

Stakeholder Dynamics

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Introduction

Stakeholders matter immensely to the process of analyzing and creating organizational strategy (Bryson 2004). Coalitions of external stakeholders create demands on the organization, supply it with resources, consume its products and compete for resources, customers, and clients. Coalitions of internal stakeholders shape strategy, mold organizational goals, and deploy resources to solve problems and achieve long term goals. Most approaches to defining and refining organizational strategy in both the public and private sectors involve an explicit analysis of stakeholders and their aspirations, needs, and wants (Bryson *et al.* 2002, Eden and Ackermann 1998) In this paper, we suggest one more critical reason why system dynamicists need to pay attention to stakeholders—stakeholders actually cause many of the feedback effects that we model. Powerful stakeholders, acting as intentional human agents striving to control the state of the system to guide it toward their own desired ends and goals interact to create what we as system dynamicists recognize as both balancing and self-reinforcing feedback effects. By explicitly focusing on individual stakeholders within the systems – their goals and aspirations and how they take actions to achieve those goals – we can get a better understanding of fundamental drivers of feedback effects within the systems that we study.

Hence, it is appropriate that recent group modeling projects involving the authors have come to include eliciting stakeholder goals and the sanctions stakeholders might implement if their goals are threatened. The facilitated, computer-supported group conversations often begin with a focus on discrete events (changes in system conditions that stakeholders are monitoring) and resulting stakeholder decisions (reactions intended to protect or reassert favorable conditions). The stakeholder interactions tend to take the form of sequences of moves in a game.

As shown in Figure 1 clients' initial articulations of sequences of events and discrete decisions emerging in these facilitated group modeling conversations must be informed by deeper understandings of good System Dynamics modeling principles in order to create useful group model building products such as sketches of key variables over time to serve as a reference mode or appropriate feedback-driven views of system structure. Bridging between the discrete-oriented products that are often created in the "facilitation zone" of GMB projects with deeper system principles in the so-called "modeling zone" creates two kinds of problems for the group modeling effort: first, discrete event-oriented views of system behavior make it difficult to move to the more continuous perspective characteristic of system dynamics modeling, and second (related to the first), they tend to draw the attention of participants away from longer-term, deeper systemic issues and pressures that ought to be the focus of strategic planning.

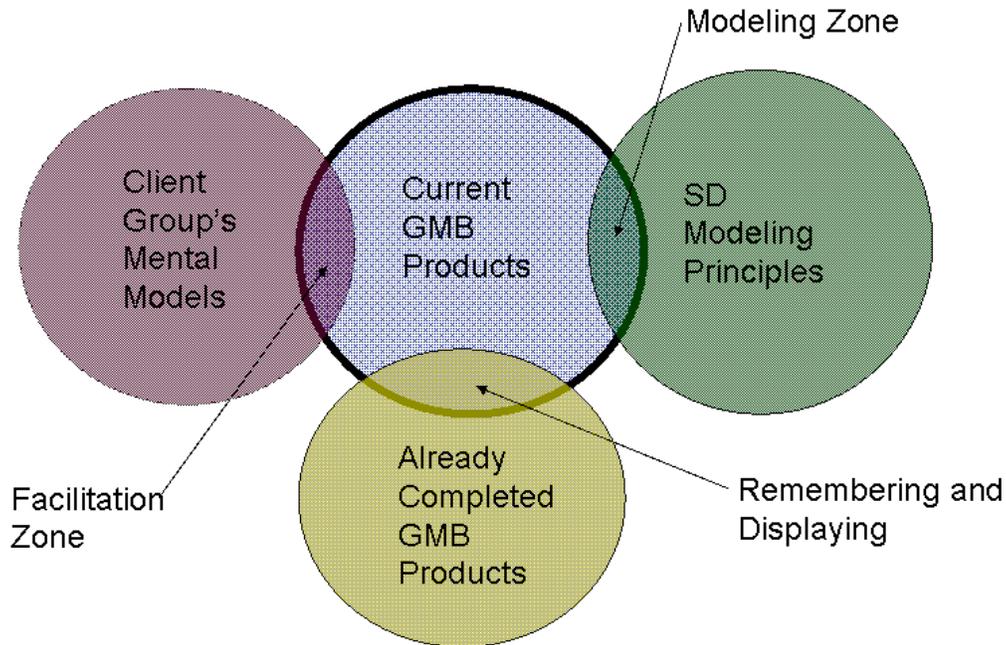


Figure 1: Client group’s mental models interact with System Dynamics modeling principles to produce useful group model building (GMB) products.

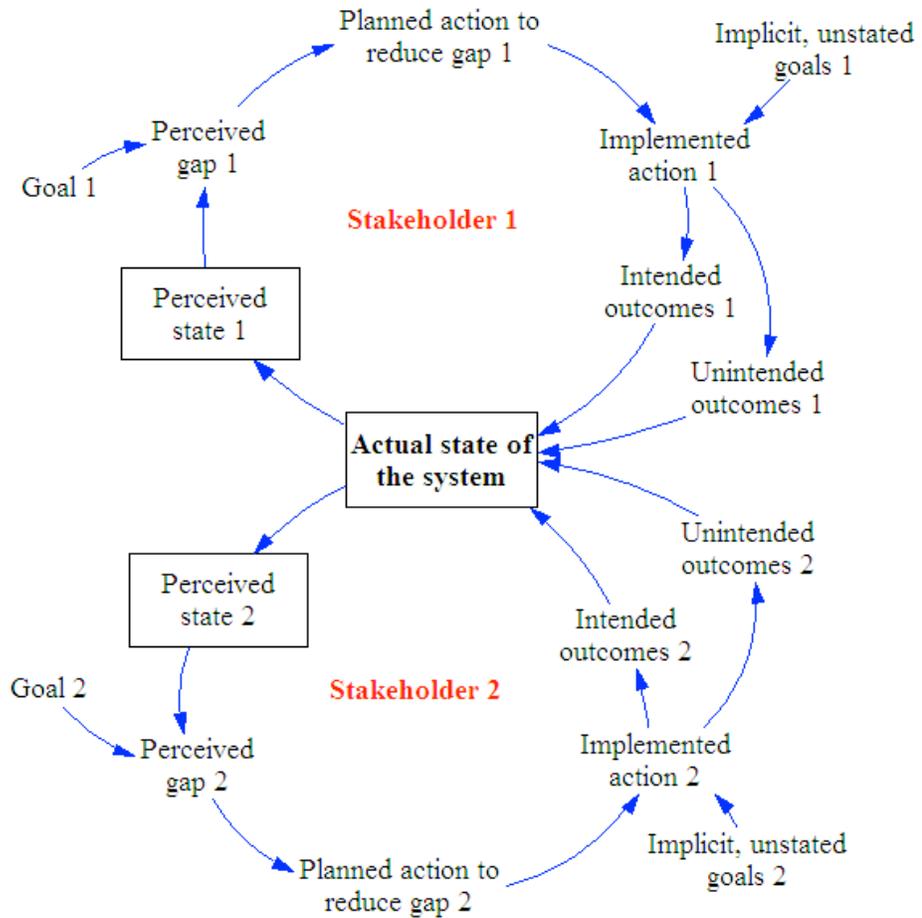
Motivated by these concerns, this article explores stakeholder dynamics from a system dynamics perspective, with the purpose of contributing ways to facilitate group conversations at the familiar event-decision level and simultaneously to move to the level of more continuously accumulating pressures and resources underlying strategy dynamics. We have two broad purposes with this paper. First, we seek to articulate some of the tensions that emerge when group modeling projects seek to bridge between the facilitation zone that must respect the integrity of client mental models and the modeling zone that seeks to create products that reflect good system dynamics practice. The facilitation zone is characterized by client mental models that are easily articulated in natural language resulting in statements with high semantic content that correspond easily to client perceptions of “how the system really works”. On the other hand, the modeling zone is grounded in formal system dynamics modeling principles and must result in formal equations that meet strict syntactical requirements (e.g., how to formulate stocks and flows) and have high degrees of internal and logical coherence.

Our second objective is to suggest practical strategies for managing these various tensions between good facilitation and good modeling. We seek to suggest how to craft specific sequences of activities for a group to follow that allows the conversation to start with natural language articulations of stakeholder dynamics and ends with more formal model-based products that can be used to construct formal system dynamics models. We begin by exploring how demonstrating how interactions between two or more key stakeholders with differing goals can and will generate important feedback effects within a social system.

stakeholders reacting to each other. There would be not just one goal, or one perception of the system condition, but multiple goals, perceptions, and implemented actions. Figure 4 shows the beginnings of such complications in a setting with just two stakeholders.

Figure 4: The goal-seeking feedback loops sketched in Figures 2 and 3 pictured in a setting with two stakeholders (or two stakeholder groups).

Each of the two stakeholders in this figure would have their own perceptions of the situation (the system condition), their own explicit and implicit goals they'd be protecting, their own plans for taking action, and their own actions. Presumably, their actions would have their own intended and



unintended consequences on the actual state of the system. Of course, Figure 4 becomes immensely more complicated in those situations where potentially competing stakeholders might view their realities to be socially or idiosyncratically constructed.¹

This figure looks like it contains four balancing feedback loops (two for each stakeholder counting unintended as well as intended paths). Actually, there is a “figure-eight” character to such systems that suggests there are more loops. For example, there is a conceptual loop starting from Perceived State 1, going around the upper loop through Intended Outcomes 1, and passing to Perceived State 2, going around the lower loop through Intended Outcomes 2, eventually passing again through the Actual State of the System and back to Perceived State 1. Counting the unintended outcomes paths, there are actually four such figure-eight

¹ For devotees of the social construction of reality, there is a deep issue here about whether such an underlying “reality” actually exists if no one can ever know it. We find it easier to think about stakeholder dynamics if we include such a shared reality.

loops here. Those figure-eight loops might be balancing or reinforcing – there’s no way to know in this general picture, but in a specific instance their polarities would be clear. An example of a reinforcing figure-eight loop in a pair of goal-seeking balancing loops is the classic arms race structure, where the primary goal of each stakeholder is to have more arms than the other: each works in a goal-seeking loop, and together, in the figure-eight, they create a reinforcing loop that escalates the arms build-up.

In any real situation, the analogous diagram with n stakeholders would be very messy looking, with $2n$ obvious balancing loops and a bunch more of these figure-eight constructions of varied polarities.

The complex interactions in such settings and the way they play out over time is what we are trying to understand when we talk about “stakeholder dynamics” as a fundamental cause of feedback effects in complex social systems.

Telling Stories from the Simplified Two-Stakeholder System

In spite of the simplicity of the two-stakeholder figure and the much greater complexity of an analogous structure represent n stakeholders, we can use this two-stakeholder diagram to tell archetypical stories.

Suppose the system is perceived by Stakeholders 1 and 2 to be in some sort of equilibrium, a period of relative calm or stasis, and is then disturbed somehow, perhaps by some action of one of these players or by some other agency. The disturbance could move the actual state of the system, and/or could move stakeholder perceptions. It’s the perceptions that are important for us here.

That shift in perceptions – let’s say of Stakeholder 1 – could create more of a gap between some goal stakeholder 1 has and 1’s perceptions. If the goal is important enough and the gap is sufficiently large, 1 would plan some action to reduce the gap. In the words of William Powers (whom we’ll talk about shortly), something 1 is “controlling for” is threatened, and 1 reacts. If we’re talking about something sufficiently significant for 1, presumably 1 would take some time to figure out appropriate moves to protect 1’s deep interest(s), and might take some time to implement them. For significant stakeholder dynamics, it is likely that there are delays in these loops.

So stakeholder 1 has perceived threats to goals he’s controlling for, has planned actions, and has implemented them. In sufficiently complex systems, when 1’s focus is on deep goals, it is probably not clear what results from 1’s actions. There are the intended results, which may begin to occur, and possibly unintended results, maybe known about in advance or maybe surprises. In any case, the actual state of the system (whatever that is) and/or Stakeholder 2’s perceptions of it change further, presumably back toward where Stakeholder 1 thought it was before the initial disturbance, but perhaps not.

Now Stakeholder 2 is likely to perceive that some explicit or implicit goals he is controlling for are threatened. If the goal is important enough and the gap is sufficiently large, 2 would

plan some action to reduce the gap, and the sequence described above to 1 unfolds for stakeholder 2, with different goals, perceptions, plans, and actions.

In these ways, the dynamic behavior of variables in the state of the system and the stakeholder perceptions of them play out over time, continuously creating and responding to system conditions.

System Dynamics Contributions to Thinking about Stakeholder Dynamics

There are several subtleties in the descriptions above that we think are important for thinking about stakeholder dynamics in policy and strategy. Many are hidden in the notions of “significant” goals, perceptions, plans, and actions. What are the powerful meanings of “significant” in stakeholder dynamics? These hidden notions with powerful meanings are elucidated by looking at the System Dynamics modeling principles that we believe must inform and support how we facilitate conversations with client groups in group model building session.

Events and Dynamics

Before addressing significant goals in stakeholder dynamics, a system dynamics practitioner would focus on the *dynamics* themselves, that is, the behavior patterns over time of various variables in the system. *Stakeholder dynamics* must be phenomena that play out over time. They ought to be able to be represented by graphs over time. One could draw graphs over a short time frame (time horizon) if those seemed to capture everything important in the situation, or one could graph variables over longer a longer time horizon if that seemed appropriate. Intuitively, stakeholder dynamics that play out over a longer time horizon are probably thought of as more significant somehow.

However, in the facilitation zone of our group model building work where unaided mental models expressed in natural language predominate, stakeholder dynamics tend to be articulated as stakeholder interactions in terms of *events*. Something happens, altering the status quo; some stakeholders see opportunities and/or threats and respond with decisions and events of their own making; then more stakeholder responses ensue. We succumb to “and then” thinking. We get a sequence of events and decisions, probably with various branching points to capture the inherent uncertainties involved in predicting events.

It seems likely that initial group elicitation of stakeholder dynamics would result in sequences of events and decisions. Hence when facilitating group discussions that seek to elucidate stakeholder dynamics, a two-step process will be required. In the first step of the process, the facilitator will seek to find exercises that allow the group to articulate interactions between stakeholder goals, aspirations, sanctions and purposive actions using language that evokes decisions, discrete events, or whatever representation of the system that clients might use to articulate images that correspond to their understanding of how key stakeholders interact within the system. This first stage of elicitation will generate a mass of “rough drafts” of key stakeholder dynamics. This raw material will somehow need to be sorted (perhaps in an off-line activity) by members of the GMB’s modeling team

(using some of the principles articulated below) and then “fed back” to the client group for a second step that will refine the raw insights generated from the initial elicitation. For example, a first-order facilitation exercise might elicit a series of retaliatory events involving two or more key stakeholders, indicating a deeper underlying conflict between these stakeholders. A subsequent exercise might focus more intensely on this goal conflict and use another facilitation technique, such as mapping key variable dynamics over time for one or more candidate stock variables in the feedback loop, to further probe and refine the stakeholder dynamic identified in the initial event-oriented description of system behavior.

In system dynamics group model building workshops, we often begin the problem finding, problem definition phase by asking participants to draw graphs over time of variables they think are important somehow in the problem they want to talk about. We have done that Graphs-Over-Time script for decades to get good lists of important variables. As we refine and develop stakeholder dynamics as a way to frame and elicit feedback effects, we will need to find innovative ways to use this same class of elicitation tools to encourage clients to articulate stakeholder goals and behavior in ways that lead easily to insights that can be modeling using best System Dynamics practices.

Time Frame and Appropriate Time Constants

To a systems modeler, any stock that is deemed to be *significant* in the problem dynamics under consideration must have a time constant *appropriate to the time frame* of the problem dynamics.

Stocks with time constants too short or too long are out of place in a formal model built to study the problem, and therefore probably ought to be out of place in thinking systemically about the problem. In a short time frame, stocks with long time constants are essentially constants. In a long time frame, stocks with short time constants adjust very quickly and do not contribute to the long-run dynamics of interest.

Forrester’s treatment of Food in *World Dynamics* provides an instructive example (Forrester 1972). The time frame of the model was 200 years. A stock of food would have been inappropriate since its time constant would have been on the order of at most a year or so. Thus an inventory of food would not be dynamically significant over the 200-year time frame of the model. The significant stocks in that study had time constants on the order of 40-to-80 years: population, capital, natural resources, pollution. So Forrester chose to capture the dynamics of food with a stock representing the fraction of capital invested in agriculture, a stock (like physical capital) with a time constant on the order of 25-to-50 years.

The *World Dynamics* example can show the difficulty of thinking about time constants in qualitative discussions about the policy dynamics of a complex system involving multiple stakeholders. Most conversations about the Club of Rome’s “global problematique” talked about the growing inability of the world to feed itself, but most people would talk about that in terms of food production (the inflow to a food stock) rather than the accumulation

representing the portion of the world's capital stock devoted to food, which would be a more appropriate focus of long-term policy.

The important conclusion here is that not just any accumulation, of any duration, thought by some to be important ought to be included in a model focusing on stakeholder dynamics. The stocks we need are the accumulations problem experts deem to be both important to stakeholders and also dynamically significant over the time frame of the problem dynamics (and thus the model).

Participants in a group strategy workshop may suggest or imply that certain accumulations ought to be included in the model of stakeholder dynamics. Some (we could hope most) will be insightful choices, but unfortunately it is likely that some will have time constants that are either way too short or way too long for the problem at hand and thus inappropriate to represent as stocks in the emerging formal model. We must craft scripts for working with groups in the facilitation zone that are sensitive to principles of system structure (in this case, dynamically significant accumulations) that are relevant in the modeling zone of our GMB endeavors (in this case, time constants).

It appears that most experienced system dynamics group modeling consultants handle the problem of the choice of stocks by “graceful fiat” or “benign dictate.” The initial stocks chosen to be important for the emerging model are chosen by the modeling team after preparing for the workshop and listening hard to the participants during the workshop. In our work where we've been able to generate a helpful concept model (Richardson 2006), some of the stocks in the concept model serve as potential choices for important stocks in the emerging group model. Those concept model stocks came from what the team learned about the problem from interactions or study prior to the group model building workshop, and sometimes lucky guesswork.

Figure 5 shows what we and our colleagues have said about these stock-selection processes in *ScriptsMap* (Ackermann, Andersen, Eden, Richardson, forthcoming; Andersen, Richardson, Eden and Ackermann 2009).² Scripts involving the concept model in the selection of stocks are shown on the right of this figure.

² *ScriptsMap* is a tool for designing multi-method group strategy support workshops. It was created by its authors to facilitate planning workshops that combine highly developed strategic planning scripts and system dynamics group modeling scripts. Its structure (alternating sequences of scripts and products) applies more generally to other multi-method workshop planning efforts. See the references cited for Figure 5.

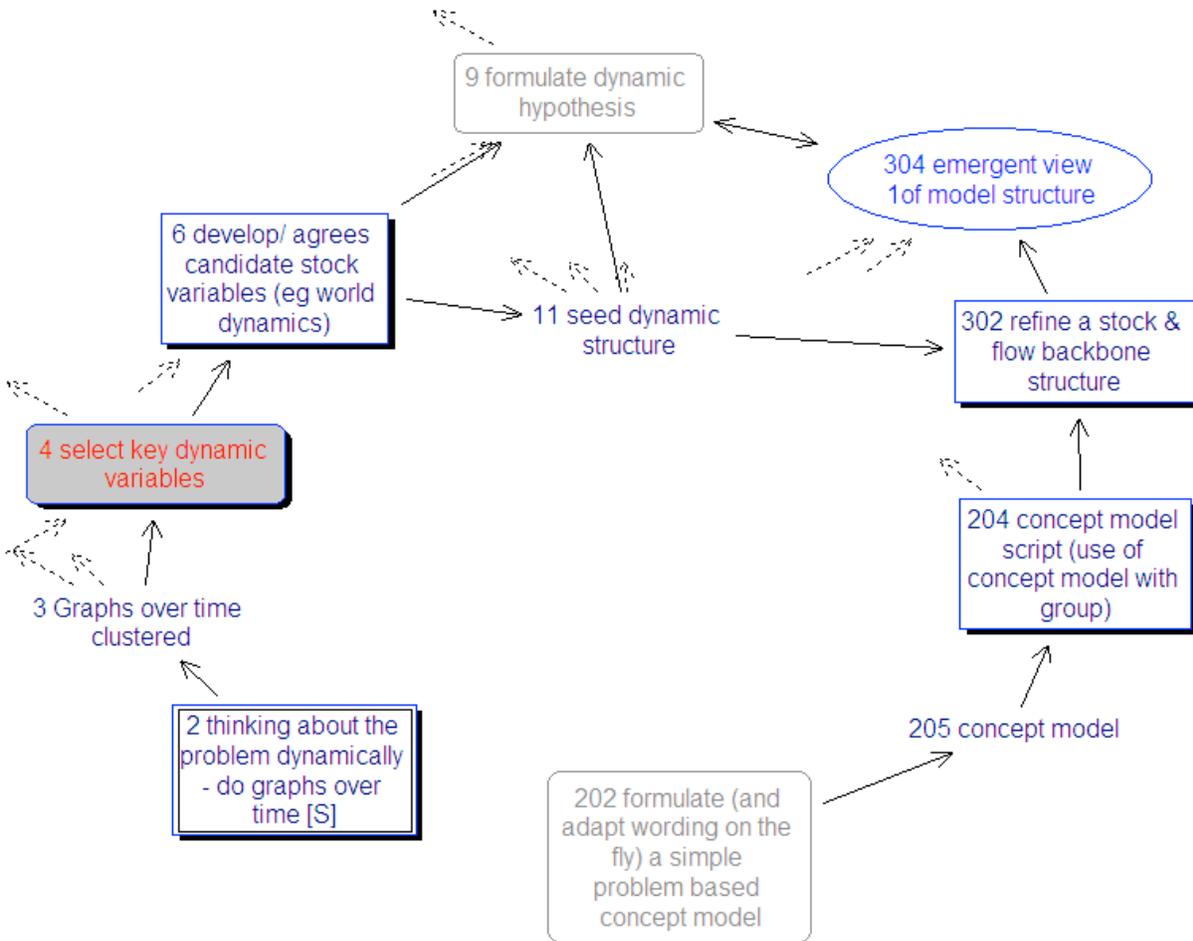


Figure 5: A selection from *ScriptsMap* showing group process scripts (rectangles) and products involved in teasing out important stocks in facilitated group modeling. (Source: Ackermann, Andersen, Eden, Richardson, forthcoming)³

Much of the rest of this *ScriptsMap* excerpt show scripts involved in identifying stocks that emerge during the GMB workshop come from the conversation of the participants. But the process is subtle. For example, item 4, “select key dynamic variables”, is an example of a specific case where this two-step process of client-dominated brainstorming in the facilitation zone interacts with System Dynamics principles in the modeling zone to create the most useful GMB products. Working often off line, the modeling team can review the full range of graphs over time to select a key few for further consideration by the group as key dynamic variables (aka stock variables). The modeling team should use all of its best knowledge of System Dynamics modeling principles to suggest a reduced set of stock variables that are candidates to be included in the seed dynamic structure that can serve as

³ Rectangles (with either square or rounded corners) in Figure 5 represent facilitated group *processes*. The other phrases in the map represent *products* of those scripts. Ovals represent products that would be thought of by participants and the facilitation team as deliverables. The numbers refer to the order items we generated, not to any significance in the sequence of events in a workshop.

a basis for the dynamic hypothesis. Such a process combines good facilitation with good modeling practices by allowing the final seed structure to be populated with variables that were initially identified by the group in a brainstorming mode (using variables with high client acceptance and face validity), but vetted by the modeling team to select variables that meet the requirements of key stock variables as understood by best modeling principles.

This multi-stage process of moving from graphs over time to capture client mental models to modeler selection of key stock variables from this “raw material” has rough analogies in other structure-mapping exercises that involve more interactive conversation between the client group and the facilitator. In the course of the group conversation being captured by the facilitator/elicitor, the facilitator edits on the fly the thoughts of the group and represents some as stocks (Andersen & Richardson 2007). In doing so, the facilitator uses bits of his accumulated modeling wisdom and bits of problem wisdom he is hearing from the group. He blends the two using sensitivity and intuition. While there are technical considerations to this facilitation/representation process, it is likely that experienced system dynamics GMB facilitators would have some trouble surfacing exactly what they do to help the group settle on an appropriate set of stocks that are dynamically significant in the group’s perspectives about the problem.

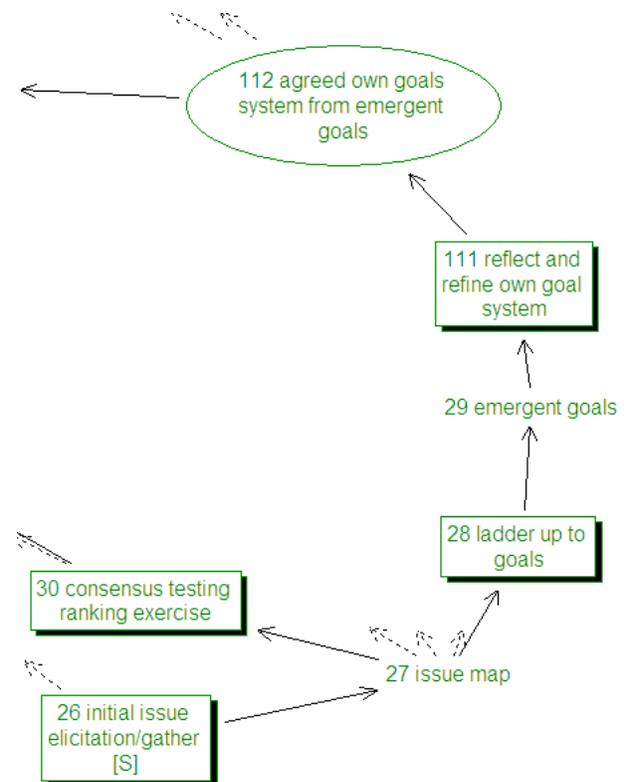
Goals: What are stakeholders “controlling for”?

In multimethod group decision support workshops we have participated in, stakeholder goals have been elicited from the participants using something like the scripts in Figure 6.

Figure 6: Facilitated group process scripts and products involved in eliciting and agreeing on stakeholder goals from a group.³ (Source: Andersen, Richardson, Eden, Ackermann (2009) and Ackermann, Andersen, Eden, and Richardson, forthcoming.)

The figure shows at the bottom right an elicitation process that results in an issue map of interconnected concerns of the group. From the issue map, in the script labeled “ladder up to goals,” it is possible to help the group to uncover the explicit and implicit goals of various stakeholders in the system and to purpose a process of refining and agreeing on a list key goals.

In order to inform and deepen these methods for facilitating goal-elicitation, we turn to the work of William Powers (See Richardson (1991), pp. 240-263.) for a view of system *goals* that has emerged from the control theory perspective that underlies the field of system dynamics.



Powers's first article was "A General Feedback Theory of Human Behavior" (1960). His masterwork was *Behavior, the Control of Perception* (1973). His writings were nothing short of an attempt to revolutionize the foundations of psychology by basing it on feedback thought.

The title of the 1973 book shows the intent: Powers claims that people behave in the ways they do in order to *control what they see*. A stimulus-response view focuses on one side of a feedback loop – *what we see* (stimulus) prompts us to action. Powers showed the significance of the other side of the loop – *what we want to see* (goal) prompts us to act to influence what we are seeing. In the figure in the first paragraphs of this paper one can hear Powers reminding us that the right-hand side of the feedback loop is trying to control the Perceived State. Planned action, Implemented action, Intended consequences – behavior – come together to try to control of perception.

In his phrasing, Powers focuses on what a person "is controlling for," his or her "reference signals," and uses that perspective to understand all human behavior:

The main proposition in the book is that all behavior is oriented all of the time around the control of certain quantities with respect to specific reference conditions. The only reason for which any higher organism acts is to counteract the effects of disturbances ... on controlled quantities it senses [BCP, pp. 47-48].

In a key passage, which we believe has significance for our thoughts on stakeholder dynamics, Powers explains why, in this view of psychological dynamics, that attempts to control others do not always work:

The behavior of an animate object – an organism – is governed by internal reference signals. The ultimate determinant of the organism's choice of reference signals is its set of intrinsic reference levels, which are not only internal to the organism by are inaccessible to external influences. The behavior of an organism can be influenced ..., but the behavior of organisms is not organized around the control of overt actions. ...Organisms do not care how [others] act as long as the actions do not disturb the perceptions they do care about" (BCP, pp. 264-265).

Powers's central thought is the concept of behavior as a feedback process organized around the control of perception.

For stakeholder dynamics, the question in Powers's terms would be, What are stakeholders "controlling for"? What do they care so much about that they will alter their behavior if they perceive threats to those internal reference conditions (goals)?

The behaviors that result when stakeholders act to control perceptions of things they care deeply about are stakeholder dynamics.

That translation suggests that when we elicit stakeholder goals in a particular problem we are seeking "deep" goals, things that stakeholders are "controlling for" *deep down*. We are not seeking surface goals, or transient concerns, or simple stimulus-response pairings. It seems likely, however, that without great sensitivity and insightful group process group

facilitators would end up eliciting goals that would range all over the map, from the simple ones of little use in understanding serious stakeholder dynamics, to the deeply significant ones that play the major roles in stakeholder behavior over the time frame of interest..

Undoubtedly, these “deep” goals that stakeholders are controlling for are related to the “significant” stocks mentioned earlier. We may be able to establish links between the two by thinking about the time constants of the significant stocks stakeholders are looking at.

Referring back to Figure 6, the nature of the facilitation problem that group model builders face become more clear. Clearly, simply relying on the top goals that happen to emerge on an initial issue map will certainly not yield the “deep” goals that Powers describes. A client-oriented script for “laddering up” the goal structure will go part way toward articulating Power’s deep goals. But some additional step involving a modeler’s understanding of deep goals as defined by Powers will be needed in the “reflect and refine own goal system” will be needed to arrive at the more basic set of system goals that really drive stakeholder dynamics to create feedback dynamics within the system under study. It will not be possible to stop the group process and deliver a short lecture on William Powers and his theories and thought. We need to design facilitation scripts that on their own lead groups to think more deeply about system goals in much the same way that the simple direction to draw graphs over time tend to draw a groups attention away from discrete events toward a more continuous view of over time dynamics.

Example relating to depth and significance of goals

A recent item in the news exemplifies the difficulty of distinguishing between “deep” goals and less important goals in stakeholder dynamics. The Dalai Lama was invited to visit the President of the United States in February 2010. The visit threatened China’s perception of the world’s understanding that Tibet is sovereign Chinese territory. In a move to attempt to signal to China that the meeting should not interrupt US-China relations, the President met the Dalai Lama in the White House Map Room rather than the more formal Oval Office. One pundit on NPR pointed out that the visit would create short-term, minor tensions in Sino-US relations, but would not get in the way of longer term, major efforts to work toward common goals. In contrast, the BBC quoted a range of opinions in various Chinese media outlets, noting “Several commentators felt that China was in a strong position to mount a counter-attack, while others urged restraint in the relationship, which has recently been challenged by several controversies.⁴

“It is gross interference in China's internal affairs and it will cause serious harm to Sino-US relations. ...A rising China will, of course, not sit idly by at the US' unjustified provocation, and it is bound to make a counter-attack. (EDITORIAL in HONG KONG'S WEN WEI PO)

“The US has frequently launched attacks against China recently on arms sales to Taiwan, the meeting with the Dalai, the Google issue, trade protectionism and the push for renminbi revaluation... One black cloud after another is covering the sky, and a 'fierce struggle' between China and the US could be set off at any moment!... At this moment, the Chinese should adhere

⁴ http://news.bbc.co.uk/2/hi/not_in_website/syndication/monitoring/media_reports/8523783.stm

to the middle way, let the Americans suffer 'indirectly' and not confront them head-on. (WANG DAO in HONG KONG'S TA KUNG PAO)

"The arrogance of the Americans will not change just because there is a new president... However, China and the US are mutually dependent on each other and need to co-operate... We should still hide our abilities and bide our time. (NG HONG-MUN in HONG KONG'S MING PAO)

"News that China has dumped a massive amount of US treasuries has caused consternation in some quarters. Coming at a time when Sino-US relations have hit a rocky patch over American weapons sales to Taiwan and US President Barack Obama's meeting with the Dalai Lama, conspiracy theorists and alarmists are having a field day... Take a deep breath now, everyone, and calm down. Other than the large amount involved, the sale itself was to be expected... (EDITORIAL in HONG KONG'S SOUTH CHINA MORNING POST)

"Recently, the US has launched successive attacks against China on arms sales to Taiwan, Obama's meeting with the Dalai Lama and Sino-US trade friction. But China has cards to play... In terms of diversifying foreign-exchange reserves, a moderate sell-off of US Treasury bonds will be beneficial and truly in line with the interests of China. (YU FENGHUI in BEIJING'S ZHONGGUO WANG) [All these quotes are found in the reference in footnote 4.]

If this topic were the subject of a group model building session, Figure 6 suggests that having the group construct an issue map would be a logical first step in a process aimed at discerning system goals. The issue map would give the group, the facilitation team, and the modeling team a body of "first draft" material with which to work. Further work with this initial goal system, working to extract a "higher" goal set by "laddering up" would use techniques described by Ackermann et al. (2005). These initial steps would clearly create an initial goal system arranged into some sort of an hierarchy. However, Powell's work suggests that the goals initially identified by the group and perhaps even those isolated by the hierarchical "laddering up" procedure, may not be the deeper set of goals that would be needed to drive a proper system dynamics formulation. More work with the group may be needed.

Some of these quotes suggest the visit of the Dalai Lama would widen a serious breach in Sino-US relations and generate various harsh retaliatory responses from China. Others suggest a minor threat requiring more of a wait-and-see attitude on the part of China. Powers would say that in either case Chinese reactions are attempts by China to control its own perception of the gap between how it wants to be perceived by the West and how they think it is perceived by the West.

The graphs over time that one could sketch to capture these stakeholder dynamics range from minor perturbations over a relatively short time frame, to major dislocations with repercussions lasting years. Linked with those short-term and long-term dynamics would be accumulations of pressures, perceptions, and resources with very different time constants. It is far from clear (to us) which of these time frames and levels of significance will prove to be true in the long run (although we tend to favor here the "minor perturbation" point of view). But the example makes very clear that the distinction

between short-run and long-run dynamics, and the time constants of stocks significant in those dynamics, are issues we have to deal with in any discussion of stakeholder dynamics.

Figure 7 shows illustrative, hypothetical graphs over time trying to capture mild and severe Chinese reactions to the Dalai Lama's visit. One graph (the red line) captures a mild reaction that is over in less than a month or two. For serious US-China relations, stakeholders would only be interested in the severe reaction (the green line) that builds in this extremely hypothetical scenario in a self-reinforcing way to a serious level that threatens peaceful relations between the two great powers. The green curve tries to capture Chinese developments that would emerge from her efforts to control her perceptions of US intransigence.

In discussions of stakeholder dynamics in facilitated group strategy workshops, systems practitioners would want to learn how to help groups talk about structure and dynamics that match in significance and duration.

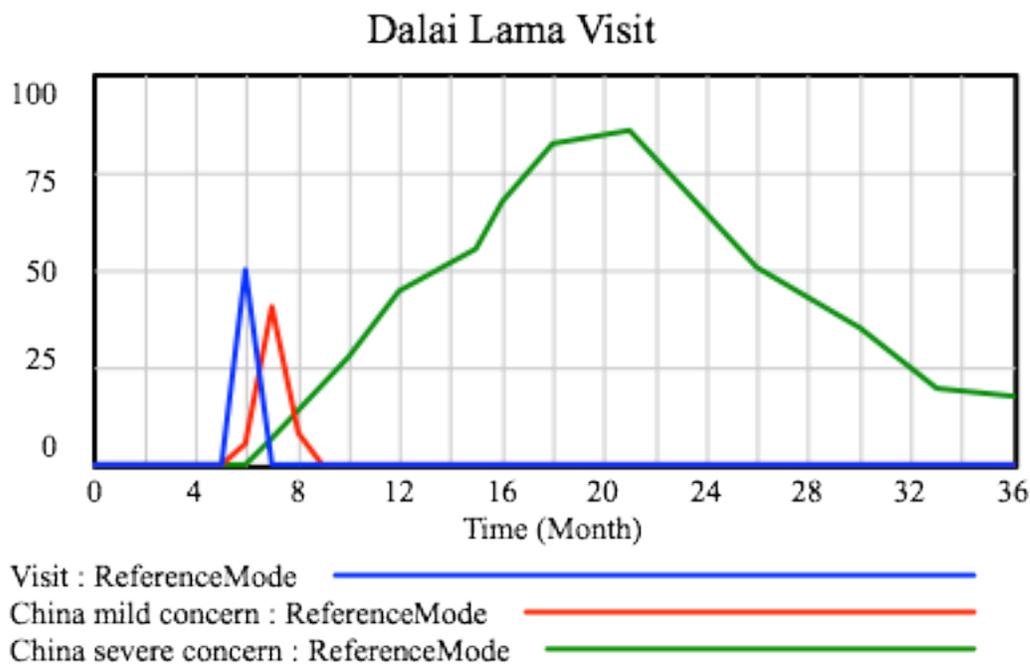


Figure 7: Hypothetical graphs over time showing the event of the Dalai Lama's visit (blue), a short-term, mild reaction by China (red), and a severe China reaction (green) building in a self-reinforcing way far beyond the original event.

Figure 7 suggests what type of further work may be needed in order to move this group process forward. The group would need an additional script that operates on the best-existing goal map but is also sensitive to the varying time frames (and seriousness of the response) suggested by the three reference modes in Figure 7. The facilitation and modeling teams would need to work together to get the group to focus on the dynamic variables that might characterize both the goal set and the response that might drive the longer frame reference mode.

Cues

Colleagues in judgment and decision making at the University at Albany sensitized us long ago to think about the *cues* people are using in their decision making and the interpretations and weights they place upon them (e.g., Richardson, Andersen, Maxwell, and Stewart, 1994). Cues are selective perceptions. There are physical (structural) limits on the cues people can use – we can't see everything – and we are further limited by our selection biases that push us toward seeing some cues and missing others – our priors and preferences enable us to see some things and prevent us from seeing others.

Figure 8 below shows an attempt to bring together judgment and decision theory wisdom with a cybernetic or system dynamics perspective focused on balancing (controlling) feedback loops. It emerged from an effort to understand the dynamics of “mental models.” Cues are at the right. At the left is the person’s “mental model” (perceptions, means, ends, and the means-ends connections).⁵

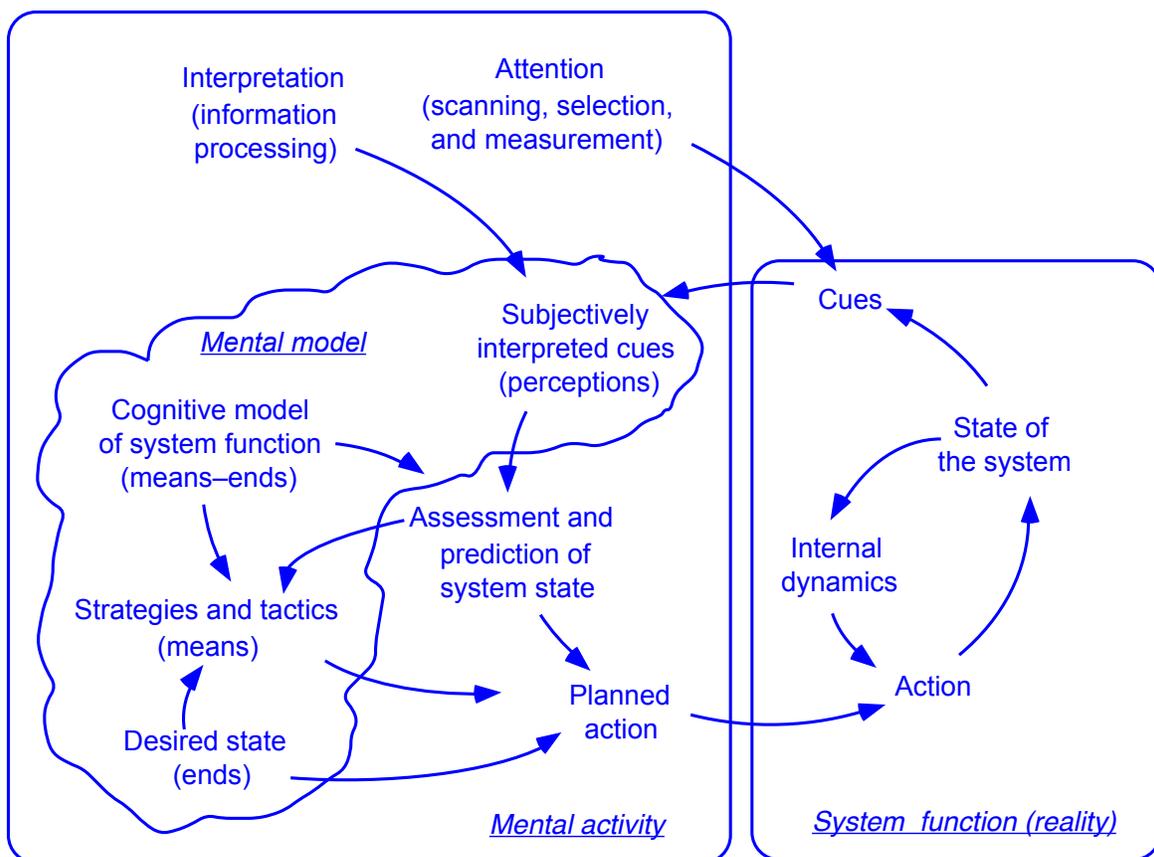


Figure 8: A representation of four components of an individual’s “mental model,” showing in particular here the cues attended to by the individual from the environment and the individual’s subjective interpretation of them. (Source: Richardson, Andersen, Maxwell, and Stewart, 1994).

⁵ For simplicity, omitted from this figure is learning, that is, the structures involved in changing various aspects of the mental model. For the bigger picture see Richardson, Andersen, Maxwell & Stewart (1994).

For stakeholder dynamics, cues would be the potential data stakeholders might pay attention to. Perceptions are subjectively interpreted cues. The interpretations might involve bias or other forms of distortion and certainly would include *cue weights* to assign relative importance.

So when we are talking about what stakeholders perceive and how they act to control those perceptions, we are talking about perceptions that are necessarily limited. First they are limited by the cues that are available to a stakeholder. Second, the perceptions are limited by the selective attention of the stakeholder (not paying attention to all available cues) and by the interpretations a stakeholder makes of a given cue or cue combination.

In our attempts to elicit stakeholder goals and sanctions it seems reasonable that we would have to pay attention to the cues available to stakeholders and their cue selections that in the end create the perceptions on which they would base their behavior.

Gaps between goals and perceptions

Stakeholder dynamics must result from actions stakeholders take to bring their perceptions in line with their goals. In Powers's terms the gap they are trying to close is the gap between what they perceive and what they are controlling for. In the Stewart/Andersen/Richardson/Maxwell map above, the crucial gap is between a person's "assessment and prediction of system state" and his or her "desired state." Or to a cybernetics fan sixty years ago, it's simply the "perceived gap."

But there must be bigger gaps and smaller gaps, significant gaps and insignificant gaps, perhaps even gaps so large their actual size doesn't matter any more, it's just huge. (System dynamics modelers would note a nonlinear saturating effect.) It seems reasonable that to capture stakeholder dynamics realistically we would want to know how large any given perception-goal gap has to be to generate stakeholder responses.

Speculative Conclusions

In this note, we have traced some thoughts about stakeholder dynamics. We arrive at three broad classes of preliminary conclusions. First, we hypothesize that many of the important feedback effects that are found in social systems emerge from stakeholder dynamics—the over time interactions between two or more intentional agents in the system who are striving to achieve distinct and often competing goal sets using sanctions and pro-active actions activated by their agency. Because feedback loops are created by stakeholder dynamics, the direct study of stakeholder goals, sanctions, actions, and reactions should be an important way to detect and map feedback effects within group model building sessions.

Second, mapping and analyzing stakeholder dynamics will not be an easy task because of a number of conceptual and practical issues that arise when we look at stakeholder dynamics from the point of view of best modeling practices. This is a classic case of conflict between the facilitation zone of GMB practice and the separate but related modeling zone. The list of conceptual and practical issues that we have discussed includes:

- Stakeholder goals and sanctions are elements of the classic goal-seeking “cybernetics” balancing loop.
- Stakeholder dynamics arise when two or more stakeholders interact in linked goal-seeking structures.
- Two or more interconnected balancing loops have “figure eight” structures that can represent either balancing or reinforcing feedback processes. Connected goal-seeking structures may not have a goal-seeking character.
- It is the potentially complex behavior over time of two or more stakeholders interacting that is what we mean by “stakeholder dynamics.”
- There are potential problems working with groups to elicit “significant” goals appropriate to the problems at issue.
- Many of these problems fall in the general category of “things skilled modelers can do but don’t know how to get others to do.”
- Groups will tend to focus on events and decisions and think in “and then” terms rather than the rather more continuous patterns of systems thinking.
- Accumulations that relate to stakeholder goals will be dynamically significant if their time constants suit the time frame of the problems issue.
- Scripts that elicit dynamically significant stocks are still in the realm of the art of the group model builder.
- Stakeholder goals may well be productively thought of as issues or quantities that stakeholders are “controlling for.”
- Getting at the deep issues or variables stakeholders are controlling for in any given context seems like a potentially difficult group facilitation problem.
- Eliciting the cues that stakeholders have available to them, and how they select from them and subjectively interpret them to create their perceptions, seem like potentially difficult group facilitation problems.⁶
- The size of gaps between perceptions and what a stakeholder is controlling for would appear in most settings to have nonlinear effects: small gaps generate little or no response, medium gaps create some response, large gaps may create large responses, and huge gaps may be no different from large gaps.

Third and finally, we have pointed toward several principles that we believe should inform the continuing development and refinement of scripts to use with groups involved in GMB exercises. While using the framework of stakeholder dynamics is not in principle different from many other aspects of GMB practice, the issues discussed above point us toward several principles that we believe will guide future development of scripts oriented around stakeholder dynamics elicitation.

⁶ Once we know something about cues, we can model formally selection and importance by using weights on the cues. The weights can vary endogenously to capture endogenous changes in selection and importance. But it seems there is a lot we’d need to know to model such things well in any given setting.

- Begin with elicitation techniques that draw immediately and directly on the client group's mental models. That is, use techniques that make sense within the framework of natural language used by the clients in their day-to-day work and are semantically flexible, allowing clients to express a wide range of ideas and concepts without having to use modeling syntax (e.g., stocks, flows, feedback loops) to express their initial thoughts.

This approach will assure that the initial data elicited from the group will have high correspondence to their insights and beliefs concerning the system being modeled. Examples of such natural language starting points include issue maps and goals maps. We recognize that this approach will in great likelihood create an initial data set that may not be well aligned with what we need to craft a formal simulation model.

- Whenever possible, early on in the elicitation process employ facilitation techniques that "push" the group in the direction of creating products that are more consistent with System Dynamics modeling principles.

For example, asking a group to graph key variables over time (as opposed to just listing key variables or extracting them from an issue map) has a much greater chance to identify dynamic variables that are candidates for system stock variables. We recognize that this second principle can and will conflict with the first principle stated just above.

- Design activities that permit both the facilitation and modeling teams to selectively mine and re-present the data elicited from the group's early work to generate views that are more likely to be consistent with best System Dynamics modeling principles.

For example, after a graph-the-variable exercise almost all of the variables gathered from a group will be truly dynamic variables. However, only some of these will be strong candidates to become stock variables that can define the state-space of the dynamic system being modeled. An off-line sorting by a skilled modeler, selecting the most likely (in her or his professional judgment) will have the greatest likelihood of getting the GMB effort headed toward an insightful system dynamics model.

We believe that we need to create more such scripts to design GMB interventions that respect the natural language utterances of the client group, but also arrive at well-formulated system dynamics models that meet our field's specific syntactical requirements. The problems we have been addressing, inherent in eliciting, mapping, and modeling stakeholder dynamics, provide a rich set of challenges for advances in group model building.

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