Setting Rules of Play for Collaborative Modeling

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ABSTRACT

A gaming approach to methods and tooling for operational modeling is proposed, emphasizing the interactive and creative collaborative modeling process rather than modeling languages or model representations. The approach builds on existing work in method engineering, but focuses on the creation of model-oriented interactive systems. Various game elements as defined in game design theory are discussed in relation to games-for-modeling. In addition, a number of possible game concepts (like competition, score systems, etc.) are considered and illustrated by means of two design sketches of multi-player games for collaborative modeling.

Keywords: Computer-Assisted Software Engineering—CASE, Computer-Supported Cooperative Work, Enterprise Modeling, Group Decision Making, Serious Games, Simulation and Modeling IS, Systems Analysis Methods

INTRODUCTION

In light of a rapidly increasing need for high-quality “lightweight formal models”1 (e.g., process models, formal ontologies, business rules, and so on) to fulfill the technology-based promises of information systems and AI—including the Semantic Web (Berners-Lee, Hendler, & Lassila, 2001)—the lack of operational methods for formal modeling and, as an embodiment of such methods, tooling to support them, is becoming a problem. The increasing need for truly collaborative modeling can be added to this (de Moor, 1999).

Current State of Support for Formal Modeling

Current tools for modeling are mostly editor-like, technical environments that at best offer some automated model checking, versioning, and file management. Contrary to what many seem to believe or claim, even advanced graphical editors for, for example, UML and BPMN schemas (Booch, Rumbaugh, & Jacobson, 1998; OMG, 2006) still require technically skilled and above all experienced people to wield them successfully. Beyond editing, very little real support for the interactive process of collaborative modeling is offered, in particular if such a process is to be carried out by

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DOI: 10.4018/jec.2009062603
relatively inexpert participants. As argued at length in Hoppenbrouwers (2008), this is not an acceptable situation in the long run, mostly because experts (modelers, facilitators) in formal modeling are relatively few and expensive. Lightweight, collaborative formal modeling will have to be brought to the masses, somehow. Creating interactive, low-threshold digital environments seems to be a highly promising way of enabling this. The image of “modeling wizards” presents itself. However, such tools simply do not exist at the moment. Creating them involves both the setting and the answering of a score of research questions and requires a long-term effort.

This article aims to be part of setting the scene for such an effort, and to make some aspects more concrete, without any pretense to provide definitive answers.

**Interactive Systems for Formal Modeling**

Formal modeling involves a broad combination of requirements on methods (including modeling languages) and tools. The primary products of formal modeling are of course formal models, with classic requirements like correctness, completeness, and validity. However, a more nuanced picture emerges if a model’s context (both context of use and context of creation) is taken into account (Krogstie, Sindre, & Jørgensen, 2006; van Bommel, Hoppenbrouwers, Proper, & Roelofs, 2008): further products of modeling are common understanding, consent, and commitment created among participants as a result of them enacting a collaborative activity (Hoppenbrouwers, Proper, & van der Weide, 2005).

Validation by showing models to stakeholders after their initial creation may work to some extent and is in fact common practice. However, there is an essential difference between model validation and/or model merger after the creative process has been largely concluded, and the creation of a model by which understanding and agreement at several levels is constructed as part of the process, from the start.

A similarity holds here with negotiation and collaborative decision making (Raiffa, 2002; Fisher, Ury, & Patton, 2003). Reconciliation of positions already taken is much harder than early and continuous, collaborative construction of joint decisions based on the deeper concerns and values of the various parties involved (see also Dean, Orwig, Lee, & Vogel, 1994). Indeed, as empirically confirmed by Rittgen (2007), the collaborative process of modeling is largely a form of negotiation, as reflected in the interaction patterns observed among collaborative modelers.

Many factors in methods and tools for modeling are the subject of study in the field of situational method engineering (SME or simply ME; Ralyté, Brinkkemper, & Henderson-Sellers, 2007). Indeed, our approach can be seen as mainly contributing to this field. However, as argued in Hoppenbrouwers, van Bommel, and Järvinen (2008), we take an approach to ME that deviates from its mainstream, though we believe the two directions are complementary. Mainstream ME mostly focuses on modeling language descriptions in combination with rather coarse-grained methodic phasing. We believe that the development of interactive support tools as embodiments of operational modeling methods should be primary in the effort to bring such support to a higher level. This implies more detailed study of real-time interactions between: (1) participants and (2) participants and the models/environments. It directly concerns the development of interaction systems. It drags modeling methodology into the field of human-computer interaction and explicitly exposes it to many human factors so far largely ignored in classical modeling methods: individual perception and expression, motivation, collaboration, decision making, problem solving, communication, and so on.

The idea of creating process-oriented systems for modeling is in itself not new. For example, Pohl et al. (1999) describe a highly complex and reasonably mature, implemented framework (called PRIME) aiming to support “enactment” of modeling processes, which indeed is almost synonymous with our notion
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