

Wicked Problems

Structuring Social Messes with Morphological Analysis

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If you work in an organisation that deals with social, commercial or financial planning, then you've got wicked problems. You may not call them by this name, but you know what they are. They are those complex, ever changing societal and organisational planning problems that you haven't been able to treat with much success, because they won't keep still. They're messy, devious, and they fight back when you try to deal with them.

Introduction

In 1973, Horst Rittel and Melvin Webber, both urban planners at the University of Berkley, wrote an article for *Policy Sciences* with the astounding title “Dilemmas in a General Theory of Planning”. In this landmark article, the authors observed that there is a whole realm of social planning problems that cannot be successfully treated with traditional linear, analytical approaches. They called these *wicked problems*, in contrast to *tame problems*.

A year later, in his book “Re-designing the Future”, Russell Ackoff (1974) essentially put forward the same concept (although in less detail), which he called a “mess”, and which later became a “social mess” (Horn, 2001).

Although we are (somewhat) wiser today, and less susceptible to the belief that complex social planning problems can be “solved” by linear methods akin to engineering solutions, it is instructive to look at the original formulation of the distinction between “wicked” and “tame” problems.

First, let's look at what characterises a *tame problem* (comp. Conklin, J, 2001, p.11). A tame problem

- has a relatively well-defined and stable problem statement.
- has a definite stopping point, i.e. we know when a solution is reached.
- has a solution which can be objectively evaluated as being right or wrong.
- belongs to a class of similar problems which can be solved in a similar manner.
- has solutions which can be tried and abandoned.

Wicked problems are completely different. Wicked problems are ill-defined, ambiguous and associated with strong moral, political and professional issues. Since they are strongly stakeholder dependent, there is often little consensus about what the problem *is*, let alone how to resolve it.

Furthermore, wicked problems won't keep still: they are sets of complex, interacting issues evolving in a dynamic social context. Often, new forms of wicked problems emerge *as a result* of trying to understand and solve one of them.

The most evident, and important, wicked problems are complex, long-term social and organisational planning problems. Examples:

- How should we fight the “War on Terrorism?”
- How do we get genuine democracies to emerge from authoritarian regimes?
- What is a good national immigration policy?
- How should scientific and technological development be governed?
- How should we deal with crime and violence in our schools?
- How should our organisation develop in the face of an increasingly uncertain future?

“The classical systems approach ... is based on the assumption that a planning project can be organized into distinct phases: ‘understand the problems’, ‘gather information,’ ‘synthesize information and wait for the creative leap,’ ‘work out solutions’ and 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.” (Rittel & Webber, 1974, p. 161.)

Ten Criteria for Wicked Problems

Rittel and Webber characterise wicked problems by the following 10 criteria. (It has been pointed out that some of these criteria are closely related or have a high degree overlap, and that they should therefore be condensed into four or five more general criteria. I think that this is a mistake, and that we should treat these criteria as arising from 10 more or less specifically encountered “frustrations” the authors have experienced in dealing with complex social planning issues.)

1. There is no definite formulation of a wicked problem.

“The information needed to *understand* the problem depends upon one’s idea for solving it. This is to say: in order to *describe* a wicked problem in sufficient detail, one has to develop an exhaustive inventory for all the conceivable solutions ahead of time.” [This seemingly incredible criterion is in fact treatable. See below.]

2. Wicked problems have no stopping rules.

In solving a tame problem, “... the problem-solver knows when he has done his job. There are criteria that tell when *the* solution, or *a* solution, has been found”. With wicked problems you never come to a “final”, “complete” or “fully correct” solution – since you have no objective criteria for such. The problem is continually evolving and mutating. You stop when you run out of resources, when a result is subjectively deemed “good enough” or when we feel “we’ve done what we can...”

3. Solutions to wicked problems are not true-or-false, but better or worse.

The criteria for judging the validity of a “solution” to a wicked problem are strongly stakeholder dependent. However, the judgments of different stakeholders ... “are likely to differ widely to accord with their group or personal interests, their special value-sets, and their ideological predilections.” Different stakeholders see different solutions as simply better or worse.

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

“... 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.”

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.

“... *every* implemented solution is consequential. It leaves “traces” that cannot be undone ... And every attempt to reverse a decision or correct for the undesired consequences poses yet another set of wicked problems”

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 the 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.”

7. Every wicked problem is essentially unique.

“There are no *classes* of wicked problems in the sense that the principles of solution can be developed to fit *all* members of that class.” ...Also, ...”Part of the art of dealing with wicked problems is the art of not knowing too early which type of solution to apply.” [Note: this is very important point. See below.]

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

Also, many internal aspects of a wicked problem can be considered to be symptoms of other internal aspects of the same problem. A good deal of mutual and circular causality is involved, and the problem has many causal levels to consider. Complex judgements are required in order to determine an appropriate *level of abstraction* needed to define the problem

9. The causes of a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem’s resolution.

“There is no rule or procedure to determine the ‘correct’ explanation or combination of [explanations for a wicked problem]. The reason is that in dealing with wicked problems there are several more ways of refuting a hypothesis than there are permissible in the [e.g. physical] sciences.”

10. [With wicked problems,] the planner has no right to be wrong.

In “hard” science, the researcher is allowed to make hypotheses that are later refuted. Indeed, it is just such hypothesis generation and refutation that is a primary motive force behind scientific development (Ritchey, 1991). One is not penalised for making hypotheses that turn out to be wrong. “In the world of ... wicked problems no such immunity is tolerated. Here the aim is not to find the truth, but to improve some characteristic of the world where people live. Planners are liable for the consequences of the actions they generate ...”

Tackling Wicked Problems with General Morphological Analysis

How, then, does one tackle wicked problems? Some 20 years after Rittel & Webber wrote their article, Jonathan Rosenhead (1996), of the London School of Economics, presented the following criteria for dealing with complex social planning problems – criteria that were clearly influenced by the ideas presented by Rittel, Webber and Ackoff.

- accommodate multiple alternative perspectives rather than prescribe single solutions
- function through group interaction and iteration rather than back office calculations
- generate ownership of the problem formulation through transparency
- facilitate a graphical (visual) representation for the systematic, group exploration of a solution space
- focus on relationships between discrete alternatives rather than continuous variables
- concentrate on possibility rather than probability

Group facilitated, computer-aided General Morphological Analysis (GMA) is fully attuned to these criteria. Developed in the middle of the 1990s, GMA was designed as a non-quantified problem structuring method (PSM), which results in an inference model which strives to represent the total problem space, and as many of the potential solutions to the given problem complex as possible (Ritchey, 2002). This, in itself, goes a long way in satisfying Rittel and Webber’s first – seemingly incredible – criterion concerning wicked problems: “... in order to *describe* a wicked problem in sufficient detail, one has to develop an exhaustive inventory for all the conceivable solutions *ahead of time*.” (My emphasis)

As a process, GMA goes through a number of iterative steps or phases which represent cycles of analysis and synthesis – the basic method for developing (scientific) models (Ritchey, 1991). The analysis phase begins by identifying and defining the most important dimensions of the problem complex to be investigated. Each of these dimensions is then given a range of relevant (discrete) values or conditions. Together, these make up the variables or parameters of the problem complex. A morphological field is constructed by setting the parameters against each other, in parallel columns, representing an n-dimensional configuration space. A particular constructed “field configuration” is designated by selecting a single value from each of the variables. This marks out a particular state or (formal) solution within the problem complex.

The morphological field represents the total “problem space”, and can contain many thousands – or even hundreds of thousands – of possible (formal) solutions. A proper “solution space” is synthesized by a process of internal *cross-consistency assessment* (CCA). All of the

parameter values in the morphological field are compared with one another, pair-wise, in the manner of a cross-impact matrix. As each pair of conditions is examined, a judgment is made as to whether – or to what extent – the pair can coexist, i.e. represent a consistent relationship. Note that there is no reference here to causality or probability, but only to possibility through mutual consistency. Using this technique, a typical morphological field can be reduced by up to 90% or even 99%, depending on the nature of the problem.

When this solution space (or outcome space) is synthesized, the resultant morphological field becomes an inference model, in which any parameter (or multiple parameters) can be selected as "input", and any others as "output". Thus, with computer support, the field can be turned into a virtual laboratory with which one can designate initial conditions and examine alternative solutions, or conversely, designate alternative solutions in order to find the conditions that could generate such solutions.

SCENARIO	Consumer behaviour	Consumption patterns (total & private import)	Households sorting behaviour	National environmt. policy	Price levels: raw materials vs. recycled material	Tech developmt: material usage	Tech developmt: material recycling	EU directives import/export	Vision/ Strategy
Wild East World crisis	Buy environmentally Willing to pay more	Total - UP Private - UP	Voluntary on ideological basis	Advanced holistic econ. & politics	Raw - high Recyc - high	Very fast development	Very fast development	More open than at present	A
Raw material crisis	Buy environmentally but will not pay more	Total - DOWN Private - UP	Sort by reward	Advanced buy fragmented	Raw - low Recyc - high	Steady development	Steady development	Status quo	B
Current development - pessimistic	Do not buy environmentally	Total - UP Private - DOWN	Sort if forced to	Advanced but only voluntary	Raw - high Recyc - low	Marginal development	Marginal development	More restrictive than at present	C
Current development - optimistic		Total - DOWN Private - DOWN	Will not sort/ protest	Lowest EU-adaptation	Raw - low Recyc - low				No strategy
Greenhouse effect - stop emissions									
Batman: High-tech solutions									
Dematerialization									
Green paradise									

Figure 1. Example of a “Scenario-Strategy” model for a Swedish Extended Producer Responsibility system. The selected scenario (red) is defined by the following 8 scenario parameters (dark blue). Compatible EPR strategies are shown in light blue.

It is also important to heed Rittel and Webber’s seventh criterion: “Part of the art of dealing with wicked problems is the art of not knowing too early which type of solution to apply.” In morphological analysis, we call this “remaining in the mess”, i.e. keeping one’s options open long enough to explore as many relationships in the problem topology as possible, before starting to formulate solutions. This can be a frustrating process for inveterate “problem solvers”, but is an absolutely necessary procedure when working with wicked problems.

Finally, the *process* of creating morphological inference models through facilitated group workshops is as important as the end-product – i.e. the model itself. As many stakeholders as possible should be engaged in the work, in order to create a common terminology, common problem concept and common modelling framework. Principal stakeholders and subject specialists should be brought together in a series of workshops to collectively 1) structure as much of the problem space as possible, 2) synthesize solution spaces, 3) explore multiple

solutions on the basis of different drivers and interests and 4) analyse stakeholder structures. The different stakeholders do not have to agree on a single, common solution, but must be encouraged to understand each other's positions and contexts.

As is the case with all methods dealing with complex social planning problems, the results of a morphological analysis are no better than the quality of the inputs provided. However, even here the morphological approach has some clear advantages. It expressly provides for a good deal of in-built “garbage detection”, since poorly defined parameters and incomplete ranges of conditions are immediately revealed when one begins the task of cross-consistency assessment. These assessments simply cannot be made until the morphological field is well defined and the working group is in agreement about what these definitions mean. This type of garbage detection is extremely important when working with *wicked problems* and *social messes*.

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