thank you for taking time out of a busy schedule.

DESIGN METHOD EDUCATION

THEY GOT ON THEIR TECHNIQUES AND RODE OFF IN ALL DIRECTIONS.

During 1971, the DMG NEWSLETTER initiated a series of articles on design methods education. A list of questions was sent to people working in design methods in several schools. The responses received were printed starting in the June/July 1971 issue, Vol. 5 No. 6/7. Responses from or comments on design methods education were printed for the University of Nebraska, Washington University at St. Louis, Cal Poly at San Luis Obispo, North Carolina State University at Raleigh, the State University of New York at Buffalo, Carnegie-Mellon University, the Architectural Association School in London, and the University of Texas at Austin. A report on the work in design methods in the College of Environmental Design at the University of California at Berkeley was planned but was not completed in time for publication in the DMG NEWSLETTER. The comments that follow describe four different directions in design methods in the Department of Architecture at Berkeley, as well as current work in the Landscape Architecture Department and the Department of City and Regional Planning. If the Design Methods Group is able to continue publication with a successor to the the DMG NEWSLETTER, this series will be continued, and other schools or institutions with work underway in design methods education are invited to submit descriptions of their programs and research.

Course work in design methods has been reported as early as 1958 at the University of Manchester, England. Design methods in the architecture curriculum at Berkeley began to develop in the early 60's, when Christopher Alexander and Horst Rittel joined the faculty, making Berkeley the seed bed for the development of design methods in architecture in the United States. Most people teaching design methods in American schools of architecture now are in fact Berkeley graduates or former faculty members, having launched their careers working with Rittel or Alexander at Berkeley. In the DMG NEWSLETTER's state of the arts series, the editors and associates made a list of nine prominent people to ask for statements. Of these, four presently work in Britain (Broadbent, Gregory, Jones, and A.G.Wilson, who responded that his current work was in other areas than design methodology), and five in the U.S. Of the five working in this country, four are on the faculty at Berkeley: Alexander, Rittel, Churchman and Meier. This concentration will not always be the case, as younger people in the field begin working in various schools around the country, but does point up the importance of Berkeley during the last few years, as design methods in architecture became an area of interest in the United States.

Current work in the Department of Architecture at Berkeley has tended to move in four directions: one identified with Christopher Alexander, pattern language, and the Center for Environmental Structure; one with Horst Rittel and his associates, including Jean-Pierre Protzen; one with the urban design and simulation work of Roger Montgomery and Vladimir Bazjanac; and one with Nestor J. Distefano and his courses in combinatorial approaches to design problems and dynamic programming. Each of these areas is briefly described here, as is work emerging in the Landscape Architecture Department with Thomas Dickert and in the area of gaming simulations in the City and Regional Planning Department, described by Charles Goldfinger.

Horst Rittel's courses:

Rittel's basic approach and interests are outlined in his articles in the DMG NEWSLETTER issues for December 1970 and January 1971 (Vol. 4 No. 12 and Vol. 5 No. 1), in his statement on the state of the art in design methods on the pages preceding this one, and in the article "Issues as Elements of Information Systems" appearing in this publication. The basic course in design methods at Berkeley is Architecture 130, Architectural Design Methods, a five unit course with lectures and seminars alternately taught by Professors Rittel and Protzen. Other courses are an Advanced Design Methods course, Architecture 230, and Seminars in Design Methods, Architecture 239A. The advanced courses usually center on one specific topic. Recent topics in the 230-239A courses have been "Logics of Planning", "Models", "Information Systems for Planning and Design", and "Computer Graphics and Design". During Professor Rittel's sabbatical, Architecture 230 was taught by Professor C. West Churchman, who is on the Business Administration faculty at Berkeley. Architecture 130, the introductory course, is a required undergraduate course. The courses with higher numbers are elective courses for graduate students in the M.Arch. and Ph.D. programs in architecture. Professor Protzen also teaches studio design courses, in which he attempts to have the students apply the approaches developed in the theory course and seminars. Several of the students in the new Ph. D. program in architecture at Berkeley came specifically to work with Professor Rittel, drawn by his established reputation in Europe and his growing reputation in the United States. Advanced work is usually in the context of independent study in consultation with Professor Rittel. The key description of Rittel's approach is to be found in the DMG NEWSLETTER article referred to above, "Some Principles for the Design of an Educational System for Design." His introductory course can be viewed as an attempt to deal with the concerns that he outlines in that article.

Gaming Simulation at Berkeley by C. Goldfinger (Department of City and Regional Planning)

The gaming simulation program in the College of Environmental Design was initiated by Professor Richard Meier in 1970, with the goals of:

- developing a number of previously synthesized gaming simulations to the point that they could be used for training and instruction,
- designing new games based upon simulation of social problems of the urban community, with emphasis on ghetto problems, especially those of the Spanish - speaking minority in California.

The program has the intent of linking up one stream of academic research based upon the "science" of gaming, resulting in a testable theory and reproducible experiments, with the "art" of gaming, which concentrates upon modelling a variety of situations found in the real world.

Initiated in the beginning of 1970, the program was carried on through series of seminars as well as individual and group research projects, made possible by a grant from the National Institute of Mental Health. Another less formal but very effective tool of popularization of gaming simulations were Thursday night Gaming Club sessions, which offered an opportunity to get acquainted with a variety of games and allowed fruitful contacts with interested people from outside of the college.

Informal but close links are maintained with a gaming group in the School of Education at Berkeley, led by Professor Elie Bower, as well as with other major centers of gaming in the U.S. and abroad, in England, the Netherlands and France.

While the program still continues, some achievements can already be listed:

- adaptation of existing games to specific local situations. One example is a game designed by F. Goodman of the University of Michigan, "Policy Negotiations", transformed into a game mapping the political process of the choice of location of a new highway through Marin County, immediately to the north of San Francisco. This game was used as a teaching tool in a community planning laboratory and nine of the actual decision makers served as consultants to the players in this application.
- in another instance, gaming simulation has been devised as a transmitting vehicle for a new theory for promoting socio-cultural and economic development in metropolitan regions of developing countries. It was specifically addressed to the program and policies concerned with the future of Bombay. The newly forming planning agency in Bombay, responsible for the regional development programs, expressed a serious interest in the gaming simulation.
- creation of new games. In the summer of 1971 a group of city planning students evolved "Community Go" (also called "Community Chess"), a contest among householders in an aging neighborhood and the developers who would profit from changes in density or land use with planners and administrators trying to intervene with the hope of achieving improvement. This game combines a model of an ecological system, developed by Richard Meier for the wildlife community of Royal Island, with the principles of the old and sophisticated game of "Go".
- Another new game is "El Barrio", which models the search for security in the Spanish-speaking urban colonia.

Nestor Distefano Professor of Architecture and Civil Engineering

Professor Distefano's interest is in analytical descriptions of design processes. His approach consists in regarding design as a dynamical process occurring in real or fictitious time. Therefore, his research evolves in a blend of combinatorics, graph theory, multistage decision processes (in the fashion of dynamic programming) and of course, digital computers. In order to familiarize students with these ideas and techniques needed in research work of this kind, Professor Distefano offers an introductory course in "Graphs and Combinatorial Mathematics in Architecture". In addition to it, specific seminars such as Architecture 239C and individual study courses under his direction serve for further study and research. The principal goal of Professor Distefano's teaching and research is to provide a methodological approach for the use of the computer in the design of systems and subsystems of significance in the architecture-engineering world. At present he is working in topics of CONTROL OF LARGE DYNAMICAL SYSTEMS, SYSTEM IDENTIFICATION and CLUSTERING in connection with specific problems of dynamics of population, structural design, etc.

Some of the courses in which Professor Distefano presents the approaches described above are Architecture 191D, Graphs and Combinatoric Mathematics in Architecture; Architecture 239C, Seminar in Design Theories and Methods (variable topic; when last taught in 1971 it dealt with scheduling, dynamic programmming and graph theory, Markov processes and fuzzy sets); and Interdepartmental Studies 131, Systems, Graphs and Combinatorics in Design.

Christopher Alexander and the Center for Environmental Structure

Professor Alexander contributed a lengthy statement of his current orientation to the March, 1971 DMG NEWSLETTER (Vol. 5, No. 3). No further statement on work at the Center for Environmental Structure was available for inclusion in this issue. Professor Alexander's course listings include Environmental Design 190, Environmental Structure; Architecture 209 A, B & C, Environmental Structure - Theory; and Architecture 288, the Integrated Specification of Environmental Structure. The last courses shown in the schedule for Professor Alexander were Architecture 209B and Architecture 288 during Winter Quarter, 1971. It is reported that Professor Alexander is currently working on a book on the pattern language.

Bazjanac and Montgomery: METHODS OF DESIGN ANALYSIS AND PROJECT PLANNING

When architects discovered that Operations Research could be potentially applied to architectural problem solving, new courses appeared in which scientific methodology and techniques are taught with the hope that students would apply them later to architectural design projects. Typically, such courses are very theoretical and technically oriented, and display limited understanding of significant problems in architecture. As a result, a gap has developed between such courses and architectural design.

To avoid such problems in the Department of Architecture at the University of California in Berkeley, a sequence of courses in methods of design analysis and project planning has been started in 1968 which deals with the subject matter in a practical way. The main objective in teaching methods of quantitative analysis is the development of skills necessary in the design of simple operational models which are useful in real projects. As students learn new techniques, they apply them immediately to large scale design projects, such as airport terminal design, high rise office buildings, art museums, etc., some of which are real. Major emphasis is continuously placed on the examination of potentials and limitations of techniques under study, as well as on realities of their application. Students who complete the sequence are, at one end, at least capable of clear communication with the specialist in the field, or at the other end of the spectrum, capable of applying those techniques themselves. A significant percentage of students after graduation select to devote their practice to application of learned techniques, and a number of them have been employed by major offices across the country.

The first two courses in the sequence, taught by Vladimir Bazjanac, Lecturer in Architecture, deal with methods of quantitative analysis and serve as the basis for the third, a course on methods of project planning, taught by Roger Montgomery, Professor of Urban Design.

Architecture 233A, Urban Design Workshop I: Methods of Design Analysis, 4 units.
Workshop on cost feasibility analysis and simulation modeling of architectural and urban design systems. Topics include engineering economy, cost benefit analysis, modelling and digital computer simulation. Problems include development of cost feasibility studies, accounting models and models of functional performance.

Architecture 233B, Urban Design Workshop II: Methods of Design Analysis II, 4 units.
Workshop on optimization, gaming and scheduling for architectural projects. Topics include linear programming, game theory, operational gaming, network analysis, and project scheduling and resource allocation, with CPM and PERT. Problems include development of optimization models, playing of planning and educational games, and development of PERT-oriented networks and schedules.

Architecture 233C, Urban Design Workshop III: Methods of Project Planning, 4 units.
A workshop on utilization of design analysis methods in the context of urban design project planning. The course draws primarily on studies of decision-making in large scale urban projects, a field heretofore largely preempted by political scientists who have produced a rich descriptive literature as well as numerous analytical models. The workshop includes both study of selected cases and exercises in problem solving. Topics include proposal writing, economic analysis, scheduling, budgeting and implementation strategies, design control, management and team organization as inputs into the design process, and the use of predictive and other models in the context of a behavioral and institutional perspective on decision making. These topics are applied in urban renewal, new town and institutional project contexts.

Landscape Architecture

Research in the Landscape Architecture Department includes such areas as strategies for ecological planning, methods of shoreline classification, principles of forest landscape design, urban landscape perception, and transportation system design.