Automated Group Facilitation for Gathering Wide Audience End-User Requirements

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Abstract

The System development projects continue to fail at unacceptable rates. Including a wide array of users in the requirements development process for a wide-audience system can help to increase system success. Facilitated group workshops can effectively and efficiently gather requirements from several different users. To decrease cost and increase the number of potential workshop participants, we designed an embodied agent facilitator to guide groups through the facilitation process. We extend previous research which found human facilitated prompting to be effective at increasing the completeness of requirements gathered by replacing the facilitator with an avatar which administered the same prompts. We hypothesize that the avatar facilitated group will also have a significant increase in the quality and quantity of requirements gathered and find support for our hypothesis.

1. Introduction

Poorly defined requirements are a leading factor in project failure [1]. Requirements development remains a difficult task due to the wide range of difficulties experienced when collaboration involves non-technical users who must recall and communicate detail-rich needs for the systems which will be developed. Using an understanding of human cognition prompting techniques overcome some of the human limitations involved in recalling requirements research has developed prompting techniques to overcome these limitations by leveraging knowledge of principles from cognitive science [2, 3]. In previous research [4], we developed and tested a prompting technique, administered by a human facilitator, which increased the ability of groups to generate a more complete set of requirements than un-prompted groups. The current study we assess the ability of an embodied agent to deliver the same prompting technique.

User involvement in the requirements development process has been advocated both as a means of assuring the development of software functionality that is actually useful, and for increasing acceptance of the system to be used [5]. Obtaining user feedback is especially important when the product is intended for a large audience or market [6]. These efforts have been met with mixed results [4], because of the many knowledge elicitation and communication [7] difficulties present when users are directly involved in a software development project. Many of the benefits of user involvement in requirements development can be reaped by involving the input of users indirectly.

There are several successful instances of groups eliciting requirements indirectly as focus groups [8, 9, 10]. While the contributions from these groups are not directly incorporated as requirements in the design process, they provide inspiration for user functionality, and confirm the importance of envisioned functionality to targeted end users. While these studies reported the success of the involvement of end-user groups, they did not report on the nature of the requirements generated, aside from the quantity and overall subjective quality. Consideration of the completeness of requirements is also important, as requirements elicitation is a cognitively demanding activity [2]. A user has difficulty recalling needs, which often must be expressed at a level of detail that the user has not previously considered consciously.

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Our findings from previous research on our own developed prompting techniques [4] support those of previous research studying requirements elicitation interviews: that prompting is an effective means of input stimulation in research studying general brainstorming [11] and in requirements elicitation effectiveness based on the completeness in fulfilling goals with a minimal amount of conflicts and overlaps in requirements [12].

In addition to providing access to larger numbers of end users through the use of facilitated workshops, in this study we incorporate the use of embodied agents to demonstrate the ability to hold workshops facilitated by autonomous agents. The use of automated agents for group facilitation can have several potential benefits. First, it may provide cost savings over human-based facilitation. Second, the agents have the potential to engage large numbers of users that may be geographically separated. Third, many groups do not have prolonged access to experienced and trained facilitators, and the agents would alleviate this need. We compare the completeness of requirements generated using a live facilitator with those generated using an embodied agent as a facilitator.

In the following section, we provide background information for the research study by highlighting the need for requirements elicitation, and then explaining the use of user stories in requirements engineering. Similarly, we outline group storytelling and discuss prompting as it relates to effective requirements definition. The background concludes with a discussion of embodied agents. Following the background, we explain the design, methodology, and procedures of the research study and share the results. The paper concludes with a discussion of our contributions, the limitations of this work, and directions for future research.

2. Background

2.1 Requirements Elicitation

System requirements gathering or elicitation is the first and one of the critical steps in requirements engineering [13, 14]. The purpose of the requirements elicitation activity is to arrive at a description of the goals of the new system, with an understanding of the needs of the stakeholders and the constraints of the system [14]. The process of eliciting requirements consists of several steps including elicitation, analysis, specification, and verification. In elicitation, the needs of customers are discovered. During analysis, information from stakeholders is analyzed through the creation of models or prototypes for incompleteness and inconsistency. Specification involves documenting the required behaviors of the system. Finally in verification, the requirements are validated with stakeholders [13].

A major concern of the requirements elicitation process is to understand stakeholder needs and discover a set of requirements that completely represents the needs of stakeholders. Towards that end, various requirement elicitation techniques have been devised and implemented, such as observation, interviews or protocol analysis [15]. The techniques may differ from one another in the difficulty levels of implementation, in the kinds of data format they might acquire and the time and effort to implement the techniques. Due to their strengths and weaknesses, each technique finds its fit in different contexts depending on the purposes of requirements and the type of knowledge that requirement engineer wants to elicit [15]. For example, observation is a simple technique to execute, but might result in a lot of irrelevant data. It might be a good method for discovering tacit knowledge but not a recommended technique for eliciting non-tacit knowledge and requirements for a future system.

The current technique is useful in a context where the product will be used by many individuals whose input into the process is needed both from a design point of view and from an attitudinal point of view [6].

2.2 Group Storytelling

The involvement of users in group workshops has recently been seen as a useful, and sometimes necessary means of obtaining a user’s ideas and input for software design [6]. Facilitated group workshops have been used successfully in many areas of requirements elicitation from entire methodologies such as Joint Application Development [16] those that focus on negotiation and prioritization [17], to those that focus purely on requirements gathering [8].

When users tell stories in groups, the knowledge of one user can be verified and expanded by another user, since the knowledge of one user helps to activate the knowledge of another group member [18]. When users meet in groups, they are able to evaluate one another’s information and ask for clarification, or provide the clarification [19]. A similar phenomenon is likely to be experienced by groups brainstorming requirements. In a brainstorming setting, the exposure of member’s groups to the ideas of other members may prompt them to fill in gaps left in the requirements left by their peers.
The success of these group efforts hinge on the ability of the group to develop a set of quality contributions (e.g. requirements) or a complete set of requirements. Bounded Ideation Theory [20] describes the factors which influence the number of quality ideas individuals (alone or in groups) can generate. These factors include the extent to which the idea generation task is open or closed ended, the intelligence of the individual, the understanding the individual has of the idea generation task, the cognitive load of the task, the individual’s goal congruence, and the extent to which the individual is physically and mentally exhausted. The design we present could be discussed with respect to each of these factors. However, we will focus on those which would be affected by our group facilitation design—the individual’s understanding of the task, and the cognitive load of the task. In later sections of the background, we will discuss the extent to which these factors are influenced by the substitution of an embodied agent for a human in the facilitation role.

2.3 Requirements Generation format

The way in which the requirements elicitation problem is framed, both in terms of the rules for communication used by a group has a significant impact on the group’s ability to generate a complete set of requirements. The task of eliciting requirements can be less cognitively demanding for individuals when a familiar, unstructured format is used, such as simple prose. Eliciting requirements in the form of user stories allows stakeholders to convey their needs in a way that is natural to them, allowing them to relate more tacit knowledge [21]. Documenting system requirements in the form of user stories allows customers to communicate desired features of a system without having to know a specific modeling language [22]. Strict syntaxes can also limit the expressiveness of participants [23].

Having a simple format allows participants to focus their attention on the generation of requirements, instead of trying to fit the requirements within the constraints of a strict syntax. Briggs and Renig [20] note that reducing the cognitive load of a task allows for greater focus of attention resources on the recall and exploration of ideas.

2.4 Requirements Generation Framing

While rules of expression may hinder the ability of participants to think about and communicate requirements, some form of structuring can help guide group participants towards better understanding of the requirements elicitation problem through a clearer problem definition, while also helping them avoid too narrow of a focus only part the problem.

When potential end users are interviewed by analysts to uncover the details of needed functionality for a system, the questions used shape the user’s understanding of the types of responses which are appropriate, leading the user to recall information related to the prompts [24, 25, 2]. Questions in the forms of prompts given by the group facilitator may therefore help the group participants better understand how to develop a set of requirements that is complete.

Prompts may also help group participants overcome cognitive inertia, or spending too much attention focused on generating a narrow section of the possible solution space, or only a part of the set of requirements [20]. Briggs and Renig explain why cognitive inertia occurs when generating ideas:

Humans can normally hold roughly seven concepts in conscious memory at a time [26]. However, concepts that are initially activated or recalled from long term memory cause, in turn, the activation of other closely related concepts as part of spreading activation [27]. Spreading activation allows people to follow a train of thought, in spite of the limits of working memory. When all related concepts have been exhausted, people cannot readily switch to a new line of thinking. Without external stimuli, people think inside the box. Prompts, therefore, also help a group to think of a more complete set of requirements by providing this external stimuli.

The prompts we developed in previous research help the user to think at a higher level of criticism than would normally be assumed. They especially encourage the user to think of all the requirements, and supporting details which would be necessary to accomplish a goal. Reasoning about goal fulfillment assures that the necessary functionality will be in place for users to achieve goals using the system [28]. The prompts developed in our previous study [4] are presented in Figure 1 below:
1. Look at the requirements written. What other requirements or features do they make you think of?
2. As you look at the features described on the page, think what they enable the user to do. What will the user do before or after? Are their features to support those activities? Try to think from the beginning to the end of your experience with the website.
3. Look at the features in the list. Are their features missing that would need to be included to support those features?
4. Think about the goals that the features of the stories support. For example, a user may want to manage his profile. What functionality is needed to support this goal? What other features would be needed to support those goals?
5. Are there any details missing from the stories on your list? Elaborate on information that is missing from the features.

Figure 1 – Prompting Technique

Up to now, we have explained why using prompts and a simple requirements format will help to increase understanding of the requirements elicitation problem, while at the same time reducing cognitive load, according to Bounded Ideation Theory [20]. We will now describe embodied agents and their likely effects on the ability of participants to generate a complete set of requirements as facilitators of a workshop.

2.5 Performance in Agent Facilitated Sessions

Past research has looked at how agents can interact with people in a variety of team settings [29, 30]. Agent-based systems have also been shown to make knowledge-based recommendations and exhibit human characteristics such as rationality, intelligence, autonomy, and environmental perception [31]. Research integrating expert systems into Group Decision Support Systems (GDSS) showed promising results; see e.g. [32, 33]. Limayem and colleagues (1993) found that small team decision-making processes guided by a text-based computer agent yielded higher quality and higher consensus outcomes than produced by unaided groups.

A particularly promising avenue of research to support teams engaged in virtual collaboration processes focuses on the development and application of embodied agents. This research is grounded in the challenge that most organizations cannot benefit from productive collaborative processes because of a lack of access to collaboration professionals such as facilitators and skilled team leaders. Recent studies have shown that a new class of agents, so-called Special Purpose Embodied Conversational Intelligence with Environmental Sensors (SPECIES) agents [34, 35, 36], enables effective human-computer interactions in the context of computer-guided interviews. These SPECIES agents are intended to function as natural user interfaces between humans and complex AI systems and have blended interpersonal communication theory with intelligent agent architectures to create rich interactions with human counterparts. Figure 1 below shows the embodied agent that was used in this study.

Figure 2 – Automated Facilitator

In the context of team collaboration settings, such agents could be deployed for a number of purposes, for example to automate the delivery of specific instructions to team members, to monitor team performance, and to automate specific group process interventions. These approaches lay a foundation for exploration how embodied agents can be coupled with group facilitation behaviors.

Given this background, our current study had one research question and multiple hypotheses.

Research Question: How does an automated facilitator affect the experience of a group requirements facilitation session as compared to a human facilitator?

2.6 Performance in Agent Facilitated Sessions

In the current study, we attempt to increase the amount of information recalled by individuals in a facilitated group process by presenting them with multiple varied, concrete based questions. Such a combination of questions will increase the likelihood that the individual will recall information by giving them multiple targets for providing relevant responses. The questions also encourage the members of the facilitated group to think of a complete system in addition to encouraging more details in general about the system. This effect is
likely to be robust to differences between artificial and human facilitation. We therefore hypothesize that:

Hypothesis 1a: An agent-facilitated group generates more user stories than a non-facilitated group

Hypothesis 1b: An agent-facilitated group generates more complete requirements than a non-facilitated group

2.7 User Satisfaction with Agent Facilitated Sessions

While using agent-based facilitation may increase performance, satisfaction with the session process and outcome may actually decrease due to implicit higher expectations session participants may feel for their performance. Locke and Latham found that those who performed at the highest levels were the least satisfied, because they are dissatisfied with achieving at a lower level [37]. A feeling of dissatisfaction led them to attempt to achieve higher goals. Because facilitated sessions, as studied here, provide a higher goal (an attempt to provide a complete set of requirements), it is also likely that the feeling of dissatisfaction with the outcome will bleed over into the process as the team works towards the goal [38]. The felt dissatisfaction with the process may also be increased by the “automaticity” of the prompting by the avatar-based facilitator. Aiello and Kolb [39] found that those who were monitored automatically by an electronic performance monitoring system felt greater stress as they worked. We therefore hypothesize that:

Hypothesis 2a: An agent-facilitated group will be less satisfied with the session processes than a non-facilitated group

Hypothesis 2b: An agent-facilitated group will be less satisfied with the session outcomes than a non-facilitated group

3 Method

3.1 Participants

Sixty-Three students enrolled in course in the psychology, business, and management information systems department classes participated in this study. Of the students who provided demographic information, 58 percent of participants were female. Participants were predominantly white (81%), with 13% Asian, 3% Latino and 1% Black.

3.2 Procedure

Participants were randomly assigned to 3 or 4 person teams for the requirements elicitation task. The participants were asked to create user stories and generate requirements for the development of an online book exchange system. This task was deemed sufficiently complex such that users would be able to generate requirements for a full 45 minutes and also because an online textbook exchange is a subject that is highly familiar to college students. User stories were generated and captured electronically using GroupSystem’s ThinkTank version 2.4 group decision support software. Experiment personnel obtained informed consent and demographic information using a pre-survey.

The experiment was a between-group design with three conditions: non-facilitated, human-facilitated, and agent-facilitated teams. Each team was randomly assigned to one of the conditions and the session began. In facilitated sessions, the facilitator introduced the task and the book exchange website and directed the participants to read a written description of the book exchange scenario. This description included (a) a description of the task, (b) an explanation of the key components of a valid user story, and (c) multiple examples of good user stories. The human facilitator observed non-verbal cues in order to determine when all of the participants were ready to continue the task. In the agent-based facilitation, the participants had a “ready” button that the pressed when they were comfortable with the written material. All of the instructions came from the facilitator, not from experiment personnel. Once all of the team members were ready to continue, additional instructions and clarifications were given. Participants were given a final chance to ask questions of experiment personnel, and then the task elicitation began. The facilitator outlined the ThinkTank tool and user began submitting user stories. The instructions indicated that subjects were to generate as many user stories as they could over a forty-minute time period. Groups were stopped before forty minutes if no contributions were submitted for at least 120 seconds. In the non-facilitated groups no additional interventions were given. Groups were left to create user stories on their own. In the human and agent facilitated groups, additional prompting and instructions were given. The facilitator had five scripted prompts. The first prompt was given after 10 minutes and the remaining prompts were delivered at approximately seven-
minute intervals, resulting in a 45-minute requirements elicitation session.

Following user story generation, individuals completed additional measures of satisfaction with the process and outcomes and were debriefed.

### 3.3 Variables

The dependent variables of interest to the study were quantity and completeness of user stories, and the user’s perceived satisfaction with the meeting process and with the meeting’s outcome. Quantity was defined as the total number of user stories generated by subjects. Completeness was calculated as the number of user-generated requirements that covered 101 predetermined categories, which were created during an earlier pilot test of this experiment. Coders worked in pairs to independently rate data from each of the groups for comprehensiveness. Inter-rater reliability had previously been established at 88.8% in previous study [4].

Previous research has found that users who are not satisfied with meeting support technology may ultimately abandon it, in spite of its proven benefits [40]. Since we are interested in the likely adoption of avatar facilitation by a group, we assess measures of satisfaction. We collected the subject’s perceived satisfaction with the process and outcomes of the requirements elicitation task using an instrument developed in previous research comparing an individual’s satisfaction with electronic supported meetings [38]. See Table 1 below for the actual questionnaire items. Based on our own data, we calculated reliability (Cronbach’s Alpha) of the satisfaction with process and satisfaction with outcome as .92 and .86 respectively.

<table>
<thead>
<tr>
<th>Satisfaction with Process</th>
<th>Scale Items for Satisfaction with Process and Satisfaction with Outcome</th>
<th>Cronbach’s Alpha</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1. I feel satisfied with the way in which today's meeting was conducted.</td>
<td>.92</td>
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<tr>
<td></td>
<td>2. I feel good about today's meeting process.</td>
<td></td>
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<tr>
<td></td>
<td>3. I liked the way the meeting progressed today.</td>
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<td></td>
<td>4. I feel satisfied with the procedures used in today's meeting.</td>
<td></td>
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<td></td>
<td>5. I feel satisfied about the way we carried out the activities in today's meeting.</td>
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<tr>
<th>Satisfaction with Outcome</th>
<th>Scale Items for Satisfaction with Process and Satisfaction with Outcome</th>
<th>Cronbach’s Alpha</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>1. I liked the outcome of the meeting.</td>
<td>.86</td>
</tr>
<tr>
<td></td>
<td>2. I feel satisfied with the things we achieved in the meeting.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. When the meeting was over, I felt satisfied with the results.</td>
<td></td>
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<tr>
<td></td>
<td>4. Our accomplishments in the meeting give me a feeling of satisfaction.</td>
<td></td>
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<tr>
<td></td>
<td>5. I am happy with the results of the meeting.</td>
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Table 1: Items for Satisfaction Scales (from [38])

### 4. Analysis

#### 4.1 User Stories Generated

Across all conditions, groups generated an average of 82.65 (SD = 43.55) user stories that covered 43.61 (SD = 11.30) of the pre-determined categories. The results of the comparisons between the facilitation treatments are discussed below and reported in Table 1.

As predicted, groups in the avatar facilitated condition generated more user stories (\(M = 80.43\)) than the non-facilitated groups (\(M = 44.83\), \(p < .05\) (\(t = 2.21\), df = 11). The avatar facilitated groups also hit more key requirement categories (\(M = 43.43\)) than non-facilitated groups (\(M = 30.83\), \(p < .05\) (\(t = 2.64\), df = 11). Therefore, hypothesis 1a and 1b both received support.

In partial answer to research question 1, the avatar-facilitated group did not perform as well as the human-facilitated group (\(M = 80.43\) vs. 96.5 user stories and 43.43 vs. 49.50 key categories hit), but the performance was not significantly worse (\(p > .05\)).
Table 2. Mean of number of generated user stories and key categories hit by condition (Means marked with an * are significantly different from the mean for Avatar Facilitated performance)

### 4.2 User Satisfaction Measures

In order to measure the differences in perceptions of satisfaction with process and outcome between the two groups, we performed a Student’s T-Test we began by computing an average of the responses to questionnaire items for both satisfaction with process and satisfaction with outcome. Then means were calculated across individuals for both satisfaction measures. The statistics used in the test are reported in Table 2. For satisfaction with outcome, the avatar-facilitated groups had an average response score of 3.87 and a standard deviation of .45. The non-facilitated groups had an average response score of 4.27 and a standard deviation of .6. The difference between the treatments was significant ($t = 2.34$, df = 37) at the $p < .05$ for satisfaction with process. Users were more dissatisfied with the process with the avatar-based facilitation. Therefore, hypothesis 2a was supported. However, the difference between treatments for satisfaction with outcome was not significant at the $p < .05$ level ($t = 1.33$, df 37). Hypothesis 2b was not supported. See Table 3 below for the results of the comparisons for satisfaction with process and satisfaction with outcome.

<table>
<thead>
<tr>
<th>Group Mean Performance Comparisons</th>
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<tbody>
<tr>
<td>User Stories</td>
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<tr>
<td>Avatar Facilitation</td>
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<tr>
<td>Human Facilitation</td>
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<tr>
<td>Non-Facilitated</td>
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Table 3. Group Mean Satisfaction Comparisons Between the Avatar Facilitated Condition and the Non-Facilitated Condition (means marked with an * are significantly different from the Avatar Facilitation Condition at the $p < .05$ level)

### 4.3 Qualitative Observations During the Automated Facilitation

Related to research question 1, we observed group behaviors towards the automated facilitator. For all of the teams, the groups accepted the embodied agent as the leader, and deferred pacing and authority to it. This would be consistent with the Computers As Social Actors (CASA) theory, which proposes that human beings interact with computers as though computers were people [41]. In multiple studies, researchers have found that participants react to interactive computer systems no differently than participants react to other people [42]. It is suggested that people fail to critically assess the computer and its limitations as an interaction partner [43] and as a result, the norms of interaction observed between people occur no differently between a person and a computer [44].

Similarly, the group would refer to the agent as “Him” not as “It.” They viewed as an embodied entity, not as a machine. It is likely that this phenomenon is related to “mindlessness”. Mindlessness is a similar concept to CASA. Humans do not stop think that the representation is just a series of bits and lights, but “mindlessly” [43] view it as a social partner [44].

### 5. Discussion

As expected, the agent-facilitated groups generate more complete requirements than non-facilitated groups. We also showed that user satisfaction with the process decreased when the sessions were facilitated by the agent and we suspect that this is due to the implicit expectation of better performance elicited by the prompting and by the cognitive and other effort that has to be expended due to the agent’s monitoring and messages. However, there was no statistical difference in the outcome satisfaction between agent-facilitated and non-facilitated groups. This may be due to the fact that there are no benchmarks for performance, and that there were limited expectations for the outcomes from the participants. Satisfaction needs to be studied further and social cognitive theory explains how social expectations and self-efficacy determine actions [45]. Such understanding may have bearings on how an automated facilitator treats the group and to what extent it encourages them and creates expectations for them.
Similarly, the Yield Shift Theory of satisfaction [46] provides important guidance in terms of participant satisfaction - those who participate need to feel satisfied during the experience, or at least that it is providing some value for them, so as to motivate their continued participation. Since this was just a one-time interaction, this may not have been important, but over time this could come into consideration. Finally, Nahapiet and Ghoshal [47] developed a theoretical framework linking social capital constructs such as trust, norms, relationship quality (and number of relationships), to behaviors such as knowledge sharing. Over time, the automated facilitators may need to demonstrate the ability to tap into these constructs.

5.1 Future Research

Future research should extend the study of agent facilitated prompting to other settings and types of systems. For example, it would be interesting to see how the agent facilitated prompting technique impacts users within an organization who may have stronger feelings about the requirements of a system than the students here who are less invested in the system than employees may be whose jobs will be altered by such a system.

One current limitation of the automated facilitation is the lack of adaptability of the agent in the current experiment. Although this adaptive capability is built into the current agent architecture, the avatar facilitator only runs through the prompts statically. Future research needs to be done to build on this foundation to allow the agent to adapt during the interaction based on feedback it receives from the human counterparts. For example, the rate that requirements are being input into the system may serve as a proxy for engagement and task performance. The agent could also provide more tailored feedback to the individual participants in order to encourage better performance as it monitors their performance.

Another important consideration is the relationship of satisfaction to performance over time. In this study, the users only had to perform one task, one time. It would be interesting to see if users interacted with the agent multiple times, or were asked to interact for generating requirements for another system how the performance and satisfaction measures would change.

Similarly, the availability of ubiquitous technologies allows organizations, be it business, non-profit, or governmental, to engage large numbers of people both within and outside their organizational boundaries. This has given rise to new forms of user engagement and could be used for requirements gathering. As a society, we are moving from small group, focused and time-boxed collaboration, to an environment in which unstructured, longitudinal mass collaboration is the norm. These automated facilitators can engage large numbers of users and coordinate their efforts, and gather requirements from the masses. However, there are many questions that need to be answered before this vision can be made reality. For example, what constitutes critical information that an agent has to collect to get a useful understanding of the ongoing performance in mass collaboration efforts? What activities and process steps do groups in mass collaboration situations execute and what are the support requirements for these activities and steps? Are there specific constraints that apply to team interactions, for example in terms of communication structure or semantics, for an agent to correctly interpret the status in a collaboration effort? Are there repeatable facilitation interventions that yield predictable group behavior for different stages in a mass collaboration setting? What conditions have to be met for participants in mass collaboration efforts to be adequately motivated by an agent to become engaged in the collaboration process?

Finally, in the context of team collaboration settings, the agents could be deployed for a number of purposes, for example to automate the delivery of specific instructions to team members, to monitor team performance, and to automate specific group process interventions. Of note, past research has looked at how agents can interact with people in a variety of team settings [29, 30]. Agent-based systems have also been shown to make knowledge-based recommendations and exhibit human characteristics such as rationality, intelligence, autonomy, and environmental perception [31]. Research integrating expert systems into Group Decision Support Systems (GDSS) showed promising results; see e.g. [32, 33]. Limayem and colleagues [48] found that small team decision-making processes guided by a text-based computer agent yielded higher quality and higher consensus outcomes than produced by unaided groups. The agents could be expanded to help project management and IS development in other areas, as well.

5.2 Conclusion

In order to develop relevant and useful Information Systems, system designers must discern user requirements and poorly defined requirements are a leading factor in project failure [1]. Defining
and capturing system requirements is a consistent challenge in all software development methodologies. In this paper, we have demonstrated that automated facilitation of system requirement generation is possible and that agent-facilitated groups generate more complete requirements than non-facilitated groups.

The use of automated agents for group facilitation can have several potential benefits. First, it may provide cost savings over human-based facilitation. Second, the agents have the potential to engage large numbers of users that may be geographically separated and is necessary for mass collaboration. Third, many groups do not have prolonged access to experienced and trained facilitators, and the agents would alleviate this need.

6. References

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