A Framework for Qualitative Analysis of Focus Group Data in Information Systems

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Abstract

Focus groups are a popular qualitative research method for information systems researchers. However, compared with the abundance of research articles and handbooks on planning and conducting focus groups, surprisingly, there is little research on how to analyse focus group data. Moreover, those few articles that specifically address focus group analysis are all in fields other than information systems, and offer little specific guidance for information systems researchers. Further, even the studies that exist in other fields do not provide a systematic and integrated procedure to analyse both focus group 'content' and 'interaction' data. As the focus group is a valuable method to answer the research questions of many IS studies (in the business, government and society contexts), we believe that more attention should be paid to this method in the IS research. This paper offers a systematic and integrated procedure for qualitative focus group data analysis in information systems research.

Keywords

Focus group, qualitative data analysis, framework, content data, group interaction data.

MOTIVATION

Focus groups are a social method that allows a group of people to provide research data through group interactions. While not as widely used as other qualitative research methods such as interviews, focus groups are popular in information systems research for (among other things) achieving a common understanding between a group of individuals (Stahl et al. 2009; Sutton and Arnold 2013), assisting with the initial conceptualization of a domain, and IS theorizing (Belanger 2012). Focus groups have been found to be a valuable method of obtaining rich data to answer the research questions of many IS studies in the business, government and social contexts. With this in mind, we believe that more attention should be paid to the focus group method in Information Systems research. This paper reviews contemporary methodological thought on focus group data analysis from other disciplines, with a view to its applicability to IS research, and suggests a clear, systematic and integrated procedure of qualitative analysis of both content data and group interaction data. We believe the method arrived at may also be of interest to researchers in related disciplines.

The Focus group is a method of obtaining qualitative data from multiple individuals through informal discussions that are focused on a specific topic (Krueger and Casey 2009; Stewart et al. 2007). As a focus group is a socially oriented environment, it can help individuals to express their experiences and perceptions and discuss their ideas. Therefore, focus groups can provide group interaction data (e.g., when participants ask questions from each other, debate, etc.) that is not obtainable through other methods such as individual interviews (Krueger and Casey 2009). It is a fast and economical method of obtaining rich data that can be used for different purposes such as a qualitative only study, developing items of a survey questionnaire, or gaining new insights for theory development (Barbour 2007; Krueger and Casey 2009). The method was first popularized in sociological research and later in marketing studies of consumer attitudes towards products and services. However, during the last two decades, it has been increasingly widely used in a number of fields, and has been particularly popular in health related research (Krueger and Casey 2009; Onwuegbuzie et al. 2009).

Methodologically, focus group is an inseparable part of qualitative research, as its main analysis procedure is all qualitative. Though, dependant on the aim and context of the research, focus group data can be analysed quantitatively (e.g., through participants vote counting) after or in parallel with the main/qualitative analysis (Morgan 1997; Stewart et al. 2007), this paper focusses on qualitative focus group data analysis.

Unlike the abundance of research articles and handbooks on planning and conducting focus groups, there are few detailed guidelines or systematic procedures for focus group data *analysis*. It appears to be implicitly assumed that focus group data is a subset of other qualitative data and that the range of methods used for qualitative data analysis can be applied. For example, even handbooks dedicated to focus group method, such as Krueger and Casey (2009), Morgan (1997), Stewart et al. (2007), and Wilkinson (2004), refer the readers to the general qualitative data analysis procedures such as Coffey and Atkinson (1996) and Strauss and Corbin (1990).

Our review of the methodological literature on focus groups identified two challenges for information systems researchers. First, the works were mainly in other disciplines, in particular health and nursing research, and did not provide specific guidance that is "theoretically sensitive" to the nature and characteristics of information systems research (i.e., conceptualising what types of data are important and what gives them meaning in the IS research). Second, even those few studies we were able to identify on the focus group analysis do not provide a clear and systematic analysis procedure. In particular, although more and more studies emphasise the importance of considering both content and group interaction data, we did not find any study that presents a clear and systematic procedure for analysing and integrating these two types of data yielded by focus groups.

Due to the multi-disciplinary nature of Information Systems, group interaction data (e.g., collaborative decision making or problem solving in project management, expression of emotions through social networks, etc.) is increasingly becoming important in the IS research (Stahl et al. 2009). Social learning through social networking (Yu et al. 2010), requirement gathering and decision making in agile environment (Drury et al. 2011), exploring grieving behaviours in virtual worlds, and emotional expression through instant messaging (Chesney et al. 2009) are only a few examples among many of the IS studies which have studied group interaction and user's emotions through focus groups. These all clearly show a significant need to develop a clear and systematic procedure that enables IS researchers to analyse both content and interaction data yielded by focus groups.

In this paper, we first present a brief overview of the current literature on focus group data analysis. Second, we present frequently used concepts in qualitative focus group analysis and clarify what we mean by each. Third, we provide a brief explanation of different types of focus group data, and use the concept of theoretical sensitivity to present a guideline to help decide the level of precision in choosing types of focus group data and level of analysis for information systems problems. Next, we present our framework for qualitative focus group data analysis. This is followed by an example that shows how this framework can be employed in practice. The paper ends with the conclusion section that explains the research limitations and suggestions for future research.

CURRENT LITERATURE ON THE FOCUS GROUP DATA ANALYSIS

Our review of the current focus group literature shows that guidelines for this method have mainly focused on the planning and conduct of focus groups. At first, these guidelines were some simple suggestions (also called rules of thumb) for planning focus group sessions. These include inviting homogeneous strangers as participants; using a structured interview guide with a high level of moderator involvement; and at least six to ten participants per group, and three to five groups for the same research (Morgan 1997). Later, more recent studies tried to focus on these aspects with a more sophisticated view. Examples of areas of focus include determining the level of focus group protocol structure based on the project characteristics and research design (Barbour 2007; Stewart et al. 2007), the optimal size of the group (Bloor et al 2001; Krueger and Casey 2009); the number of different focus groups for a researcher to reach across-group data saturation; (Morgan 1997; Stewart et al. 2007; Barbour 2007; Wilkinson 2004; Krueger and Casey 2009), and the importance of overall data saturation (i.e., continuing till no new information is received (Sandelowski 2008).

The literature on the qualitative analysis of focus group data suggests two main approaches for focus group data analysts including inductive content analysis and deductive content analysis approaches (Elo and Kyngas 2008; Hsieh and Shannon 2005; Moretti et al. 2011). The differences between inductive and deductive approaches center on the way codes and categories are developed. In the deductive (directed) approach, the coding and categorisation are based on an existing theory or previous research. Therefore, this approach enables researchers to efficiently refine or extend an existing theory (Elo and Kyngas 2008).

In the inductive approach (also called conventional analysis), codes, categories and their names are concluded inductively from the transcription and/or observation field notes (i.e., raw data). In this approach, direct information is gained from raw data without preconceived codes or perspective. Therefore, using this approach can lead to emergence of new insights and richer understanding of a phenomenon (Elo and Kyngas 2008; Halkier 2010; Moretti et al. 2011). The inductive approach is desirable when current literature or theory on a topic is limited and when researchers aim to use unstructured focus groups, where vote counting and the level of participants' consensus on a topic are not of high importance for data analyst (Morgan 1997).

When considering the qualitative content analysis for research one may ask "Is this method able to analyse group interaction data, as well?" The answer to this questions is 'yes' (Duggleby et al. 2005; Halkier 2010). Our procedure extends this assertion (Duggleby et al. 2005) by providing a method that can be used for both content data (manifest content and latent content) and interaction data, and which includes consideration of theoretical sensitivity to enable researchers to select which analysis procedures are appropriate for their research questions.

Although flexible data collection and analysis procedure is an advantage of qualitative research, this flexibility has created some difficulties in the data analysis procedure. Moreover, different terminology and different definitions of the main concepts in the literature have added to this complexity (Elo and Kyngas 2008; Graneheim and Lundman; 2004; Hsieh and Shannon 2005). Therefore, we present the frequently used concepts in the qualitative focus group data analysis, different terminologies used for each of them, and make clear that what is meant by each of these concepts in our focus group data analysis framework (see table 1).

Table 1: The Frequently Used Concepts in the Qualitative Focus Group Data Analysis

Concept	**Definition**
Content Area	A content area (also called a domain, rough structure, or a cluster) is the part of the focus group transcript or observation field notes that clarify aspects of the specific issue or topic of business or organizational phenomena that will be addressed by the research (Elo and Kyngas 2008; Graneheim and Lundman 2004).
Manifest and Latent Content	Manifest content is the parts of the focus group transcript where the meaning is clear and easily agreed by multiple coders, without needing a high level of interpretation. Parts of the text that need a higher level of interpretation, result in more disagreement, and require more discussion to understand and report what the text talks about is called latent content (Elo and Kyngas 2008; Graneheim and Lundman 2004).
Meaning Unit	In the literature, a meaning unit also has been called 'idea unit' (Kovach 1991), 'content unit', 'coding unit' (Baxter 1991), 'textual unit' (Krippendorff 1980), and even 'theme'. In this study, we have adapted Graneheim and Lundman's (2004 p. 106) definition of meaning unit ("words, sentences or paragraphs containing aspects related to each other through their content and context").
Condensation and Abstraction	Condensation, also called reduction and distillation (Cavanagh 1997) means shortening a text without changing the quality of its concept. Abstraction, also called aggregation (Barrosso 1997) is the process of grouping together the condensed text on varying levels. The process of abstraction can include for example creating the codes and concluding subcategories, categories, and themes.
Unit of Analysis	A unit of analysis is the object of study such as an individual, a group, a program, an incident, or even the whole abstracted and coded parts of the transcript (Elo and Kyngas 2008; Graneheim and Lundman 2004).
Code	A code is a label, a number, or a colour that is assigned to a condensed meaning unit based on the context of the research (Elo and Kyngas 2008; Graneheim and Lundman 2004; Hsieh and Shannon 2005; Morgan 1997). In this paper, we have considered use of labels (as codes) in the analysis framework.
Category	A category: is a group of content with similar characteristics and can consist of a number of subcategories at different levels of abstraction. Categories are exhaustive and mutually exclusive. In other words, no data can fit into more than one category and no data can be excluded due to lack of an appropriate category. 'Category' expresses the manifest content of the transcript and answers the question 'what?' (Elo and Kyngas 2008; Graneheim and Lundman 2004).
Theme	A theme is defined as "a thread of an underlying meaning through, condensed meaning units, codes or categories, on an interpretative level" (Graneheim and Lundman 2004 p. 107). In this paper, by theme, we mean the expression of the latent content of the focus group transcripts. A theme can include subthemes and answers the question 'how?'. Themes are not necessarily mutually exclusive; therefore, one or more condensed meaning units, codes and/or categories can fit into more than one theme (Elo and Kyngas 2008).

FOCUS GROUP DATA

Qualitative data has been categorized variously (e.g., verbal data, different types of non-verbal data, etc.). In this study we focus on the two main types 'content' data and group 'interaction' data, as they have been emphasised in writings specific to qualitative data analysis such as Duggleby et al. (2005) and Halkier (2010). Group interaction data (i.e., the verbal and/or non-verbal interactions such as when participants ask each other's

questions or debate each other) is the most important factor that makes focus groups distinct from individual interviews (Morgan 1997; Stewart et al. 2007). However, many studies that have used focus groups as their data collection method, have not explicitly considered analysis of these interactions (Myers 2006; Onwuegbuzie et al. 2009); or when it is appropriate to use them. Group interaction data is obtainable through the focus group audio or video recording, transcription and/or the observations written in the field notes.

To analyse group interaction data, Rothwell (2010) presented a categorisation of small group interaction types. See table 2 for this categorisation. While Rothwell (2010) presented this categorisation for interaction *statements* (i.e., verbal interactions) we argue that non-verbal interactions (e.g., agreeing/disagreeing with other participants through a facial expression or moving head) can be considered in the analysis process, also. In another study, Halkier (2010) presented the methods that can help to integrate content and interaction data including conversation analysis, positioning theory, and discourse psychology. Each of these methods is useful to study highly social interactions among participants, especially when practical discussion questions are used.

To determine the extent of use and importance of different types of data for data analysis, prior research (e.g., Duggleby et al. 2005) suggests that the concept of *theoretical sensitivity* (i.e., conceptualising what types of data are important and what gives them meaning) must be considered. In an information systems context, these types of interaction data can provide useful insights depending on the research question. For example, dependency and counterdependency could be considered when studying leadership style for project management, software engineering, IS management studies, outsourcing relationships, or top-management support. Fight could be useful when studying conflict in a project context. Pairing and counterpairing could be relevant when studying social networks.

Table 2: Small Group Interaction Data Types (adapted from Rothwell 2010)

1) Dependency: Expressing reliance and/or compliance with others. 2) Counterdependency: rejection or expressing independency from current leadership/ authority in the group
3) Fight: expressing criticism, agitation, hostility, or aggression
4) Flight: evasion, irrelevant or isolated behaviour and/or expression 5) Flight-pairing: nonintimate, irrelevant and/or avoidante expression
6) Pairing: Expressing intimacy, friendship and/or support 7) Counterpairing: Avoiding intimacy and/or revealing personal information
8) Unscoreable: is not comprehensible or cannot be considered in any of the categories

Conversely, if group interaction data or detailed non-verbal data does not contribute to the context and research questions of a study, using this concept, they are not required to be reported. In this case, however, analyst should explain how the data were analysed to convince the readers that attention was paid to all sources of data (Duggleby et al. 2005). For example, if the research questions of a study aim to understand individual user's decision making process (not group's decision making process) and participants are asked about their experience of an incident where they solved a problem on their own, group interaction data will not be of high importance. Moreover, the importance of analysing interaction data and non-verbal data (to understand emotions, feelings, etc.) can be significantly reduced for such a study.

Similar to 'group interaction' data analysis, depending on the theoretical sensitivity, data such as silence, sighs, laughter, and body language may provide a source of information to help realise emotions, strength of opinions, etc in some focus groups. These data can be categorised into four types including kinesic (postures or movements of body), proxemic (using interpersonal space to express one's viewpoint), chronemic (pacing of individual's speech and his/her length of silence), and paralinguistic (all changes in volume, pitch, and quality of an individual's voice) (Onwuegbuzie et al. 2009). Bloor et al. (2001) have provided a list of transcription codes for these data.

To remain focused on the purpose of this research (i.e., presenting a framework for qualitative focus group data analysis), we emphasise that due to the multidisciplinary nature of IS research and possible unique characteristics of each IS project, detailed representation of types of data (that should be used for each type/topic of IS study) is beyond the scope of this paper. See the last section for the explanation of the research limitations. Therefore, this section of the paper and figure 1 aim to use the concept of theoretical sensitivity to provide a high-level illustration to help decide the level of precision in considering different types of data in the focus group analysis procedure.

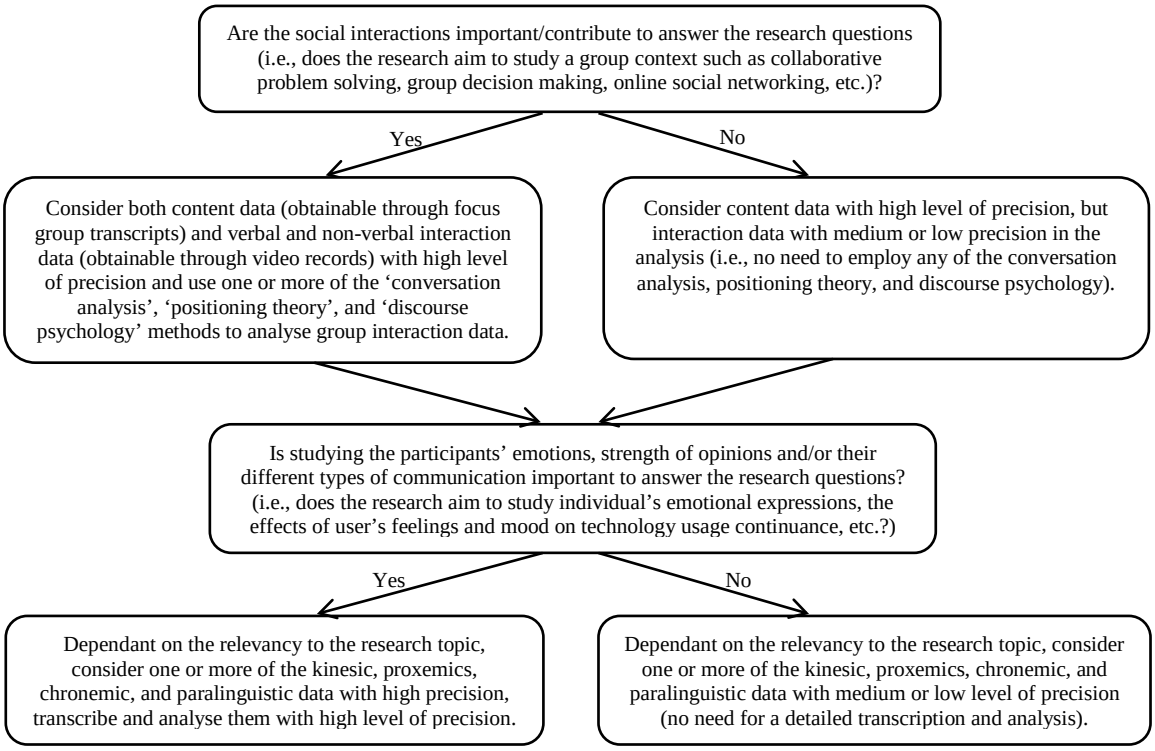

Figure 1: Level of Precision Required to Analyse Different types of Focus Group Data based on Duggleby et al. (2005), Halkier (2010) and Onwuegbuzie et al. (2009)

AN INTEGRATED PROCESS FOR FOCUS GROUP DATA ANALYSIS

Our approach for the analysis of the content and interaction data obtained through focus groups includes five phases: (1) Determining the theoretical sensitivity to types of focus group data and the level of precision to analyse them, (2) Conducting a manifest content analysis of each content area (analysis of the visible components of the text with low level of interpretation), (3) Conducting a latent content analysis of each content area (i.e., analysis of what the text talks about through a high level of interpretation of the underlying meaning), (4) Integrating the results of the second and the third phases for each content area, and (5) Integrating the results of all content areas. The section also clarifies the way group interaction data is analysed. The phases of the procedure have been presented below.

Phase 1) Determining the theoretical sensitive types of data and the level of precision required to analyse them: Dependant on the relevancy to the research topic and the level of contribution to the research questions, (using the concept of theoretical sensitivity), the analyst should determine and justify the types of focus group data (e.g., content data, interaction data, and non-verbal data such as kinesic, proxemics, etc.), the level of precision in considering these data in the analysis process, and the analysis approach (e.g., whether conversation analysis, positioning theory, etc is needed to be employed). See figure 1 for a guidance for determining types of theoretical sensitive data and analysis approach.

Phase 2) Manifest content analysis:

2.1) Preparation step:

- Reading through the transcript and field notes to understand the whole context.
- Extracting and bring together the text about each topic (or question, issue, etc.) into one text to constitute each content area.
- Each content area is divided into meaning units which need to be condensed into a description close to the text.

2.2) Organizing step (for each content area):

- Considering the whole context in mind, each condensed meaning unit should be abstracted and then labelled with a code. Unlike 'margin coding' that is usually used in cut and paste method (also called scissors and paper technique), these codes are written in coding sheets.

- Based on the similarities and differences between the codes, these codes should be sorted into subcategories which are further abstracted into categories. These categories should be labelled with names/labels that represent their contents. To constitute appropriate categories, the categorisation process may need several back and forth movements and continues until it is possible and reasonable.
- Lastly, the underlying meaning of the categories of the content area is formulated into one theme.

2.3) Reporting step:

- Using tables, illustrations, and/or appendices to report the analysis process and link data with the categories, and the theme in each content area. See table 3 for an example of this presentation.

Table 3: An Example of Representation/Reporting the Results of Manifest Content Analysis

The theme concluded through the overall interpretation of all categories in content area 1:										
Theme 1										
Categories in content area 1:										
category 1 (=subcategory 1)				category 2						
				subcategory 2					subcategory *n*	
sub-subcategory1 (=code 1)	sub-subcategory 2			sub-subcategory 3		sub-subcategory 4			sub-subcategory *k*	
The codes (labels) of each condensed meaning unit:										
code 1	code 2	code 3	code 4	code 5	code 6	code 7	code 8	code 9	code *i*	code *j*
Condensed meaning units in content area 1:										
condensed MU 1	condensed MU 2	condensed MU 3	condensed MU 4	condensed MU 5	condensed MU 6	condensed MU 7	condensed MU 8	condensed MU 9	condensed MU *x*	condensed MU y
The meaning units (MUs) in content area 1:										
MU 1	MU 2	MU 3	MU 4	MU 5	MU 6	MU 7	MU 8	MU 9	MU *x*	MU *y*

Phase 3) Latent content analysis:

3.1) Preparation:

- Reading through the whole text and the content areas (identified in the previous phase), again.
- The latent content of each content area is divided into meaning units.
- Each of the meaning units should be condensed into a short description that is close to the wording of that meaning unit.
- Next, the underlying meaning of each condensed meaning unit should be interpreted and written concisely.

3.2) Organising:

- The condensed meaning units are abstracted into subthemes.
- Grouping these subthemes into one or more themes with relevant headings/labels. The (label of the) theme(s) can be different or the same with the one emerged in the second phase.

3.3) Reporting:

- Using illustrations, tables, and/or appendices to report the analysis process and link data with the sub-themes and themes in each content area. See table 4 for an example of this presentation.

Table 4: An Example of Representation/Reporting the Results of Latent Content Analysis

The theme(s) concluded through the interpretation of the latent content in content area 1:								
Theme 1					Theme 2 (= the subtheme)		Theme *n*	
Subtheme 1		Subtheme 2			Subtheme 3		Subtheme *k*	
Interpretation of the meaning units:								
interpretation of MU 1	interpretation of MU 2	interpretation of MU 3	interpretation of MU 4	interpretation of MU 5	interpretation of MU 6	interpretation of MU 7	interpretation of MU *x*	interpretation of MU *y*
The condensed meaning units (the descriptions close to the text):								
condensed MU 1 close to the text	condensed MU 2 close to the text	condensed MU 3 close to the text	condensed MU 4 close to the text	condensed MU 5 close to the text	condensed MU 6 close to the text	condensed MU 7 close to the text	condensed MU *x* close to the text	condensed MU y close to the text
The Meaning units (MUs) in content area 1:								
MU 1	MU 2	MU 3	MU 4	MU 5	MU 6	MU 7	MU *x*	MU *y*

As mentioned earlier, focus group interaction data is a kind of latent content; therefore, interaction analysis follows the same procedure (explained for latent content analysis) to conclude themes (not categories). Depending on the theoretical sensitivity, if group interaction analysis is needed, an extra table (similar to table 4) should be drawn to illustrate the group interaction data analysis process and results. This approach of group interaction process is consistent with Duggleby (2005) who introduces three methods of interaction analysis (congruent method, description, and incorporated into transcripts) and suggests the congruent method (i.e., analysing the group interaction data through the same method as content data, but separately). In this regard,

Duggleby (2005 p.836) states that "an ideal method of group interaction data analysis should be congruent with the qualitative approach and provide new levels of insight in the phenomena being researched". However, if the participants' interactions in a content area are not complex and do not need a table to illustrate the analysis process, we suggest writing the direct quotes in some participants' interactions and analyse them based on the focus group interaction data types presented in table 2.

Phase 4) Integrating the results of phase 2 and phase 3 of each content area: All sub-categories and categories (identified in the second phase) and all sub-themes and themes (emerged in the third phase) of each content area should be reported in one integrated text and/or table for that content area. In this integration phase, the subcategories and categories (from the manifest content analysis) and the subthemes, and themes (from the latent content analysis) are integrated together into 'subgroups' and 'groups' which capture the overall results of the focus group for each content area.

Phase 5) Reporting the whole results: As the final phase of the focus group data analysis, all groups and subgroups of all content areas should be reported in an integrated text and/or one illustration. In this phase, drawing a table to illustrate the whole results is encouraged, as it makes presentation of the report more efficient and easier to understand. However, if space does not allow illustrating such a table in the report document, we suggest drawing a figure instead, as figures usually can incorporate much information and represent them in an integrated way.

As Graneheim and Lundman (2004) and Krueger and Casey (2009) state, trustworthiness of qualitative analysis deals with the extent to which the presentation of the analysis process and the results allows for alternative interpretations. Therefore, our systematic analysis procedure along with such tables and figures can increase the trustworthiness of analysis.

AN ILLUSTRATIVE EXAMPLE

In a study of the factors affecting user's persistence with solving technology problems, we conducted a focus group with the service staff of IT Services department at a large organisation in New Zealand. The study aimed to understand individual user's behaviour (technology problem solving), not problem solving by a group, and the focus group was held with staff with a great deal of experience of dealing with users. The aim was to increase the researchers' understanding of the phenomenon and guide the design of further enquiry using observation and thinking aloud method. We decided to conduct the focus group with the staff, as their extensive experience of working with users was an opportunity for us to gain new insights for designing and planning the focus groups and individual data gathering with users. This focus group is used to illustrate the method.

Phase 1: We considered the theoretical sensitivity of the data, using the decision tree in Figure 1. Considering the aim of the study, which is to capture a range of perspectives on individual self-service technology (SST) problem solving persistence strategies, we determined that 'group interaction' data and kinesic, proxemics, chronemic, and paralinguistic data would not contribute to the research questions, therefore, the study does not need to report these data in detail.

Phase 2: (2.1) We prepared the data read through the transcript and field notes to understand the whole context. Next, we constituted the content areas through extracting and bring together the text about each topic into one text. As a result, four content areas were identified including the text about the quality of information (e.g., instructions) needed to solve a SST problem; text about quality of the technological factors (e.g., ease of use and interactivity); personal factors (e.g., technology self-efficacy); and task characteristics (e.g., task criticality and complexity). Each of these content areas was divided into meaning units which were condensed into a description close to the text. (2.2) Each condensed meaning unit was abstracted and labelled with a code. Based on the similarities and differences, these codes were sorted into subcategories and further abstracted into categories. The categories were labelled with content-characteristic names. As already mentioned, the level of abstraction can vary among different studies or even among the content areas in the same study. Therefore, for example, the level of abstraction in some of our content areas stoped at the category level and did not include subcategories. Lastly, the underlying meaning of the categories of each content area was formulated into one theme. (2.3) The condensation and abstraction process and the results for each content area were illustrated with a table. Table 5 illustrates the manifest content analysis of the first content area (quality of information on SST problem solving). Some examples of the selected quotes (meaning units) from which the categories were concluded are presented, as well.

Phase 3: (3.1) We analysed the latent content by reading through the whole text and the content areas identified earlier. The latent content of each content area was divided into meaning units that were then condensed into a description close to the text. Next, these descriptions were interpreted to understand their underlying meaning. (3.2) These were then abstracted into sub-themes which were grouped into themes with relevant headings/labels.

(3.3) The latent content analysis process and the results for *each* content area were illustrated through one table. Table 6 presents some examples of the selected quotes from which the two subthemes and the theme in the first content area were emerged.

Table 5: Analysis of the Manifest Content of the First Content Area

Theme: Information Quality								
Category 1: Usefulness			**Category 2: Obtainability of (required/needed) information**				**Category 3: Presentation**	
Relevancy	**Timeliness**	**Completeness**	**Availability**	**Accessibility**	**Easiness**	**Time to Receive**	**Contextualisation**	**Clarity**
Condensed MU1: This isn't what I needed help with	**MU 2:** P4: "The versions do change pretty frequently and …. needs to be updated."	**MU 3:** "All information is in the manual to help …"	**Condensed MU4:** The service has the instructions on it.	**Condensed MU5:** The page may not be found/accessed.	**Condensed MU6:** Finding a particular information can be challenging.	**Condensed MU8:** information *immediately* comes up.	**Condensed MU7:** There is contextualised help information.	**Condensed MU8:** Duplicates are due to unclear information.
MU 1: P9: "… and you end up wait a second, this isn't even vaguely what I needed help with."			**MU 4:** P8:"we introduced that service this time last year, and it's just had instructions on it, on the sites. - we don't hear much (enquiry) about it."	**MU 5:** P10: "It might be on like, the old page that a user probably wouldn't find the page."	**MU 6:** P4: "The …'s web page, we tell people to go there but then once they get there to find a particular piece of information it can be challenging."	**MU 8:** P9: "When you put an address in and somebody is offline or on leave, (information) *immediately* comes up to say they're on leave…"	**MU 7:** P8:"So….products request for support is a good example because within the.…products there is help (information) and very contextualised if we type it in …"	**MU 8:** P3: "(information) is not clear, so we end up with duplicates you see."

Table 6: Analysis of the Latent Content of the First Content Area

Theme: Information Quality	
Subtheme 1: Easiness (of obtaining info)	**Subtheme 2: Information Conciseness**
Interpretation of the underlying meaning: It was easy to find the information.	**Interpretation of the underlying meaning:** Unnecessarily, there is too much information.
Condensed MU close to the text: The information was moved to a different menu or different icon.	
Meaning Unit: P7: "There used to be some previous version of … you could find … and they moved it to a different menu or different icon."	**Meaning Unit:** P6: So it's possible to get information overload, like... , like what it was done in the... product.

As mentioned, focus group interaction data is a kind of latent content; therefore, the interaction analysis follows the same procedure to conclude themes. As we discussed, the theoretical sensitivity of the data does not require this type of analysis. This example is therefore supplied for only completeness to illustrate the method. We extracted the direct quotes of some participants' interactions in each content area and analysed them based on the Rothwell's (2010) list of focus group interaction data types. An example of the group interaction analysis for this focus group is:

> *P10: "Alternatively, the further up the hierarchy they have research assistants."*
> *P8: "Somebody to delegate to."*
> *P7: "But also, all they'll ask is for someone like you guys to come down and you guys will show them, walk them through it."*

Having looked at the focus group transcript, audio record and the observational field notes, we consider this interaction 'pairing', because the seventh participant's quote in this interaction was an intimate and supportive expression for her colleagues. Therefore, for example, the analyst can consider this possibility that 'moral support' can be a subtheme for the 'community support' theme (colleagues and friends' support when solving a technology problem), or if the analyst has already concluded this subtheme, this 'pairing' interaction can increase the validity of the subtheme.

Phase 4: In the fourth phase, we integrated the results of the second and the third phases. Therefore, all subcategories, categories, subthemes, and the themes of each content area were reported in an integrated text (this can be illustrated with a table or a figure, as well). For example, for the first content area (i.e., all parts of the transcript that are about quality of information on technology problem solving), we considered 'Information Quality' as the group, and information 'usefulness', 'obtainability', and 'presentation' as its subgroups. 'Usefulness' subgroup consists of 'timeliness', 'relevancy' and 'completeness'. Moreover, Information 'availability', 'accessibility', 'obtainability easiness', and 'time to receive info' form the 'Information obtainability' subgroup. Similarly, information 'conciseness', 'contextualisation', and 'clarity' constitute the 'information presentation' subgroup. Table 7 represents these results for the first content area.

Table 7: Integration of the Results in the First Content Area

Content Area: All text related to the quality of information on technology problem solving									
Group: Information Quality									
Subgroup 1: Usefulness			**Subgroup 2:** Obtainability				**Subgroup 3**: Presentation		
Relevancy	Timeliness	Completeness	Availability	Accessibility	Easiness	Time to Receive	Contextualisation	Conciseness	Clarity

Phase 5: Finally, the groups and subgroups of all content areas can be reported, this is not included due to the space limitation. As discussed, these results (the groups and subgroups of all content areas) can be presented through a table and/or figure to report them in an integrated way.

CONCLUSION AND RESEARCH LIMITATIONS

Our analysis process, along with the use of tables and/or figures can be used to improve focus group data *analysis* for information systems researchers. We provided a clear, systematic and integrated procedure of qualitative analysis of both content data and group interaction data, which includes (if required) both verbal and non-verbal data. Our process provides clear provenance from data to results; provides transparency and completeness (all relevant data is considered); supports theoretical sensitivity of data analysis to research problem; and overall, increases the trustworthiness and insightfulness of focus group data analysis.

Before presenting our analysis framework, we presented the frequently used concepts in the qualitative focus group analysis, different terminologies and definitions used for each of them, and clarified that what we meant by each of these concepts in our framework. The paper also provided a brief explanation on different types of focus group data and suggested to use the concept of *theoretical sensitivity* and presented an illustration (figure 1) to help decide with what level of precision different types of data should be considered and reported in the analysis process. However, figure 1 is a high-level illustration, as the focus of this paper was mainly on proposing an analysis framework. Therefore, we suggest future research to focus on presenting a guidance in more detail to help decide on the level of precision when data analysis and reporting the results.

We used raw data obtained through the focus group of our recent study for the example section of this paper to further explain how our proposed focus group analysis procedure can be employed in practice. Although the example explained all five phases of our analysis framework our data limited us in providing an extensive example of analysis of interaction and non-verbal data (a research limitation of this paper). Moreover, to remain focused on the purpose of this paper, we did not study the issues of *consensus and decent* (i.e., the level of participants' agreement or disagreement with a focus group question) and assessing the participant's *strength of opinions* when discussing their ideas. According to the past research and as Sim et al. (1998 p. 349) states, the concept of consensus is more about "consensus across groups in terms of the range of issues concerned" (when multiple focus groups have been conducted on the same topic), rather than consensus within a group. As Sim (1998 p. 349) states, assessment of the participant's strength of opinions is difficult and can be easily misinterpreted, because in a focus group "the apparent strength of opinion is context-specific, and does not necessarily represent some stable underlying intensity of feeling". Therefore, we suggest future research to focus more on these two aspects of the focus groups.

We offered a systematic, integrated and clear focus group data analysis framework for IS researchers; however, each project with qualitative analysis can be unique and the level of abstraction and data integration can vary. This is why even with a clear analysis procedure in hand; fully exploring the richness of focus group data is not an easy job. We hope that our process will contribute to the enjoyment, richness, trustworthiness of focus group data analysis, and stimulate further discussion to improve the use of this important method by information systems researchers.

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