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CHALLENGES OF SIMULATING TEAMWORK IN ORGANIZATIONAL SCENARIOS

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ABSTRACT

Today's workplace is driven by a high amount of available information and hereby the complexity of work processes increases. In this context the project AdaptPRO uses an interdisciplinary approach from business informatics and business psychology to analyze, model and simulate the concept of intentional forgetting by reorganizing roles and processes in an organizational context. Towards the vision of simulating teamwork, this paper proposes an experiment and simulation framework to model and simulate the effects of different role and process configurations in teams. Bringing both of these disciplines together can open up new opportunities for developing and understanding simulation models of human teamwork practices.

1 INTRODUCTION

Today's workplace is driven by a high amount of available information as well as an increase of required knowledge. The project "*AdaptPRO - Adaptive Process and Role design in Organizations*" uses an interdisciplinary approach from business informatics and business psychology to analyze, model and simulate the concept of intentional forgetting. In this context we define intentional forgetting as a reorganization of roles and processes in an organizational context. The reorganization focuses on the balance between specialized team structures and generalized team structures. A specialized role and process configurations enables highly efficient knowledge distributions in teams because a single team member has deep knowledge in a particular field which facilitates a high overall information capacity of the whole team. Contrastingly, in a generalized knowledge structures each team member has the same knowledge which enables more robust role and process configurations, e.g., when a team member becomes unavailable (Ellwart and Antoni 2017). To address the challenge of finding a suitable role and process configuration we propose a framework which uses a multiagent-based simulation model to test the effects of different role and process configurations.

2 MULTIAGENT-BASED TEAMWORK SIMULATION FRAMEWORK

From an artificial intelligence perspective, agent-based modeling and multi-agent-based simulation have been successfully applied to the design and evaluation of novel approaches to distributed task processing and cooperative problem-solving (Timm et al. 2017). Hence multiagent-based simulation as a method to analyze the efficiency of teamwork is a promising approach. The main challenge of simulating teamwork with artificial agents is providing a suitable teamwork model. In order to achieve this, we propose a framework (Figure 1) which combines psychologically grounded experiments and multiagent-based simulation. The framework consists of two subcomponents, namely the experiment and simulation part which are combined by means of a formal scenario description. The scenario definition is the central aspect in this framework and controls the experiment as well as the simulation. Within the scenario, roles and processes are defined and formalized. The formalization is used by agents to reason about their roles which define what actions they can perform in the process. A promising approach for such scenario definitions are descriptions in general game playing where agents try to solve games by a formalized description. In this domain the

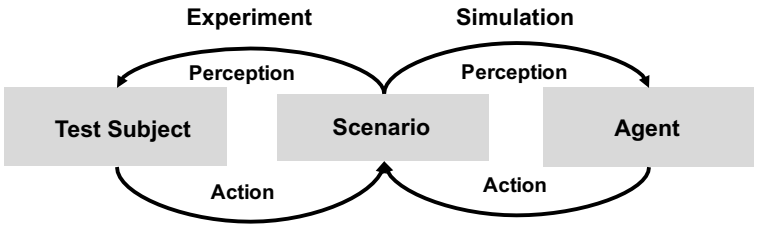

Figure 1: Combined Experiment and Simulation Research Framework

game description language GDL is commonly used. The description is used by agents to reason about their roles in the games and their next moves. GDL is a universal approach and therefore promising for describing roles and processes in teamwork scenarios in a standardized format (Reuter, Berndt, and Timm 2017). With the use of such a scenario formalization the scenario can be described for the test subjects as well as artificial agents. Both of them perceive the current scenario state and perform actions regarding their roles.

3 CHALLENGES

With the use of the proposed framework, the design of a psychological grounded agent-based teamwork is enabled. Furthermore, bringing both of these disciplines together can open up new opportunities for developing and understanding simulation models of human teamwork practices.

The main challenge to prepare psychological experiments and simulate them, is to define a scenario which can be formalized for agents. The main task is to translate the actions from the scenario description in appropriate GDL statements and extend additional ones. From an agent-based simulation perspective, the key challenge is to choose an agent architecture which is suitable to model human decision making processes. In this framework a Belief-Desire-Intention (BDI) architecture is a promising approach. The next step is to adapt and to implement BDI agents which can reason about scenario descriptions in GDL and make decisions according to the defined scenario. Afterwards, the data from the psychological experiment can be used to evaluate the simulation model. In order to achieve a comprehensive understanding on adapting roles and processes in organizations, several experiment and simulation iterations need to be conducted.

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