A Two- Layer Participatory Simulation to Support a Flexible Participation of a Consultative Council

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Abstract. In this methodological paper, we present a project aiming to introduce computer- based support for participatory management of protected areas, in order to promote biodiversity conservation, social inclusion, and conflict resolution. We focus on the on the communication between participants through the decision making process, and in particular on the issue of temporal lapses during simulation sessions. Our first case study, the Tijuca National Park, in Rio de Janeiro (Brazil), reveals the importance of this lapse and the shortcomings of traditional approaches. We propose a two- layer simulation to grab information from participants in order to favor the exchange of information within each layer and between layers. We claim this method could be extended to other parks where the conservation of natural resources is at stake, and to other fields which have to deal with social inclusion, participatory management, conflict resolution, and temporal lapse through the simulation.

Keywords: Role- playing games, multi- agent based simulation, protected areas, social inclusion, participatory management.

1 Introduction

Participatory decision making is often used to deal with biodiversity conservation, social inclusion, and economic development. Most social simulation methods are based on bottom- up participatory approaches to try to find solutions using the knowledge of local actors and communities [1], [2]. A limitation of these methods is that, in most cases, participants should be gathered in the same place at the same time. In this paper we propose to use a two- layer participatory simulation to deal with this temporal lapse and to help stakeholders make decisions.

2 Park of Tijuca and Participatory Management

In the urban National Park of Tijuca, different sorts of people and communities exert great pressure, especially through the human growth and illegal occupation [4]. To establish and to implement the predetermined actions to reach the goals of the park, a consultative council was composed of representatives of the civil society and the government. The council has a consultative role and is a department of the administrative structure of the park. One of its target is to promote the participatory management of the park through the inclusion of all involved sectors in order to improve the quality of the life for the communities around the park. In this system, we distinguish two groups: stakeholders and members of the council.

3 Two-Layer Participatory Simulation

Most social simulation methods have been developed and adapted to different circumstances in order to benefit from agent-based simulations, role playing games and participatory decision making [1], [2], [3], [5]. Some of them simulate systems before or during role playing game sessions [1], [3], other simulate systems within role playing game sessions [2], [5]. They help stakeholders make decisions and they have an educative role for stakeholders, considering that they improve the exchange of information and they help stakeholders understand each other. These methods group organizers and players in a single layer simulation, where everybody participate at the same time.

The context of the Park of Tijuca reveals several shortcomings of traditional methods: (a) in single layer simulations, the council would be represented by several players, whereas the council must participate as a unique entity, not as a group of independent players; (b) it is not always possible to assemble members of the council and stakeholders in simulations; and (c) it is also not recommended because the council should be represented by all its members and all these members could not be always available to participate of all simulations.

We propose to split the simulation in two layers to help the council play its role advising stakeholders, to help stakeholders exchange information, and to help with the temporal lapse between sessions of simulations. On the first layer, stakeholders play their roles in a simulation. Assistant agents help stakeholders showing them the opinion of the council about actions. Stakeholders can explain their decisions to assistant agents and to other participants. This simulation grabs information about stakeholders, and help them exchange information and reveal their intentions. On the second layer, members of the council discuss the results of the first layer simulation, propose ideas, debate, and define the council position on questions which arose

in the first layer. In each layer, at the end of simulations' turns, there is a debriefing session to discuss players' choices. After the simulation in each layer, assistant agents are updated in order to represent either the council (in the first layer) or the stakeholders (in the second layer). These processes are independent and can be iterated many times, in order to improve the exchange of information.

4 Conclusion

Assembling actors in two different groups, (a) does not require the whole council to attend every simulation designated for stakeholders and (b) favors, through the participatory simulation, the social learning and the exchange of information, and affects the stakeholders who take part in the decision process. In order to simplify the connection between the two layers we propose to use of artificial agents to help the council know about emergents questions which arise from the stakeholders' simulations (artificial agents are present in both layers) and to allow the council, as a unique entity, play its role in the first layer, through the artificial assistant agents.

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