The effects of communication media on group performance in requirements engineering

-- Extended abstract --

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Delivering systems that meet all stakeholders' needs is easier said than done in a software development world in which resource constraints are everyday realities. In particular, the negotiation between different stakeholders and the reconciliation of their conflicting viewpoints has been recognized as major problems in requirements engineering. This is even more challenging as organizations become more global, and requirements often come from distributed groups. Although the use of multimedia meeting systems is becoming a reality in distributed software development, our knowledge of how such systems impact group performance and their role in facilitating social processes in requirements engineering is limited.

This paper reports on a study that compared the performance of groups in face-to-face and distributed requirements negotiation meetings, paying special consideration to the socio-psychological aspects of group interaction in both communication media.

Research design

In our study we designed a laboratory experiment which uses a scenario that illustrates the conflict between requirements scope and development time constraints.
The experimental task, presented as a scheduled meeting of 40 minutes, involved the communication between a system analyst and two representative customers, mediated by a facilitator. The briefings for the two customers gave them different roles and requirements for the system to be developed ensuring the need for trade-offs in order to meet the constraint on system development time. Five experimental conditions were designed to compare the face-to-face with four distributed group interaction settings. These were chosen to vary the relative physical location of the two customers, the system analyst and the facilitator. Five different group settings were selected for this study: (1) all team members being co-located, (2) the two customers interacting remotely, (3) the two customers being co-located and (4) the developer and (5) the facilitator respectively interacting remotely.

The multimedia meeting system used in the distributed settings was Microsoft's NetMeeting, a system that allowed video-conferencing and real-time sharing of an editor for the manipulation of requirements.

Fifteen groups of university students participated in the study (three in each experimental condition), and three professional facilitators volunteered for the facilitation of the meetings. Each facilitator mediated five groups (one group from each condition).

Dependent variables were (1) group performance and (2) person perception. The first variable was measured by an objective quality of the negotiation of requirements, defined as the extent to which the agreement integrated the perspectives of both customers and supports the overall business goal of the organization. On the second variable, the participants rated both the local and the remote partner on 12 attributes.

Triangulation was applied for the collection of data: the use of the shared electronic editor was recorded for groups in all conditions and post-session questionnaires were used for ratings of person perception. The sessions were videotaped and participants were interviewed after the meetings.

Results

Contrary to the belief that face-to-face interaction increases performance, we found that groups in face-to-face meetings performed no better than the videoconferencing groups. Moreover, the group setting in which the two customers with conflicting perspectives interacted remotely improved significantly the performance across all other distributed conditions. A predominance of lower quality outcomes, i.e. agreements that favored one customer's perspective over the other's, was found in all other group settings.

With respect to the person perception, the local partners were rated as more emotional, argumentative and competitive than those encountered remotely through video-conferencing. Rich qualitative data from interviews provided more insights into the interpersonal relationships across different communication media. There is an indication that a reduced ability to perceive emotional cues enabled the customers to have a more rational approach to conflict and system analysts to attain a level of impartiality in the negotiation.

Overall, the findings of our study suggest that the distributed group settings were more conducive to requirements negotiation than face-to-face meetings. Detailed information on the study design and results can be found at http://sern.ucalgary.ca/~danah/RE_study.html

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