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SUPPORT SYSTEMS FOR DECISION AND NEGOTIATION PROCESSES

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CONSTRUCTING NEGOTIATION SUPPORT MODELS APPLYING SSM: A SOFTWARE DEVELOPMENT LOOKOUT

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Abstract: A new generation computer-based modeling environment consisting out of a modeling, implementation and documentation tools named *Structured Spreadsheet Modeling* (SSM) is an answer to the current crisis in modeling science. SSM was used in the construction of a computerized negotiation support model for resolving conflicts during the software system design. Both the SSM and the negotiation system are briefly presented in the paper.

Keywords: modeling, computerized negotiation support models, computer-based modeling environment, SSM, software systen design, EOP.

1. Introduction

It is evident from the current praxis [Checkland (1983), Kokol (1990), Geoffrion (1987)] that modeling in general and especially of computerized decision support systems is a low productivity activity. Main contributing factors are (1) that three distinct representations are used for each model namely natural, mathematical and computer executable; (2) a semantic gap between solvers and modeling tools; (3) software modeling tools are to specific; and (4) software modelling tools cover just a few of the model's life cycle phases. The answer to above-mentioned problems is a new generation computer-based modeling environment consisting out of a modeling, implementation and documentation tools in our case the *Structured*

Spreadsheet Modeling (SSM) [Kokol (1990)].

2.Spreadsheet structured modeling

The SSM is a combination of structured modeling [Geoffrion (1987)], spreadsheet software [Kokol (1990)] and SPRENOT (spreadsheet documentation notation) [Kokol (1990)]. It is the process in which a structured model is built first using the SML. This model is then transformed into an executable form using spreadsheet software and documented using SPRENOT.

Structured Modeling (SM) is a foundation for computer-based modeling environments. It has three levels: elemental, generic and modular structure. *Elemental structure* aims to capture all of the definitional detail of a specific model instance and is often presented as a directed graph; *generic structure* aims to capture the natural familial groupings of elements. Mathematically, this is done by partitioning all elements of a given type into genera; *modular structure* aims to organize generic structure hierarchically to the extent that seems appropriate and useful. Genera are grouped into conceptual units called modules according to commonalty or semantic relatedness, similar modules are grouped in the higher order modules and so on. In this manner the complexity of a model is managed and organized in terms of higher order abstractions.

Spreadsheet software is an ideal replacement for three nearly universal tools: a pencil (the cursor), a sheet of paper (spreadsheet) and a calculator (build in functions). Its greatest advantages are that it is an integrated tool enabling the user to make his applications more effectively, reliably and in shorter time as with conventional programming, and it is natural, easy to learn, teach and use.

The SPRENOT (SPREadsheet NOTation) is graphical notation developed to describe and document spreadsheets.

3.Software development with EOP

One of our most successful attempts in bridging the software crisis was a new software development paradigm called **Extended Operational Paradigm** (EOP) [Kokol (1991)]. Its most interesting features and advantages according to the scope of this paper are: (1) it is user oriented in the sense not only to enable the users to participate but to perform the development by themselves; and (2) it enables the multi-instance design. The EOP has two main phases: in the first multi-instance-phase each conflicting user party builds his own specification using prototypes and in the second phase these specifications are implemented in the manner that a consensus between various parties including the implementation development group representing the implementation constraints is achieved first in the form of common operational specification which is next transformed into the final system. Achieving the consensus is one of the most important and complex activities during the whole development process, and that's why we decided to improve it using a computerized negotiation support system constructed with the help of the SSM.

4.SSM negotiation model

Our negotiation support model is based on Kano model, Pugh Selection Matrices, Affinity and Relationship diagrams [Cohen (1991)] and on in our institution constructed usability evaluation method. The use of SSM helps us to develop a flexible and easy to change user friendly software system implemented with spreadsheet software. This model enable us to answer "what-if" question, to develop, modify and optimize various negotiation strategies, and finally to interactively

manage and support the negotiation process.

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