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REQUIREMENTS ELICITATION WITH FOCUS GROUPS: LESSONS LEARNT

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Abstract

Requirements are the heart of Information Systems Development. Therefore, requirements elicitation is a critical and crucial activity. Despite many years of researches towards this activity, requirements are still ill-defined, ambiguous or incorrect and condemn Information Systems to failure. A major problem is the complex communication between different communities. On the one hand, stakeholders do not always know what they want or have difficulties articulating their needs. On the other hand, analysts do not know business concepts and have difficulties understanding stakeholders' needs. Our research used several extensions of Focus Groups to ease the communication between stakeholders and analysts. This paper describes field studies, using extended Focus Groups, to reduce the challenges of this communication and improve the requirements elicitation activity. From the empirical results, we present lessons learnt that consolidate knowledge and guide practitioners to a more efficient requirements elicitation. A major contribution of this paper is, therefore, the set of empirical studies which allowed us to take several conclusions that may help researchers and practitioners.

Keywords: Requirements Elicitation; Collaboration; Focus Groups; User Involvement; Group.

1 Introduction

The importance of requirements elicitation (RE) has long been established and recognized by researchers and practitioners because it tries to extract needs of the system, determining how it will operate (Zowghi & Coulin, 2005). However, errors in this activity still occur frequently, costing around 80-100 times more if discovered at the implementation stage and condemning Information Systems (IS) to failure (Avison & Fitzgerald, 2006).

There has been little doubt in the past about the complexity of RE. Complexity comes from several factors, including complex communication between stakeholders and analysts, quality of identified needs or conflicts of interests (Zowghi & Coulin, 2005). In fact, since RE is based on an intense communication between stakeholders and analysts, it is highly error-prone. Stakeholders do not always recognize or articulate their own needs while analysts may misunderstand business concepts because of the culture “gap” (Burg, 1997; Nuseibeh & Easterbrook, 2000).

Over the years, several methods have been proposed for RE. Many of them have been adapted from other disciplines such as the social sciences, and only a few have been developed specifically for eliciting software requirements. However, the industry should be more prepared to address the social factors of RE to address the business goals and satisfy the users’ needs (Zowghi & Coulin, 2005).

We recognize both the importance and social nature of RE and follow recent trends of investigation to improve communication and obtain high quality requirements. Since we adopted Action Research, we present our previous field studies as action research cycles. We then present lessons learnt, guiding practitioners to a more effective RE activity. The main contributions of our paper are the revision of the literature and the empirical research work, which is useful to both investigators and practitioners using group work methods to elicit requirements.

The remaining of the paper is organized as follows. Section II presents a revision of the literature about RE. Section III describes our field studies in industrial projects. Section IV summarizes and discusses the field studies. Section V presents the lessons learnt from our research. Section VI provides concluding remarks and potential future work.

2 Requirements Elicitation

Eliciting requirements is critical (Sadiq, Shahid, & Ahmad, 2010; Zowghi & Coulin, 2005) for many reasons: a) it relies on a complex and error-prone communication between stakeholders and analysts; b) stakeholders are not always clear about what they want; and c) analysts may not understand business concepts (Avison & Fitzgerald, 2006; Burg, 1997; Nuseibeh & Easterbrook, 2000).

According to the Standish Group, major failure reasons are related to requirements (Group, 2009). In fact, many researchers think that the ineffectiveness of RE is grounded in the complex communication between stakeholders and analysts (Cheng & Atlee, 2007; Coughlan & Marcredie, 2002).

2.1 Recent Trends

The social nature of RE is unquestionable (Al-Rawas & Easterbrook, 1996; Goguen & Linde, 1993; Nuseibeh & Easterbrook, 2000). As such, recent researches have been using methods derived from social sciences. From the eight groups of techniques proposed by Zowghi and Coulin (2005), we focus the ones derived from social sciences: ethnography, interviews and group work.

Ethnography is the observation of people in their natural environment to understand the social and organizational contexts (Crabtree, 1998; Crabtree, et al., 2000). Several limitations are identified, including risk of incorrect interpretation (Crabtree, 1998), impossibility of identifying new requirements (Sadiq, et al., 2010) or difficulty in generalizing results.

Interviews are informal interactions during which analysts gather requirements by asking questions about the system in use and the system to be (Zowghi & Coulin, 2005). Several researchers studied interviews and recognized some weaknesses, such as the limited stimulus-response interaction and the participants' need to share basic concepts and methods (Goguen & Linde, 1993).

Group work gathers stakeholders to collaborate reaching solutions about an identified problematic situation. Typical limitations are dominant participants, biased opinions, high logistic costs and gathering stakeholders (Zowghi & Coulin, 2005).

2.2 Group Work Methods

There are several group work methods, such as brainstorming, creative problem solving or workshops.

Brainstorming joins stakeholders in informal discussions to rapidly generate ideas. However, it does not explore ideas and does not resolve main issues (Zowghi & Coulin, 2005).

Maiden and Robertson (2005) used creative workshops to stimulate creativity and discover requirements, concluding that the overall process was successful but not in all the workshop sessions.

Joint Application Development (JAD) is a variant of workshops where discussions focus on business requirements and users rather than technical issues to make decisions. JAD differs from brainstorms because it determines requirements during the design phase, after establishing the main goals of the system (Zowghi & Coulin, 2005). Although JAD brings improvements in systems development, it is difficult to sustain in practice (Davidson, 1999). Moreover, there is a rigid user-designer interaction, and limitation in acquiring knowledge (Coughlan & Marcredie, 2002).

Focus Groups are special workshops where a specialist follows a guide to move the group discussion towards key questions. This method differs from other group work methods because of the group's special characteristics: homogeneous and focused (Krueger & Casey, 2000). Although stakeholders discuss their perspectives and formalize requirements, there are dominant talkers and analysis costs are (Farinha & Silva, 2009). Also, other researchers revealed that a web-based tool based on a forum that engaged Focus Groups supports shared involvement and eases RE (Kasirun & Salim, 2009).

2.3 Collaboration Tools

The intense communication of RE (Burg, 1997; Zowghi & Coulin, 2005) demands a high level of collaboration between stakeholders (Whitehead, 2007). But gathering stakeholders at the same time and place is difficult (Avison & Fitzgerald, 2006). Thus, collaboration tools have been used to ease these discussions (Whitehead, 2007; Zowghi & Coulin, 2005).

Alternative tools have been proposed to support group work, such as WinWin (Boehm et al., 1998), EasyWinWin (Boehm, Grunbacher, & Briggs, 2001), wikis (Brown, Huettner, & James-Tanny, 2006; Decker, Ras, Rech, Jaubert, & Rieth, 2007; Knauss, Brill, Kitzmann, & Flohr, 2009), Stakesource based on a social network (Lim, Damian, & Finkelstein, 2011), iRequire, a mobile RE application for smartphones (Norbert, Florian, & Neil, 2010), CoREA (Geisser & Hildenbrand, 2006) and Athena (Laporti, Borges, & Braganholo, 2009). None solved the problem.

Visualization has also been studied to achieve a better understanding about elicited requirements (Gotel, Marchese, & Morris, 2007). It can either represent requirements in multi-dimensional clusters of metadata to ease comprehension and elicitation (Cooper, Lee, Gandhi, & Gotel, 2009) or represent the stakeholders involved in RE. In fact, people tend to compare their achievements with whom they feel related, incentivizing individual efforts to obtain social reputation (Vassileva & Sun, 2008).

3 Field Studies

We consider that RE problems derive mostly from the inefficient communication between disparate communities, which is promoted by the following challenges that constitute our research questions:

- Stakeholders' difficulties in recognizing or articulating needs;
- Conflicts of interests from different stakeholders;
- Incorrect interpretations of analysts

Recent research trends led us studying social approaches, especially group work because of the benefits from the group synergy. Focus groups called our attention due to their special characteristics: group discussions moved towards key research issues with focused questions, in which participants can openly communicate. Then, we formalized our hypotheses: RE can be enhanced by using extended Focus Groups to encourage agreed and high quality requirements.

We planned several field studies with industrial projects in order to reduce the impact of these challenges in communication between disparate communities, gathering high quality requirements:

1. Regular Focus Group, based on a typical focus group
2. Adapted Focus Group, adjusted with some techniques to improve previous results
3. Comment-oriented Focus Group, based on written comments of stakeholders
4. Vote-oriented Focus Group, centered on a voting system to ease requirements support
5. Visualization-supported Focus Group, with visualization techniques to stimulate participation

Data collection was performed by direct methods (the researcher was in direct contact with the subjects and recorded data in real time) in the first two field studies and indirect methods (the researcher directly collects raw data without actually interacting with the subjects during the data collection) in the last three, as presented in (Runeson & Höst, 2009).

Data analysis was performed in two parts, as presented in (Runeson & Höst, 2009): hypothesis generation and hypothesis confirmation. Generation took place within the first field study when one hypothesis (focus groups usefulness) was established and the results of the first field study could generate more hypotheses for the other cycles of action research and, hence, for the next field studies. Confirmation was done with data from other field studies. The data was analyzed through the long-table approach (Krueger & Casey, 2000) to code and find patterns in the collected data within the first two field studies and, in the last three field studies, the data was not analyzed. Instead, the last three field studies avoided analyst's interpretations and delivered the elicited requirements "as-is".

Following Action Research, we derived conclusions from the data, keeping a clear chain of evidence, from information systems' projects in real organizations. This way, we could generate knowledge while improving the organizations participating in the research projects. The following figure illustrates an action research cycle:

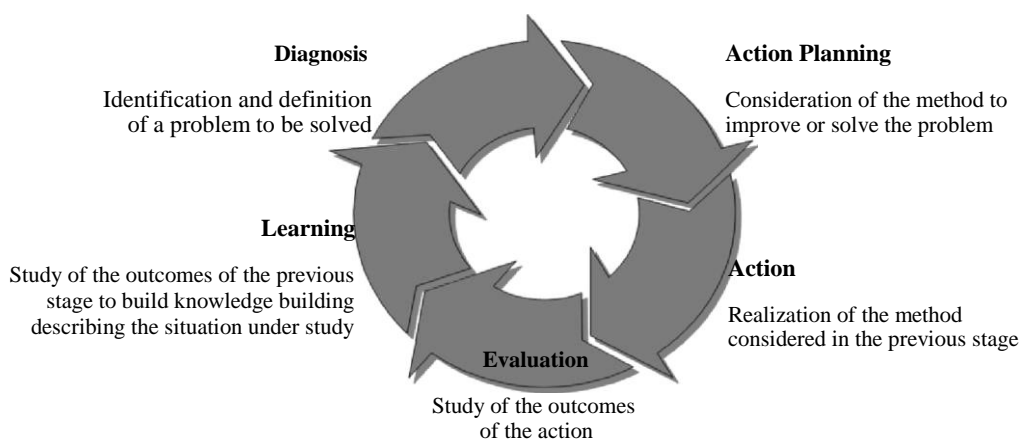


Figure 1. Action Research Cycle.

Action research was performed as follows: the first field study was the first cycle of our action research. After specifying its learning, we moved to the second cycle of our action research that was the second field study. Diagnose was based on challenges raised in the previous one and considering the lessons learnt.

The next sections will present the five field studies following the action research model.

3.1 Regular Focus Group

This field study intended to validate the effectiveness of focus groups on the RE activity. We called it regular focus group because we followed a typical focus group to elicit requirements for a new IS.

1. **Diagnosis:** Considering that an inefficient communication condemn RE to failure and following the literature, we identified three main challenges that promote this inefficiency:
 - Stakeholders' difficulties in recognizing or articulating needs;
 - Conflicts of interests from different stakeholders;
 - Incorrect interpretations of analysts
2. **Action Planning:** conduct a focus group in an enterprise that was looking for a new IS, as follows:
 - Perform action in a Small and Medium-sized Enterprise (SME) focused on the implementation and maintenance of Information Technologies' infrastructures
 - The SME had ten employees and customers of small and medium dimensions
 - The Chief Executive Officer (CEO) selected four key stakeholders (CEO, Technical Director, Customer Technical Manager and technical support specialist) to elicit requirements for the new IS that would support the core services of the SME.
3. **Action:** The focus group was prepared with the CEO as follows:
 - The moderator guide included the five typical categories of questions.
 - Occurred in the enterprise's facilities, was recorded with an MP3 player and lasted 2 hours
 - The discussion was transcribed, analyzed, and summarized in a report delivered to the CEO.
4. **Evaluation:** Requirements were identified and results were as follows:
 - 3 functional requirements and 4 non-functional requirements were elicited and prioritized
 - Stakeholders discussed perspectives before reaching consensus and formalizing requirements
 - Weaknesses of this study were the moderator's lack of experience that allowed dominant talkers and wandering away from the discussion's key topics; and the slow results' analysis.
5. **Learning:** The focus group allows stakeholders to discuss their perspective on the IS, acquiring a global overview of the IS. It also helps to quickly elicit prioritized requirements. However, a skilled moderator is useful and to deal with several situations. The challenges we faced in this field study were: dominant and shy participants; biased opinions by the CEO; slow analysis of the focus group; stakeholders' time and space constraints to meet; limited number of involved stakeholders in the focus group; and difficulty in prioritizing requirements although suggested by stakeholders.

3.2 Adapted Focus Group

This field study involved an outdated IS of a real world enterprise. We called it adapted focus group because we altered the typical focus group in order to integrate techniques to improve our results.

1. **Diagnosis:** Our previous field study (Farinha & Silva, 2009) confirmed that focus groups allow stakeholders to discuss and agree on requirements. However, we faced other challenges:
 - Dominant talkers and shy participants;
 - Biased opinions by the most senior stakeholders;
 - Slow analysis of the focus group;
 - Stakeholders' time and space constraints to meet;
 - Limited number of involved stakeholders in the focus group;
 - Difficulty in prioritizing requirements.

2. **Action Planning:** adjust focus group, introducing techniques to solve these challenges, as follows:
 - Perform action in a SME that sells an IS to geographically distributed civil-law notary offices
 - The IS, with around 120 clients, automates acts and processes of the notaries offices
 - The marketing director supported the elaboration of the moderator guide and selected 7 key civil-law notaries from geographically distributed offices to elicit unmet requirements with different work practices in order to progress this old IS
3. **Action:** The focus group was prepared with the enterprise's marketing director as follows:
 - The typical moderator guide integrated techniques to avoid dominant participants and call for all stakeholders' participation. Techniques included questioning each participant requiring oral answers before discussion; and questioning each participant requiring written answer before discussion. Finally, the whole group was asked to prioritize the elicited requirements
 - Occurred in the enterprise's facilities, was recorded with an MP3 player and lasted 2 hours
 - The discussion was transcribed, analyzed, and summarized in a report delivered to the CEO
 - Civil-law notaries' collaborators were sent due to notaries' time and space constraints
 - The discussion was transcribed and analyzed with the support of a tool, and a summarized report was delivered to the enterprise's marketing director.
4. **Evaluation:** results confirmed that the new techniques allowed overcoming the challenges:
 - 7 functional requirements and 3 difficulties were elicited and prioritized
 - Stakeholders discussed different perspectives before agreeing on the requirements
 - The new techniques allowed focusing the discussion on key topics, avoiding dominant participants and motivating shy participants. However, participants did not follow the third technique to the letter, discussing new requirements before writing them.
5. **Learning:** The focus group allowed stakeholders to discuss different perspectives of the IS, acquiring a global overview and identifying prioritized requirements. As such, from the challenges identified in the previous field study, we could overcome dominant participants, stimulate the participation of shy individuals and reduce the time taken to analyze the discussion by using a support tool. However, other challenges were faced, including: biased opinions by the rest of the group; slow analysis of the focus group, even with a tool; stakeholders' time and space constraints to meet; and limited number of involved stakeholders.

3.3 Comment-Oriented Focus Group

This field study intended to overcome the stakeholders' time and place constraints to meet. Therefore, we performed a web based focus group to elicit requirements from distant stakeholders. We called it comment-oriented focus groups because it was completely based on comments posted by stakeholders.

1. **Diagnosis:** From our previous field studies, focus groups seemed adequate to elicit requirements. This time, we intended to elicit requirements from distant individuals and involving a higher number of stakeholders to overcome the following challenges:
 - Biased opinions by the rest of the group;
 - Slow analysis of the focus group;
 - Stakeholders' time and space constraints to meet;
 - Limited number of involved stakeholders.
2. **Action Planning:** conduct a web-based focus group that, although web-based, maintained the definition of a typical focus group: an homogeneous group regarding the discussion, allowing free and open communication towards intended research topics with focused questions:
 - Perform action in a SME that sells technological solutions, with 60 employees from 23 to 37 year-olds where, the majority, were IT savvy
 - Elicit unmet needs of an old in-house IS that manage internal activities, namely time reporting
 - The project manager of this IS supported the elaboration of the moderator guide and invited, by e-mail, all employees to participate in the discussion since all report time
3. **Action:** The focus group was performed with the support of the IS project manager as follows:

- The moderator guide excluded opening and ending questions that wouldn't make sense in a web-based focus group and included eight initial questions of the other categories
 - Occurred in a self-hosted blogging tool where each page represented a question. Following the guidelines of a typical moderator guide, pages had a sequential order and stakeholders were advised to participate according to that order in the first contribution. Participation was anonymous and through comments about the questions and about others' comments.
 - It lasted 2 weeks, after which a summarized report was delivered to the project manager
5. **Evaluation:** some challenges were overcome and results were (Farinha & Silva, 2011a, 2011b):
- 15 new functional requirements, 6 recognized difficulties and 5 positive aspects in the existing IS were identified;
 - During the discussion period, some perspectives were strongly supported by comments while others were criticized, which allowed us to prioritize requirements
 - Anonymity promoted free answers.
6. **Learning:** The web-based focus group allowed us to gather a higher number of stakeholders that could not easily meet in a physical focus group. The asynchronous focus group allowed stakeholders to introduce their perspectives, think about others' perspectives and continue discussing opinions. It was also possible to invite all participants instead of selecting a number of individuals. The focus group elicited several requirements, ordered by priorities according to the number of comments that supported them. Elicited requirements were ultimately developed in a new IS. The results proved that the method was a success since stakeholders are now pleased with the new IS. Although the requirements were prioritized, participants complained about the difficulty in prioritizing them, which would be easy with a voting system. They also claimed that it was hard to follow a discussion, asked for fewer questions, and called for rewards to the most active participant in order to stimulate interest. Finally, anonymity was controversial because some of them believed that it raised unreasonable criticisms.

3.4 Vote-Oriented Focus Group

This field study was stimulated by the improvement suggestions given by the participants of the comment-oriented field study, including a voting system as well as rewards. Therefore, we called it vote-oriented focus group because the major feature was the voting system.

1. **Diagnosis:** Participants approved the web-based focus group to allow asynchronous and distributed participation. However, some challenges were identified and need to be answered.
 - Difficulty in the prioritization of requirements;
 - Low participant rate;
 - Time consumed to follow the discussion.
2. **Action Planning:** conduct a web-based focus group introducing a voting system as follows:
 - Perform action in the same SME of the previous focus group, but in order to progress the old project management and financials modules by eliciting unmet needs
 - The project manager of this IS supported the elaboration of the moderator guide and invited, by e-mail, the fourteen stakeholders of these modules (directors and project managers)
 - Only key topics were asked and participation was not anonymous
 - A voting system was integrated and rewards were based on rankings regarding the participation rate. Therefore, stakeholders could participate not only with comments but also with votes (up and down votes) to support or disagree with others' perspectives.
3. **Action:** The focus group was, again, performed with the project manager's support as follows:
 - Occurred on a question and answer tool where only three key questions were initially provided
 - It lasted 2 weeks and results were summarized in a report delivered to the project manager
4. **Evaluation:** Stakeholders presented their requirements and outcomes were as follows:
 - 33 new functional requirements, 7 recognized difficulties and 3 positive aspects in the existing IS were identified for the project management module

- 23 new functional requirements, 5 recognized difficulties and 4 positive aspects in the existing IS were identified for the financials module
 - The vote system allowed us to prioritize elicited requirements
 - Absence of anonymity seemed to promote a commitment sense and higher participation rate
 - Stakeholders claimed to be motivated by the rankings (rewards) given according to their participation.
6. **Learning:** A web-based focus group allows gathering distant stakeholders asynchronously. This allows stakeholders to see others' perspectives, think about their opinions and organize their own perspectives in order to continue the discussion. Several requirements were elicited and prioritized with votes. However, participants suggested new improvements: reduce the time to read all comments to follow a discussion and motivate participation.

3.5 Visualization Supported Focus Group

This field study was stimulated by the low participation rate verified in both the previous web-based focus groups. Therefore, we intended to stimulate stakeholders' participation including visualization techniques that would turn the web-based focus group more appealing. As a result, we called it visualization supported focus group.

1. **Diagnosis:** Our previous web-based focus groups were successful in eliciting requirements from distant stakeholders (Farinha & Silva, 2011a, 2011b). However, we believe that participation was still limited by stakeholders' motivation and by the time it takes to contribute. Therefore, in this focus group, we centered our attention in the challenge of increasing the participation rate.
2. **Action Planning:** conduct web-based focus group with visualization techniques that would stimulate participation:
 - A customized platform was developed to integrate several features: different participation types (votes, comments and new requirements), choice of anonymity but also information visualization about requirements and participants
 - Performed with the 17 moderators of a sports betting forum to find requirements for an IS that could keep a registry of their bets and extract reports based on their results
 - Requirements included a title, a description and the category in which it fits, previously determined by project managers.
 - Requirements' visualization was provided as follows: bar charts to several representations of requirements (most voted, most commented); a tree map to display the two level hierarchy of requirements classified by category; 3D tag cloud to represent all requirements, representing the most voted with a larger size; and a bubble chart represented over time (motion chart) to show the evolution of the number of comments and votes on requirements through time
 - Participants' visualization presented a bar chart with the most active participants and a bubble chart with the most active participants with larger bubbles.
 - Stakeholders were then asked about the participation experience and their preferences about textual or visual representations of requirements.
3. **Action:** The focus group was configured on a custom platform that allowed submitting new requirements, discussing the existent ones through comments, and prioritizing requirements. It also had a dashboard to illustrate several visualizations. Stakeholders were invited to participate in the focus group for 12 days. Results were summarized in a report delivered to the project manager.
4. **Evaluation:** Stakeholders discussed several perspectives. The outcome of this field study resulted only on 3 functional requirements and 4 votes. Stakeholders' feedback showed that they enjoyed visualizations but preferred a textual list of requirements. They also expressed that they would be motivated to participate if they were rewarded and if the elicitation was in a game basis.
5. **Learning:** The focus group allowed us to invite all the stakeholders and elicit requirements by priorities according to votes. However, the results were not as satisfactory as we expected: stakeholders' feedback suggests that more features could be explored to motivate participation, including actual rewards or presenting the collaboration tool as a game.

4 Discussion

Beginning with a regular focus group to overcome our initial challenges, we were driven to web-based focus groups to beat other challenges. These were also focus groups debating towards research topics with focused questions and open communication. Table 1 outlines views of our field studies:

View	Field Study 1	Field Study 2	Field Study 3	Field Study 4	Field Study 5
Where	SME of IT services	SME of IT services and products	SME of IT services and products	SME of IT services and products	Sports betting forum
Who	Collaborators of the SME that are IT savvy	Civil-law notaries' collaborator that are not IT savvy	Enterprises' collaborators (both IT savvy and inept)	Enterprises' directors and managers (both IT savvy and inept)	Moderators of betting forum (IT inept)
Why	SME does not have an IS to support their core services	Notaries' IS was outdated	In-house IS with outdated time reporting module	In-house IS with outdated project management and financial modules	IS does not support registry of bets or extraction of results' reports
When	2-hours	2-hours	Couple of weeks	Couple of weeks	Couple of weeks
What	Regular focus group discussion	Customized focus group discussion	Comment-oriented web-based focus group	Vote-oriented web-based focus group	Visualization supported web-based focus group
How	Physical meeting	Physical meeting	Self-hosted blogging tool	Question and answer tool	Custom platform

Table 1. Comparison of Field Studies' Views.

Each field study we performed raised new challenges illustrated in Table 2:

Challenge	FS1	FS2	FS3	FS4	FS5
Stakeholders' difficulties to articulate own needs	☑	☑	☑	☑	☑
Conflicts of interests from different stakeholders	☑	☑	☑	☑	☑
Incorrect interpretations of analysts	☑	☑	☑	☑	☑
Dominant participants	✗	☑	☑	☑	☑
Shy participants	✗	☑	☑	☑	☑
Biased opinions	✗	☒	☑	☒	☑
Difficulty prioritizing requirements	✗	☑	☒	☑	☑
Slow analysis of the focus group	✗	☒	☑	☑	☑
Stakeholders' difficulties to gather at the same time and place	✗	✗	☑	☑	☑
Success of the focus group dependent of the moderators' skills	✗	✗	☑	☑	☑
Limited size of the group because they are difficult to control and limit each participant's opportunity to share insights	✗	✗	☑	☑	☑
Low participation rate	✓	✓	✗	☒	☒
Time consumed to follow the discussion	✓	✓	✗	☑	☑

- ☒ challenge considered but experienced by that field study
- ☑ challenge considered and overcame by that field study
- ✗ challenge not considered and experienced in that field study
- ✓ challenge not considered but overcame by that field study

Table 2. Comparison of Field Studies' Challenges.

Triangulation, used by qualitative research and based on the analysis of multiple data sources to outline a final understanding and interpretation of the study's results, validated our study. In fact, we performed our hypothesis, collected data from different groups of stakeholders with diverse focus groups using direct methods and indirect methods and compared results. Therefore, triangulation allowed us to draw interpretations from multiple perspectives and supporting our hypothesis: RE can be enhanced by using extended Focus Groups to encourage agreed and high quality requirements.

However, threats to validity, as presented in (Runeson & Höst, 2009), were not addressed. There may be a threat to the construct validity if the focus group questions are not interpreted in the same way by the analyst and the stakeholders. There is also a threat to external validity, although we intended to do analytical generalization so that the results would be extended to cases with common characteristics and for which the findings are relevant: Portuguese SMEs with outdated IS.

Our work is reliable considering that the data and the analysis are independent of the researchers: the moderator guides and the way data was coded are clear in (Farinha & Silva, 2009, 2011a, 2011b).

5 Lessons Learnt

Based on the results of our field studies, we extracted five lessons for the use of focus groups.

- Focus groups promote a richer overview of the whole IS by stimulating group discussion towards requirements. Stakeholders' face others' needs, highlighting relevant issues not yet considered by all stakeholders. Therefore, they understand the overview of the entire IS.
- Elicitation and prioritization of requirements are positively correlated with Focus Groups: these field studies highlighted that the group synergy generates several needs and desires that reflect stakeholders' requirements. Also, it was possible in both regular and web-based focus groups to prioritize requirements.
- A better communication is positively correlated with Focus Groups: the group discussion eases communication between stakeholders and also analysts because they perceive others' work practices and concerns.
- Focus groups excuse analysts from interpretations: web-based focus group obtained written requirements that are ultimately commented by other stakeholders, fulfilling the gaps that could ask for analysts' interpretations. As for regular focus groups, the discussion was translated and analyzed in order to extract results. Even so, at the end of the discussion, the moderator shall summarize the discussion with the requirements ordered by priorities to avoid interpretations.
- Moderation techniques can overcome focus groups' limitations: the second field study introduced techniques that incentivized shy participants and controlled dominant talkers and biased opinions.

6 Conclusion

This paper focuses on RE. From the literature review, we confirmed that RE is highly error-prone mostly because of the communication between disparate communities of stakeholders and also analysts. Therefore, methods adapted from social sciences could improve the RE activity.

Group work methods offer several benefits to elicit requirements because of the group synergy. Focus groups, in particular, are group debates moving towards intended research topics with questions centred on those key topics, promoting free and open communication.

We outlined three challenges of RE that we intended to address: stakeholders' difficulties recognizing and articulating own needs, conflicts of stakeholders' interests and analysts' misinterpretations.

From these challenges, we evaluated the usage of extended focus groups in five field studies. We were driven from regular focus groups to web-based ones. Despite being web-based, these discussions are also focus groups because they maintain the special characteristics: allow free and open communication among participants, and move the discussion towards intended research questions.

We saw that Focus Group's style depends on the target audience: both regular focus groups and web-based focus groups are positively correlated with the elicitation and prioritization of requirements. However, both have limitations. The analyst or project manager shall decide the suitable method according to stakeholders' limitations. If there are few stakeholders and no space or time constraints, a regular focus group may be suitable. Otherwise, a web-based focus group should be chosen.

Our main contributions are both theoretical and practical. The revision of the literature about recent methods' trends derived from social sciences may be useful to analysts. Also, our research work is useful to both analysts and practitioners considering group work methods to elicit requirements: the empirical perspective and the lessons learnt provide more information to effectively use focus groups.

A limitation of our work is related to the people theme followed (Avison & Fitzgerald, 2006): it may promote claims and problems. Also, collaboration tools may change the nature of group work from being largely face to face to online. Finally, our proposal does not solve the problems of RE at all. Instead, it aims to reduce the challenges initially outlined and give a small step in this research field.

There are several potential directions for future work. We could give an additional guidance step to provide the best type of focus group depending on the context (SME or larger) and the characteristics of the project if we explore the usage of focus groups in larger enterprises and with different development approaches (e.g.: agile). We also could encourage stakeholders' participation with real rewards and richer visualization techniques or a game based collaboration tool.

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