

Chapter 4

The Focus Group Method as an Empirical Tool in Software Engineering¹

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Abstract This chapter presents the focus group method and discusses its use for empirical research in the software engineering context. The background, process and main characteristics of the method are presented, as well as guidelines for its use. Moreover, the traditional as well computer-mediated focus group variations are compared to each other. The chapter concludes in with a discussion of the applicability of the method for software engineering research. In summary, the focus group method is a cost-effective and quick empirical research approach for obtaining qualitative insights and feedback from practitioners. It can be used in several phases and types of research. However, a major limitation of the method is that it is useful only in studying concepts that can be understood by knowledgeable participants in a limited time. We also emphasize the importance of empirical rigor when the method is used in scholarly work.

1. Introduction

The software engineering community has begun to emphasize empirical research methods to improve the validity and generalizability of research results (Basili et al., 1986; Tichy, 1998; Wohlin et al., 2003; Zelkowitz and Wallace, 1998). The community has also recognized the need to improve the amount and quality of empirical research in the field (Buhner, 2007; Kitchenham et al., 2004; Tichy et al., 1995). Experimentation, in particular, has received much attention in software engineering literature (Juristo and Moreno, 2001; Wohlin et al., 1999) and the community has clearly matured in its use of empirical methods, as evidenced by an increasing number of empirical research papers, textbooks, and emergence of conferences focusing on empirical research.

Increased attention in empirical methods has also interested software engineering researchers in having a broader range of empirical methods in their arsenal so that appropriate methods can be selected and used for each research problem. Similar conclusions have been drawn in related fields of information systems (Benbasat, 1996; Galliers, 1991) and business studies (Ghauri et al., 1995).

¹ Based on Kontio, J., Lehtola, L., and Bragge, J. (2004). Using the focus group method in software engineering: obtaining practitioner and user experiences, *International Symposium on Empirical Software Engineering*, pp. 271–280, Redondo Beach, CA.

This chapter presents a specific qualitative research method, the focus group method. We supplement current research by providing guidelines for the method's use in software engineering research. This chapter is largely based on our earlier paper (Kontio et al., 2004), with extensions to the guidelines on the use of the method, and on the comparison of traditional and three computer-mediated focus group variations.

2. The Focus Group Method

This section gives an overview of the focus group method in general, whereas the next section presents experiences from the software engineering context.

2.1. Background and Definition

Focus groups emerged as a research method in the 1950s in the social sciences. The open-ended interview format was extended to group discussion (Templeton, 1994), hence becoming the focus group method. Morgan defines focus groups as a “research technique that collects data through group interaction on a topic determined by the researcher” (Morgan, 1996). Focus groups are thus carefully planned discussions, designed to obtain personal perceptions of the group members on a defined area of research interest. There are typically between 3 and 12 participants and the discussion is guided and facilitated by a moderator-researcher, who follows a predefined questioning structure so that the discussion stays focused. Members are selected based on their individual characteristics as related to the session topic (so-called purposive sampling). The group setting enables the participants to build on the responses and ideas of other participants, which increases the richness of the information gained (Langford and McDonough, 2003).

Focus group sessions produce mainly qualitative information about the objects of study. The benefits of focus groups are that they produce candid, sometimes insightful information, and the method is fairly inexpensive and fast to perform (Widdows et al., 1991). However, the method shares the weaknesses of many other qualitative methods. Results may be biased by group dynamics and sample sizes are often small. Therefore, it may be difficult to generalize the results (Judd et al., 1991). Poorly conducted focus group sessions may, therefore, be particularly prone to producing unreliable results.

Currently, the method is widely used, e.g., in sociological studies, market research, product planning, political campaigning, defining business services, and in system usability studies (Baker, 1991; Edmunds, 1991; Morgan, 1997; Neter and Waksberg, 1964; Stewart and Shamdasani, 1990; Rubin, 1994; Widdows et al., 1991). Focus groups can be used either as a stand-alone research method or in combination with other research methods, e.g. with individual interviews or quantitative surveys (Morgan, 1996).

There are several textbooks and detailed guidelines available on how to plan and run focus groups (Anon., 1997; Feig, 1989; Krueger and Casey, 2000; Nielsen, 1997; Templeton, 1994; Langford and McDonough, 2003), making the method that is relatively easy to adopt and use consistently. McQuarrie (1994, 2001), for instance, offers extremely useful focus group book reviews which can direct the reader, a researcher, an industry practitioner, or moderator, to an appropriate approach.

2.2. Steps in Focus Group Research

Based on several sources (Anon., 1997; Edmunds, 1991; Krueger and Casey, 2000; Morgan, 1996; 1997), we have summarized the main steps of focus group research as follows.

2.2.1. Planning the Research

Defining the research problem. The focus group method is best suited to obtaining initial feedback on new concepts, developing questionnaires, generating ideas, collecting or prioritizing potential problems, obtaining feedback on how models or concepts are presented or documented, and discovering underlying motivations (Edmunds, 1991). According to Morgan (1996), among others, survey researchers have increased their use of focus groups to provide valuable data on how the respondents themselves talk about the topic of subsequent surveys, as the questions posed in surveys are inherently limited.

The method is not suitable for all situations. Focus groups can seldom be used to test hypotheses as samples are too small and group dynamics create an uncontrollable variable. In verbally conducted settings it is not easy to obtain subjective quantitative assessments, as opinion leaders or group behaviour may influence the results. It may be also hard to explore political or otherwise sensitive issues as people may not reveal their true opinions in a public setting. Also, it is difficult to study complex issues that are difficult to grasp in a short session, as people have limited mental capacity to grasp complexity and interact simultaneously. Finally, there is the issue of team dynamics and interaction wherein team members may be reluctant to reveal their true subjective preferences. Such limitations might arise in defining prices or cost preferences, for example (Edmunds, 1991).

Typically focus groups are not the only research method used in a study. Morgan's (1997) content analysis of abstracts revealed that a majority of the published research articles using focus groups combined them with other research methods. The most frequent pairings were with either in-depth, individual interviews or subsequent surveys (Morgan, 1997). When focus groups are used in combination with other research methods, they can serve either as a primary

research method or as the secondary method in the study (Morgan, 1996). The role of focus groups in the research process should be carefully defined in the planning phase of research.

In some cases, it might be a good idea to use focus groups instead of other similar research methods. For example, Fern's (1982) results suggest that two 8-person focus groups produce as many ideas as ten individual interviews. Thus, in case it is more cost-efficient to arrange two group sessions instead of ten individual meetings, focus groups are worth considering.

2.2.2. Designing focus groups

Typically focus group research should consist of 4–6 focus groups (Morgan, 1997). The size of an individual focus group can vary from 3 to 12, but more typically there are between 4 and 8 participants. Smaller groups seem to be more appropriate with emotionally charged topics that generate high levels of participant involvement, while larger groups work better with more neutral topics that generate lower levels of involvement (Morgan, 1992).

Selecting participants. The value of the method is that it is very sensitive to the experience and insight of participants. Thus, recruiting representative, insightful and motivated participants is critical to the success of the focus group study. Depending on the research question, participants may not have much experience in the topic of the focus group – or they may be seasoned experts who can rely on their years of experience when interacting in the group. However, when discussing novel and innovative concepts or products to be launched, participants seldom have much expertise on the topic.

Segmentation refers to strategies that consciously vary the composition of groups. The most obvious kinds of segmentation captures something about the research topic itself (Morgan, 1997). For example, if age differences are of interest, it might be a good idea to separate groups based on the participants' age.

Morgan (1997) argues that segmentation offers two basic advantages. These are:

1. Building comparative dimension into the entire research project.
2. Facilitating discussions by making the participants more similar to each other.

In practice, it is generally recommended that some over-recruiting take place as last minute cancellations usually happen. It may also be useful to use pre-session questionnaires so that session time is used most effectively for discussions.

2.2.3. Conducting the focus group sessions

Basic sequence. An individual focus group event usually lasts 2–3 h and has a pre-defined schedule and structure. The number of issues to be covered needs to be limited so that sufficient time can be allocated for the participants to comprehend

the issue and have meaningful discussion and interaction. Limited time also places a constraint on the complexity of the issues selected.

The focus group session needs to be carefully managed for time while still making sure that all main contributions can be made during the allocated time. The moderator should thus be determined and have adequate skills in guiding group dynamics. The session needs to be initiated by an introduction where the goals and ground rules of the session are explained to participants. Each of the topics is usually presented one after another.

The discussion and interaction in a focus group session can take many forms. It can be a structured discussion, where the moderator acts as a chair; it can involve brainstorming techniques, such as affinity grouping or teamwork methods; polling and voting using preference votes or the Delphi method (Adler and Ziglio, 1996); comparison games; or even role plays (Edmunds, 1991). Some researchers are very strict in defining what constitutes a genuine, interactive focus group discussion, while others are more inclusive in this [see discussion in Morgan (1996)]. For example Langford and McDonaugh (2003) are proponents of the more liberal view, and they present 38 different tools and techniques that can be used to supplement a traditional focus group discussion.

Data capturing. There are several alternatives for data capture during a session. There can be additional observers taking notes during the session. Audio, video or keyboard recording can be used, and artifacts used during the session can be captured if the session involves techniques producing such artifacts. It may also be useful to arrange a debriefing session with some of the participants immediately after the session so that fresh observations and interpretations from the session are captured as fully as possible. It is obvious that relying on moderator notes will not be sufficient because being a moderator is a full-time job in a focus group session. It can even interrupt the discussion if the moderator starts making notes (Langford and McDonaugh, 2003).

The role of the moderator. The role of the moderator is critical in a focus group session. The moderator should facilitate discussion but not allow his or her own opinions to influence the discussion. His or her main task is to listen and probe deeper when necessary, requiring the moderator to be able to grasp substantial discussions quickly. It is often necessary to paraphrase participant points to ensure that the contribution was correctly understood.

2.2.4. Analyzing the data and reporting the results

The *data analysis and reporting* of focus group studies can use the methods used in qualitative data analysis (Bogdan and Biklen, 1982; Miles and Huberman, 1984; Patton, 1990; Taylor and Bogdan, 1984; Myers, 2004). Quantitative data, if gathered, can be analyzed using descriptive statistics and other standard quantitative methods.

3. Experiences in the Software Engineering Context

We collected experiences from three focus group studies we have conducted (Kontio, 2001; Lehtola et al., 2004; Sunikka, 2004). We provide here only short summaries of the studies, as detailed reports on each of them are available elsewhere [see broader account also in Kontio et al. (2004)].

The objective of the first study (Kontio, 2001) was to provide insights into why and how organizations seek to improve their risk management (RM) practices, what they intend to achieve with better RM, and what impediments preventing more effective RM approaches from being used. Furthermore, we also wanted to obtain feedback on specific characteristics of a RM method called Riskit (Kontio, 1997) and the corresponding software tool (“eRiskit”). The study included three focus groups having 12 participants altogether from several organizations.

The objective of the second study (Lehtola et al., 2004) was to clarify the practical challenges in requirements prioritization. We wanted to find out how and in which phases of development work companies prioritize requirements, and who performs the prioritization. We also clarified which factors have an effect on priorities, and from which sources practitioners gather information on which they base their priority decisions. In this study, one focus group with four participants from two organizations was conducted.

Regarding the third study (Sunikka, 2004), the aim was to collect user opinions about the usability of a university’s website. This information was used mainly in planning the actual usability testing to follow, but the focus group results also offered additional insights. The usability study as a whole consisted of several phases: focus group discussion, web survey questionnaire, usability tests, and heuristic evaluations. The focus group was computer-mediated, and it had nine participants invited from the personnel of the case university one of the main end-user groups of the website under study.

We reviewed experiences from each study and constructed a mind map of the experiences and lessons learned. These mind maps were compared and discussed between authors, and the synthesized lessons learned are reported in the following sections. In addition, we collected original focus group participants’ feedback in informal discussions or in feedback surveys.

We did not track the effort spent during the studies but estimated it afterwards using the Delphi method (Adler and Ziglio, 1996). These estimates are presented in Table 1 by the main tasks.

3.1. Suitability

Our studies showed that the focus group method is suitable for gathering experience: all of the studies resulted in relevant and usable findings that were used to

Table 1 Estimated effort in the studies (person hours)

Task	Risk study (3 groups)	RE study	Usability study
Research problem formulation	15	5	3
Planning and preparation (including rehearsing)	25	10	10
Selecting and recruiting the participants	8	3	2
Conducting the sessions	9	3	2
Transcribing the data	11	6	0*
Analysis	15	6	10
Total	83	33	27

*Reports of computer-mediated discussion were generated automatically

guide or complement the research projects in which the focus group studies were conducted. We believe that the types of issues that can be addressed by focus groups include, among others, the following:

- Identifying relevant research questions
- Obtaining practitioner feedback on research questions
- Recognizing past experience that can be studied in more detail by other methods
- Initial evaluation of potential solutions, based on practitioner or user feedback
- Collecting “lessons learned” recommendations
- Identifying potential root causes of phenomena

Such issues can be relevant in all the main phases of a research life cycle. We illustrate this here using the general research phases defined by Glass (1995) and extended by Kontio (2001). This research life cycle is divided into the informational, propositional, analytical, evaluative, and technology transfer phases. It should be noted that not every phase is found in each research study, and the last phase especially is typical only in constructive or design research.

In the *informational phase* the focus group method can be used to collect characterizing information about current practices, experiences, or problems. In the *propositional phase* the initial constructs, i.e., models, theories or prototypes, can be subjected to practitioner and user opinions to provide early feedback. In the *analytical phase* user feedback can be used to evaluate the operationalization of constructs or to test their initial feasibility. In the *evaluative phase* focus groups can be used to refine research questions, provide some of the empirical feedback, and support the interpretation of empirical data.

Finally, in the *technology transfer phase* the focus group can help researchers to package their contributions into a form that is more easily deployable by users. In addition, a focus group session can also act as a “sales session” for research results. We have included examples of potential research questions in Table 2 that are relevant in this research framework.

Table 2 Research question examples for the focus group method in different research phases

Phase of research	Description of the phase	Suitable issues for focus groups
Informational phase	Observing the current state-of-art and practice to identify problems and potential solutions	<ul style="list-style-type: none"> – What are most urgent or relevant research questions? – What kind of problems are common in industry? – Why are some problems relevant or urgent? – What practices currently exist in industry?
Propositional phase	Constructs are formulated, models are built, theories proposed or formulated	<ul style="list-style-type: none"> – What are possible solutions or hypotheses? – What similar experiences exist in industry (has someone already tried or tested it)? – Are the assumptions made realistic from practitioner and user perspectives?
Analytical phase	Operationalization of the constructs or models and their analytical evaluation and improvement	<ul style="list-style-type: none"> – Is the model understandable? – How can it be deployed into practice? – What are the potential problems in using or understanding the model? – Are there any omissions or gaps in the model?
Evaluative phase	Testing and evaluating the constructs or models	<ul style="list-style-type: none"> – Is there any data available, can data be obtained? – Is the empirical study design sound and practical? – What does the data mean?
Technology transfer phase	Transferring constructs, models and/or new knowledge into practice	<ul style="list-style-type: none"> – Is the model packaged well for operational use? – What are the potential challenges in selling or using it? – How it could be packaged better?

McQuarrie and McIntyre (1986) offer guidelines on how to utilize focus groups in the evaluation of new product concepts developed by technologically driven companies. They distinguish six stages through which the discussions could evolve. These stages are comparable to the actual adoption and diffusion processes regarding new products (orientation, exposure, evaluation, pricing, extensions, product modification). Nambisan and Wilemon (2000) and Nambisan (2003), among others, have recently discussed how software development and IS in general could

benefit from the research done in the field of new product development (NPD), and vice versa. Thus, the framework provided by McQuarrie and McIntyre could well adapt to software NPD processes as well, especially to those software products that are targeted to normal consumers (e.g., software embedded in mobile phones).

3.2. *Strengths*

Discovery of new insights. The interactive nature of the group setting and participants' different backgrounds seem to encourage and prompt participants to react to points during discussion, reflecting and building on each other's experiences. This may lead to discovery of issues that researchers might not have been able to plan in advance, as happened in our risk management and requirements prioritization studies.

Aided recall. On several occasions in the example studies, the points made by participants resulted in other participants confirming similar, almost similar and opposite incidents or events. These insights might have been hidden in personal interviews.

Cost-efficiency. For the researchers the focus group method is a cost-efficient way of obtaining practitioner and user experience as several participants can be "interviewed" at the same time. In addition, many current research projects are conducted with industrial companies and access to practitioners is limited due to their business responsibilities. Practitioners find the method cost-effective as well.

Depth of interview. Focus group discussions allow in-depth exploration of the reasons why the participants think the way they do. For instance, questionnaire results usually reveal only what people think, not why.

Business benefits to participants. The practitioners in our studies gave positive feedback for having participated in the interactions during the session and found them valuable even before receiving any reports or summaries. In informal feedback sessions they indicated two main reasons that provided immediate benefits to them:

- *Benchmarking.* The participants in our studies indicated that the sessions already provided valuable information to them during the sessions. This seems to have resulted from two factors. First, the discussions resulted in benchmarking experiences and practices between the members of participating organizations. Second, they seemed to value other participants' experiences and insights. This seemed to be a substantial advantage to participants.
- *Networking.* The focus group event seems to increase networking contacts and incentives to increase cooperation between participants.

3.3. *Weaknesses*

Group dynamics. As the focus group discussion within a topic often takes place without a predefined format, it is possible that the group dynamics or communication styles influence the level of activity. In addition, compared to a personal

interview, it is not as easy for the moderator to have control over the flow and style of the discussion. This weakness can be compensated for by using structured discussion techniques or by the moderator balancing the discussion and activating the less active participants.

Social acceptability. In group situations, social acceptability can influence the points made during discussion. For example, it is possible that a participant can volunteer incorrect information and disagreement may take place. Such situations may be perceived as embarrassing by some participants, resulting in selective contributions and volunteering of information. This weakness can be mitigated by laying out appropriate ground rules at the beginning and by the moderator taking an active role in conducting the discussion in those situations.

Hidden agendas. Some participants may have hidden agendas in the session, e.g., due to business relationships between them, a motivation to appear in a favorable light because of the potential publication of the results, or their company's internal politics. Such hidden agendas may bias the results of the session. This can be mitigated by selecting participants into sessions such that business relationships are not present, by emphasizing the importance of open information, and by guaranteeing or agreeing to the anonymity or confidentiality of results.

Secrecy. Some relevant information may be withheld because of proprietary or business reasons. This can be avoided by the same procedures as mentioned above.

Limited comprehension. The time available for discussions in a focus group session is limited and communication happens mostly only verbally during the discussion. This means that complex issues or points are not necessarily understood by all participants – nor by the researchers. However, if the participants are all experts in their area, the discussion may be surprisingly complex and deep for an outsider. Nevertheless, there is an obvious limit to how complex an issue can be discussed. This potential weakness can be mitigated by selecting participants of equal expertise in the session, by providing more thorough briefings to participants, by providing advance reading material to participants, and by partitioning complex issues in to more “digestible” pieces.

4. Computer-Mediated Focus Groups

This section describes and evaluates the application of computer-support in the conduct of focus groups. In particular, the emphasis here is on face-to-face focus groups mediated by Group Support Systems (GSS) technology (Nunamaker et al., 1991). The benefits and drawbacks of GSS-mediated face-to-face focus groups are compared to traditional focus groups, and also to online (distributed) focus groups that have recently gained popularity with increased use of the Internet. Figure 1 illustrates the framework of our analysis (cells with patterned background are analysed). Examples of software engineering research applications are also mentioned in this section.

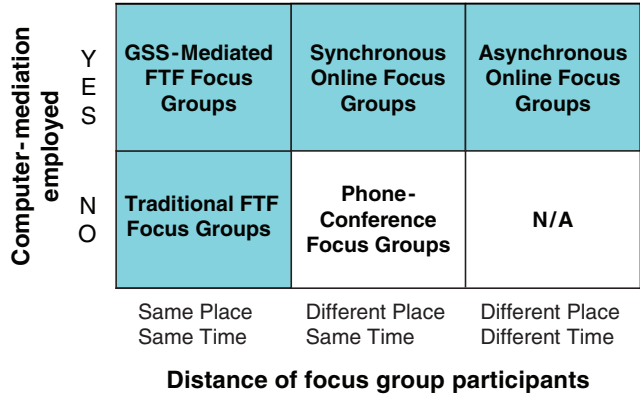


Fig. 1 Framework of the focus group analysis

As early as in the late 1980s, Management Information Systems researchers developed so-called Group Support Systems (also called Electronic Meeting Systems), to alleviate the common process problems caused by task-oriented group work, such as brainstorming (Nunamaker et al., 1991). These process problems result from, for example, the need to wait for one’s own turn to speak, or the dominance of one or a few participants. The strengths of computer-mediated GSS-sessions are built on:

1. Simultaneous and anonymous contribution via computers
2. Structured agenda
3. Real-time voting and multi-criteria analysis possibilities
4. Group memory during and after the sessions
5. Complete records of the electronic discussions

GSS technology is conventionally employed in a same-time same-place mode, where the interaction between the participants is for the most part conducted via personal computers. The majority of the meeting time may be used in deliberating why participants think the way they do, and what to do about it. This is due to the fact that finding out what people are thinking can be conducted in a few minutes due to the parallel input mode – even with large groups of more than 15 participants. Field research results on GSS show savings up to 50% of individual work hours and 90% of project time when compared to regular meetings and group work (Fjermestad and Hiltz, 2000).

Extensive research on GSS usage exists, see for example the laboratory, case and field research reviews (Fjermestad and Hiltz, 1999, 2000), or a recent study profiling 2,000 GSS research articles (Bragge et al., 2007b). Despite the vast amount of research studies on GSS, only a few of them have touched explicitly how the application of GSS may benefit the conduct of focus group studies (Clapper and Massey, 1996; Easton et al., 2003; Klein et al., 2007; Kontio et al., 2004; Massey and

Wallace, 1991; Parent et al., 2000). However, as Reid and Reid (2005) state, “the resemblance of focus groups to brainstorming groups is no accident – focus groups are popular precisely because they generate a ‘flow of input and interaction related to the topics that the group is centred around’” [citation from (Edmunds, 1999)]. Furthermore, Langford and McDonough (2003) view focus groups as a method that encompasses many tools, and not just a plain group interviewing technique [see discussion also in Morgan (1996)]. Thus, even if not explicitly mentioned, numerous GSS-mediated brainstorming studies centred on a particular topic may be regarded as focus groups, especially if their conduct otherwise follows the steps of the focus group method.

There exists a few commercial GSS software systems on the market today. GroupSystems is the most well known. Others are Facilitate.Pro, WebIQ, MeetingWorks and Grouputer (Austin et al., 2006). Some of these tools provide templates for the conduct of focus groups, which normally follow a structured interview approach [see e.g. (Morgan, 1996)] with predefined questions. However, utilizing the versatile features of the GSS technology it is also possible to use different brainstorming rules, scenario-based discussions, cognitive maps and a variety of other techniques (Langford and McDonough, 2003; Morgan, 1996) in a focus group.

Many of the applications in GSS studies concern software engineering or information systems development (see e.g. Boehm et al., 2001; Bragge et al., 2005b; Chen and Nunamaker, 1991; De Vreede et al., 2005; Elfvengren et al., 2004; Gruenbacher et al., 2003; Halling et al., 2001; Liou and Chen, 1993; Rodgers et al., 2004; Van Genuchten et al., 1997, 2001; Vitharana and Ramamurthy, 2003). This may be partially due to the fact that IT professionals are naturally attracted to using various ICT tools to support their work. Processes have been developed especially for requirements engineering (needs assessment, requirements elicitation or requirements negotiation), code inspections and usability studies.

The participants in software engineering related studies may involve people designing and developing a system, people interested in the system’s use (e.g., end-users or customers), people having a financial interest, or people responsible for system introduction and maintenance (Gruenbacher et al., 2003). User-centric approaches, which are currently growing in popularity, come closest to focus group studies. End-users are often nowadays widely geographically dispersed, and not within traditional organizational boundaries (Bragge et al., 2005b; Tuunanen and Rossi, 2004). Their inclusion in the software engineering process calls for novel approaches.

The above-mentioned user-centric development, along with the commercialization of the Internet, has brought yet another variation of focus groups to the researcher’s toolkit: *online (or virtual) focus groups*. Several authors provide case descriptions or useful practical advice to researchers conducting online focus group studies (Fraunhofer, 2002; Hansen and Hansen, 2006; Klein et al., 2007; Montoya-Weiss et al., 1998; Newby et al., 2003; O’Connor and Madge, 2003; Oringderff, 2004; Reid and Reid, 2005; Sweet, 2001; Ten Pow, 2003; Turney and Pocknee, 2004; Wellner, 2003; Zinchiak, 2001).

The online focus groups can either be conducted in the form of synchronous interactive groups, or in the form of asynchronous discussion boards. The information systems that may be utilized in online focus groups encompass web-based versions of GSS software, commercial focus group platforms, discussion groups, listservs, chatrooms, bulletin boards, mailing lists, instant messaging systems and so forth. Although these online forms provide many advantages over traditionally conducted focus groups (e.g., anonymity, larger group size, savings in travelling and venue costs), they also have distinct drawbacks, too. For example, the task of the moderator can be much more demanding in online than in face-to-face settings. This is due to the lower richness of the media used (Daft and Lengel, 1986). Media richness is determined by a medium's ability to provide immediate feedback, utilize multiple cues and channels, and enable language variety (Montoya-Weiss et al., 1998).

5. Comparing the Benefits and Drawbacks of Different Focus Group Variations

The literature offers several studies that thoroughly discuss a single type of focus group or compare selected variations with each other (Clapper and Massey, 1996; Easton et al., 2003; Hansen and Hansen, 2006; Klein et al., 2007; Massey and Wallace, 1991; Montoya-Weiss et al., 1998; Morgan, 1996; Newby et al., 2003; Parent et al., 2000; Reid and Reid, 2005; O'Connor and Madge, 2003; Oringderff, 2004; Sweet, 2001; Ten Pow, 2003; Turney and Pocknee, 2004; Wellner, 2003; Zinchiak, 2001). Based on this literature and also on our own experiences of conducting all main types of focus groups (e.g., Bragge et al., 2005a, c, 2007a), we have gathered comparative information on traditional, GSS-mediated face-to-face, as well as online focus groups (synchronous and asynchronous). The results of these comparisons are presented in Tables 3–5. Moreover, we will discuss the comparison data with respect to four issues: people, technology, process and costs. We have not cited the above reference sources in the tables or in the discussion to keep them more concise.

5.1. *Traditional focus groups*

Regarding *people issues*, the moderator's task in traditional focus groups is easier than with computer-mediated groups (that are lower in media richness, especially in different-place settings), although the moderator must possess excellent social skills. The participants may feel more satisfied with a familiar verbal and more social process, and they do not have to possess typing skills (e.g., elderly people). However, the participants can be recruited from a limited geographical distance, and they may be shy about talking, especially about sensitive or controversial issues.

The media-rich interaction in the verbal *process* is high, and it can result in the deepest insights. The process usually stays focused without any external distractions, and if they happen, the facilitator can respond immediately. However, group

thinking, domineering, communication apprehension, getting off-the-track, and social rank related issues are common problems.

Concerning *technology*, the audio or even video recording of the session is quite usual and routine. The latter is needed in case it is important to know afterwards who said what. In traditional settings, it is possible to present handheld prototypes or models. The travelling, venue, and transcribing *costs* are high. Traditional focus groups can accommodate the lowest number of participants due to “serial” communication mode, thus more groups with relatively homogeneous participants are needed (see Table 3 for a summary).

Table 3 Benefits and drawbacks of traditional focus groups

Benefits	Drawbacks
+ Richer media, researchers may observe nonverbal communication, such as body language, facial expressions, tones of voice etc.	– High travelling costs (participants and moderators)
+ Moderator’s task is easier than with computer-mediated communications (especially those in different-place settings)	– High rental costs venue
+ Participants may feel more satisfied with a verbal/social process (especially older people)	– High transcribing costs and long delay in reporting
+ The process usually stays focused without any external distractions (and if they happen, the facilitator can respond immediately)	– Limited time to speak per person (e.g. with ten participants 6 min/person in 1 h)
+ FTF discussion is a familiar form of communication to the participants	– Possible dominance of some persons
+ Participants don’t have to have typing skills (e.g. children, old people)	– Group thinking (pressure to conform) and communication apprehension (e.g. with sensitive issues) may occur
+ Possibility to utilize 3D-models, prototypes, highly confidential material etc.	– Comments and ideas evaluated based on the presenter, not the idea itself
+ Smaller probability for technical problems (audio and video recording technologies needed in FTF sessions are more mature than computer-mediated communication technologies)	– Max. 12 participants per group
	– The more people, the more process losses due to the “serial communication” mode
	– The discussion might easily get off track; thus the moderator must be determined and knowledgeable about how to guide the group dynamics
	– Moderator must have excellent social skills
	– Requires homogeneity between participants, and thus often several groups
	– Need for videotaping if vital to know who said what

5.2. GSS-mediated face-to-face focus groups

Concerning *people* issues, the moderator must be an expert in the GSS technology, but his or her task is easier than in different-place settings due to the possibility of giving verbal instructions and seeing the participants' reactions. The moderator must be mentally prepared for back-up plans due to technology breakdowns, although they are rare. The participants can be recruited from a limited geographical distance as in traditional groups, but the groups can accommodate a larger number and more heterogeneous participants due to the parallel communication mode. The participants must possess fluent typing skills and they should be willing to use computers. However, no other technology usage skills than simple e-mail applications are needed.

The *process* must be planned carefully in advance, but several advantages accrue from the anonymous computer-mediated mode: domineering and group thinking are alleviated, confidential and honest sharing of opinions is encouraged, also negative or controversial feedback is easy to give, there are no social-rank related problems due to the equal process, and comments are easily retrievable from the written "group memory" also during the session. However, free-riding and flaming may appear due to anonymity, and the first comments might be overtly influential (anchoring effect). It is possible to include quick electronic polls or surveys in the sessions, and discuss the results immediately. Due to the pre-planned and structured process, it is easy to repeat the same agenda for several focus groups.

There is a need for dedicated room facilities with GSS *technology* (computers for all participants, special group software, and a common white screen, at the minimum). The equipment may however be rented from a service provider. The *costs* are high due to travelling and the need for technology and GSS expertise, but these costs are partially or even completely compensated for as there are no transcribing costs, and more participants can be included in groups at the same time. Accurate reports are immediately available with all computer-mediated communication (see Table 4 for a summary).

5.3. Online (distributed) focus groups

Many of the benefits and drawbacks of GSS-mediated face-to-face focus groups apply to online focus groups, too. Thus, we will mainly concentrate here on issues that are specific to different-place settings. Regarding *people*, the moderator must be an expert in the chosen technology platform, and her task is quite challenging in synchronous settings in case no additional audio or video conferencing systems are used in parallel. "Techies" might be inclined to conduct online groups although they may lack important qualifications needed for guiding group dynamics. The moderator should be able to handle technology problems, which are quite possible as the participants use their own computers with a variety of internet browsers. There are no limits to the geographical participation, although in synchronous

Table 4 Benefits and drawbacks of GSS-mediated, face-to-face focus groups

Benefits	Drawbacks
+ Possibility to contribute simultaneously: efficiency increased, everybody's answers collected for memory	– The medium is less rich (lack of body language, facial expressions etc.), text may be misunderstood
+ Supports larger groups (e.g. 15–25) and more heterogeneous groups	– High travelling costs (participants and moderators)
+ Possibility for anonymous contributions: encourages confidential and honest sharing of opinions. The comments can however be tagged to enable identification of the same person's comments	– High rental costs of venue with GSS
+ Group thinking (social conformity) as well as domineering are alleviated	– Moderator must have expertise on GSS technology
+ Participants feel more comfortable giving negative or controversial feedback	– Not everybody is willing to use computers
+ Ideas are not evaluated based on the presenter	– A backup plan needed in case of technology breakdown
+ The process usually stays focused without any external distractions (and if they happen, the facilitator can respond immediately)	– Fluent typing skills are needed; varying typing speeds may have unfavourable effects on the process
+ Possibility to include quick electronic surveys and polls, also discuss results and pinpoint disagreements	– Anonymity might induce free-riding or flaming (less discretion and tact)
+ Transcription expenses are eliminated, the transcripts are complete and immediately available	– Not suitable if capturing body language is vital
+ Structured agenda aids in keeping time and replicating several groups with different participants	– Possibility for an anchoring effect (first comment may be overtly influential)
+ Moderator may give instructions verbally	

settings separate groups are needed when time zone differences are too large. The number of participants in asynchronous settings can be larger than in same-time settings, and the participants do not need as fluent typing skills. There is no need to dress-up, and people who are normally hard to recruit can participate more flexibly in their own homes or offices and even at the time that is the most suitable for them. Youth, especially, is very accustomed to communicating via the Internet.

The *process* needs to be even more carefully planned and administered than in face-to-face situations, and instructions need to be extremely clear and simple. The process advantages of the anonymous communication mode are practically the same as mentioned in the GSS section above. Clients may easily view the group discussion without participants being aware of their presence. However, the process is more exposed to external distractions, e.g. from family members or colleagues. Also, faster typists and those with faster Internet connections may have more influence on the discussion.

There is a no need for dedicated facilities, and in the simplest form, online focus groups can be conducted using freely available discussion board or similar *technology*. With synchronous settings, it is necessary for the participants to test

their connection to the dedicated forum in good time before the session starts. The *costs* are relatively low as there are neither travelling nor transcribing costs involved (see Table 5 for a summary).

Many market researchers recommend that topics related to web-based systems, information technology or the Internet are especially suitable for the

Table 5 Benefits and drawbacks of online focus groups (S or A in parenthesis if specific for synchronous or asynchronous)

Benefits	Drawbacks
+ No geographical limits for participation (except that separate groups may be needed for different time zones in S), also rural areas reached	– The medium is less rich (lack of body language, facial expressions etc.), text may be misunderstood
+ No travelling costs	– Not everybody is willing to use computers
+ Possibility to contribute simultaneously: efficiency increased, everybody's answers collected for memory	– Basic (A) or fluent (S) typing skills are needed for both participants and the moderator
+ Also suitable for heterogeneous groups	– Moderator must have expertise on the technology
+ Possibility for anonymous contributions: encourages confidential and honest sharing of opinions. The comments can however be tagged to enable identification of the same person's comments	– Need for an Internet connection
+ Group thinking (social conformity) as well as domineering are alleviated	– Online information security risks involved
+ Participants also feel more comfortable giving negative or controversial feedback	– Participants should pre-test the forum to eliminate technical difficulties (S)
+ Ideas are not evaluated based on the presenter	– Max. ten participants/group for effective management of online group dynamics (S)
+ Supports large groups of 25–40 participants (A)	– Faster typers and those with faster Internet connections may have too much influence (S)
+ Transcription expenses are eliminated	– More difficult to verify participant identity
+ Transcripts are complete and immediately available	– Moderators need to know how to assure that all participants are contributing
+ Convenient as there is no need to dress up, and participation is possible from home, office etc.	– Larger probability for outside distractions (S)
+ Possibility to contribute at a time that suits best (A)	– Youth audience requires that the moderator knows their "chat" vocabulary and use of emoticons etc.
+ Possibility to come back and continue discussion (A)	– Anonymity might induce free-riding or flaming (less discretion and tact)
+ Reaches groups that are hard to recruit otherwise (e.g. parents, business professionals with limited time)	– Not suitable if capturing body language is vital
+ Incentive costs are smaller for participants	– Not suitable if there is a need to show prototypes or 3D-models, or products need to be handheld

(continued)

Table 5 (continued)

Benefits	Drawbacks
+ Youth is already more accustomed to computer-mediated-communication than verbal discussions	– Not suitable if client material is highly confidential
+ Suitable for studying technology-related topics	– Show rates are lower than in FTF sessions, as participation requires a high level of motivation and interest. More over-recruitment is thus needed
+ Clients may view the group without participants being aware of their presence	– Developing rapport and gaining the trust of the participants is demanding
+ Provides social equalization and egalitarian data collection method as socio-economic status, ethnicity, nationality or gender may be unknown	– Physically demanding to type and read for 60–90 min virtually (S)
	– “Techies” may attempt to conduct groups, although they might lack important moderator qualifications
	– Bulletin boards may be too exhaustive to read, and participants may just answer their own opinions (A)
	– Bulletin boards may generate an enormous amount of text that requires extra reading and analysis time (A)
	– “Pair friendships” may develop (participants engage in their own dialogue and alienate the rest)

online environment. Thus, software engineering researchers should consider online focus group studies, too. Sweet (2001) concludes that the future promises many advancements for online groups including sophisticated visual aids, real-time video and sound, accurate voice recognition, and videoconferencing. We expect that the recent developments in IP-based multi-party video and audio conferencing tools will bring online practice forward in the next 5 years. Many end-users are already more familiar than business people with the utilization of web-cameras, Skype and Messenger conversations and conferences.

5.4. Summary of focus group comparisons

Researchers utilizing focus groups should weigh the benefits and drawbacks of these four main variations presented in Tables 3–5, and come to a conclusion as to which variation is best for their particular study. As Sweet (2001), Montoya-Weiss et al. (1998) and Zinchiak (2001) state, online (or other computer-mediated) focus groups are not going to replace traditional focus groups – merely the research arena is expanding as new tools are added to the pool of research techniques.

6. Discussion

The focus group method is, by its very nature, prone to problems associated with qualitative data. As the developers of models and theories may also act as the researchers responsible for the focus group session, there is an obvious danger of researcher bias influencing the results, either during the planning, during the sessions themselves, or during the analysis. However, e.g. Langford and McDonough (2003) mention that it is usually better to use a moderator who is an expert in the subject matter and not in professional facilitation. Thus, we recommend that disciplined, objective and rigorous instrumentation and data analysis methods are used in focus group studies and that all findings be based on traceable data.

We found the affinity grouping method to be a useful and effective tool in obtaining inputs from practitioners and users. While we do recognize the limitations posed by the short time available for discussions, we believe that it is also possible to address more complex issues with focus groups. Compared to consumer studies, the software engineering field contains some well-defined methods and standards that are used fairly consistently across the industry, such as the UML, CMMI, and FPA. Thus, it is possible to select a group of experts who are familiar with a given, complex technology and use the focus group session to elicit these experts' insights.

It is also possible to use brainstorming, scenario-based discussion, cognitive maps and a variety of other methods in a focus group. Langford and McDonough (2003) discuss these and 35 other tools and techniques that can be utilized especially regarding ergonomics and human factors design, but also regarding information systems. They posit a view of focus groups as a method that encompasses many tools, and not just a simple group interviewing technique. We also recommend the use of other stimulating techniques that fit the characteristics of the situation.

As our effort data indicates (see Table 1), the actual sessions constitute only a small share of total effort. Yet, these sessions provide more data and are perceived as value-adding sessions to participants as well. Thus, we recommend that more than one session be held when possible.

The role of the moderator is central in focus group sessions and is a particularly challenging task in the software engineering domain, due to the complexity of the technology and issues involved. The moderator should have experience or be trained in non-intrusive, neutral facilitation techniques and be cautious about his or her own bias in the session. A practice session should be mandatory for all focus group studies.

We wanted to include the electronic focus group comparison in this chapter as we believe that the computer-mediated technology is naturally prone to studies in the field of software engineering, as well as in IS studies in general. It is easier to get software users and developers to employ the technology than for example carpenters or other craftsmen. Moreover, the future users of software are more and more used to communicating via electronic media.

Our studies indicate that focus groups can provide valuable, complementary empirical data quickly at low cost. However, there are potential sources for

unwanted bias. The method should be used properly and the sessions should be planned and executed well and with appropriate rigor.

Due to its apparent ease of use and low cost, some researchers may be tempted to use focus groups without proper planning and instrumentation. Such studies are likely to contain biases and ignore much of the experience available. Therefore we recommend that researchers take a closer look at the extensive variety of books on focus group research, e.g., by starting with the valuable book reviews by McQuarrie (1994, 2001). Langford and McDonaugh (2003) is also a valuable source to start with.

We hope that the empirical researchers in the research community and in industry learn to use the method with appropriate rigor. As the method is not frequently used in the software engineering domain, we hope that the community develops sound practices for applying the method so that it could establish itself as a reliable research method in the field.

We ourselves plan to continue using the method in our future studies and in addition we aim to develop repeatable focus group processes in the spirit of the newly established field of collaboration engineering (Briggs et al., 2003).

References

- Anon., *Focus Group Kit*, Vol. 1–6, Sage Publications, Thousand Oaks, CA, 1997.
- Adler, M., Ziglio, E., *Gazing into the Oracle: The Delphi Method and Its Application to Social Policy and Public Health*, Jessica Kingsley Pub, 1996.
- Austin, T., Drakos, N., Mann, J., Web Conferencing Amplifies Dysfunctional Meeting Practices. Gartner Research Report Nr. G00138101, Gartner Inc., 2006.
- Baker, S.L., Improving Business Services through the Use of Focus Groups, *Reference Quarterly*, 30(Spring):377–385, 1991.
- Basili, V.R., Selby, R.W., Hutchens, D.H., Experimentation in Software Engineering, *IEEE Transactions on Software Engineering*, 12(7):758–773, 1986.
- Benbasat, I., Rethinking Diversity in Information Systems Research, *Information Systems Research*, 7(4):389–399, 1996.
- Boehm, B., Gruenbacher, P., Briggs, R.O., Developing Groupware for Requirements Negotiation: Lessons Learned, *IEEE Software*, 18(3):46–55, 2001.
- Bogdan, R.C., Biklen, S.K., *Qualitative Research for Education: An Introduction to Theory and Methods*, Allyn and Bacon Inc., Boston, MA, 1982.
- Bragge, J., den Hengst, M., Tuunanen, T., Virtanen, V., A Repeatable Collaboration Process for Developing a Road Map for Mobile Marketing. In Proceedings of the 11th Americas Conference on Information Systems AMCIS, 2005a.
- Bragge, J., Marttiin, P., Tuunanen, T., Developing Innovative IS Services Together with Wide Audience End-Users, In Proceedings of the 38th Annual Hawaii International Conference on System Sciences, Los Alamitos, CA, pp. 1–10, 2005b.
- Bragge, J., Merisalo-Rantanen, H., Hallikainen, P., Gathering Innovative End-User Feedback for Continuous Development of Information Systems: A Repeatable and Transferable E-Collaboration Process, *IEEE Transactions on Professional Communication*, 48(1):55–67, 2005c.
- Bragge, J., Merisalo-Rantanen, H., Nurmi, A., Tanner, L., A Repeatable E-Collaboration Process Based on ThinkLets for Multi-Organization Strategy Development, *Group Decision and Negotiation*, 16(4):363–379, 2007a.
- Bragge, J., Relander, S., Sunikka, A., Mannonen, P., Enriching Literature Reviews with Computer-Assisted Research Mining. Case: Profiling Group Support Systems Research. In Proceedings

- of the 40th Annual Hawaii International Conference on System Sciences (HICSS'07), IEEE, Los Alamitos, CA, pp. 1–10, 2007b.
- Briggs, R.O., De Vreede, G.J., Nunamaker, J.F., Collaboration Engineering with ThinkLets to Pursue Sustained Success with Group Support Systems, *Journal of Management Information Systems*, 19(4):31–64, 2003.
- Buhrer, H.K., Software Development: What It is, What It should be, and How to get There, *ACM SIGSOFT Software Engineering Notes*, 28(2):1–4, 2007.
- Chen, M., Nunamaker, J.F., The Architecture and Design of a Collaborative Environment for Systems Definition, *Data-Base*, 22(1–2):22–29, 1991.
- Clapper, D.L., Massey, A.P., Electronic Focus Groups: A Framework for Exploration, *Information and Management*, 30(1):43–50, 1996.
- Daft, R., Lengel, R., Organizational Information Requirements, Media Richness, and Structural Design, *Management Science*, 32(5):554–570, 1986.
- De Vreede, G.J., Fruhling, A., Chakrapani, A., A Repeatable Collaboration Process for Usability Testing, In Proceedings of the 38th Annual Hawaii International Conference on System Sciences, Los Alamitos, CA, pp. 1–10, 2005.
- Easton, G., Easton, A., Belch, M., An Experimental Investigation of Electronic Focus Groups, *Information and Management*, 40:717–727, 2003.
- Edmunds, H., *The Focus Group Research Handbook*, NTC Business Books, Lincolnwood, IL, 1991.
- Edmunds, H., *The Focus Group Research Handbook*, NTC Business Books and American Marketing Association, Lincolnwood, IL, 1999.
- Elfvengren, K., Karkkainen, H., Torkkeli, M., Tuominen, M., A GDSS Based Approach for the Assessment of Customer Needs in Industrial Markets, *International Journal of Production Economics*, 89(3):272–292, 2004.
- Feig, B., How to Run a Focus Group, *American Demographics*, 11(December):36–37, 1989.
- Fern, E.F., The Use of Focus Groups for Idea Generation: The Effects of Group Size, Acquaintanceship, and Moderator on Response Quantity and Quality, *Journal of Marketing Research*, 19(1):1–13, 1982.
- Fjermestad, J., Hiltz, S.R., An Assessment of Group Support Systems Experimental Research: Methodology and Results, *Journal of Management Information Systems*, 15(3):7–150, 1999.
- Fjermestad, J., Hiltz, S.R., Group Support Systems: A Descriptive Evaluation of Case and Field Studies, *Journal of Management Information Systems*, 17(3):112–157, 2000.
- Fraunhofer USA Inc., Summary of the Third eWorkshop on Agile Methods, Center for Experimental Software Engineering, <http://fc-md.umd.edu/projects/Agile/3rd-eWorkshop/summary3rdeWorksh.htm>, 2002.
- Galliers, R.D., Choosing Appropriate Information Systems Research Approaches: A Revised Taxonomy, in: *Information Systems Research: Contemporary Approaches and Emerging Traditions*, H.-E. Nissen, H.K. Klein and R. Hirschheim, eds. Elsevier Science Publishers, Amsterdam, pp. 327–345, 1991.
- Ghauri, P., Grønhaug, K., Kristianslund, I., *Research Methods in Business Studies*, Prentice-Hall, Englewood Cliffs, NJ, 1995.
- Glass, R.A., A Structure-Based Critique of Contemporary Computing Research, *Journal of Systems and Software*, 28(1):3–7, 1995.
- Gruenbacher, P., Halling, M., Biffl, S., Kitapci, H., Boehm, B.W., Repeatable Quality Assurance Techniques for Requirements Negotiation, In Proceedings of the 36th Annual Hawaii International Conference on System Sciences, Los Alamitos, CA, pp. 1–9, 2003.
- Halling, M., Gruenbacher, P., Biffl, S., Tailoring a COTS Group Support System for Software Requirements Inspection, In Proceedings of the 16th Annual International Conference on Automated Software Engineering, IEEE, Los Alamitos, CA 201–208, 2001.
- Hansen, K., Hansen, R.S., Using an Asynchronous Discussion Board for Online Focus Groups: A Protocol and Lessons Learned, In Proceedings of the College Teaching and Learning Conference, Clute Institute for Academic Research, Littleton, Colorado 1–8, 2006.

- Judd, C.M., Smith, E.R., Kidder, L.H., *Research Methods in Social Relations*, Harcourt Brace Jovanovich College Publishers, New York, 1991.
- Juristo, N., Moreno, A.M., *Basics of Software Engineering Experimentation*, Kluwer Academic Publishers, Boston, MA, 2001.
- Kitchenham, B., Dyba, T., Jorgensen, M., Evidence-Based Software Engineering. In Proceedings of 26th International Conference on Software Engineering, IEEE, Los Alamitos, CA, pp. 273–281, 2004.
- Klein, E.E., Tellefsen, T., Herskovitz, P.J., The Use of Group Support Systems in Focus Groups: Information Technology Meets Qualitative Research, *Computers in Human Behavior*, 23(5):2113–2132, 2007.
- Kontio, J., The Riskit Method for Software Risk Management, version 1.00. (College Park, MD, University of Maryland, 1997) CS-TR-3782/UMIACS-TR-97-38, Computer Science Technical Reports.
- Kontio, J., Software Engineering Risk Management: A Method, Improvement Framework, and Empirical Evaluation. Doctoral dissertation. (2001), Helsinki University of Technology, publisher: Center of Excellence, ISBN: 952-5136-22-1.
- Kontio, J., Bragge, J., Lehtola, L., Using the Focus Group Method in Software Engineering: Obtaining Practitioner and User Experiences. In Proceedings of the International Symposium on Empirical Software Engineering (ISESE), ACM-IEEE, Los Alamitos, CA pp. 271–280, 2004.
- Krueger, R.A., Casey, M.A., *Focus Groups: A Practical Guide for Applied Research*, Sage Publications, Thousand Oaks, CA, 2000.
- Langford, J., McDonaugh, D., *Focus Groups. Supporting Effective Product Development*, Taylor and Francis, London, 2003.
- Lehtola, L., Kauppinen, M., Kujala, S., Requirements-Prioritization-Challenges-in-Practice. In Fifth International Conference on Product Focused Software Process Improvement, 2004.
- Liou, Y.I., Chen, M., Using Group Support Systems and Joint Application Development for Requirements Specification, *Journal of Management Information Systems*, 10(3):25–41, 1993.
- Massey, A.P., Wallace, W.A., Focus Groups as a Knowledge Elicitation Technique, *IEEE Transactions on Knowledge and Data Engineering*, 3(2):193–200, 1991.
- McQuarrie, E.F., New Books in Review: The Handbook for Focus Group Research & Successful Focus Groups: Advancing the State of the Art, *Journal of Marketing Research*, 31:377–380, 1994.
- McQuarrie, E.F., New Books in Review: The Mirrored Window: Focus Groups from a Moderator's Point of View & Advanced Focus Group Research, *Journal of Marketing Research*, 38(November):515–516, 2001.
- McQuarrie, E.F., McIntyre, S.H., Focus Groups and the Development of New Products by Technologically Driven Companies: Some Guidelines, *Journal of Product Innovation Management*, 1:40–47, 1986.
- Miles, M.B., Huberman, A.M., *Qualitative Data Analysis: A Sourcebook of New Methods*, Sage Publications, Thousand Oaks, CA, 1984.
- Montoya-Weiss, M.M., Massey, A.P., Clapper, D.L., On-line Focus Groups: Conceptual Issues and a Research Tool, *European Journal of Marketing*, 32(7/8):713–723, 1998.
- Morgan, D.L., Designing Focus Group Research, in: *Tools for Primary Care Research. Volume 2: Research Methods for Primary Care*, M. Stewart, F. Tudiver, M.J. Bass, E.V. Dunn and P.G. Norton, eds. Sage Publications, Thousand Oaks, CA, 1992.
- Morgan, D.L., Focus Groups, *Annual Review of Sociology*, 22(August):129–152, 1996.
- Morgan, D.L., *Focus Groups as Qualitative Research*, Sage Publications, Thousand Oaks, CA, 1997.
- Myers, M., Qualitative Research in Information Systems, <http://www.qual.auckland.ac.nz/>, 2004.
- Nambisan, S., Information Systems as a Reference Discipline for New Product Development, *MIS Quarterly*, 27(1):1–18, 2003.
- Nambisan, S., Wilemon, D., Software Development and New Product Development: Potentials for Cross-Domain Knowledge Sharing, *IEEE Transactions on Engineering Management*, 47(2):211–220, 2000.

- Neter, J., Waksberg, J., A Study of Response Errors in Expenditure Data from Household Interviews, *Journal of the American Statistical Association*, 59:18–55, 1964.
- Newby, R., Soutar, G., Watson, J., Comparing Traditional Focus Groups with a Group Support Systems (GSS) Approach for Use in SME Research, *International Small Business Journal*, 21(4):421–433, 2003.
- Nielsen, J., The Use and Misuse of Focus Groups, *IEEE Software*, 14(January):94–95, 1997.
- Nunamaker, J.F., Dennis, A.R., Valacich, J.S., Vogel, D.R., George, J.F., Electronic Meeting Systems to Support Group Work, *Communications of the ACM*, 34(7):40–61, 1991.
- O'Connor, H., Madge, C., "Focus Groups in Cyberspace": Using the Internet for Qualitative Research, *Qualitative Market Research*, 6(2):133–143, 2003.
- Oringderff, J., 'My Way': Piloting and Online Focus Group, *International Journal of Qualitative Methods*, 3(3):1–10, 2004.
- Parent, M., Gallupe, R.B., Salisbury, W.D., Handelman, J.M., Knowledge Creation in Focus Groups: Can Group Technologies Help?, *Information and Management*, 38(1):47–58, 2000.
- Patton, M.Q., *Qualitative Evaluation and Research Methods*, Sage Publications, Thousand Oaks, CA, 1990.
- Reid, D.J., Reid, F.J.M., Online Focus Groups. An In-Depth Comparison of Computer-Mediated and Conventional Focus Group Discussions, *International Journal of Market Research*, 47(2):131–162, 2005.
- Rodgers, T.L., Dean, D.L., Nunamaker, J.F., Increasing Inspection Efficiency through Group Support Systems, In Proceedings of the 37th Annual Hawaii International Conference on System Sciences, Los Alamitos, CA, pp. 1–10, 2004.
- Rubin, J., *Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests*, Wiley, New York, 1994.
- Stewart, D.W., Shamdasani, P.N., *Focus Groups: Theory and Practice*, Sage Publications, Thousand Oaks, CA, 1990.
- Sunikka, A., Usability evaluation of the Helsinki School of Economics Website. Master's thesis, Helsinki School of Economics, 2004.
- Sweet, C., Designing and Conducting Virtual Focus Groups, *Qualitative Market Research*, 4(3):130–135, 2001.
- Taylor, S.J., Bogdan, R., *Introduction to Qualitative Research Methods*, Wiley, New York, 1984.
- Templeton, J.F., *The Focus Group: A Strategic Guide to Organizing, Conducting and Analyzing the Focus Group Interview*, McGraw-Hill Professional Publishing, New York, 1994.
- Ten-Pow, J., Fundamentals for Those Considering Online Focus Groups, On Survey Research Intelligence, <http://www.onsurvey.ca/supplemental/onfocus.pdf>, 2003.
- Tichy, W.F., Should Computer Scientists Experiment More?, *IEEE Computer*, 31(5):32–40, 1998.
- Tichy, W.F., Lukowicz, P., Prechelt, L., Heinz, E.A., Experimental Evaluation in Computer Science: A Quantitative Study, *Journal of Systems and Software*, 28(1):9–18, 1995.
- Turney, L., Pocknee, C., Virtual focus groups: New technologies, new opportunities, new learning environments, Proceedings of the 21st ASCILITE Conference, University of Wollongong, New South Wales, Australia, pp. 905–912.
- Tuunanen, T., Rossi, M., Engineering a Method for Wide Audience Requirements Elicitation and Integrating It to Software Development, In Proceedings of the 37th Annual Hawaii International Conference on System Sciences, Los Alamitos, CA, 2004.
- Van Genuchten, M., Cornelissen, W., Van Dijk, C., Supporting Inspections with an Electronic Meeting System, *Journal of Management Information Systems*, 14(3):165–178, 1997.
- Van Genuchten, M., Van Dijk, C., Scholten, H., Using Group Support Systems for Software Inspections, *IEEE Software*, 18(3):60–65, 2001.
- Vitharana, P., Ramamurthy, K., Computer-Mediated Group Support, Anonymity, and the Software Inspection Process: An Empirical Investigation, *IEEE Transactions on Software Management*, 29(2):167–180, 2003.
- Wellner, A.S., The New Science of Focus Groups, *American Demographics*, March 1 29–33, 2003.

- Widdows, R., Hensler, T.A., Wyncott, M.H., The Focus Group Interview: A Method for Assessing User's Evaluation of Library Service, *College and Research Libraries*, 52(July):352–359, 1991.
- Wohlin, C., Runeson, P., Host, M., Ohlsson, M.C., *Experimentation in Software Engineering: An Introduction*, Kluwer Academic Publishers, Boston, MA, 1999.
- Wohlin, C., Höst, M., Henningsson, K., Empirical Research Methods in Software Engineering, Lecture Notes in Computer Science, Vol. 2765 7–23, 2003.
- Zelkowitz, M.V., Wallace, D.R., Experimental Models for Validating Technology, *IEEE Computer*, 31(5):23–31, 1998.
- Zinchiak, M., Online Focus Group FAQs, Quirk's Marketing Research Review, <http://www.quirks.com/articles/a2001/20010712.aspx?searchID=2619905>, July/August 2001.