

2.3 Planning Problems are Wicked Problems

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A great many barriers keep us from perfecting [an idealized] planning/governing system: theory is inadequate for decent forecasting; our intelligence is insufficient to our tasks; plurality of objectives held by pluralities of politics makes it impossible to pursue unitary aims; and so on. The difficulties attached to rationality are tenacious, and we have so far been unable to get untangled from their web. This is partly because the classical paradigm of science and engineering—the paradigm that has underlain modern professionalism—is not applicable to the problems of open societal systems. One reason the publics have been attacking the social professions, we believe, is that the cognitive and occupational styles of the professions—mimicking the cognitive style of science and the occupational style of engineering—have just not worked on a wide array of social problems. The lay customers are complaining because planners and other professionals have not succeeded in solving the problems they claimed they could solve. We shall want to suggest that the social professions were misled somewhere along the line into assuming they could be applied scientists—that they could solve problems in the ways scientists can solve their sorts of problems. The error has been a serious one.

The kinds of problems that planners deal with—societal problems—are inherently different from the problems that

scientists and perhaps some classes of engineers deal with. Planning problems are inherently wicked.

As distinguished from problems in the natural sciences, which are definable and separable and may have solutions that are findable, the problems of governmental planning—and especially those of social or policy planning—are ill-defined; and they rely upon elusive political judgment for resolution. (Not 'solution'. Social problems are never solved. At best they are only re-solved—over and over again.) Permit us to draw a cartoon that will help clarify the distinction we intend.

The problems that scientists and engineers have usually focused upon are mostly 'tame' or 'benign' ones. As an example, consider a problem of mathematics, such as solving an equation; or the task of an organic chemist in analyzing the structure of some unknown compound; or that of the chess player attempting to accomplish checkmate in five moves. For each the mission is clear. It is clear, in turn, whether or not the problems have been solved.

Wicked problems, in contrast, have neither of these clarifying traits; and they include nearly all public policy issues—whether the question concerns the location of a freeway, the adjustment of a tax rate, the modification of school curricula, or the confrontation of crime.

There are at least ten distinguishing properties of planning-type problems, i.e. wicked ones, that planners had better be alert to and which we shall comment upon in turn. As you will see, we are calling them 'wicked' not because these properties are themselves ethically deplorable. We use the term 'wicked' in a meaning akin to that of 'malignant' (in contrast to 'benign') or 'vicious' (like a circle) or 'tricky' (like a leprechaun) or 'aggressive' (like a lion, in contrast to the docility of a lamb). We do not mean to personify these properties of social systems by implying malicious intent. But then, you may agree that it becomes morally objectionable for the planner to treat a wicked problem as though it were a tame one, or to tame a wicked problem prematurely, or to refuse to recognize the inherent wickedness of social problems.

1. There is no definitive formulation of a wicked problem

For any given tame problem, an exhaustive formulation can be stated containing all the information the problem-solver needs for understanding and solving the problem—provided he knows his 'art,' of course.

This is not possible with wicked problems. The information needed to *understand* the problem depends upon one's idea for *solving* it. That is to say: in order to *describe* a wicked problem in sufficient detail, one has to develop an exhaustive inventory of all conceivable *solutions* ahead of time. The reason is that every question asking for additional information depends upon

the understanding of the problem—and its resolution—at that time. Problem understanding and problem resolution are concomitant to each other. Therefore, in order to anticipate all questions (in order to anticipate all information required for resolution ahead of time), knowledge of all conceivable solutions is required.

Consider, for example, what would be necessary in identifying the nature of the poverty problem. Does poverty mean low income? Yes, in part. But what are the determinants of low income? Is it deficiency of the national and regional economies or is it deficiencies of cognitive and occupational skills within the labour force? If the latter, the problem statement and the problem 'solution' must encompass the educational process. But, then, where within the educational system does the real problem lie? What then might it mean to 'improve the educational system'? Or does the poverty problem reside in deficient physical and mental health? If so, we must add those etiologies to our information package, and search inside the health services for a plausible cause. Does it include cultural deprivation? spatial dislocation? problems of ego identity? deficient political and social skills?—and so on. If we can formulate the problem by tracing it to some sorts of sources—such that we can say, 'Aha! That's the locus of the difficulty', i.e. those are the root causes of the differences between the 'is' and the 'ought to be' conditions—then we have thereby also formulated a solution. To find the problem is thus the same thing as finding the solution; the problem cannot be defined until the solution has been found.

The formulation of a wicked problem *is* the problem! The process of formulating the problem and of conceiving a solution (or re-solution) are identical, since every specification of the problem is a specification of the direction in which a treatment is considered. Thus, if we recognize deficient mental health services as part of the problem, then—trivially enough—'improvement of mental health services' is a specification of solution. If, as the next step, we declare the lack of community centres one deficiency of the mental health services system, then 'procurement of community centres' is the next specification of solution. If it is inadequate treatment within community centres, then improved therapy training of staff may be the locus of solution, and so on.

This property sheds some light on the usefulness of the famed 'systems approach' for treating wicked problems. The classical systems approach of the military and the space programmes is based on the assumption that a planning project can be organized into distinct phases. Every textbook of systems engineering starts with an enumeration of these phases: 'understand the problems or the mission', 'gather information', 'analyse information', 'synthesize information and wait for the creative leap', 'work out solution', or the like. For wicked

problems, however, this type of scheme does not work. One cannot understand the problem without knowing about its context; one cannot meaningfully search for information without the orientation of a solution concept; one cannot first understand, then solve. The systems approach 'of the first generation' is inadequate for dealing with wicked problems. Approaches of the 'second generation' should be based on a model of planning as an argumentative process in the course of which an image of the problem and of the solution emerges gradually among the participants, as a product of incessant judgment, subjected to critical argument. The methods of Operations Research play a prominent role in the systems approach of the first generation; they become operational, however, only *after* the most important decisions have already been made, i.e. after the problem has already been tamed.

Take an optimization model. Here the inputs needed include the definition of the solution space, the system of constraints, and the performance measure as a function of the planning and contextual variables. But setting up and constraining the solution space and constructing the measure of performance is the wicked part of the problem. Very likely it is more essential than the remaining steps of searching for a solution which is optimal relative to the measure of performance and constraint system.

2. Wicked problems have no stopping rule

In solving a chess problem or a mathematical equation, the problem-solver knows when he has done his job. There are criteria that tell when *the* or *a* solution has been found.

Not so with planning problems. Because (according to Proposition 1) the process of solving the problem is identical with the process of understanding its nature, because there are no criteria for sufficient understanding, and because there are no ends to the causal chains that link interacting open systems, the would-be planner can always try to do better. Some additional investment of effort might increase the chances of finding a better solution.

The planner terminates work on a wicked problem, not for reasons inherent in the 'logic' of the problem. He stops for considerations that are external to the problem: he runs out of time, or money, or patience. He finally says, 'That's good enough', or 'This is the best I can do within the limitations of the project', or 'I like this solution', etc.

3. Solutions to wicked problems are not true-or-false, but good-or-bad

There are conventionalized criteria for objectively deciding whether the offered solution to an equation, or whether the

proposed structural formula of a chemical compound, is correct or false. They can be independently checked by other qualified persons who are familiar with the established criteria; and the answer will be normally unambiguous.

For wicked planning problems there are no true or false answers. Normally, many parties are equally equipped, interested, and/or entitled to judge the solutions, although none has the power to set formal decision rules to determine correctness. Their judgments are likely to differ widely to accord with their group or personal interests, their special value-sets, and their ideological predilections. Their assessments of proposed solutions are expressed as 'good' or 'bad' or, more likely, as 'better or worse' or 'satisfying' or 'good enough'.

4. There is no immediate and no ultimate test of a solution to a wicked problem

For tame problems one can determine on the spot how good a solution-attempt has been. More accurately, the test of a solution is entirely under the control of the few people who are involved and interested in the problem.

With wicked problems, on the other hand, any solution, after being implemented, will generate waves of consequences over an extended—virtually an unbounded—period of time. Moreover, the next day's consequences of the solution may yield utterly undesirable repercussions which outweigh the intended advantages or the advantages accomplished hitherto. In such cases one would have been better off if the plan had never been carried out.

The full consequences cannot be appraised until the waves of repercussions have completely run out, and we have no way of tracing *all* the waves through *all* the affected lives ahead of time or within a limited time span.

5. Every solution to a wicked problem is a 'one-shot operation'; because there is no opportunity to learn by trial-and-error, every attempt counts significantly

In the sciences, and in fields like mathematics, chess, puzzle-solving, or mechanical engineering design, the problem-solver can try various runs without penalty. Whatever his outcome on these individual experimental runs, it does not matter much to the subject-system or to the course of societal affairs. A lost chess game is seldom consequential for other chess games or for non-chess-players.

With wicked planning problems, however, *every* implemented solution is consequential. It leaves 'traces' that cannot be undone. One cannot build a freeway to see how it works, and then easily correct it after unsatisfactory perform-

ance. Large public works are effectively irreversible, and the consequences they generate have long half-lives. Many people's lives will have been irreversibly influenced, and large amounts of money will have been spent—another irreversible act. The same happens with most other large-scale public works and with virtually all public-service programmes. The effects of an experimental curriculum will follow the pupils into their adult lives.

Whenever actions are effectively irreversible and whenever the half-lives of the consequences are long, *every trial counts*. And every attempt to reverse a decision or to correct for the undesired consequences poses another set of wicked problems, which are in turn subject to the same dilemmas.

6. Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan

There are no criteria which enable one to prove that all solutions to a wicked problem have been identified and considered.

It may happen that *no* solution is found, owing to logical inconsistencies in the 'picture' of the problem. (For example, the problem-solver may arrive at a problem description requiring that both *A* and not-*A* should happen at the same time.) Or it might result from his failing to develop an idea for solution (which does not mean that someone else might be more successful). But normally, in the pursuit of a wicked planning problem, a host of potential solutions arises; and another host is never thought up. It is then a matter of judgment whether one should try to enlarge the available set or not. And it is, of course, a matter of judgment which of these solutions should be pursued and implemented.

Chess has a finite set of rules, accounting for all situations that can occur. In mathematics the tool chest of operations is also explicit; so, too, although less rigorously, in chemistry.

But not so in the world of social policy. Which strategies-or-moves are permissible in dealing with crime in the streets, for example, have been enumerated nowhere. 'Anything goes', or at least, any new idea for a planning measure may become a serious candidate for a re-solution: What should we do to reduce street crime? Should we disarm the police, as they do in England, since even criminals are less likely to shoot unarmed men? Or repeal the laws that define crime, such as those that make the use of marijuana a criminal act, or those that make car theft a criminal act? That would reduce crime by changing definitions. Try moral rearmament and substitute ethical self-control for police and court control? Shoot all criminals and thus reduce the numbers who commit crime? Give away free

loot to would-be thieves, and so reduce the incentive to crime? And so on.

In such fields of ill-defined problems and hence ill-definable solutions, the set of feasible plans of action relies on realistic judgment, the capability to appraise 'exotic' ideas and on the amount of trust and credibility between planner and clientele that will lead to the conclusion, 'OK let's try that'.

7. Every wicked problem is essentially unique

Of course, for any two problems at least one distinguishing property can be found (just as any number of properties can be found which they share in common), and each of them is therefore unique in a trivial sense. But by '*essentially unique*' we mean that, despite long lists of similarities between a current problem and a previous one, there always might be an additional distinguishing property that is of overriding importance. Part of the art of dealing with wicked problems is the art of not knowing too early which type of solution to apply.

There are no *classes* of wicked problems in the sense that principles of solution can be developed to fit *all* members of a class. In mathematics there are rules for classifying families of problems—say, of solving a class of equations—whenever a certain, quite-well-specified set of characteristics matches the problem. There are explicit characteristics of tame problems that define similarities among them, in such fashion that the same set of techniques is likely to be effective on all of them.

Despite seeming similarities among wicked problems, one can never be *certain* that the particulars of a problem do not override its commonalities with other problems already dealt with.

The conditions in a city constructing a subway may look similar to the conditions in San Francisco, say; but planners would be ill-advised to transfer the San Francisco solutions directly. Differences in commuter habits or residential patterns may far outweigh similarities in subway layout, downtown layout, and the rest. In the more complex world of social policy planning, every situation is likely to be one-of-a-kind. If we are right about that, the direct transference of the physical-science and engineering thoughtways into social policy might be dysfunctional, i.e. positively harmful. 'Solutions' might be applied to seemingly familiar problems which are quite incompatible with them.

8. Every wicked problem can be considered to be a symptom of another problem

Problems can be described as discrepancies between the state of affairs as it is, and the state as it ought to be. The process of resolving the problem starts with the search for causal explana-

tion of the discrepancy. Removal of that cause poses another problem of which the original problem is a 'symptom'. In turn, it can be considered the symptom of still another, 'higher level' problem. Thus 'crime in the streets' can be considered as a symptom of general moral decay, or permissiveness, or deficient opportunity, or wealth, or poverty, or whatever causal explanation you happen to like best. The level at which a problem is settled depends upon the self-confidence of the analyst and cannot be decided on logical grounds. There is nothing like a natural level of a wicked problem. Of course, the higher the level of a problem's formulation, the broader and more general it becomes: and the more difficult it becomes to do something about it. On the other hand, one should not try to cure symptoms: and therefore one should try to settle the problem on as high a level as possible.

Here lies a difficulty with incrementalism, as well. This doctrine advertises a policy of small steps, in the hope of contributing systematically to overall improvement. If, however, the problem is attacked on too low a level (an increment), then success of resolution may result in making things worse, because it may become more difficult to deal with the higher problems. Marginal improvement does not guarantee overall improvement. For example, computerization of an administrative process may result in reduced cost, ease of operation, etc. But at the same time it becomes more difficult to incur structural changes in the organization, because technical perfection reinforces organizational patterns and normally increases the cost of change. The newly acquired power of the controllers of information may then deter later modifications of their roles.

Under these circumstances it is not surprising that the members of an organization tend to see the problems on a level below their own level. If you ask a police chief what the problems of the police are, he is likely to demand better hardware.

9. The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution

'Crime in the streets' can be explained by not enough police, by too many criminals, by inadequate laws, too many police, cultural deprivation, deficient opportunity, too many guns, phrenologic aberrations, etc. Each of these offers a direction for attacking crime in the streets. Which one is right? There is no rule or procedure to determine the 'correct' explanation or combination of them. The reason is that in dealing with wicked problems there are several more ways of refuting a hypothesis than there are permissible in the sciences.

The mode of dealing with conflicting evidence that is customary in science is as follows: 'Under conditions C and assuming the validity of hypothesis H , effect E must occur. Now, given C , E does not occur. Consequently H is to be refuted.' In the context of wicked problems, however, further modes are admissible: one can deny that the effect E has not occurred, or one can explain the non-occurrence of E by intervening processes without having to abandon H . Here is an example: Assume that somebody chooses to explain crime in the streets by 'not enough police'. This is made the basis of a plan, and the size of the police force is increased. Assume further that in the subsequent years there is an increased number of arrests, but an increase of offences at a rate slightly lower than the increase of GNP. Has the effect E occurred? Has crime in the streets been reduced by increasing the police force? If the answer is no, several non-scientific explanations may be tried in order to rescue the hypothesis H ('Increasing the police force reduces crime in the streets'): 'If we had not increased the number of officers, the increase in crime would have been even greater'; 'This case is an exception from rule H because there was an irregular influx of criminal elements'; 'Time is too short to feel the effects yet'; etc. But also the answer 'Yes E has occurred' can be defended: 'The number of arrests was increased', etc.

In dealing with wicked problems the modes of reasoning used in the argument are much richer than those permissible in the scientific discourse. Because of the essential uniqueness of the problem (see Proposition 7) and lacking opportunity for rigorous experimentation (see Proposition 5), it is not possible to put H to a crucial test.

That is to say, the choice of explanation is arbitrary in the logical sense. In actuality, attitudinal criteria guide the choice. People choose those explanations which are most plausible to them. Somewhat but not much exaggerated, you might say that everybody picks that explanation of a discrepancy which fits his intentions best and which conforms to the action-prospects that are available to him. The analyst's 'world view' is the strongest determining factor in explaining a discrepancy and, therefore, in resolving a wicked problem.

10. The planner has no right to be wrong

As Karl Popper argues in *The Logic of Scientific Discovery*, it is a principle of science that solutions to problems are only hypotheses offered for a refutation. This habit is based on the insight that there are no proofs to hypotheses, only potential refutations. The more a hypothesis withstands numerous attempts at refutation, the better its 'corroboration' is considered to be. Consequently, the scientific community does not blame its members for postulating hypotheses that are later

refuted—so long as the author abides by the rules of the game, of course.

In the world of planning and wicked problems no such immunity is tolerated. Here the aim is not to find the truth, but to improve some characteristics of the world where people live. Planners are liable for the consequences of the actions they generate; the effects can matter a great deal to those people that are touched by those actions.

We are thus led to conclude that the problems that planners must deal with are wicked and incorrigible ones, for they defy efforts to delineate their boundaries and to identify their causes, and thus to expose their problematic nature.

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