The value of Stakeholder Group Model-Building when facing a System Dynamic problem

A qualitative research about methodological approach to form a CLD

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Abstract

Group Model-Building (GMB), is often used as an approach to form a model in system dynamics (SD). The purpose of this article is to explore how participants in GMB experience the process and analyse the value of it. The paper presents a qualitative research based on the grounded theory, carried out with interviews with SD specialists and participants in GMB. Results indicated that the value from the stakeholder point of view lies foremost in the networking aspect of GMB and in the platform to communicate their ideas and learning. From the GMB managers point of view the results are in line with the textbooks and indicate that the value lies first and foremost in trust towards the resulting model from those who have the power to use them but number of other aspects come to consideration and are presented in a value framework and in the form of a theory.

Key words: system dynamics, methodology, group model building, grounded theory, stakeholder workshops, model, ownership.

Introduction

System dynamic model building process in which a client group is deeply involved in the process of model construction is here referred to as a stakeholder group model building process or *GMB*. Group model building emerged as a method to guide the modelling process, where an attempt was made to merge the conceptual part of the modelling process (the qualitative process) and the quantitative simulation with system dynamic tools (SD tools) (Vennix, 1996). The method is believed to be a powerful tool in the creation of feedback theories. Since its beginnings, the founders of the field have developed a series of guidelines for the model building process (Randers, 1980; Sterman, 2000) and a series of tests to build confidence in the models created (Sterman, 2000). Building models with a group

of stakeholders has become an established approach in the field of system dynamics. Involving stakeholders is believed to generate relevant information regarding the issue and gain ownership of those involved on the recommendations generated in the process. Fewer studies have been carried out about how enthusiastic the stakeholders are about this approach.

It has been clear from the beginning within System Dynamics research that models are of limited use if they cannot communicate the understanding to the user or the client. The development of the CLD concept was an attempt by Forrester to address this issue. It was later realized that the conceptual phase of the modelling progress was important when dealing with problems together with stakeholders (Randers, 1980) and over the last decades, a consensus has grown that group-modelling process is an effective tool for fostering insight into the problem and ownership of the model. It's also a well-known fact by practitioners that group model building encourages team-learning, commitment and strives for agreement but not a compromise. But is the group model building process always necessary when forming a causal loop diagram (CLD) as a base for a system dynamic model? If so, what is the value of the group model building process? The complexities of problem conceptualization, model formulation and group work with different stakeholders makes it a valid question.

There is a growing body of literature on how to involve clients in the modelling process and it is a general assumption among those who agree upon using GMB that system dynamics can be used as a method to systematically elicit and share mental models in teams. When following that approach the process of building a model starts from the different perceptions of the participants. Stated differently, group model building is a process in which team members exchange their perceptions of a problem and explore such questions as: what exactly is the problem we face? How did the problematic situation originate? What might be its underlying causes? How can the problem be effectively tackled? The primary focus is descriptive and diagnostic: the way team members think a system works is separated from the question of how they would like a system to work (Vennix, 1996).

The purpose of the study is to explore GMB and to understand the affects the method triggers. The research goal is embodied in researching the value for participants and managers of group model building in relation to forming a causal loop diagram intended as a base for a stock and flow diagram.

The main research questions are: 1) *Does group model building, as an approach to form a CLD, reinforce more trust to the model as apposed to methods that don't include the stakeholders in the model building process? 2) What is the value of stakeholder group model building?*

Note that the noun "value" can be defined in a number of ways, one of which is "usefulness or importance" (Merriam-Webster.com, 2014). Hence, the definition used in this paper captures the forenamed from both the stakeholder point of view and the researchers point of view. In addition, the following is considered to be of special value in this research considering GMB, trust towards a model, ownership of model from those who have the power to act and consensus regarding results from GMB.

The paper presents a qualitative research based on the grounded theory, carried out with interviews with SD specialists and participants in GMB.

Stakeholders

Planning a GMB project requires addressing the question of "who are the stakeholders for this project?" Therefore, one should be familiar with the definition of a stakeholder. In general, a stakeholder is someone who will, develop, make use of, or have an impact on any aspect of the project. They can be categorized in many ways but in short stakeholders are those who have a stake in the project. Grimble and Wellar describe stakeholders according to the impact of or on them, the description covers "those who affect (determine) decision or action, and those affected by this decision or action and therefore a distinction is made between active and passive stakeholders. They also define stakeholders according to their importance and influence, which leads to a classification of primary and secondary stakeholders (Grimble & Wellard, 1997). Murray-Webster and Simon define stakeholders by attributes of power, interest and attitude and therefore one might say that they include the stakeholders' own motivation into the classification (Murray-Webster & Simon, 2008). Mitchell *et.al* argues that stakeholders possess one or more of the following relationship attributes, *power, legitimacy* and *urgency*. They combine the attributes and generate an interesting typology of stakeholders (Mitchell, Agle, & Wood, 1997).

If a decision is made to involve the stakeholders in a GMB sessions some stakeholder analysis is needed. The following questions need to be addressed; *what* stakeholders should be taken into account? *Why* should they be taken into account? And *how* should we take them into account?

After the identification of stakeholders has been done, the researcher has to decide who should be invited. One way to evaluate which stakeholders to include in the model building is based on a stakeholder analysis approach. Different methodologies suggest different ways of analysing stakeholders. One is to start by grouping the stakeholders with similar interest into groups and then prioritizes them in order of importance, interest and power or influence of each stakeholder group on a quadrant (Bryson, 1995).

Inviting stakeholders can be costly, it takes time and effort and therefore it is important to reflect up on the decision of whom to invite and make an argument why they should be invited. There are a couple of guidelines which might be of help according to Vennix, for example if the project aims at bringing about particular decisions one important point to keep in mind when selecting participants is to have those present who have the power to act. In that context it is better to have one person to many than one to few (Vennix, 1996). Richardson og Andersen point out that the breadth of knowledge and diversity of points of view in the group seem to be crucial for the success of a model-building sessions, but also argue that it is reasonable to guess that too much breadth and diversity in the room might create conflicts that could greatly inhibit the process (Richardson & Andersen, 1995).

Generally, the benefits from involving a number of different stakeholder that individually might only have a limited view of the problem are that they can likely draw up a holistic view of the system. Involving them could result in consensus about the recommendations from the GMB sessions and the feeling of ownership towards the solution that increases the likelihood for the recommendations to be put in use in practice. Ideally one could argue that it was best to get at least one representative from every stakeholder group. If the project aims at bringing out particular decisions it is also important to select participants that have the power to act (Vennix, 1996). As to the group size, there is no single answer. A larger group might result in better quality of the model; however it might also result in greater difficulty in creating interpersonal relationships that might lower group performance (Collins & Guetzkow, 1964). Research has shown that the larger the group the fewer the number of people who

tend to participate in the discussion, and in large groups the discussions tend to be dominated by a only few people (Báles, Strodtbeck, Mills, & Roseborough, 1951). According to Slater (1958), a group of five seems to be optimal when it comes to satisfaction.

Then the question turns to, "How to involve them?" When designing conceptual models and carrying out the subsequent scenario planning, a strong focus on stakeholder participation can be regarded as an essential phase (Cavana & Maani, 2000). In Group model building the focus is on stakeholder participation. It can be used to stand in the shoes of stakeholders or to communicate with them and last but not least to actually involve stakeholders in the decision making process.

Stakeholder Group Model Building

Group model building is a process in which team members exchange perceptions of a problem and explore such questions as: what exactly is the problem we face? How did the problematic situation originate? What might be its underlying causes? How can the problem be effectively tackled? The primary is descriptive and diagnostic (Vennix, 1996). The process of assembling a model is a way of eliciting mental structures in order to clarify and structure debate about some problematic situation (Vennix, 1996).

When facing a System Dynamic problem one needs to weigh and measure the benefits and drawbacks from using Stakeholder Group Model Building as an approach to form the base of the model or not. For sure a successful GMB can and should foster consensus and create commitment with the resulting decision from the GMB session among the stakeholders. Stakeholders usually quickly adapt the method of forming a causal loop diagrams, possibly because that people have strong tendency to think in terms of causal processes (Weiner, 1985). Considering the drawbacks it is imperative that it is taken into account that when stakeholders are the main model builders, that stakeholders are people and people base their reality on their experience. Many experiments in psychology have conformed the existence of selective perception (Johnson Abercrombie, 1960), i.e. people see things according to what they expect to see (Vennix, 1996). Other experiments have shown that people can easily be led to believe something (Naftulin, Ware, & Donnelly, 1972). When working with a large group of different stakeholders it is quite common that individual stakeholders are convinced that they are right in which other stakeholders primarily argue for their own opinions rather than listen to each other, resulting in a sphere when one is trying to win the discussion rather than trying to learn from the perspective of the other GMB members(Vennix, 1996).

It is not always necessary to construct a full-blown system dynamic model to gain understanding on the system. In some cases qualitative model is even more suitable. Note that some system dynamists hold the opinion that only quantified models serve as a system dynamic model and others that argue that it is unwise to limit system dynamics to quantified models (Vennix, 1996; Wolstenholme, 1990). In this respect some authors between make a distinction qualitative and quantitative system dynamics, where qualitative system dynamics refers to the stages of a problem identification and conceptualization and quantitative system dynamics involves full-blown system dynamics models including simulations (Vennix, 1996). It is important to understand that though the plan might be to build a quantitative system dynamic model that is not the ultimate goal of GMB. Hence the quantitative system dynamic model is a means to achieve other ends (Vennix, 1996) though the outcome from the GMB workshops should serve as a platform to formulate such a model.

The goals of GMB, is to accomplish that team learning is enhanced in a way so it creates shared social reality (Phillips, 1989). Considering that when working with a large group of different stakeholders it is quite common that individual stakeholders are convinced that they are right in which other stakeholders primarily argue for their own opinions rather than listen to each other, resulting in a sphere when one is trying to win the discussion rather than trying to learn from the perspective of the other GMB members (Vennix, 1996). Therefore it is an important goal to foster consensus within the group rather than compromise and acceptance and commitment with the results (Eden, 1992). The model outcome from a GMB aims to identify the feedback processes causing the system's problems and look for the dynamic structure underlying the system's behaviour (Vennix, 1996).

When trying to establish whether GMB is successful it is imperative to define the meaning of the phrase. One definition of "successful", is "to obtain something desirable or intended", and that is the meaning used in this research. Therefore a successful GMB project, used in this research, is when the intended goals for the GMB are reached or succeeded and the process returns value for both stakeholders and managers. Even though goals can be different for different projects, the aims for GMB are usually the same. According to Vennix there are three purposes with regard to GMB. Firstly to create climate in which team learning can take place, reinforcing understanding of the problem. Secondly to foster consensus (not compromise) and thirdly to create acceptance and commitment with the decision made(Vennix, 1996).

Methodology

The methodology used was a qualitative research since it seeks to produce a plausible and coherent explanation of the phenomenon under study with a small detailed sample. Instead of trying to extract abstract categories from social phenomena as quantitative scholars do, qualitative researchers try to understand social processes in context (Esterberg, 2002). The results from this qualitative study are not statistically generalizable, although the theory generated may be.

The methodology is based on the *Grounded theory approach (GTA)* and the interviews used for the data gathering where carried on in a semi structured form. The aim of grounded theory is to generate or discover a theory. It may be defined as *the discovery of theory from data systematically obtained from social research* (Glaser & Strauss, 1967). The method is ideal for exploring integral social relationships and the behaviour of groups where there has been little exploration of the contextual factors that affect individual's lives (Crooks, 2001). The approach consists of a set of steps whose careful execution is thought to guarantee a good theory as the outcome (Borgatti, 2006; Strauss & Corbin, 1998). According to Strauss and Corbin, the quality of a theory can be evaluated by the process by which a theory is constructed (Strauss & Corbin, 1998). The basic idea of the grounded theory approach is to read and re-read a textual database and discover or label variables, called categories, concepts and properties, and their interrelationships (Borgatti, 2006).

Data analysis

Following are the stages of the analysis:

1) Codes: Anchors identified in the data that allow the key points of the data to be gathered
2) Concepts: Codes of similar content collected together that allowed the data to be grouped

3) Categories: Broad groups of similar concepts identified used to generate a theory
4) Theories: A collection of explanations that explain the subject of the research

The data gathered from the interviews was analysed with constant comparison and line-by-line open coding, i.e. the analytic process through which concepts are identified and their properties and dimensions are discovered in data. Analytic codes and categories where developed from the data and inductive construction of abstract categories. Analytical memos where written in the stage between coding and writing an integration of categories into a theoretical framework was made. To keep anonymity the interviewees where identified with the following letters, KEF, P, GB, S, JL, MF, AH, PO.

The research method is mainly based on the fact that data is gathered and hypothesis are formed based on the data wich would ideally be a foundation for a theory. Emphasize is placed up on finding clues in the data that can possible increase the researchers understanding on the subject. The clues can contribute to the researchers point of view and possible broaden the question scope (Strauss & Corbin, 1998). This approach fits well to the research goal, that is to increase knowledge and deepen understanding on the real valus on forming a CLD with stakeholder group model building method.

Data

All the interviews where *semi-structured.* In a *semi-structured interview* the researcher has a list of questions or fairly specific topics to be covered, often referred to as an *interview guide*, but the interviewee has a great deal of leeway in how to reply. Questions may not follow on exactly in the way outlined on the schedule. Questions that are not included in the guide may be asked as they pick up on things said by interviewers. But, by and large, all of the questions will be asked and a similar wording.

The interviews took place over two time periods. The first period was between 18th of September 2012 – 19th of November 2012, and the second from 18th of February 2014 – 6th of March 2014. The interviews took place in Malmö (Sweden), Reykjavík (Iceland) and over Skype via the internet. All the interviewees where asked about their background in general and in relations to System dynamics (SD) and group model building (GMB), and to describe their current connection, if any, to GMB and/or SD. They where also asked about their opinion regarding the usefulness of GMB, their experience of GMB and their trust towards models in general. In particular the interviewees where asked how satisfied they where with the final model as a participant in a workshop representing a stakeholder group or as a workshop manager.

Data gathering took place in 40-60 minute interviews that where audio recorded and transcribed. The interviews where preformed on Icelandic and English, therefore the English translation of relevant quotes is displayed when a supporting quote is believed to be needed.

Interview framework, with sub themes, was made with questions that are believed to add value for the main research question. The themes used for the interviews where; *General, group work & model building, causal loop diagrams/system dynamics, stimulus, trust, problem approach, other.*

Participants

Eight carefully chosen individuals, six male and two women, at the age of 35-65 years old, participated in the research. Participants where chosen in consultation with a highly qualified professor in System Dynamics with many years of experience in the field. All the participants have some experience of group model building (GMB) in relations to forming a causal loop diagram (CLD) intended to be a base for a system dynamic model (SDM). Two of the participants qualify as specialists in system dynamics and their experience is mostly characterized from managing workshops. The others participants are not specialists in SD but have experience as participants in workshops. Their point of view was considered particularly valuable for this research. The two aforementioned have a comprehensive academic career but those that where not considered SD specialists have very different backgrounds. Effort was made to choose participants that where unknown to the researcher.

Table 1: Participants identity

Research identity	**Status**
P	University professor currently working in the field of system dynamics. Background in engineering and environmental science. PhD. degree.
SB	University professor currently working in the field of system dynamics. Background in chemical engineering, environmental science, medicine and mathematics. PhD. degree.
GB	Hotel manager, entrepreneur, writer, business, self-employed. Student.
KEF	Computer science, modelling. M.Sc. degree.
JL	Masters degree, system analysis. Banking industry. Modeller for money systems.
AH	Small restaurant owner. Teacher. Masters degree.
MF	Geographer degree. Worked in charities and social enterprises for public and private sector.
PO	BS degree in Forestry. Works with mountain related issues.

Limitations

According to many social scientists the main shortcomings of the grounded theory is the oversimplified deductive approach to theory development that has been adopted in the scientific methods. This occurs because some of the essential variables of reality are assumed to be constants (Lye, Perera, & Rahman, 2006). Other shortcomings of this particular research are recognized below.

All the participants where asked to chose a location for the interview and a emphasis was placed on the site to be a place where the participant felt comfortable, preferable in their working environment or at home. Even so the site locations for all the interviews ended up as a coffeehouse, excluding the one that took place over the Internet. Therefore it can't be ruled out that the imperfect site selections influenced the interviews.

The original research was carried out in Icelandic and due to the researchers location; two of the interviews were conducted in Icelandic. The limited source of Icelandic speaking specialists in SD controlled the fact that two of the interviews were carried out in English. Two different languages in data analysis are therefore considered a possible shortcoming.

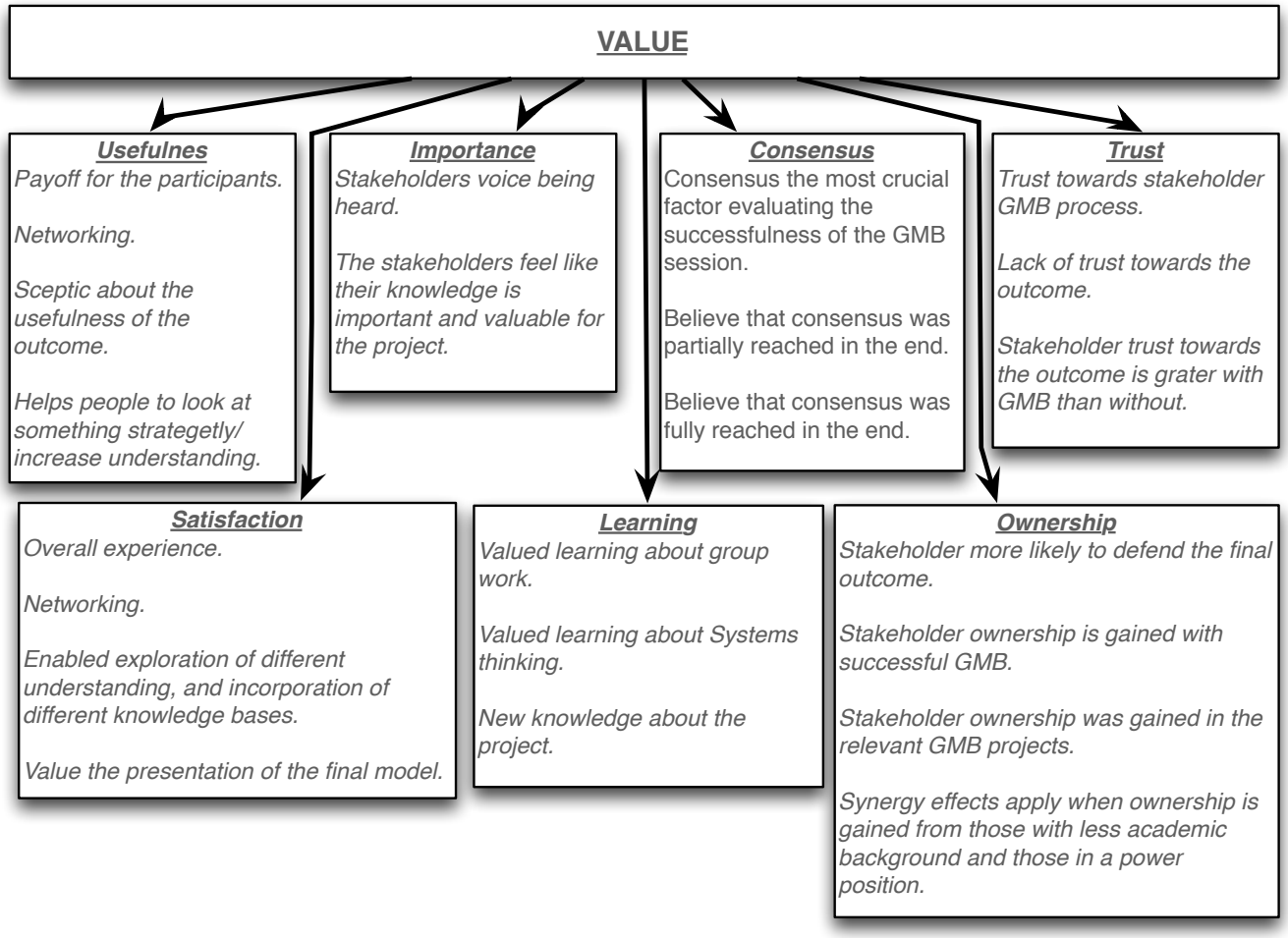
Analysis

The analysis on the data based on the open coding, concerned with identifying, naming, categorizing and describing phenomena found in the text, from the interviews revealed seven main categories with up to eight concepts under the main categories. For the purpose of this paper an analysis for one of the categories is presented. The results from the interviews aims to deepen the understanding on the workshop participants experience on group model building, their views towards group model building and factors that have the most effect relating to the research questions. Value; *Usefulness*, *Importance*, *Consensus*, *Trust*, *Satisfaction*, *Learning* and *Ownership*. The figure below presents the categories and concepts analysed in the research.

Value

Analysis was made based on the outcome regarding seven subthemes (concepts), i.e. *usefulness, importance, learning, trust, ownership, consensus* and *level of satisfaction.* The results are summarized in a value framework in Table 2 and substantiated below.

Table 2: Value



Usefulness

For something to be of value it needs to be useful in some sense. The product formed in the GMB process is a model, and therefore one could assume that for GMB to be valuable the model needs to be useful. Supporting quote from one interviewee is "*I think that models are pointless, unless they will be used*"[GB]. Other interviewee said the following:

> "*So if you have the right data and the right assumptions and the right model, it can be very valuable. It can predict what will happen […] to some extent anyway.* […] *I think, I say it's a useful part of a useful toolkit. To show people how many influences there are around. […] Even if it's never complete. It helps people, who are able to look at something strategetly…"[*" [MF]

The quote above indicates that the interviewee feels that GMB, and the outcome, can be useful even though the model is not finished. Surprisingly, analysing whether or not the interviewees believed that the results from the GMB would be useful or not, revealed that two of them where seemed sceptic, JL, KEF. Supporting quote from JL is:

> "*There where all sorts of parameters that I thought that should have been included, but other people thought that they where layers of complexity that maid the whole process impossible to get any useful outcomes from, you know*"[JL]

One of the interviewee, JL, had an interesting reflection regarding the usefulness of GMB for the stakeholders, stating that GMB managers might want to think more about the payoff for the stakeholders, underscoring that information regarding how the model could be used by the stakeholders in the future had been lacking in the project he participated in.

Whether the networking aspect of GMB is considered only to be part of the motivation aspect of it or also as a part of the usefulness, it was common among the interviewees to value the networking aspect of it.

Importance

The feeling of importance, or having significant knowledge that might be of use for the project being studied in the GMB seemed to be a common factor among the participants. Following are supportive quotes from two of the interviewees: "*I think my knowledge was quite helpful sometimes cause I was involved in things.*"[MF] and "*And felt I had something to offer."*[AH].

Those representing stakeholder groups that usually don't have much power to act up on the subject analysed might serve as grate supporters of the final outcome since they seem to value their involvement. Supporting quote from a participant representing a small company in a big project said the following:

> "*I enjoyed being part of the project, I think it is very nice to be able to feel that your voice is being heard, even if you know, you have got only a small business, when you experiences is valued, then that´s a good feeling*."[AH]

In line with the quote above, one of the GMB managers had the following to say:

"*If you use an expert team to try to write the CLD's the you lose the contact with the local actors for instance. Cause they are often very critical on how the authorities are working. They don't find that the authorities are listening to them. So that's why group modelling is good. Cause then everybody have a good view of what is happening, and they I think that they believe that their point of view is taken into the project. So they will be listened to.*"[PO]

Trust

Trust here refers to stakeholders trust in the final outcome of the GMB. Quoting from the SD specialist:

> *"And yea, I guess in the end it boils down to trust in the process. If you can get the stakeholder to understand that this is their question, there problem, then you want to get their ownership."* [SB]

When investigating stakeholders trust of the outcome with respect to the method used to build the model, it was evident that the stakeholders prefer models that where made with stakeholder Group Model-Building. Supporting quote from a stakeholder when asked whether he would have as much trust on the outcome when a mixed group of stakeholder where not invited in the GMB as opposed to mixed stakeholder GMB process: "*Yes I would have much more trust to the outcome of a stakeholder GMB sessions*"[KEF]. There where also indication that the GMB participants where lacking trust towards the outcome. One interviewee, that was happy about the process overall, had this to say:

> "*There where all sorts of parameters that I thought that should have been included, but other people thought that they where layers of complexity that maid the whole process impossible to get any useful outcomes from, you know […] I think it's tendency for the drivers of a project to try to get an outcome which looks coherent*." [JL]

Ownership

Numerous literature can be found that convincingly demonstrates that one of the reasons for using stakeholder GMB is to gain stakeholder ownership of the model in the hope that the stakeholder would be supportive of the model in the real world, defend it against critique and employ the results in the industry. If clients do not have the feeling that the final model is theirs, they are unlikely to support it from critique and to act up on it (Akkermans & Vennix, 1997). This statement is conformed by a case study research conducted by Ackerman and Vennix. Therefore it must be a crucial factor when executing stakeholder Group Model-Building sessions that the participants feel ownership of the model. Supporting quotes from the SD specialists, when asked about ownership and GMB:

> "*With group model building you make them own the problem. It becomes theirs and commonly. The two or three or four sides of the problem definition together. This is what we want to bring light on."* [SB]

> *"[...] it affects the trust in the model, clearly I mean they feel ownership of the model collectively. Our experience on the m*** project which had 65 stakeholders or something like that, was that in the end everybody agreed on the model, and felt that they had ownership of the model and when the model was criticized everybody was ready to defend the model as to representing a good approximation of there understanding"* [P]

Interesting point one of the interviewee made about ownership was that there is particularly beneficial factor when participant's with lower social status feel ownership of the model for the reason that people in that category are more likely to defend the model for critic for the reason that they suddenly have the same platform that people with higher social/academic background.

> "*Bring down the language to the level so everyone understands. And then again everyone in the end has to feel comfortable. It's the people that fell the most left out in the beginning that, this happen all the time, when they come in they become the strongest supporters of the model. Because suddenly they have the same platform as everybody."* [SB]

The stakeholder participant's interviewed agreed that they experienced some sort of ownership feeling in the final model. Even though they didn't necessarily agree about everything in the final model they felt that they had accomplished some part of the whole. One interviewee described his experience in that way:

> "*There were a lot of things that I made comments and suggestions about, that just flied in the model. You know. So I felt that I owned a lot in the final model even though the final model was not exactly the result I had hoped for*" [KEF]

Consensus

The interviewees, that categorize as specialists agreed that the success of a GMB sessions could be measured from whether there is consensus about the recommendations and the final model. In both cases they felt confident that in their experience as a workshop leaders, the consensus stage had been reached in all cases. When the interviewees, that categorize as participants where asked about whether they agreed upon the final model and recommendations fro the GMB sessions it can be concluded that in both cases the participants only partly agreed up on the final solution, they where content and satisfied, but felt that some things should be different.

Learning

Surely one aspect of the value framework is embodied in learning. One interviewee said the following: "*I understand more about models, that I did before I attended the workshop. […] More confident in use of models as well*."[AH]. Most of those interviewed thought that they had learnt something from the experience whether it concerned system dynamics or the project being researched each time. KEF said the following:

> "*This was really educating for me. Well, I realized even more that before, on the value of knowledge and experience, and not to put to much faith on the one that has the sharpest mind or the specialist that has the longest academic background*."[KEF]

Satisfaction/dissatisfaction

The interviewees where asked about their level of satisfaction towards the outcome from the GMB sessions. In general the data indicated that the participants where satisfied overall with the results of the GMB sessions, especially they where satisfied with the work done, apart from the outcome, and the

networking gained from the GMB sessions. Several of the participants expressed dissatisfaction concerning lack of presentation of the final results.

Quote from one interviewee describes how he experienced the vibe toward the outcome from other participant's.

> "*I'm not sure that everyone had full understanding about what the project was about in the end. I mean what's the point, yee we knew what we where doing. We where making diagrams of **. But what was the main goal with the project, you know... I suspect that there was less understanding about that."* [KEF]

Other interviewee, MF, mention that he really thought that the project would end up as a sort of academic exercise and another had the following to say: "*I think it's tendency for the drivers of a project to try to get an outcome which looks coherent*." [JL]

Results and discussion

The purpose of the study was to explore GMB and increase understanding on the affects the method triggers. Hence the fourth step in the data analysing is to form a theory conducted from the categories and concepts identified that forms collection of explanations that could explain the questions stated in the introduction. Following are answers to those questions that are afterwards summarized in the theory generated.

Does group model building, as an approach to form a CLD, reinforce more trust to the model as apposed to methods that don't include the stakeholders in the model building process?
There research indicates that stakeholders bear greater trust towards the outcome generated with GMB than without and participants in general bear trust towards stakeholder GMB process, even if trust for model building in general is not great. It can be concluded from the data that stakeholder ownership is gained with successful GMB and at some degree that was the case for the interviewees.

There where also indication that the GMB participants where lacking trust towards the outcome. Somewhere even sceptic from the beginning and towards the end but still valued the experience of the workshops, indicating that the motivation and value can in some cases be independent of the outcome.

What is the value of stakeholder group model building?
In search of answers for the value of stakeholder GMB there is no simple answer. From the analysis a framework representing the value was drafted up. The findings from the research indicate that the value is not only in form of ownership and trust towards the model but there is also great value for the stakeholders to expand their social network and for them that might be the biggest gain. The stakeholders might not care as much about the final results as the GMB manager might wish for or even believe in it. The data indicated that generally stakeholders feel satisfied with the GMB work towards the end. The specialists implied that a GMB sessions where not successful unless the stakeholders felt happy in the end and there is consensus towards the final model and recommendations. The SD specialists where under the impression that the level of full consensus had been reached in the projects they participated in but the stakeholder interviewed felt that there was only a partially consensus about the final outcome. Even though the stakeholders where not completely consensus regarding the final

outcome they where satisfied with the GMB experience. Participants commented that the group model-building experience assisted in a better understanding of the model development process. The data also indicated that the workshops enabled the stakeholders to explore different understanding on the system, and incorporation of different knowledge bases and for them that was not less important than the outcome itself. The participants also found that the approach allowed a holistic view of the system, agreeing with the SD specialists, but there was uncertainty whether there was shared understanding of the system in the end and whether the final outcome assisted participants to understand the inherent complexities.

From the GMB managers point of view the results are in line with the textbooks and indicate that the value lies in believe in the results from those who have the power to use them.

The theory is that GMB managers and stakeholder participants have both similar and dissimilar aspects of the GMB experience. In both cases they feel the similar dynamic shift in atmosphere as the process moves forward. The managers tend to believe that there is perfect consensus regarding the outcome while there seemed to be some confusion among the participants what the real outcome was. The value of GMB differs between GMB managers and stakeholders. For the forenames the value is in line with the literature and is based mostly on the hope that the outcome will be trustworthy. The motivation for stakeholders influences the experienced value of the GMB. Hence the value for the stakeholder lies less in the outcome and more in the process.

Future research

In this work the analysis has been made up with constant comparison and *line-by-line* open coding. Analytic codes and categories where developed from the data and finally a theory was formed. It is interesting to carry out further analysis on the data presented in this research with the use of axial coding, i.e. the process of relating categories and properties to each other via combination of inductive and deductive thinking. That analysis may bring about more useful insights. Recommendations for future research that might be interesting for the System Dynamic Society, is to focus on how participants in GMB experience the process, what motivates stakeholders to participate in GMB, the payoff for the stakeholder participants and their take on the outcome.

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