

JEL D83

GROUP MODELLING AS A TOOL FOR ORGANIZING COLLABORATIVE ACTIVITY OF A GROUP OF STAKEHOLDERS

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Abstract.

Purpose. The presented brief overview of methods of collaborative modelling is aimed at demonstrating the advantages of its application in the management of socio-economic systems as well as filling the shortage of publications on this topic in the native scientific and business spheres. The involvement of stakeholders in the management of the socio-economic system is considered as a positive process. However, a very complicated aggregate of communication and coordination problems caused by differences in aims, values, experience and knowledge occurs in the process of organization of collaborative activity of the stakeholders. Collaborative modelling is viewed as a powerful tool which allows the stakeholders to expand their knowledge and understanding of the system and build up communication processes.

Methods. On the basis of the analysis of publications in which theoretical and methodological approaches to working out methods of collaborative modelling were reflected as well as practical experience of their application, an attempt has been made to identify the main problems of application and put forward perspectives of further development.

Perspectives. The experience of applying some methods of collaborative modeling in different areas has allowed to identify some tasks for further research: the development of methods in terms of raising their effectiveness without affecting the quality of the produced models, ways of forming and the optimal size of a groups of stakeholders, approaches to evaluation of the designed models from the point of view of the participants.

Keywords: systems modelling, collaborative modelling, group modelling, conceptual modelling.

INTRODUCTION

In the modern world organizations come across such complicated problems and tasks that no one possesses information, knowledge or experience for solving them. Due to this the role of collaborative managerial activity is growing and the group of shareholders is becoming the subject of management. During collaborative activities of the group arises a number of complicated communicative, coordinating and positions negotiating tasks as differences in purposes, values, organizational culture, functional experience, knowledge, managing styles sufficiently influence the productivity and results of the group work. On the one hand, the effectiveness of collaborative work depends on the social relations between the stakeholders, their ability to communicate and exchange information and knowledge. On the other hand, there exists an obvious

necessity of special tools for organizing and supporting group processes and interaction. Methods of collaborative modelling are considered to be the above mentioned tools. During recent decades certain progress in their design and development has been achieved and some experience in their practical application has been gained.

Collaborative modelling as part of applied scientific research had been developing within recent decades whereas the practice of building group models refers back to the second half of 1970-ies, when system analysts in the area of system dynamics started to engage clients for the modelling process. Since that time there have been worked out several approaches to involve stakeholders to modelling in the framework of different schools. Different groups of researchers were simultaneously working out and applying methodologies based on the same basic principles but aimed at different parts of the process.

TYPES OF COLLABORATIVE MODELLING

Collaborative modelling is defined as “the joint creation of a shared graphical representation of a system” [1, p.249]. An indispensable part of the collaborative modelling process is the exchange of opinions between the participants. From this aspect the model is considered as a way to identify, reflect and present different points of view, judgments and assumptions of the group members. For creating a common image of a system as opposed to the individual one it is necessary to form shared understanding of the elements and their interrelation in the model. The shared understanding can be defined as “the overlap of understanding and concepts among group members” [2, p.36]. For collaborative modelling shared understanding is seen as “the extent to which specific knowledge among group members of concepts representing system elements and their relations overlaps” [1, p.249]. For creating overlap of knowledge the participants not only need to exchange information about the elements of the model and their interrelation but also to form a shared meaning of these elements and their interrelation. The formation of shared meaning is usually viewed from the point of view of sensemaking, understood as “the ongoing retrospective development of plausible images that rationalize what people are doing” [3, p.409]. Sensemaking normally requires some development of shared meaning of concepts, terms and notions and presupposes forming of common understanding of the context in which the model is designed from the point of view of all stakeholders.

For organizing the processes of interaction in the group of stakeholders as well as for creating shared understanding and a system model there has been developed a number of methods and tools for collaborative modeling.

Problem Structuring Methods, PSMs cover a wide spectrum of methods and tools worked out mainly in the UK for overcoming situations characterized by complexity, vagueness and controversion [4]. In this case the models are viewed as tools for learning [5] at the stage of strategic decision making and problem solving. Among the most

successful and considerably widespread methodologies there could be highlighted the Soft Systems Methodology (SSM), Strategic Choice Approach (SCA), Strategic Options Development and Analysis (SODA).

Group Model Building was created in the Netherlands and then widely used by Decision Techtronics Group (DTG) (Albany, New York) [6] mainly in the sphere of business applications. This direction uses the models of system dynamics and allows to expand the conceptual model up to the simulation model for studying different strategic options. Modelling is considered as a process of forming mutual understanding, defining terms and notions and experience exchange.

Mediated Modelling (MM) is a trade mark which was introduced by M. van den Belt [7] and is usually using the models of system dynamics. As could be seen from its name, MM is mainly focused on the conflict processing tasks through mediation and working out mutually accepted points of view.

Companion Modelling (CM) is a brand introduced in the middle of 1990-ies by the researchers from CIRAD (France). The method represents a combination of agent based models and role-playing games and is based on three basic principles: creating the model by the stakeholders, transparency of the process and the adaptability of the process. The model is being transformed alongside with changing the understanding of problems in the process of research.

Enterprise Analysis. Modelling analysis at Arizona University includes both working out programming tools and designing methods of supporting collaborative activities. Models are mainly based on the IDEF0 standard [8]. As a rule the initial model is created at a collaborative working session of stakeholders. Then the group is subdivided into subgroups for detailed work on those parts of the model which match the expertise of certain subgroups.

Apart from the above mentioned directions comes across a term “participatory modelling” which is referred to as a general term with no connection to any of the particular directions. In some recent publications, however, collaborative modelling is viewed as one of the multiple component parts

of the participatory modelling, with the differentiation being made depending on the level of involvement of the stakeholders [9]. Thus, a high level of involvement is typical for collaborative modelling (e.g. at making collaborative decisions, designing.) Opposed to that, participatory modelling is done for a wider spectrum and could involve much lower levels of involvement: from discussion to consultations and information exchange.

Collaborative modelling is usually used for supporting the decision making processes and working out strategies and is aimed at 1) spreading knowledge and forming the shared understanding of the system and its dynamics in various conditions; (2) identifying and justifying consequences of the solution of the problem under consideration.

The following ways of involvement of the stakeholders could be identified there: passive involvement or participation which is aimed at informing people; eliciting of information, data for researchers and system analysts; participation in the process of supporting collaborative decision making; interactive participation when stakeholders are using diagnostic and analytical methods and tools; self-organization during which some participation process learning turns into decisions made directly by stakeholders [10-11].

A collaborative model has got a double identity. On the one hand, at some stages of the collaborative modeling process the model is viewed by the group of stakeholders as a micro-world, a supposedly realistic image of the object under research [12]. At other stages of the modeling process the model serves as a socially constructed artifact aimed at assisting management teams to form shared understanding. The latter type of a model is the closest to the representation of the models in PSMs as transitional objects, referred to as a basis for social interaction (communication, negotiations, discussions) [13-14].

DISCUSSION AND CONCLUSIONS

It's common knowledge that active participation of the stakeholders in the modeling processes allows to create better

quality models of complicated systems. However the participation of stakeholders in collaborative modeling causes a number of problems. For solving all the problems it is necessary to get a deeper understanding of different techniques and methods of collaborative modeling.

The achieved results of applied use of different methods of collaborative modeling allow to pick up a number of interesting possibilities for further research. Collaborative modeling is very time-consuming and requires a lot of expenses. The above facts require working out and developing some ways of raising the collaborative modeling methods effectiveness without damaging the quality of the model which is being created.

Involving stakeholders who possess different knowledge and experience booster the creation of more comprehensive and accurate models, but at the same time it makes it more likely that the conflict between the parties arises due to different points of view and knowledge. As a rule, in small groups the effectiveness of modeling and parties involvement is higher, and it is easier to form shared understanding.

Another important direction is the choice of the starting point for the modeling task. The use of a preliminary model created by an expert or an analyst outside the group process might accelerate the process and identify critical topics for discussion. However, it might also cause rejection from the participants' side and a refusal to continue the process.

A possible solution of this problem could be found in the parallel process of creation of submodels in subgroups followed by the collaborative group work to get the created submodels integrated and converged. At this point strict syntactic rules are needed to achieve common understanding.

It looks like the results of collaborative modeling activities are only restrictedly studied. The majority of articles cover the quality and complexity of the created models from the experts' points of view. The development of approaches to the evaluation of the models constructed by the participants is one of the most promising and complex tasks of further research.

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