Technical Briefing on Qualitative Research and Qualitative Data Analysis

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Abstract—**This technical briefing will help ICSE attendees gain an understanding of the basics of qualitative research and hands-on experience with conducting systematic and rigorous qualitative data analysis using socio-technical grounded theory (STGT). It will be useful for students and professional researchers with all levels of experience, including those attempting qualitative research for the first time. The briefing will cover selected content from the new "*Qualitative Research with Socio-Technical Grounded Theory*" Springer book and include plenty of hands-on examples of qualitative data analysis to interactively work through. It will equip attendees with the knowledge, skills, and resources required to handle qualitative data from human and LLM sources, and to derive rich descriptive findings, taxonomies, theoretical frameworks, models, and theories.**

Index Terms—**qualitative research, socio-technical grounded theory, STGT, qualitative data analysis**

I. Introduction and Background

Increasingly, software engineering (SE) studies involve the consideration of qualitative data derived from human and large language model (LLM) sources. Whether as standalone qualitative studies or as part of mixed methods studies, a systematic and rigorous approach to qualitative data analysis will lead to rich and robust findings. SE researchers are always on the look out for useful qualitative data analysis methods. There are many qualitative data analysis methods available. For example, thematic analysis [1] and content analysis [2] have been employed in SE research studies. However, not all qualitative methods are equally rigorous and powerful.

This technical briefing will provide an introduction to qualitative research and will focus on qualitative data analysis using socio-technical grounded theory (STGT). STGT was first introduced in an article published in the IEEE Transactions on Software Engineering [3] and has been detailed in *Qualitative Research with Socio-Technical Grounded Theory* Springer book [4]. STGT is a modern variation of the traditional Grounded Theory methods arising from social sciences [5]. It has been customised for the study of socio-technical topics, where "*human and technological interactions are tightly coupled, such that studying one without the other makes for an incomplete investigation and understanding*" [3], [4].

STGT is being used for qualitative research and qualitative data analysis across the domains of SE, human-computer interaction (HCI), human-robot interaction (HRI), artificial intelligence (AI), emerging technologies, and digital health. Some examples of its application are listed below.

- *Software Engineering*: to study neurodiverse software developers [6], product managers in software startups [7], human aspects in requirements engineering [8], data challenges in data-intensive software systems [9], empathy in developer-user interactions [10], cultural diversity in SE research and practice [11] etc.
- *Requirements Engineering*: to explain the role of developer emotions in requirements change handling [12]
- *Artificial Intelligence (AI)*: to study ethics of AI and AI practitioner experiences with ethics [13], and AI tool use and adoption in software development [14]
- *Human robot interaction (HRI)*: to study reactions in human-robot encounters with autonomous quadruped robots [15], understanding the complexities of situated practices and agency in the laboratory [16], for conducting qualitative study of reactive synthesis in simulated experiment of robot control [17]
- *Emerging Technologies*: to understand and enhance block chain adoption [18]
- *Digital Health*: to explore the adapting of user interfaces for software supporting chronic diseases [19]

STGT has been included in the teaching of empirical software engineering courses at Eindhoven University of Technology [20] and as part of the explaining empirical research in the *Experimentation in Software Engineering* book [21].

II. Target Audience

The technical briefing will be useful for researchers, both from academia and industry, conducting all types of qualitative studies and those working with qualitative data in general. It will be suitable to researchers with all levels of experience with qualitative data analysis including those looking to attempt it for the first time. This can include Masters (by research), PhD students, and new and experienced researchers in academia and industry, including user experience (UX) designers and researchers and those working with qualitative data produced by or in collaboration with LLMs. Some basic exposure to research is expected, need not be in qualitative research. There are no pre-requisites for this briefing. However, browsing through the relevant study materials (listed later) in advance is recommended for an enhanced overall experience.

III. Technical Briefing Details

This technical briefing will focus on qualitative data analysis, including types of qualitative data, qualitative data collection techniques, and qualitative data analysis using socio-technical grounded theory (STGT) techniques.

A. Benefits and Learning Outcomes

ICSE attendees participating in this technical briefing will learn about a socio-technical approach to qualitative research in SE, focusing on qualitative data analysis with socio-technical grounded theory (STGT) [4]. It will enable them to approach qualitative studies and qualitative data analysis with confidence. It will help them improve the robustness of qualitative research applications and achieve quality outcomes such as rich descriptive findings, taxonomies, theoretical models, frameworks, and theories.

The **learning objectives** of this technical briefing include:

- Identifying different types of qualitative data
- Identifying and selecting from different qualitative data collection techniques for various study contexts
- Assessing the quality of qualitative data for inclusion in research studies
- Applying STGT's data analysis techniques of open coding, constant comparison, and memoing for making sense of different types of qualitative data
- Learning to progress from first, often unsatisfactory, attempts to satisfactory and good qualitative data analysis
- Deriving rich, socio-technical codes, concepts, and categories, and
- Understanding different expected outcomes, e.g. rich descriptive findings, insights, taxonomies, theoretical frameworks, and theories, through several examples from published studies

B. Outline and Topics

This technical briefing will cover selected content from Chapters 3, 7, 8, 10, 12 and 14 of *Qualitative Research with Socio-Technical Grounded Theory* [4]. It will be presented in a 90 mins format which will cover basic qualitative data analysis for deriving rich descriptive findings, preliminary taxonomies and theoretical frameworks. The briefing will include plenty of hands-on examples of qualitative data analysis to interactively work through.

The **planned outline** of the briefing is as follows:

- An introduction to qualitative research and socio-technical research framework
- Types of qualitative data, such as those derived from texts, audio and video recordings, field notes, observational notes, participant reflections, discussion forums, commits logs, and chats
- Qualitative data collection techniques, such as through surveys, interviews, observations, focus groups, usability evaluations, data mining, LLM outputs
- STGT's basic qualitative data analysis techniques, such as open coding constant comparison

- Role of memoing in qualitative data analysis and theoretical sampling
- Examples of possible outcomes of qualitative data analysis, such as rich descriptive findings, preliminary or mature taxonomies, theoretical frameworks, and theories
- Question and Answers, to address participant queries throughout and at the end

Hands-on Exercises The briefing will include hands-on experience with qualitative data analysis applying a socio-technical lens. Participants will have the opportunity to apply qualitative data analysis on a piece of text/data (relevant to HCI studies). Together, we will go through three iterations: 'do on your own', 'discuss as a group', 'debrief', moving from first attempt and its debrief to the second attempt and its debrief and then to the final attempt and its debrief. In the process, examples of poor coding, satisfactory coding, and good analytical coding will be shared to demonstrate how we can iteratively improve the quality of our analysis. No devices are required for the hands-on exercises.

C. Relevant Study Materials and Accessibility

Visiting some of the following materials ahead of the briefing will enable an improved experience.

- Qualitative Research with Socio-Technical Grounded Theory, 2024 Springer Book [4]
- Socio-technical grounded theory for software engineering, 2022 TSE article [3]
- Some of the papers that have applied STGT, as listed in the Introduction section
- Videos, slides of previous technical briefings available at: www.rashina.com/stgt

Participants are encouraged to contact the presenter if they have any accessibility needs.

D. Previous Offerings

Technical briefings related to this topic have been presented at ICSE as 90 minutes sessions in 2021 [22], 2023 [23] and 2024 [24]. All sessions were very well attended to room capacity (30-50 attendees), with majority new attendees every time, and including novice to highly experienced researchers. At ICSE2025, the technical briefing will draw on the contents of the recently published book [4] and include examples of dealing with qualitative data from LLM sources.

IV. Speaker Information

Rashina Hoda is a Professor of Software Engineering and Associate Dean Equity Diversity and Inclusion at the Faculty of Information Technology at Monash University, Melbourne. She is a world leading expert in qualitative empirical research. Based on 15+ years of conducting, supervising, reviewing, and editing experience, she has developed Socio-Technical Grounded Theory (STGT), a modern socio-technical version of sociological Grounded Theory methods. This technical briefing will draw from her book *Qualitative Research with Socio-technical Grounded Theory* (Springer, 2024). She first introduced STGT in a 2022 IEEE Transactions on Software

Engineering (TSE) article [3]. Since its introduction, Rashina has been presenting technical briefings on this topic at ICSE in 2021, 2023 and 2024. All three sessions were very well attended.

With her research teams, Rashina has published over a 150 peer-reviewed papers in top software engineering venues such as TSE and ICSE. She received an ACM SIGSOFT Distinguished Paper Award at ICSE2017 and a Distinguished Reviewer Award at ICSE2020. She serves as an Associate Editor of IEEE TSE and as the General Chair of the Cooperative and Human Aspects of Software Engineering (CHASE) co-located with ICSE2025. Rashina is an engaging presenter, having presented a SXSW Sydney talk in 2024, TEDxAuckland talk in 2019, and various invited talks at research conferences (ICSE, XP, EASE, ASE) and industry events, including Agile Australia 2022-2024, Agile India 2019, Agile NZ 2017, and so on. For more information, visit www.rashina.com/videos

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