Spatial discourses in participatory decision making

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Abstract

We report from a role-playing experiment concerned with spatial decision-making in groups. We combined methods from classical mediation with software for web-based discourses (Zeno) and multi-criteria spatial exploration (CommonGIS). The lessons learned concern the integration of the tools, a model of decision tasks in facility allocation, a corresponding template for structuring discourses in Zeno, and the organization of the process as an alternation of face-to-face meetings with web-based communication.

Keywords
e-discourse, decision making, online mediation, e-participation, alternative dispute resolution

1. Introduction

Spatial decision problems in environmental planning and logistics often occur as procedures of location choice or allocation of service points. The decision makers are expected to decide on the basis of a variety of tables, maps, debates and recitations. The consideration and appreciation of their respective values – the desires of concerned individuals and groups not to be forgotten – turns out to be highly complex. Although electronic media may not fully replace face-to-face sessions, information technology could support defined portions of spatial discourses.

To facilitate spatial decision-making in groups we combine classical mediation (Fietkau, to appear (2002)) with web-based software, especially the participation platform Zeno[2] (Voss, to appear (2002)) and the geographic information system CommonGIS[3] (Andrienko and Andrienko, 2001) for multi-criteria spatial exploration.

We perform role-playing experiments in order to improve and assess our models and procedures. In our first experiment, conducted in June 2001, the characters were 11 scientists who wanted to test and evaluate the behavior of robots on skis organizing a variety of robot races during a workshop in Wallis, Switzerland. The task was

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[2] see www.ais.fhg.de/MS/ (visited 28.02.2002).

[3] see www.commongis.com (visited 28.02.2002).

to find a suitable village in Wallis. The group had 1,5 days to reach a decision and was facilitated by a professional mediator. The software was used during several phases in the face-to-face meeting.

Our next experiment, “Call-a-Bike” or “CaB” for short, conducted over four weeks in November 2001, was inspired by a franchise system for renting bikes that DBrent, a daughter of the German railway company, plans to install in all major German cities.

2. A model for site selection

In the Wallis experiment, the problem was to select from a given set of places a single one that would best accommodate the robot competition and workshop. In the CaB experiment, a number of well distributed places had to be found while there were no predefined places and any location could be selected on a map of Bonn. We thought it was a multi-site selection problem and the same model as for Wallis would be applicable.

But it turned out that the CaB problem was not a simple location selection problem. The information phase revealed that the places to be selected had to be equipped with facilities, which had to provide certain capacities (or services). These capacities (or services) had to satisfy demands, which we had not made explicit in the experiment. To satisfy each area of demand, (alternative) locations should be proposed, whose services could be negotiated.

This led to a model for demand-oriented facility allocation. For the new CaB model, we designed a template of discourse sections in Zeno and filled it with the contributions from the original experiment[4].

3. Software tools

An important subject of the CaB experiment was the integration of Zeno (version 2) our web-based groupware for moderated discourses, with CommonGIS, a web-based spatial exploration tool, which has also been developed in our institute.

Zeno provides a flexible and easy to use discourse environment for public participation, organizational learning or decision-making. The moderator can prepare different sections dedicated to particular phases or parties, and introduce a special “discourse grammar” for each of them (Turoff et al., 1999). A discourse grammar provides a set of labels for contributions and relations between them. If in this way the role of each contribution in the discussion is indicated, the argumentation is easier to understand and allows participants with different levels of engagement to take part even if they cannot follow the whole discussion. As an example, in the information phase of the CaB experiment we originally used labels to distinguish places pro-

[4] see www.ais.fhg.de/MS/results/zeno2/ to find the interactive demo (visited 28.02.2002).

posed by the municipality, the franchise taker, and the other participants; later we preferred to distinguish areas of demand and locations for the bikes.

From the viewpoint of Zeno, integration with a multi-criteria spatial decision support tool like CommonGIS offers three opportunities:

1. Geo-referenced discussions: It should be possible to link articles in Zeno to places on the map and, vice versa, access discussions about geographic objects from the map.
2. Visual exploration of options and criteria: Once options are geographically referenced, it should be possible to explore and compare them interactively on the map. As a prerequisite, the relevant characteristics of the options must be elaborated in the preceding discussion (clarification phase).
3. Voting: Once options and their characteristics have been explored geographically, it should be possible to submit a vote based on an automatically computed and manually modifiable ranking of options. Further, it should be possible to analyze the collected voting results with the same powerful spatial exploration instruments. This requires that the voting results be introduced as new attributes of the options in the map.

For the CaB experiment, we implemented an experimental mechanism for the first feature, geo-referenced discussions between Zeno and a variant of CommonGIS that was developed for "Naturdetektive" (Andrienko et al., 2000) (http://www.naturdetektive.de). For the second desirable, spatial exploration of options, we used the full variant of CommonGIS, but could not provide any automatic transfer of options and their characteristics from Zeno to CommonGIS. The full CommonGIS incorporates a geographic information system with sophisticated support for interactive display and analysis (Jankowski et al., 2001). The users could visually compare and analyze the locations and how they fulfilled the criteria. Bar charts can be generated with a few mouse clicks and specially designed triangles or utility bars support decision finding.

Once users were satisfied with gathering and assessing information about the locations, they could come to a rational decision using the Ideal Point plot method. The user could select some criteria as a basis for voting and then weigh them relatively to the others according to the personal importance.

This improvised combination of Zeno and CommonGIS in the CaB experiment gave us a clear idea of what was needed; we made a concept for a comprehensive technical integration of the two tools, which is now being implemented.

4. Summary, outlook, conclusion

In conclusion, the CaB experiment was very illuminating. It confirmed our understanding of the role of mediation in decision-making, and how it can be enhanced with decision support and group communication tools. We could elaborate our model of site selection to a model of demand satisfaction through facility allocation, and develop a corresponding discourse template in Zeno. Open questions on other factors influencing the cost-benefit ratio will be explored through a questionnaire.

Our models, methods and software will be evaluated in further role-playing experiments, demonstrations and real applications in the course of this year. One of them will investigate synchronous meetings on the web (same time, different place) as a new element in our repertory. Zeno will become available as open source in March 2002. This version offers many features that were not yet available at the CaB, such as enhanced process awareness and editing tools moderators. The integration of Zeno with CommonGIS is scheduled for the next release.

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