

**9: SPECIFYING AND MAINTAINING ENVIRONMENTAL
PERFORMANCE STANDARDS**

THE ROLE OF RESEARCH IN THE DEVELOPMENT OF PERFORMANCE STANDARDS

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Abstract

The assumptions underlying much of the current discussion about industrialized building systems for housing are that research should investigate the needs of users of housing, that the resulting findings could be cast into explicit performance standards or specifications to permit industry the development and mass-production of housing systems conforming to these standards.

These assumptions are questioned. If user requirements research is to produce useful results it must focus upon users in actual decision-making situations and be complemented with procedures of negotiation, conflict-detection, argumentation, debate, bargaining and conflict-settling.

An approach is discussed which extends research into the implementation phase of actual projects as a part of the planning discourse and decision making process.

1. Introduction

The development of industrialized building systems for the housing sector is entering into a new phase of large-scale corporate efforts transgressing the traditional building industry, aiming at large aggregated markets and integrated systems embracing structure-enclosure, interior finishings, installations, utilities and including the public services of new communities. At the same time, the government becomes an active participant in this area, in part called for by industry to help carry the development burdens and to guarantee the necessary market site, but, in fact, trying to govern and control the development on its own, providing the framework for industry's activity, striving to secure quality and safety standards as well as taking on the unrewarding task of trying to control the social implications of the housing problem which industry is, understandably, inclined to ignore.

This development means that at many levels people who are usually not directly concerned with the problems they are dealing with must make unprecedentedly far-reaching decisions. For these decisions, criteria which traditionally have been applied to single buildings or projects with familiar techniques are no longer satisfactory.

It is, therefore, not surprising that those in industry and government faced with such decisions should raise a call for better guidelines, better criteria and decision rules. The discussion has increasingly concentrated on what is called the "performance concept" or performance specifications. These can be interpreted as a set of statements which (while not prescribing specific materials, products or technologies) permit a decision-maker to deduce in each specific case whether a product or system is acceptable or not, or to judge which of a set of proposed alternatives is most desirable.

It is quite understandable that the call should be on research to produce the information on which these performance standards might be based. More specifically; the contention is that the standards should be derived from the needs of the prospective users of a system in question.

2. Expectations

It is necessary to take a closer look at this call for Research. In a rather simplified way, the expectations could be described as follows:

- Scientific investigations should be conducted to find out what users of housing, for example, need with respect to the properties of their built environment. Here, one quite readily admits the existence of different user groups, say with respect to age, income, life style (a euphemism for "race"?) and that their respective needs might be different;
- The outcome of such research (presumably neutral, objective and unquestionable "facts") should be stated in terms of unequivocal user needs requirements. Preferably, this should take the form of lists of variables which can be easily quantified and measured, to allow verification in specific cases, so that decisions are not likely to be questioned afterwards because of conceptual vagueness or uncertainty about the actual quantities of a given solution: "No useless discussion.
- Now, the standards of performance would be

- set, according to the research findings, as values or ranges of values on the variables.
- With these prerequisites, industry could develop building systems to meet the prescribed performance standards - or also present their systems for testing and evaluation (but against criteria known beforehand). This would take the burden of responsibility off everyone - industry would be free to develop technical solutions to well-specified problems - efficiency in meeting the specifications would be their sole concern - and government officials would just have to verify (measure) whether a given item conforms to the standard.

3. Questions

Are the preceding expectations and assumptions realistic?

Well aware of the risk of being accused of posing unreasonable demands and thereby hampering what little and bitterly necessary progress we can achieve, it is our contention that they are not only unrealistic but that they represent a step in the wrong direction. There are a number of reasons for this: the first, and probably most important, rests in the concept of user needs. While it sounds quite sound, if not inevitable (and what is more, popular from left to right) to base developments of building systems upon user needs - what else? - the attempt to state these needs often turns out quite narrow, abstract statements based on trivial physiological conditions. These do not provide sufficient power to distinguish between even crude technologies. In the process of more discriminating specification - a number of disturbing properties are found:

- "user needs" change over time, i.e. these requirements are not sufficiently stable even within the same individual to permit an unequivocal statement that such and such must be the case;
- this, of course, is because (as mentioned earlier) people are different with resulting differences in their "needs" and do change from one identifiable group to another. Some transitions are automatic, such as ageing - others are spurious, random, voluntary, subject to fad and fashions, and unpredictable.
- "user needs" are dependent on the social context: a person may exhibit quite different "needs" in one society than when he is moved to another; another way of saying the same thing is that they are to a considerable extent dependent on tradition and quite arbitrary conventions. For example, we are used to buildings providing shelter from weather conditions, space, light, water etc.

but generally not furniture nor stereo sets nor food, and the possibility that a home might be identical to the means of transportation is still treated as a special case as far as codes, zoning regulations, etc. are concerned.

- "user needs" are technology-dependent. We cannot realistically separate the requirements for building systems from the technological means envisaged to be part of the system. For example, lighting requirements or the simplest sanitary standards of today would have been considered sheer insanity, unreasonable demands in the context of 16th century technology. This is especially critical when we are dealing with innovations: a system of standards implicitly geared to the given technological possibilities becomes a roadblock to significant technological innovation (even if it is granted that performance standards as opposed to product specification do favor improvements on the same technological level. But performance standards for sailboats or horse carriages of the kind aimed at in construction now would never have permitted introduction of the steamship nor the automobile);
- these examples reveal that we should talk about user "ambitions" and "aspirations" rather than "needs";
- Whereas initially one might have started from notions of a contradiction-free, somehow "natural" system of user needs, talking about aspirations makes it quite evident that they may be conflicting, counteracting or mutually exclusive. This means that in a planning case, decisions have to be taken to "resolve" these conflicts, i.e. to strike a balance between them, or decide against one aspiration-need in favor of another.
- It should be equally obvious that such decisions can only be taken on the basis of personal values. But, if this is true, the notion of universally valid performance standards based on what we now would understand by "user needs" cannot be maintained: the setting of a balance - or choice of one of two conflicting objections - is an arbitrary act. This kind of information can only be obtained from the individual user in a specific concrete situation, and the researcher has no scientific nor moral, ethical or political mandate (for we must recognize that we are facing political questions) to make these decisions in lieu of the user or those affected by such decisions. Taking averages of "prevailing" opinions, extending trends of past attitudes, etc., are obviously no viable alternatives, either.

A remark is in order at this point about the common avoidance of such imaginable "needs" as that of the user "needing" to make decisions about his environment himself. If it were admitted that this might be a genuine concern, then there is no justification for assembling an elaborate system of performance standards. This cannot be helped by providing fake "choices" among pre-established alternatives. It should be clear that what is meant is the generation of such alternatives by the user himself. Without falling into extensive philosophical discussions, a strong case can be made for the contention that it is precisely this feature by which man develops and maintains his identity, dignity, self-image. One might say that the areas of self-expression have changed through history - formerly vital means of self-expression have been succeeded by others and left to standardization - why not e.g. housing? But these are questions that cannot be decided upon by research, industry or government - they must be discussed.

This discussion of user aspirations and values shows an emerging dilemma: with respect to technological innovations, the prospective user cannot develop a proper value position and make choices he would - himself - be able to live with - in a void, remote from the actual experience of the impending consequences of a decision. This might well be the reason for so many failures of the "ask the user" approach, which has led to the widespread attitude that "the user does not know what's best for him." It must be maintained that he cannot know if he is merely confronted with abstract alternatives whose consequences he cannot judge adequately and not having any share of responsibility in the decision. But at the same time nobody can know better what consequences should be considered - if he is made to fully understand the alternatives. The problem, of course, is that in many cases the users are not known, and that even if they were, informing them about all possible alternatives and obtaining information useful and significant enough represents an effort generally out of scale to the resources available for most projects.

The second major objection to the idea of a system of performance criteria has to do with the measurability of performance variables - even if we assume that we are considering questions which are not personal judgements. The legitimate but disastrous quest for hard "objective" criteria carries with it the temptation to concentrate upon variables which can be readily measured and to neglect those which do not lend themselves to easy quantification and verification. It goes without saying that this can lead to severe distortions in evaluation results. But perhaps more critical overall might be the extension of this temptation to research itself. Researchers today are under very much the same

pressure as anybody else to produce useful results in short time - and since the field of investigation is at any time more complex and greater than can be handled, it would be only normal to focus upon the easier tasks first. Moreover, there exists in the realm of scientists a distinct distrust of dealing with variables and concepts that are not fully defined, quantified, etc. No matter how important work on such aspects might be, researchers shun tasks for which they might possibly be labeled as "unscientific".

These observations would nourish the suspicion that the models which serve as the working base for research investigations might, on the whole, be equally slanted toward preoccupation with easily quantifiable entities; and it should be obvious that models in which important variables are omitted because one does not know how to measure them are of rather limited usefulness. It should be pointed out that this by no means should be understood as a criticism of models which have been proposed, nor as an accusation of arbitrary, even cynical omission of variables from models in which they should appear, but rather as a suspicion that (though unwittingly) the difficulties outlined influence the very choice of models for investigation.* Here we have another source of error which has been given little attention, and which is of little concern in a single research task, but which becomes extremely critical when seen from the point of view of the effort to develop an overall, coherent, complete set of performance measures and standards for, say, housing.

Third, even if we assume that somehow a set of performance variables has been arrived at and that they, indeed, can be measured, in very few cases will we find that there is precisely and only one value of that variable which must be achieved. An acceptable range of values will probably be the normal case, or also all values below or above a certain point will be acceptable. This does not present a great obstacle to the evaluation of alternatives, since of two different values one can always be judged as "better" or "more desirable" than the other. (The only difficulty might be in saying "how much better" which is, once more, a problem of value and judgement or in who is to say, but if we are talking about standards, where should the standards be set? It is a commonplace observation that standards which are located close to the minimum acceptable value tend to produce solutions which are just that: barely acceptable. But deviating from that minimum usually

* On the other hand, it is well known that research results can be bought and produced almost "to order" to fit any political purpose but that is a question of ethics in research which is not our concern at this time.

costs money - how much do we want to pay for higher quality standard? These are, of course, again questions which cannot be resolved by research.

The preceding considerations have shown that the role of research must be viewed with some caution, and that it is least useful in that area that industry and administration would like most - the alleviation of responsibility for their decisions. Furthermore, some of the difficulties make performance standards appear as less of a solution to our troubles than much of the recent discussion would indicate.

This does not mean, of course, that either research efforts should be abandoned nor the efforts to develop performance measures should be diminished. But their respective uses and roles within developments such as that of industrialized solutions to the housing problem must be re-defined.

4. What is Needed?

The following suggestions may serve as a first step toward an outline of what we need:

Performance Measures

To begin with performance measures and statements as the objective of research efforts. In our opinion, these should not be considered as an ultimately "complete" set of standards to which all decisions could be referred, but rather as a frame of reference for the discussion which undoubtedly will go on for a long time. The rationalization for decisions to develop or support the development of particular systems, and finally to implement such systems, must be sought elsewhere.

Research

If the above contention is correct - that some of the critical information needed consists of user's value attitudes and judgement, and that people can develop such judgement only when confronted with the real choices and responsibility for the decision, then research must focus upon users in such decision-making situations both in studying and assisting them. This amounts to saying that:

- we need alternate models of the planning and decision-making process;
- the prospective users must play a significant role in that process;
- therefore, probably, the overall picture should not be "nation-wide" centralized projects in which the decisions must nec-

essarily be abstract, geared to (lowest?) common denominators and remote from their consequences; but a variety of projects which may be centrally coordinated in a network where decision-makers will be in very close touch with the real implications of their planning;

- research must be integrated into such planning processes. This means that research should no longer be conducted before a project starts, then withdrawn to leave those concerned with results often quite far from what they actually need. The direction of the research should be governed by the problems and questions actually occurring during the course of a project. It is obvious that this demand will be difficult to meet. It will conflict most severely with traditional independence and working style of researchers, and it will create problems of logistics and coordination as it attempts to provide research services to be drawn upon when necessary.
- Nevertheless, research itself should not be expected - nor allowed - to provide answers where it is - as research - not entitled to do so. That is, in all questions that fall into the domain of value judgement, personal preference, decisions among conflicting interests and objectives, compromises, etc.
- This finally means that research must be complemented with procedures of negotiation: conflict-detection, argumentation, debate, bargaining, conflict-settling. This should not be considered a - perhaps necessary - evil, but as the very process of planning; a vital source of design decision criteria. Research findings and professional technical expertise contribute to the forming of the opinion and judgement of the decision-makers, but do not substitute for it.

5. Proposals and Approaches

These are some of the things we need. Do we have the means for organizing such planning processes?

The problem of integrating research activities and research findings, reference to existing standards, codes, etc., professional expertise and interests, opinions, judgements of those concerned by a project can be viewed as an information system problem.

Work has been done recently^[1] on information systems which are planned specifically to support planning processes of various kinds: Issue Based Information Systems ("IBIS") are based on a model of the planning process as an argumentative discourse during which issues are raised

(e.g. what should be achieved, etc.) and debated because the participants in the discourse assume different positions with respect to these: for, against a proposed measure. Arguments are offered to back up the positions assumed or to refute counterarguments, this leading to new issues as the debate proceeds. In this play and counterplay of issues and arguments questions of fact, or explanation of definitions, causal connections or functional relationships as well as instrumental questions (how to do, achieve certain objectives technically or methodically) occur and must be answered to validate arguments. This is the task of research and professional expertise.

By choosing issues and questions as the elements or organizing principle of the information system, a very precise picture of the state of the discourse can be conveyed constantly to all parties involved in such a process - specifically to the aspects of research which are our main interest here, so that investigations may focus exactly on what is needed for the case at hand.

Arguments typically contain, implicitly, criteria for evaluation of solutions for the planning problem. Experience shows that this source of criteria is a much richer one and generates a much more differentiated discussion than pre-established evaluation systems starting from abstract categories such as "costs", "benefits", "risks", etc. To each evaluation aspect, generally a number of variables and indicators can be associated which may serve as performance measures for any resulting solution. Choosing among these variables again is, in itself, an issue to be dealt with critically, (since measurements and verification not only involve expenditures of resources but also influence, especially in social systems, the solution itself.) Measurement and verification, development and manipulation of models to predict the expected performance of a solution with respect to the aspect under consideration is again a matter for research and professional experts. Their business is not, however, to determine the weight an aspect should carry in the final decision about a plan.

The outcome of such a process will show that whatever performance standards may have been developed a priori will never provide sufficient information for decisions to be taken in particular planning situations - they may or may not carry more weight than aspects arising specifically from that situation. This is the reason why standards should not be considered more than a frame of reference to be constantly improved, amended and supplemented in each single case as may be necessary. It is evident that if the standards in this way lose their traditional role of legitimization of decisions, these can only be legitimized by distributing

the decision-making responsibility as widely as possible - gaining accomplices to share the risk and consequences.

Based on such considerations and techniques, some approaches have been developed for the organization of projects (planning and research projects) which attempt to account for some of the demands outlined earlier. As an example, a proposal shall be discussed briefly which was developed for a project in Germany. The task was to survey, evaluate, recommend improvements for, and organize the implementation of prototypes of various "urban systems" proposals. This was a first major attempt to include a number of such proposals put forward during recent years (ranging from building systems, technical innovations for use in urban design, to major innovative concepts for the form and organization of cities) into the current practical discussions about urban design in Germany.

In contrast to the official proposal which was eventually given the contract^[2], this concept^[3] abandons the idea of extensive theoretical investigations prior to implementation and separate from actual projects. An attempt is made to introduce the proposals in question into actual ongoing urban planning projects in various places at a very early stage, to initiate what was called a "Structured Planning Discourse" (for lack of a better name) in each project, which would be supported by an IBIS-type planning information system and whose aim it would be to record very carefully the resulting discussions. The SPD would be organized in several distinct cycles, each with a very definite task to be fulfilled (e.g. selection of a site, spelling out and preparing the conditions for a competition, evaluating the entries and taking a decision on the alternatives, etc.) and each carried out with as much participation from prospective users and the public as possible.

In preparation for each cycle, a research staff would investigate "model issues" likely to be brought up and organizing what contributions could be found in the literature and other cases.

During the discourse cycle itself, research assistance would be required to provide fast and expedient expertise and information on issues and questions brought up by the participants.

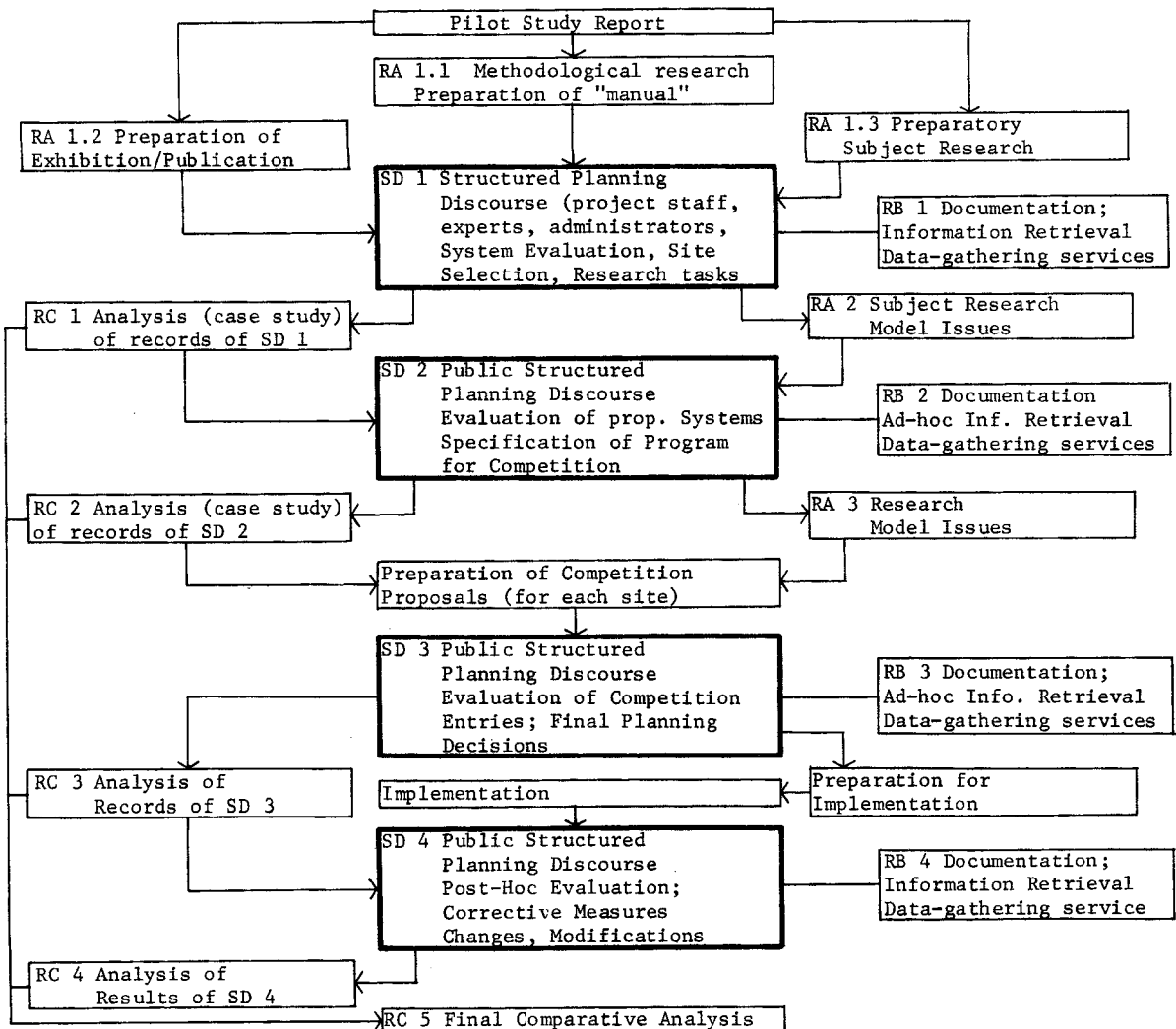
Subsequently an analysis of the results of the discourse would be performed and compared with results at other sites. Thus, several elements of a project in which research and planning are integrated in the way described, can be distinguished, as shown in the diagram: SD - the various cycles of the Structured Discourse; and RA, RB, RC, the various phases of research: preparation for the discourse cycle, activities sup-

porting it, and subsequent analysis, respectively.

The advantages of such a project organization (besides corresponding to the demands outlined above) are seen:

1. In the openness of the models which serve as the basis for the planning process and for research, as well as the organization of the information system supporting both.
2. In the possibility of comparing a very rich empirical data base for the investi-

gation of such questions as: Which aspects and problems are recurring in all projects and which ones are specific to the respective particular site and situation? What is their relative weight in the decisions that were taken in each project? From this, some information might be expected as to which solutions and performance criteria may be standardized for future projects, and which ones may not. Of course, the same considerations pertain to the questions of values and objectives (and their stability over time), as well as technological solutions, methods, etc.



6. Conclusion

As can be seen from the last few remarks, our contention is that the model prescribed for the example could be easily adapted - and should be - for use in further research toward performance measures for industrialized housing systems and similar developments.

There are still many open questions in the development of the tools described. One of them is the validity of the assumption upon which the model rests: that the participants (or opponents) in a planning project be willing to cooperate by communicating, by talking with each other about what each one perceives as the essential problems. Other questions pertain to the different role and mode of operation of the research staff within such projects, or the appropriate rule system for the treatment, negotiation, and deciding upon issues.

However, it is held that the refinement of the techniques underlies the same principles as the tasks they will be used for: the appropriate solutions will emerge by putting them to work and adapting the method to the problems as they occur - not by trying to anticipate all possible aspects and developing a fixed, perfected solution that turns out too inflexible to adapt to unanticipated obstacles.

Notes

- [1] Kunz, Werner, and Horst Rittel: "Issues as Elements of Information Systems", Center for Planning and Development Research, University of California, Berkeley, working paper #131, 1970.
- [2] Stoeber, Gerhard J., "Staedtebauliche Integrations-Systeme" Pilot Study, unpublished, summary in "Staedtebauliche Forschung, Kurfassungen, " May 1971 (Research projects sponsored by the German Ministry of Urban Development and Housing.)
- [3] Presented in greater detail in: Mann, Thorbjorn: "New Approaches for the Role of Research and Information in Planning," working paper, Berkeley, February 1971.