Agent Support for Policy-Driven Mission Planning Under Constraints

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The problem
- Forming ad-hoc coalitions between military forces and humanitarian organizations is crucial in mission-critical scenarios [2].
- Coalition members need to adhere to certain policies (explicit obligations, permissions and prohibitions) [3].
- Coalition members need to consider their own goals, but also to support coalition partners.

We show how intelligent agents – implemented in Jess [4] – can support human planners and ease their cognitive burden by detecting and giving advice about violation of policies and compliance with constraints.

Approach
We conducted experiments with human subjects [1]. We compared the agents’ performance in three conditions: agent support with possible override, policy enforcement with no override allowed, neither support nor enforcement.

Military relevance
The focus of this research is how software agents can most effectively support the collaborative decision-making process.
- Which effects on policy and constraint violations?
- Which effects on quality of plans and on cooperation between coalition members?
- How to ease information overload caused by high number of norms/constraints to satisfy?

Experimental Scenario
- Interaction of two organisational entities, each with its own goals and regulated by its own set of policies [5].
- Cooperation between parties required to achieve own goals and comply with the policies.
- Humanitarian Relief Organisation → rescue all injured civilians from a hostile region (see maps).
- Military Organisation → support Humanitarian Organisation in rescuing injured & defeat all hostile strongholds.

Experiment Sessions
- Twelve teams of two paid subjects played the game through a dedicated PC. Subjects sat in different rooms.
- Communications only by using the structured message representation provided by a Graphical User Interface.

Conclusions – Critic agents:
- Fostered collaboration between coalition partners. Planners established and stabilised plans quickly, and produced higher quality plans with respect to the main mission objectives – rescuing wounded and capturing insurgents.
- Limited the number of policy violations attempted and committed by planners, without hampering the communication between the partners.
- Enabled planners to develop a more accurate prediction of the plan outcomes, both in terms of objective achievement and costs incurred for resource deployment.

References