

The influence of Group Model-Building on policy intentions

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Abstract

Most system dynamics models aim to support strategic decision making. Since the first evaluation studies of the actual impact of models on decision making appeared in the 1970s, the factors influencing effectiveness have become increasingly clear. As a result, in addition to development and analysis of models, the communication of recommendations to policy makers has become a major focus of the system dynamics community. Often, this communication takes the form of direct involvement in the modeling efforts, resulting in Group Model-Building. Simultaneously with the introduction of system dynamics the concept 'mental model' was proposed as an important variable influencing decision making. Recently, this concept was criticized as being pre-scientific and for the most part undescribed and unmeasured (Richardson et al, 1994). Richardson et al. see 'operator logic' as the intervening concept between managers' behavior and modeling projects. In a case study of the effects of Group Model-Building (Vennix et al, 1996) an alternative construct was proposed, i.e. 'the intention to perform a behavior'. Both of these proposed constructs illustrate the need for a better understanding of the relationship between model-building on one hand, and cognition and behavior of managers involved in model-building, on the other hand.

In this paper we take the assumption that a concept's meaning depends upon its place in a broader conceptual framework. We therefore aim to develop a preliminary conceptual model of the effects of model-building on cognition and behavior of participants. In order to make this model as transparent as possible, to study its dynamic consequences and to facilitate its discussion and testing, and to generate testable hypotheses for future research, we chose to translate this conceptual framework in a system dynamics model.

The model operates at the level of the individual. Following the direction taken in the study of Vennix et al. (1996), the central variable in this model is the intention to perform a behavior. This variable is influenced by other constructs in Ajzen's (1991) 'theory of planned behavior', i.e. attitude toward a behavior, subjective norm and perceived behavioral control. These variables are in essence emotional or affective, and formed on the basis of cognitions and evaluations of these cognitions. The change of cognitions and evaluations (and ultimately the other factors in Ajzen's model) may be seen as a process of persuasion. Petty and Cacioppo (1986) describe a number of variables influencing persuasion by functioning as an argument, a peripheral cue or by changing the likelihood that a message is processed. We see the effect of Group Model-Building mainly as enhancing message processing and number and quality of arguments exchanged (in comparison with unsupported decision making). Various factors mediating this effect are defined in the model. 453

Theory of planned behavior

In essence Ajzen's (1991) theory of planned behavior explains human behavior as a pursuit of two goals, personal well-being and social valuation, and the means to perform a behavior. According to this theory an individual forms an affect for or against an action, on the basis of (strength and evaluation of) beliefs about the outcome of this action. This affect is defined by Ajzen as the attitude towards behavior (Cushman and McPhee, 1980). Next to the attitude towards behavior, the perception of the opinions of others (social valuation, beliefs about the opinions of important referents) and perceived control of behavior (beliefs about the possibilities to perform a behavior) determine the behavioral intention. Intentions are 'indications of how hard people are willing to try, how much effort they are planning to exert, in order to perform a behavior' (Ajzen, 1991: 181). This definition reveals that the concept is quite similar to the concept of commitment. We will speak about a 'policy intention' if the commitment to a agreed upon course of action is meant. Intention and perceived behavioral control jointly determine the extent to which action is performed. The theory is successful in predicting behavior in a large number of experiments (Ajzen, 1991). Schematically, the proposed relation between variables is as follows.

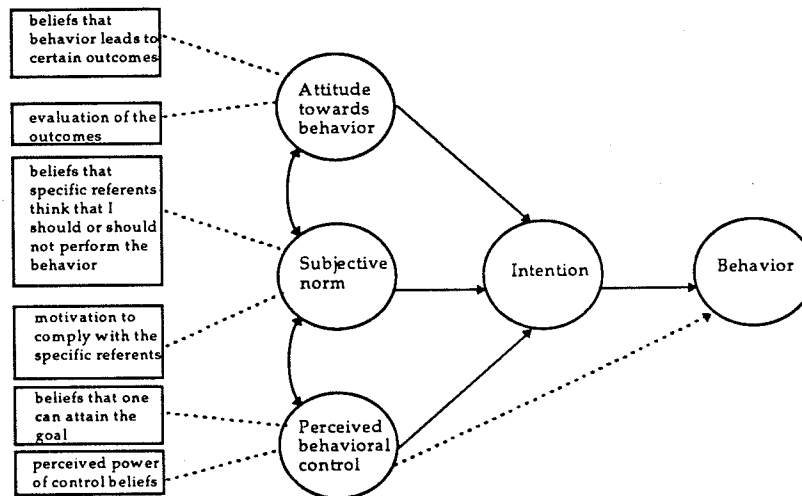


Figure 1: Theory of planned behavior (adapted from Ajzen, 1991: 182). The arrows represent sufficient conditions leading to the connected constructs. The double-headed arrows denote possible interactions between constructs. According to Ajzen (1991) perceived behavioral control influences behavior directly if it represents actual control, and through the psychological route of increasing effort put into a behavior. Hence the broken line.

A theory of cognitive change

The theory of planned behavior describes the relation between individual cognition, attitude toward behavior and intentions. The way in which strength and evaluation of cognitions are changed is described by theories of persuasion. Recently, dual-process theories of persuasion are becoming increasingly popular (Eagly and Chaiken, 1993). One of these is the Elaboration Likelihood Model (Petty and Cacioppo, 1986). In this model, persuasion is a result of one or more of three processes. People might change their thinking as a result of issue-relevant argumentation. A persuasive message is received and understood, arguments in the message are identified, contrasted with existing knowledge and judged for validity.

Alternatively, persuasion can result from some cue in the persuasion context that makes change of cognitions possible without close inspection of arguments. For example, a message that puts one in a positive mood (e.g. a commercial) might be used to form a positive opinion about the issue at stake. Here, 'mood' is used as a peripheral cue. The third way in which persuasion might be affected is by changing the extent or direction of message processing. For example, if a person that already knows a great deal about an issue receives a message opposing her initial position, she is likely to generate negative thoughts. She is also in a better position to counterargue any such message. In this way prior knowledge can bias thinking about a relevant message. Petty and Cacioppo (1986: 132) describe the three influences on persuasion as:

'Variables can affect the amount and direction of attitude change by (a) serving as persuasive arguments, (b) serving as peripheral cues and/or (c) affecting the extent or direction of issue and argument elaboration.'

Two categories of variables are of special importance here. Variables influencing the motivation or ability to process arguments determine to what extent the information in a message or peripheral cues will be used to form an opinion. Petty and Cacioppo (1986: 152) describe this as:

'As motivation and/ or ability to process is decreased, peripheral cues become relatively more important determinants of persuasion. Conversely, as argument scrutiny is increased, peripheral cues become relatively less important determinants of persuasion.'

Group model-building and change of intentions

We can now ask the question what light the theories described above throw on the relation between Group Model-Building and intentions or commitment to action. Group Model-Building is commonly used in a situation in which an important problem exists. Participants in a session are selected on the basis of their expertise or involvement in the problem. We can expect that in this situation participants are motivated to hold 'correct' attitudes, attitudes that correspond to the state of affairs in the 'real world'. A course of action leading to considerable costs for the individual should be regarded as 'bad' and vice versa. Group Model-Building maximizes the ability to exchange arguments for or against a point of view: the facilitator stresses that participants have to identify problem elements and possible courses of action themselves (the client keeps owning the problem), provides optimal conditions for discussion, by building a model the relations between viewpoints become clear and courses of action can be tested using a quantified model. From this perspective, building a model in a group can be seen as mutual persuasion. Each participant in a session provides arguments for his or her point of view. The connection between different positions is subsequently shown, and the dialectic may lead to a change in cognitions. By clarifying the relation between concepts that surface in the discussion their meaning becomes clear. Because all participants are exposed to the same argument pool, have a chance to ask for clarification and to bring their own views forward, we can expect cognitions to change in the same direction. If, from a particular participant's position an argument is not valid, ample opportunity is provided to state a counterargument.

We expect that after Group Model-Building the three variables influencing behavioral intentions show less variance than before. The attitude toward behavior is formed on the basis of beliefs about the outcome of the behavior. We expect that the sessions results in an agreed upon course of action, which participants think will have positive consequences. A positive attitude toward this policy will then be established. By giving due attention to power, roles

and resources to implement a course of action, the subjective control of the proposed policy is expected to be high. We might say that the group of participants in a session represents a major part of important referents in deciding about a course of action. If the sessions result in a consensus, a clear subjective norm is established. A shared definition of the problem situation affects a participant's behavior in two ways: firstly because shared cognitions might give rise to shared attitudes and therefore a match of intentions, and secondly because it poses a clear norm that will be used as a reference.

Modeling the effect of Group Model-Building on intentions

As a starting point for building a model about the influence of Group Model-Building on intentions, we used the quantitative models of attitude change described by Hunter, Danis and Cohen (1984). In their study, the information processing paradigm (Hovland, Janis and Kelley, 1953) provides the best fit with empirical data. According to this theory an individual perceiving an message might change his attitude as a result of the comparison of his position with the position advocated in the message. If an individual accepts a message as valid, his position will change in the direction advocated. In the model developed here, this principle is used to account for change in evaluation of the three sorts of beliefs in Ajzen's model (i.e. evaluation of outcomes, motivation to comply with referents and perceived power of control beliefs). The impact of a message depends both on the position advocated and on peripheral cues associated with the message (e.g. credibility of the source). In this way, messages may cause a change in attitude toward a behavior, subjective norm and/ or perceived behavioral control. Changes in these three variables cause a change in behavioral intention. A difference between behavioral intention and opportunities in the environment gives rise to emotional arousal (for example, unexpectedly meeting a friend leads to a positive emotion). This arousal might function as a peripheral cue and cause a change of attitudes. A difference between the position expressed by behavior and attitude might in some circumstances cause a change in attitudes in the direction of the former (as in the case of cognitive dissonance). In this way a model is constructed of individual change of behavioral intention. This model is then expanded to include two or more persons exchanging messages about an issue towards which each initially takes a different position. By analyzing the behavior of the model, some conclusions can be drawn about the conditions under which individuals will reach a joint and stable intention. The applicability of these conclusions to the practice of Group Model-Building is then discussed.

- Ajzen, I. 1991. The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes* nr. 50: 179-211.
- Cushman, D.P. and R.D. McPhee. 1980. *Message-Attitude-Behavior Relationship. Theory, Methodology, and Application*. New York: Academic Press.
- Eagly, A.H., and S. Chaiken. 1993. *The Psychology of Attitudes*. Orlando: Harcourt Brace Jovanovich.
- Hovland, C.I., Janis, I.L. and Kelley, H.H. 1953. *Communication and Persuasion*. New Haven: Yale University Press.
- Hunter, J.E., J.E. Danes and S.H. Cohen. 1984. *Mathematical Models of Attitude Change. Change in Single Attitudes and Attitude Structure*. Vol. 1. Orlando: Academic Press.
- Petty, R.E., and J.T. Cacioppo, 1986. The Elaboration Likelihood Model of Persuasion. In *Advances in Experimental Social Psychology* 19: 123-205.
- Richardson, G.P., Anderson, D.F., Maxwell, T.A., and T.R. Stewart. 1994. Foundations of Mental Model Research. In *System Dynamics 1994*, ed. E.F. Wolstenholme. 181-192. System Dynamics Society, 49 Bedford Rd., Lincoln, MA 01773, U.S.A.
- Vennix, J.A.M., H.A. Akkermans, and E.A.J.A. Rouwette. 1996. Group Model-Building to Facilitate Organizational Change: An Exploratory Study. *System Dynamics Review*, Vol 12, No 1: 39-58.