

Design in the Decision-Making Process

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ABSTRACT

The design of alternative courses of action is an essential part of decision-making, but one which has been neglected in theory and practice. A pilot study of alternatives' design in organizations suggests that already in the design stage choice focuses on a few alternatives, highlighting the importance of design in affecting the quality of outcomes. Design may be search or creativity, or a blend of both. While search is probably a significant part of design, there may be a residue of basically irrational creativity. These observations suggest that design should be deliberately undertaken in decision- and policy-making, by intensifying search, developing and utilizing design methods, and providing organizational creativity-enhancing environments.

Introduction

The rational decision-making model has demonstrated its usefulness in many contexts, although it is conceded that its demands are capable of only limited fulfillment in realistic conditions (Schoeffler, 1954: 250–251; Simon, 1957). We can envision the decision-making process in this model as a sequence of stages, linked by feedback loops where appropriate. One of these stages is the development of the alternative problem solutions or possible courses of action which in the next stages are the objects of comparative assessment and choice. This decision-making aspect of the policy process has received little attention over the last fifteen years compared to the study and research devoted to the stages of goal articulation, evaluation and choice (Alexander, 1979: 382).

This neglect is unfortunate, and may have serious implications for our understanding of the decision process. But even more serious are its practical consequences:

A most serious, and probably warranted criticism of agency decision procedures is that they tend to devote little or no effort to generating the alternatives among which they choose, but instead deal with a

small and haphazardly chosen group of potential projects and spend great effort showing that each of them has, in some sense, absolute merit. The losses of efficiency in choosing from too restricted a set may be very large indeed (Steiner, 1975: 351).

Why Design in Decision- and Policy-making?

Design is commonly associated with giving form to some concrete response to a need or problem: a building (architectural design), a tool or product (product design), a machine or structure (engineering design), or a built environment of avenues or plazas (urban design). This view sees design as “to conceive the idea and prepare a description of a proposed system, artifact or aggregation of artefacts” (Archer, 1970: 287). We do not usually think of design when considering the decision-making process. It only takes one step up the ladder of abstraction, however, to recognize design as a stage in the decision-making process: “Everyone designs who devises courses of action aimed at changing existing situations into preferred ones” (Simon, 1969: 55).

Design can therefore be viewed as an integral part of decision-making. After all, the choice between alternative courses of action, always taken to be the focus of the decision, cannot take place without a set of options among which to choose. Indeed, all descriptions of the decision-making process include a design stage, though many give it short shrift [1]. Observers of the process of policy development, too, envisage something akin to design. Lasswell calls this “the invention of policy proposals” (1971: 56) while Brewer begins the six basic phases of the decision process with “invention/initiation,” describing this stage as “reconceptualizing a problem, laying out a range of possible solutions, and then beginning to locate potentially ‘best’ choices within the range” (1974: 240).

But it may not be obvious why design, as part of the decision process, should receive more attention in the development of policy than it has. One reason is that policy is not always problem-solving – that is, responding to the perception of a disfunction or a shortfall from a desired state – but may, as suggested in the “garbage can” model of organizational choice, be stimulated by solutions looking for problems (Cohen et al., 1972: 1–25). Information processing problems which were only perceived when computer application became available are perfect examples of this phenomenon.

Another reason is the link between design-initiated policy and innovation – innovation which does not have to be massive radical change, but which can consist of a series of small but non-routine adaptations:

The first step (in the process) is the decision by a participant to propose an idea, or to connect an idea to a problem But the initial decision to create a change opportunity and the later formal change have to be made for the innovation to proceed. At this point in our thinking, we suspect that the initial decision, made without fanfare in the hinterland of the organization, is the more important decision for explaining innovation. Yet we know virtually nothing about (it), perhaps because the following, formal decision is easier to observe, quantify and evaluate (Daft and Becker, 1978: 169–170).

Finally, the design of alternatives is as essential to the development of policy as it is an integral part of decision-making: “A policy analysis . . . cannot exist apart from a proposed solution . . .” (Wildavsky, 1979: 26). Good policy analysis will include deliberate design and will not blindly accept given options: “A design of a good new alternative is likely to be worth a lot more than a thorough evaluation of some unsatisfactory old alternatives” (Enthoven, 1975: 463).

Design: Search or Creativity?

There are two basic reasons why the design of alternatives has hardly been addressed in connection with decision-making, and they relate to different views, sometimes implicit rather than explicit, of the design process. If we regard decision-making as a process of choosing between alternative problem solutions which are already there, the question of their origin becomes secondary. At most, the solutions have to be found by means of alternative search mechanisms – systematic, heuristic (“rule-of-thumb”) or intuitive.

On the other hand, if alternative solutions have to be generated *ex nihilo*, many would rather ignore this inconvenient problem. This is true of those who would like to believe that the decision process can be expressed in an algorithm, however complex. Naturally, they prefer to disregard a stage involving creativity, with its associations of unpredictability and its basically irrational nature.

Little empirical evidence exists about how design takes place in the decision-making process. Alexander (1979) presented what was available, and developed a conceptual model for analyzing the design process as a decision-making stage in organizational and interorganizational contexts. This model addressed two main questions: (i) What is the mix, in alternatives’ design, between search and creativity? (ii) What is the degree and kind of interaction between design and the adjacent stages of the decision-making process?

This study covered only three cases: Vietnam policy in the U.S. national security establishment between 1961 and 1968 [2]; the choice of a site for a third London airport; and a University of Wisconsin Task Force charged with responding to a Governor’s budget cuts. The cases were chosen to display as wide a range of variation as possible while still exhibiting the basic characteristics of the design process: the deliberate identification of a number of options, and the selection of some of them for systematic evaluation. They cover different levels of policy-making, but their choice was limited by the need for rich and detailed descriptions, so that abstraction would not project a spurious image of rationality.

The by-now familiar Vietnam policy emerged over a period ending with the TET offensive in 1968. The second case involves the work of the “Roskill Commission,” a Parliamentary Commission of Enquiry set up in Britain in 1968 to select a site for a third London airport. The Commission employed sophisticated benefit-cost analytic techniques to evaluate a short list of five sites selected from a large number of alternative

locations. Its recommendations proved controversial, and changing air traffic projections made the immediate need for a decision moot. The third case reviewed the process of alternatives' design which took place in a sub-committee of a State University System Task Force established in 1975. The group went through a process of brainstorming to develop a broad array of options which, however, was rapidly narrowed down through institutional pressures. Only a few alternatives were elaborated in the Task Force's report and the policy impact of the committee's work was negligible (Alexander, 1979: 389–396).

Though limited in its scope, this study suggests some qualified conclusions about the relationship between the type of design process and the decision outcomes. Alternatives tend to be few and similar when the design process is constrained. This may occur when all the relevant decision-makers share a narrow set of agreed values, and “nonconsensual” options, even if they surface, are shelved without serious consideration. The development and review of options for Vietnam policy between 1956 and 1968 illustrate this proposition [3]. Institutional constraints may also limit the design process, to the ultimate detriment of decision outcomes. This was the case, for example, in the State University System's responses to budget pressures. Limited, as it was, to proposals which offered potential savings, options which offered prospects, rather, of generating new revenue had to be dropped.

Search is more evident than creativity, though the latter is not absent. Some proposals emerged in the University of Wisconsin Task Force, for example, which were quite innovative in their respective settings, such as a novel budget allocation formula (based on British precedent) which was subsequently adopted. Intensive and systematic search tends to generate a wide range of options and so can deliberate brainstorming. For the evaluation of alternative sites for a third London airport, the Roskill Commission developed a list of 78 feasible locations by systematically utilizing information sources and institutional contacts. In a two-day brainstorming session, the University System's Task Force committee charged with developing alternative policies generated 29 proposals.

However, the most salient observation and perhaps the most surprising one in the light of rational decision-making norms was the blending of design with informal evaluation. This resulted in a rapid focusing of choice onto a few alternatives which fit into a predetermined decision space, long before formal evaluation ever began. In all three cases, it was this process – rather than the results of subsequent formal assessment – which eliminated what, in the wisdom of hindsight, we can identify as the optimal choices. It is clear that to deploy design effectively in the policy process, both the deliberate development of a wide range of alternatives and the suspension of judgment to allow their systematic evaluation are necessary conditions.

If these findings are typical of the design process in organizations in general, they beg the question of the relative usefulness of commonly used evaluative techniques in affecting the quality of outcomes. It is, of course, impossible to generalize from such a small sample. However, even as questions alone, the relative importance of design in

the decision-making process, and the respective roles of creativity and search in the development of alternatives, have profound normative implications. After all, any choice, even with the most sophisticated analysis, cannot be better than the quality of the options to be evaluated (Lichfield et al., 1975: 13), so the design of those options is critical.

Decision-making and Creativity

To the degree that it is rational, decision-making can be systematized, simplified, and taught, and we can explain and logically communicate the process with its outcomes. If creativity is an important component of design, if it is intrinsically irrational, unpredictable, and non-transmittable, then perhaps the limits of rationality in decision-making are narrower than even its most pessimistic critics thought. The question, then, to what degree design in decision-making is based on search, or whether it is mainly creativity, has serious implications for the rationality and predictability of the decision process as a whole.

The Rational Part of Design: Search

Two schools of thought address the role of systematic and heuristic search in the design process. Both do so from a desire (admitted or not) to see design as a rational part of a systematic decision-making process. One approaches the design process from a descriptive perspective – how does it happen? The other from a normative one – how to do it?

From the descriptive point of view, there is a large group of decision theorists who see design essentially as a process of search and discovery, i.e., retrieval of pre-existing solutions. They range from students of artificial intelligence and human thought (Nilsson, 1971: 43–72; Newell and Simon, 1972) through observers of individual and organizational decision-making (Simon, 1957; Cyert and March, 1963: 120–122; Braybrooke and Lindblom, 1963; Cohen et al., 1972) to researchers attempting to plumb the nature of creativity; more on these later. Simon takes the implications of this approach for the rationality of the design process to their logical conclusion when he claims that in rational decision-making the normative logic of “what is to be done” is no different, essentially, from the descriptive logic of scientific analysis (1965).

All those who propose design methods for problem-solving are, in fact, offering systematic search approaches or ways to develop useful rules of thumb to simplify complex problems. Though all these methods are variations on a theme of search through a problem or solution space, they are not without interest.

There are few prescriptions of how to do design which can be applied at a more abstract level than the form-or-space-shaping design practiced by the “design professions”. But there are some which have been applied in fields as diverse as transportation planning (Mannheim, 1970) and organization development (Blake and Mouton,

1972). For more concrete problems in architecture, product design and engineering, design methods have also been developed. One anthology of design methods is offered by Jones (1970); another by Broadbent (1973a: 195–298). What these methods have in common is that they infer that design may be thought of simply as a series of transformations of accessible information (Watson, 1972: 211) or that problem solutions can be deduced from an available set of theoretical rules (Broadbent, 1973b: 316–318).

While these design methods have usually been presented for form-giving or technical applications, there is no intrinsic reason why they cannot be adapted for policy applications as well. The matrix of a “morphological box” for example, applied to the problem of designing a domestic space heating system consists of dimensions such as: A. Essential Functions (including air temperature, radiant temperature, air movement, humidity, etc.); B.1 Circulated warm air system (including natural/forced air movement, etc.); B.2 Circulated hot water system . . . Bi . . . Bn. (Jones, 1970: 292–295). Applied to developing alternative policy responses for local government faced with decreasing federal and State revenues, these dimensions might become: A. functional subsystems (including general government, land and property, infrastructure, services, etc.); B.1, cost-cutting components (including RIFs, resource reallocations, expenditure deferrals, etc.); and B.2, revenue-enhancing components (such as higher tax rates, reassessments, new taxes, public entrepreneurship, service charges, etc.). The cell representing the intersection of two such dimensions can generate a program option – routine or innovative – which might become a component of an alternative policy package. The infrastructure/public entrepreneurship cell, for example, might suggest city-owned cable TV (an option under serious consideration by several municipalities), while the land–property/reassessment intersection could generate proposals for changing the assessment ratios between residential–commercial–industrial property.

It is important to note that in the policy domain, just as in the area of physical design, these methods are only aids; their results will be no better than the information provided by the experience, intuition and creativity of the practitioner. Indeed, critics of the “design methods” approach include some of its most enthusiastic original proponents. As some of them have said: “Archer, Eastman, Luckman and Rittel only offer techniques which facilitate the process of classifying information. ‘Filling’ the domains of the variables is at the discretion of the designer” (Höfler et al., 1970: 65). As a result, these exponents of formal design methodology perceive themselves now as in a second, or perhaps even a third “generation” of evolution. While the first generation aspired to expertise, objectivity, and tried to apply sophisticated quantitative methods, the second (still in a search mode) has adopted more interactive, “organic” procedures (Grant, 1975: 98–99).

The Rational Part of Creativity: Facilitation

Even proponents of the “design-as-search” view have recognized that solutions cannot always be found or constructed on the basis of bits of pre-existing information:

Some of the planning models described in the literature display an astonishing underestimation of the creative domain and an overestimate of the rational domain. Probably this faulty evaluation arises from the fact that it is more possible to explicate the rationally accessible domain, than the creative domain. (Joedicke, Matthesius and Schulte, 1970: 135).

While there is also a significant body of opinion which recognizes the role of creativity in design (Marr, 1973), not all students of creativity concede the inaccessible or irrational nature of the creative process. Many of the researchers trying to explain the creative process have discovered that a critical element is access to, and utilization of, an information-rich environment (Ehrenzweig, 1967: 32–33; 35–38, 42, 45–46; Eastman, 1970; Getzels and Csikszentmihalyi, 1976). Both the “gestalt” approach to creativity (Wertheimer, 1945) and the “associative” approach (Bloomberg, 1973: 7–9) relate the design process to information retrieval, though it is the particular nature of the retrieval process and its combination of items from the conscious or subconscious memory or the environment which characterize the creative act.

Another aspect of creativity noted by observers is the need for “suspension of judgment” (Parnes, 1967: 66–69; Barron, 1963: 156) – in terms of the decision process, the need for closure between designs and evaluation. Such insights provide the basis for techniques and proposals for stimulating and facilitating creativity, such as “synectics” and “brainstorming” (Prince, 1970; Tarr, 1973: 85–103; Taylor, 1975: 19–27). These suggest enhancing the individual’s ability to retrieve apparently unrelated information from memory and environment and combine it into novel associations, and providing a supportive and stimulating interactive context where ideas will be encouraged rather than criticized. The culmination of this “rationalization” of creativity is in proposals to institutionalize creative design in appropriate organizational environments (Crosby, 1968: 157–174; Taylor, 1972).

Creativity: The Extra-Rational Residue

Some researchers have questioned the actual utility of facilitative techniques like brainstorming (Arici, 1965; Taylor, Berry and Black, 1958). But more important from our point of view are the questions: How much of the design process is rational? To what degree can we study and understand creativity, analyze and define it, or model and reproduce the creative process in any meaningful way?

One can address this question from two directions. One point of departure is a critical analysis of the design process, which suggests that design is fundamentally different from logical deduction. This analysis stresses the difference between the

design process and the kinds of thought processes which underly scientific reasoning (Hillier et al., 1972). While it does not reject the possibility of systematically exploring and eventually understanding the design process, this approach sees design as linked more to the individual-cultural unconscious and to the deeper patterns in our thought processes than to the conscious and deliberate connections of logical association. To draw an analogy with language, design resembles more the symbolic content of language than its logical structure (Hillier and Leaman, 1974; Lobell, 1975).

The second approach poses a more basic problem: the paradox of creativity. If true creation produces a genuine innovation – a structure, form, process or technique that transcends routine imitation – it is a process that, while far from random, defies prediction or predetermination:

Creative acts appear to be anomalies. They appear to be controlled yet discontinuous processes which lead to valuable Novelty Proper and which interrupt the regularity and orderliness expected of an intelligible world (Hausman, 1975: 53).

This paradox of creativity, Hausman asserts, reflects the fundamental paradox of the unintelligibility of the world in terms of explanation by efficient causes (1975: 59–64, 124–138).

Discussion and Conclusions

Contrary to many conceptions of the rational decision model, we see that design is an integral part of decision-making and policy development. The implications of the role of design in these processes depend on how we believe that design takes place, or how important the element of “pure” creativity is in the design process. The answer to this question could raise serious reflections on the rationality and applications of decision-making and policy analysis, and has significant policy implications.

Empirically, we know too little as yet about the respective importance of search and creativity in the design process to arrive at any generalizable descriptive conclusions. However, some contingent statements exploring possible alternative combinations of search and creativity, and their implications, might narrow the range of possibilities.

If design is just a matter of search and information retrieval, we need not be concerned about possible limits on rationality from this aspect. Even if design is a blend of search and creativity, the latter might also have a large component of search, so that the ultimate residue of creativity might be quite small. It is only if we claim that design is, or can only be, largely a matter of creativity, and that the search component of creativity is insignificant or entirely absent, that we are faced with the kind of problem to which Wildavsky alluded when he wrote: “If a book about policy analysis were to deal with the invention of new alternatives, that is with creativity, there would be little to say” (1979: 387).

The weight of considered opinion and the available evidence, slender though they

are, tend to refute the last possibility. At the same time, acceptance of the first statement implies that all decisions include actions which are precedented and routine, and sees few if any qualitative differences in problems of increasing scale and complexity. This is an attitude which I am reluctant to accept [4]. Some serious observers of the design process, too, make a persuasive case against this possibility.

We are left, then, with the likelihood that design is a mix of search and creativity, and that creativity itself includes at least some, if not a good deal of, information retrieval, processing and transformation. There is probably at least a residue of inexplicable, extra-rational creativity in addressing novel problems, nonroutine situations, or in developing highly innovative and unprecedented solutions.

The implications of this conclusion are twofold. One is that there is probably a significant rational element in the design process, consisting of relatively routinized systematic or heuristic search and information retrieval. Even some parts of the creative component of design can be rationalized through facilitative techniques and supportive environments. The relative neglect of the potential offered in these areas of research and systematic applications, compared to the attention which has been lavished on other phases of the decision process, seems, in this light, inexplicable or, at least, ill-advised.

The other implication is that there may be another constraint on the possible rationality of the decision-making process, in addition to those advanced by previous critics. This may be the residue of extra-rational creativity inherent in the design of innovative alternative solutions to complex, unprecedented problems. While this cannot be systematized or taught, it may be important, at least, to alert students and practitioners to this aspect of the decision-making process.

Policy Implications

How can the rational elements of the design process be incorporated in systematic decision-making and policy development? The elements themselves, as they have been identified above, offer some answers to this question. They are: search and creativity, where the former can be divided into real world search and information retrieval; and search in the problem space – that is, design methods. Under creativity, we are at the outer bounds of rationality, but even here there are possibilities in creativity facilitating techniques and creativity enhancing environments.

Search and information retrieval. Heuristic search is probably the most common aid to design in decision-making and policy analysis today. Extended heuristic search is the prevailing source of alternatives (Pounds, 1969) and even of the bulk of innovations (Marquis, 1969). Indeed, superior heuristic search merges into – and may be an indispensable ingredient of – creativity (Simon, 1977: 154–175, 214–241). Unquestionably policymakers' and analysts' design abilities could be improved with more familiarity with the principles and practice of effective heuristic search (Nilsson, 1971: 53–72).

The present analysis of the design process suggests that systematic search can effect an even greater improvement in the quality and range of available options. In the design stage of decision-making and policy development, systematic search is still relatively neglected, although, of course, it is a major part of other parts of policy development and implementation, such as monitoring and evaluation. Systematic search can consist of deliberate information discovery and retrieval, from sources ranging from in-house personnel, through outside experts and informants, to programmed search of data banks. The economy of systematic search is an important consideration, and when systematic search is applied to problem representations (Nilsson, 1971: 72–87) it merges with design methods.

Design methods. The introduction of systematic design methods into the policy-making process offers perhaps the greatest potential for enhancing the quality and range of policy alternatives. This potential, however, is largely unrealized, since most existing design methods were developed for use in formal design tasks in engineering, product design, and architecture. To test their suitability for the more abstract demands of developing policy alternatives, and to adapt those that are transferable for use in policy analysis, planning, administration and management might make a major contribution to improving the quality of decisions.

To illustrate this potential, take the case which was described above, of a State University's responses to budget constraints and declining prospective enrollments. While it presented a sporadic attempt to develop some policy alternatives, the University System's ultimate response through the last several years has in fact been a variation on across-the-board cuts, as a way equitably to spread and minimize the pain. The use of design methods adapted for policy applications would elicit more innovative responses, such as the "creative reuse" of under-utilized facilities (converting vacant dorms to halfway houses, for example), increasing revenue from funded research by investing in more systematic information search and liaison with public agencies and foundations, and reorganizing to reduce administrative overheads and increase effectiveness by creating regional units or increasing campus autonomy [5]. The usefulness of design methods is limited to facilitating the development of a wide, and possibly innovative, range of alternatives. They do not guarantee that the optimal alternative will be included nor – even if it is – adopted [6]. But systematically applied design methods do seem to offer the same prospect of raising the level of policy analysis and policy debate that the introduction of more sophisticated evaluative techniques provided thirty years ago. At the very least, they can provide the student or practitioner of policy analysis with an answer to the question: "How do I arrive at these policy alternatives which I'm supposed to analyze and evaluate?"

There are some design methods which are suitable for policy related applications. They include AIDA – the "analysis of interrelated decision areas" (Luckman, 1967), the "morphological box" (Zwicky, 1969), the IDEALS concept (Nadler, 1967), and IBIS – "issue-based information systems" (Dehlinger and Protzen, 1972). Unfortunately, their diffusion and adoption in policy contexts is very limited, and examples of

systematic design applications to policy problems are even rarer [7].

Creativity facilitating techniques. A repertoire of creativity facilitating techniques, such as “brainstorming” and “synectics” has been developed and is sometimes applied in policy contexts. Such techniques have also been proposed specifically for policy development and analysis, for example by Nadler (1978) and Brewer (1975). Though some question how much these interactive approaches are superior to individual efforts in enhancing creativity, it is likely that in the appropriate circumstances they can be useful.

However, we must realize that the contribution of these techniques can at best stimulate a broad range of options which may penetrate to the limits of the problem space. Research shows that the organizational environment has a more important effect on outcomes, and an exciting array of options will not make much difference to the eventual decision if most of them are filtered out before any formal evaluation. Thus, perhaps creativity facilitating techniques are less important than creativity enhancing environments.

Creativity enhancing environments. An agency’s administration or an organization’s management can deliberately structure and run the organization to create an environment for “the release of creativity” (Gibb, 1972). Such an environment will not only enhance the available creative potential, but will also attract creative individuals, who gravitate to selected organizational environments (Parrish, 1977).

There is broad consensus on the prescriptions for an organizational environment which will stimulate creativity and innovation: 1) decentralized authority and broad discretion; 2) incentives for risk-taking and innovation; 3) enough “slack” to minimize fear of failure or error; 4) open interfaces with other parts of the organization and the organizational environment to provide a stimulating and information-rich context (Hitt, 1975). Such environments, which have already been tested and proved successful in R & D situations, provide creative people with the balance between challenge and security which maximizes their potential (Pelz, 1970).

Design as an integral part of decision- and policy-making poses the paradox that these supposedly rational processes – especially at their best – may include an irreducible element of irrational creativity; “irrational” because creativity cannot be simulated, analyzed, predicted, reproduced, or taught. By definition, this “irrational” intrusion into policy design and decision admits no systematic resolution. Effective or comprehensive policy analysts will be aware of its existence and may consciously try to mobilize their creative potential in addressing policy issues. At the same time, the design process also includes rational elements which can be incorporated in policy-making and policy environments; a conscious concern with the systematic design of policy alternatives can undoubtedly effect a significant improvement in decisions and outcomes.

Notes

- 1 See, for example, Bross (1953: 18–23), Simon (1960: 1–4) and Quade (1967: 1–16); dismissing the design of alternatives in a sentence or two prior to focusing on their evaluation are Marschak (1968: 42–43), Mack (1971: 17, 119) and Zaltman, Duncan and Holbeck (1973: 4).
- 2 This period was determined by the time covered by the major source, the Pentagon Papers (1971a, b), though other sources also cover later events.
- 3 This analysis is supported from another perspective – the convergence of ideas among preselected groups (Janis, 1972).
- 4 It is, however, espoused by a respectable school of thought best represented by Herbert Simon (1972).
- 5 These proposals, and many others, were generated in a teaching context applying some of the design methods referred to below.
- 6 These limitations, too, are well illustrated in the case in question. Adoption of innovative policy options, once they have been proposed, demands several other conditions. These include creativity enhancing environments which provide the suspension of judgment essential to sustain unconventional proposals into the stage of formal evaluation – see below – and other institutional prerequisites which are beyond the scope of this discussion; see, for example, Zaltman and Duncan, (1977: 248–280).
- 7 Two interesting cases of systematic design of alternative policy solutions are Downs' urban policy options (1970) and the development of alternative health insurance schemes (Newhouse et al., 1974).

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