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Focus Groups For Eliciting Requirements In Information Systems Development

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FOCUS GROUPS FOR ELICITING REQUIREMENTS IN INFORMATION SYSTEMS DEVELOPMENT

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Abstract

Traditional methods for eliciting requirements focus on specifying functional requirements for the software without putting the same effort on understanding the system scope and what the stakeholders really need. As a result, users cannot agree easily on what they want or need, and resist formalizing the requirements that many times remain undefined for the lifetime of the project. This is one of the main reasons for the high failure rate in information system projects. In this paper we propose to apply Focus Groups in order to better elicit requirements for complex information system projects. Using Action Research as the research method, we have applied Focus Groups in real-world experiments to evaluate the proposal. The preliminary results show that stakeholders actually discuss different points of view about the system as a whole before reaching consensus and agreeing to formalize the requirements. We conclude that Focus Groups help to understand both system scope and actual needs better than using traditional methods based on requirements specification.

Keywords: Requirements Elicitation, Focus Groups, Action Research

Topic: IS Design and Requirements Engineering
FOCUS GROUPS FOR ELICITING REQUIREMENTS IN INFORMATION SYSTEMS DEVELOPMENT

Abstract

Traditional methods for eliciting requirements focus on specifying functional requirements for the software without putting the same effort on understanding the system scope and what the stakeholders really need. As a result, users cannot agree easily on what they want or need, and resist formalizing the requirements that many times remain undefined for the lifetime of the project. This is one of the main reasons for the high failure rate in information system projects. In this paper we propose to apply Focus Groups in order to better elicit requirements for complex information system projects. Using Action Research as the research method, we have applied Focus Groups in real-world experiments to evaluate the proposal. The preliminary results show that stakeholders actually discuss different points of view about the system as a whole before reaching consensus and agreeing to formalize the requirements. We conclude that Focus Groups help to understand both system scope and actual needs better than using traditional methods based on requirements specification.

Keywords: Requirements Elicitation, Focus Groups, Action Research

1.0 Introduction

The Information Systems Development (ISD) process starts with the elicitation of requirements (Coughlan & Macredie, 2002), (Avison & Fitzrald, 2006), (Davey & Cope, 2008). This initial phase involves interaction between stakeholders (users and customers) and system analysts in order to understand the purpose of the system, the stakeholders and their needs (Christel & Kang, 1992) (Al-Rawas & Easterbrook, 1996), (Byrd, Cossick, & Zmud, 1992). An accurate elicitation of requirements increases the probability of success in these projects (Christel & Kang, 1992).

However, Requirements Elicitation (RE) still has many problems (Goguen & Linde, 1993) (Davey & Cope, 2008), and in particular it needs more real-world research (Coughlan & Macredie, 2002). These problems include: incomplete requirements such as incomplete understanding of needs, incomplete domain knowledge, poor users’ collaboration, and so on; incorrect requirements including ill-defined system boundary or misunderstanding of system purpose; ambiguous requirements such as synonymous and homonymous terms; and inconsistent requirements including unsolid intentions of requesters and different views of different users (Tsumaki & Tamai, 2006). These problems can be grouped into three categories: defining the system scope (organizational and contextual factors); understanding difficulties
between analysts and stakeholders; and dealing with the volatility of requirements (Christel & Kang, 1992).

The problems caused by RE may lead to development of unsatisfactory or unacceptable information systems or even to the cancelation of development projects (Christel & Kang, 1992), (Goguen & Linde, 1993), (Al-Rawas & Easterbrook, 1996), (Davey & Cope, 2008). For example, according to the CHAOS Report (Standish Group, 1994), top IT managers ranked incomplete requirements and lack of user involvement at the top of the reasons why projects are impaired or cancelled. This report also ranked lack of user input and incomplete requirements and specifications as the top factors for challenged projects.

In fact, most of the past and current research efforts on traditional methods for requirements elicitation focus on specification (i.e. representation) of requirements, assuming somehow that they are easy to elicit from stakeholders (Miller, 1964), (Christel & Kang, 1992). Furthermore, traditional methods elicit requirements for building software – not information systems composed of software, hardware, and networks but also people that will use the new systems and organizational processes that need to change. As a result, RE for ISD heavily depends on the social context (Goguen & Linde, 1993) and, as such, socially-oriented methods are more suitable for RE than just specifying requirements (Coughlan & Macredie, 2002).

In this paper we propose to apply Focus Groups, a qualitative research method that is very popular for marketing purposes, in order for better eliciting requirements in ISD projects. Using Action Research as the research method, we have applied Focus Groups in real-world experiments to evaluate the proposal. The preliminary results show that stakeholders actually discuss different points of view about the information system as a whole before reaching consensus and agreeing to formalize the requirements. We conclude that Focus Groups help to understand both system scope and actual needs better than using traditional methods based on requirements specification.
2.0 Related Work

A number of researchers have worked on RE. For example, Byrd et al. compared representative Requirements Analysis (RA) and Knowledge Acquisition (KA) techniques (Byrd, Cossick, & Zmud, 1992). The authors concluded that these two research streams have many things in common and that researchers in one area can benefit from developments in the other area. However, they also recognized that much more research is needed, in particular: techniques to overcome communication obstacles and enrich understanding; matches between elicitation types (prototyping, interviews, brainstorming, critical success factors, etc.) and problem domain categories (information requirements, process understanding, behavior understanding, problem frame understanding); examinations into synergetic effects of elicitation techniques; development of more techniques for RE to serve emerging needs; and comparisons of the relative advantage of generalized versus specialized elicitation techniques.

Goguen and Linde evaluated some techniques for RE of computer-based systems, namely introspection, interviews (questionnaire interviews, open-ended interviews and focus and application development groups), protocol analysis and discourse analysis including conversation, interaction analysis and discourse structure analyses (Goguen and Linde, 1993). Although relatively untried, the authors concluded that the first three techniques (XXX QUAIS???) do not match the needs for computer-based systems and that the last three (XXX QUAIS???) are promising because they can elicit tacit knowledge by observing actual interactions in the workplace and they can also be applied to the system development process itself.

Christel and Kang synthesized various methods and techniques into a methodology, arguing that no elicitation technique is comprehensive enough to adequately cover in detail the issues of scope, communication, and requirements volatility (Christel and Kang, 1992). The proposed methodology consists in a process model of two sets of activities (user-oriented and developer-oriented) and recommends that an elicitation approach can be instantiated to address the attributes of a given target system. The authors argued that the difficulties in applying the proposed methodology due to its generality can be overcome by specializing according to a given elicitation scenario.
and the characteristics of the affected parties. However, this proposal remains too ambiguous and no orientations are given to instantiate the methodology to a target system.

Engelbrektsson et al argue that RE depends not only on the data collection method but also on an efficient choice of context or environment in which data collection takes place, a choice of participants, and a choice of stimuli or mediating tools in order to enhance the data collection process (Engelbrektsson, Yesil and Karlsson, 2000). The authors worked on two studies with the overall aim of assessing the effect of choice of participants and product representation. They concluded that a choice of participants with product experience seems to have an overall positive effect on the volume and character of the information elicited, and that for efficient RE is more important to consider the information content of a representation than the type of representation. However, they recommended further work to validate their results.

Coughlan and Macredie proposed a four-dimensional framework to evaluate four different methodologies that promote a closer working relationship between users and designers, arguing that RE comprises “an early and critical but highly error-prone stage in system development” (Coughlan and Macredie, 2002). The four dimensions of this framework are: user-designer interaction (1D); user participation and selection (2D); and employ techniques (3D) to entail communication activities (4D).

A recent methodology that they discuss is JAD (Joint Application Development) that brings together representatives with management authority and accountability into a structured workshop to foster timely decision-making. JAD starts with fact-finding and information gathering that are validated in the JAD session. The JAD process concentrates on this JAD session and thus JAD contributes to RE as primarily a means to validate information already gathered. Although their analysis is theoretical and therefore the practical consequences are limited, the authors concluded that the four methodologies are fairly complicated to utilize. They recommend more real-life research on methods and on the user-analyst relationship.
More recently, Davey and Cope concluded that measurement of outcomes across timelines stretching from 1982 to the present continue to show that RE is problematic, reconfirming its immaturity and importance in order to avoid the “major causes of systems failure or abandonment” (Davey and Cope, 2008). They enumerated some RE techniques – such as observation, interviews, brainstorming, ethnographic methods, etc. – and stated that interviews (conversations between clients and consultants) are the most effective method for RE. Moreover, they examined how consultants experience RE conversations to show that various treatments can improve RE. They concluded that research into the nature of conversations is still needed.

We summarize the related work by concluding that RE remains a crucial research topic because there is still no consensus on how to do it properly and poorly performed ER can lead an ISD project to partial or even total failure. Most research so far has concentrated on specifying requirements for building software and very little exists about eliciting requirements for real-world, complex, large-scale information systems with stakeholders that hardly know what they want or need – not to mention agreeing on the functionalities the system should support.

3.0 Proposal

We propose that RE must involve all stakeholders (users and customers) as well as system analysts (Al-Rawas & Easterbrook, 1996), (Byrd, Cossick, & Zmud, 1992), (Christel & Kang, 1992) using teams that allow more natural interactions between people than questionnaire interviews or even open-ended interviews (Goguen & Linde, 1993) to promote cooperation, understanding, and teamwork among users, developers, and customers. Developers help users formulate problems and explore solutions, while users share ownership of the requirements and associated documents (Christel & Kang, 1992). These approaches ensure that information is gathered from everybody so that the resulting requirements meet the approval and understanding of all stakeholders (Christel & Kang, 1992). They are also more amenable to the active encouragement and exchange of ideas, whereas traditional methods do not include the user in the requirements process (Coughlan & Macredie, 2002).
In particular, we propose to apply Focus Groups (FG) (Simon, 1999), (Ehigie & Ehigie, 2005) in order to better elicit requirements for information system development projects. FG are a qualitative research technique that represents a type of in-depth interviews where the interview is between the researcher (called moderator) and a small group of people with relevant characteristics to the studied phenomenon. As a result, this method collects in-depth information from a group of people representing the interested population in the field of study (Simon, 1999).

FG sessions are able to explore current work practices and new ideas or perspectives from different individuals with distinct profiles. An FG session involves representative stakeholders to collect data and generates more complete and valid results to improve work practices.

We used Action Research (AR) as the research method because of its unique nature of involving two goals: research (theory) and problem-solving in real-world situations (practice) (Kock, Mcqueen, & Scott, 1997), (McKay & Marshall, 2002), (Bhattachariya & Venable, 2006), (Chiasson, Germonprez, & Mathiassen, 2008). In order to use AR we need to first establish the purpose of the action, then perform some practical action in the problem setting (socially situated) with action researchers as participant/observers, and finally adjust the theory according to the practical outcome of the action (Baskerville & Myers, 2004).

Moreover, being future oriented, situational, collaborative and agnostic, implying system development through action guided by theory and evaluated by its consequences (Susman & Evered, 1978), AR shows great potential for real-life information systems research (Kock, Mcqueen, & Scott, 1997).

Our research work was based on the five phases of AR: diagnosing the problem that causes the organization’s desire to change; planning an action by considering alternative courses of action for solving the problem; taking an action or applying the action planned in the previous phase; evaluating the outcomes; and specifying learning (Susman & Evered, 1978).
The next three sections will present the phases action planning and action taking as well as evaluating and specifying learning.

4.0 Action Planning

According to AR, the action planning phase considers alternative courses of action for solving a problem with collaboration of researchers and practitioners (Susman & Evered, 1978). In our research work we planned to organize an FG session with the practitioners of the enterprise in order to elicit requirements for implementing a novel information system.

4.1 Organizational Context

The enterprise where the proposal was tested is a Small and Medium Enterprise (SME) focused on the implementation and maintenance of IT infrastructures, including networks computers and software provided by third-parties. The company has customers of small and medium dimension and now wants to implement a new information system to support the core services they provide.

4.2 Data Collection

The selection of stakeholders for FG sessions is crucial (Engelbrektsson, Yesil, & Karlsson, 2000) (Coughlan & Macredie, 2002). It is important to include not only managers that ensure implementation and acceptance (status) and technicians responsible for the technical issues but also users with specific task knowledge as well as skills that represent different profiles (Engelbrektsson, Yesil, & Karlsson, 2000). The participants of the FG session were selected with the collaboration of the CEO and included individuals with different profiles described in the Table below.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>CEO (Chief Executive Officer)</td>
</tr>
<tr>
<td>P2</td>
<td>Technical Director</td>
</tr>
<tr>
<td>P3</td>
<td>Customer’s Technical Manager</td>
</tr>
<tr>
<td>P4</td>
<td>Technical Support Expert</td>
</tr>
</tbody>
</table>

Table 1. Participants’ Profiles.
The objective for this FG sessions was to understand the current structure of the enterprise, their objectives, and the requirements for the new information systems, in particular:

- **Business Model**: core services currently provided, strategic objectives, and actions needed to reach these objectives;
- **Requirements**: current work practices, existing needs, and requests for the new system.

### 4.3 Data Analysis

The next step is to plan how to organize and analyze data rigorously. Because FG sessions rely on texts or audiovisual rather than numbers, the raw data was analyzed through several techniques (Bachman & Schutt, 2008):

- **Documentation**: documentation of the data and the process of data collection, for example, transcribing useful portions recorded on audio.
- **Organization or categorization**: conceptualization, coding (conceptual labeling of citations and the gradual grouping and categorization of concepts according to their properties, namely topics or questions of the study) and identification of categories.
- **Connection of the data**: systematic comparison of the categories identified to illustrate how concepts influence each other and to select core categories.
- **Corroboration or legitimization**: evaluation of alternative explanations in order to extract conclusions.
- **Report**: reflection on encountered problems and their resolutions to report the findings.

Some considerations were made in order to interpret and categorize the coded data, such as, actual words and meaning of words, context within which the comments are made, internal consistency or changes in opinion, frequency and intensity of comments, specificity of responses, extensiveness of participants who express a view, and big picture or large trends (Rabiee, 2004).

### 5.0 Action Taking

According to the AR method, in the action taking phase researchers and practitioners collaborate in the active intervention into the organization in order to implement the course of action considered in the action planning phase. The objective is to develop knowledge about the organization, not only for the researcher but also for the practitioners (Susman & Evered, 1978).
The action we performed was to conduct an FG session that took place in the enterprise, lasted two hours and was fully recorded with an MP3 player. This section summarizes the results of this experiment that will be evaluated in the next section.

5.1 Business Model
The questions about the current business model were only answered by P1 that described the services they provide: implementation and maintenance of IT infrastructures.

However, the subsequent questions about the future business model were discussed between P1 and P2 that together identified the following goals:

- **ITIL**: implement incident and other processes from the Service Support book to help provide the services;
- **ISO 20000**: initially thought for the entire enterprise, the discussion concluded that this certification would only make sense to the technical department providing services directly to customers;
- **IT as a Service**: a new concept that means adopting a new outsourcing business model based on a “service catalogue” to be sold on-demand;
- **Customer relationship**: to improve the communication with customers.

P3 and P4 did not participate in this discussion and did not say anything relevant.

5.2 Requirements
The questions about requirements for the new information system were discussed between all the participants and allowed to identify three main processes for supporting services:

- **Incident Management**: a process for handling incidents reported by IT users in order to restore normal service operation as quickly as possible and minimize the adverse effect on business operations, ensuring high levels of service quality and availability;
- **Project Management**: a process for planning, organizing and managing resources in order to successfully complete goals of the project;
- **Financial Management**: a process for handling financial decisions, including budgeting, accounting, charging, reporting and auditing of operational costs.
The requirement for implementing Incident Management was identified during a discussion between all participants. In fact, they quickly agreed that current work practices of managing incidents had several problems, such as very long times to solve incidents and being unable to create reports about the incidents.

The requirement for Project Management was raised by P2 that currently has difficulties for lacking an appropriate tool to manage people, tasks and meetings.

Finally, the requirement for Financial Management was recognized by P1 as a requirement. P1 said that currently they do not have difficulties for controlling costs but the new business model will probably bring several problems in this area. So they believed it was crucial to implement a tool to support cost control.

### 6.0 Evaluating and Learning

The evaluating phase determines, with the collaboration of practitioners, whether the theoretical effects of the action taken were realized (or not) while the learning phase identifies the main findings based on that evaluation (Susman & Evered, 1978). Our evaluation of the FG session can be summarized as follows.

Regarding the future business model, P1 and P2 had a discussion and then identified four mains goals that were described in section 5.1. The interesting point in this discussion is that the ISO 20000 certification was a controversial goal in the beginning, but P1 and P2 quickly reached a consensus by changing their original opinions. Initially thought to include the entire enterprise, both concluded that the goal was too ambitious so this certification should only include the technical department.

The elicitation of requirements was also very interesting because of the different rate of participations. For example, implementation of incident management allowed the contribution of all participants because all of them were aware of the problems in this area. However, project and financial management were almost exclusively discussed by P2 and P1 respectively. These contributions cannot be taken as evidence per se that incident management is more important than the other two processes; they just reveal
that P2 is more aware of problems due to the lack of project management and P1 is responsible for financial management.

Based on the outcomes of this evaluation, we learned that using FG sessions for eliciting ISD requirements has strengths and weaknesses, and, as a result, we have suggestions for optimizing these FG sessions. For example, we expected that managers would dominate the FG session but in this session P1 had a participation that almost eclipsed the others. Next time we should apply techniques during the FG session to avoid this problem.

A related problem was caused by the (lack of) experience of the moderator that is one of the common FG limitations pointed by several papers (Christel & Kang, 1992), (Goguen & Linde, 1993). Next time we should take care to deal better with this problem. It is expected that only an experienced analyst is able to properly elicit requirements, independently of the chosen method, but in order to use FG the analyst should also have moderator experience.

Another important finding that resulted from our experiment with FG was that stakeholders are more comfortable to talk and discuss their problems and needs than write requirements – even knowing that sound is being recorded. Furthermore, we found that it is very important to gather perspectives from stakeholders with different profiles, and in particular from users, so that all needs are identified to avoid resistance to change.

From this experiment we also realized that stakeholders, even top managers, do not always know exactly what they want or need. Or even worse: they think they know but they are wrong. However, we learnt that FG sessions provide an appropriate environment to discuss different points of view and reach a consensus that helps to identify requirements.

A weakness of our experiment was the time it took to analyze the session. Because of the subjective nature of the collected data, with lots of digressions and contradictions, it was very time consuming to transcribe and examine the data. However, next time this overhead can be reduced with that help to transcribe and categorize data.
7.0 Conclusion

Requirements elicitation for information system development projects is still an immature research area that urgently needs more experiments so that efficient techniques are proposed for real-world situations.

This paper proposed to apply FG for RE and summarized an evaluation of a real-world experiment. From the results we may conclude that Focus Groups help to understand both system scope and actual needs better than using traditional methods based on requirements specification. Moreover, the results show that stakeholders actually discuss different points of view about the system as a whole before reaching consensus and agreeing to formalize the requirements. These discussions can gather perspectives from different stakeholders that will ultimately help in the acceptance and usefulness of the information system.

However, this experiment included only one FG in one enterprise. More research is needed not only to confirm our conclusions about the usefulness of FG for RE but also to improve the weaknesses we identified in the previous section. In fact, we intend to conduct another FG session in another enterprise using the tools and techniques appropriate to correct the weaknesses found in the first session. For example, next time we intend to use tools for helping not only with the transcription of audio but also with the analysis of the collected data.

Another important issue for future work is the optimization of the FG itself, namely the experience of the moderator and the techniques used during the session. Instead of allowing a participant to completely dominate the FG session, next time we should apply techniques to control the dominant participant and create incentives for others to contribute more. Moreover, all participants without exception must express their perspectives about any topic.

Finally, next time we should deal better with the purpose of the FG session. In fact, requirements engineering can be decomposed in requirements elicitation, specification and validation. Furthermore, requirements are volatile and their nature can change (Christel & Kang, 1992). This experiment covered only requirements elicitation but
FG sessions have the potential to validate previously identified requirements and identify new ones. Another research issue is whether FG can also be used to specify requirements.

References


