Using Groupware Technology to Facilitate Team Model Building and Learning

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Mental knowledge databases or mental models must be captured, synthesized, and communicated to all team members in the model building process to ensure team learning and a successful modeling project. These mental knowledge databases bridge model development and team learning, where iterative model building is intimately intertwined with updating mental models of the team. This paper introduces groupware technology as a tool for facilitating and enhancing this process by providing an electronic forum for team members to capture and share all relevant information. The end result is a model which is truly owned by the team and an electronic database archiving team learning over the course of the project. The electronic database archives corporate knowledge of the issues discussed, and serves as a corporate memory when others are interested in how the team arrived at their conclusions. This paper illuminates the use of groupware in system dynamics modeling projects and discusses cases where this approach can be utilized.

Introduction

Knowledge elicitation and group model building are fundamental to the construction of dynamic feedback models. Most models result from eliciting knowledge about the complex system of interest from a group of managers or policy-makers who, as a group, possess the required information to construct a dynamic model. This elicitation and model building process varies with model purpose and group time constraints, and can be described as a continuum of group involvement in the construction of dynamic models. The traditional modeling project anchors one end of this continuum, while group workshop projects stand at the other end. Groupware technology assists in balancing the trade-offs inherit in choosing one of these modeling approaches over the other. Ideally, modelers would like unlimited access to groups of senior managers or policy-makers for construction of dynamic models. In reality, senior managers and

policy-makers have very limited time to come together as a group. Modeling teams (modeling team or core modeling team is used throughout this text to identify the modeling and group process experts who facilitate modeling projects for the group of managers or policy-makers) must choose an elicitation and model building approach which sufficiently captures the mental models of the group, while working within the scheduling constraints of busy senior managers or policy-makers. The traditional and group workshop approaches are briefly summarized in the following paragraphs, followed by a discussion of an approach utilizing groupware technology. It is suggested that utilizing groupware technology to facilitate knowledge elicitation and group model building helps balance the trade-offs of the other approaches.

Elicitation and Model Building Approaches

The modeling team, in a traditional dynamic modeling project, conducts individual interviews with senior managers or policy-makers and iteratively constructs a dynamic model from a collection of individual mental models. This approach often takes 2-6 months and gives the core modeling team time to reflect and think through model conceptualization and subsequent policy analysis. The drawback of this approach is that without the benefit of group involvement during all phases of model construction, mangers or policy-makers must be convinced that they 'own' the resulting model. Presentation of the model to the full group focuses on obtaining group 'buy-in' and may result in large-scale model reformulations. Knowledge elicitation occurs through individual interviews, and the majority of model building occurs 'off-line' by modeling experts.

Group workshop projects condense knowledge elicitation and model construction into a few working days. Senior managers or policy-makers come together with the core modeling team to define the problem issue, elicit mental models, and move in the direction of constructing dynamic simulation models. The core modeling team facilitates group processes while directing model development. The literature discussing the group workshop approach (Vennix et al 1996, Richardson and Andsersen 1995, Hall et al 1995, Vennix et al 1994, Edin 1994) provides overviews and extensive details of the group sessions. This approach places a great deal of

pressure on the core modeling team to build a dynamic model within an extremely short time period, and most modelers would prefer more time to reflect and process information when constructing dynamic models of complex systems. In addition, the process may not progress as far as desired within the time allocated for the workshop. Despite these shortcomings, bringing the group together for all stages of model development solidifies ownership of the resulting dynamic model and stimulates team learning.

An elicitation and model building approach utilizing groupware technology can assist modeling teams in reaping the benefits of both the traditional and group workshop approaches. The Planning Technologies Group has successfully used groupware technology in dynamic modeling projects over the past several years, and has standardized a general approach. This general approach is discussed in the following paragraphs along with a few insights outlining the necessary conditions for groupware technology to be applicable for modeling projects.

Groupware Technology in Use

Groupware technology links team members electronically, thus overcoming the practical difficulties of engaging senior managers or policy-makers in multiple group meetings. Specifically, Lotus Notes databases unite group members in a continuous virtual team meeting in which all pertinent information and issues are shared and discussed. Team members self document their mental models, and ensuing electronic discussions lead to consensus building or formation of alternative assumptions. Team members follow the discussion and contribute when they have time to be engaged, which allows schedule-overloaded team members to stay involved in the process, while potentially attenuating the anxiety associated with discussing sensitive issues. These virtual meetings must be managed or facilitated just like any other meeting, and the core modeling team must perform this role while also mapping out the consensus or alternative mental models of the team. The maps are documented in the electronic discussion with narrative explaining the implied inter-relationships. Electronic discussion of these maps clarifies the relationships and ultimately serves to synthesize information shared by the team such that the team members agree that their mental

models have been captured adequately. Subsequent phases of model development are executed similarly in the continuous virtual meeting.

Continuous virtual meetings allow the modeling team to keep senior managers or policy-makers actively involved in the process, thus providing a means for building group consensus and commitment to decisions. As with any approach, the environment has to be right in order to use groupware successfully in dynamic modeling projects. Specifically, groups that are already comfortable using groupware in their organizations are the only groups for whom this approach is likely to be effective. Introducing groupware into an organization requires a different set of skills, and developing the new working culture takes time. In addition, overloading teams with new groupware technology and system dynamics modeling is likely to be too much for any group to digest during the course of most projects. With the rapid adoption rate of groupware technology over the past several years, most large corporations have an installed base of users and are quickly developing the working culture associated with such technology. There is likely to be no shortage of opportunities to use groupware technology in the new era of group computing which has just recently dawned, and modeling teams skilled in this approach will be positioned to tap into the wealth of mental databases for construction of more useful dynamic feedback models.

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