A Role-Based Framework for integrating Emotional Intelligence in Agile Teams during Requirement Changes

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NATIONAL UNIVERSITY OF MODERN LANGUAGES

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Candidate of Master of Science in Software Engineering at the National University of Modern Languages, do hereby declare that the thesis titled as **A Role-Based Framework for integrating Emotional Intelligence in Agile Teams during Requirement Changes** submitted by me in partial fulfillment of MSSE degree, is my original work and has not been submitted or published earlier. I also solemnly declare that it shall not, in the future, be submitted by me for obtaining any other degree from this or any other university or institution. I also understand that if evidence of plagiarism is found in my thesis/dissertation at any stage, even after the award of a degree, the work may be canceled and the degree revoked.

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ABSTRACT

Title: A Role-Based Framework for Integrating Emotional Intelligence in Agile Teams during Requirement Changes

Requirement engineering is a foundational yet challenging aspect of the software development lifecycle (SDLC), particularly within traditional models such as Waterfall, where rigid structures hinder effective change management. While Agile methodologies embrace change, they often introduce emotional complexities that impact individual well-being, team dynamics, and overall performance. Existing literature primarily focuses on the role of Emotional Intelligence (EI) among developers in handling requirements changes, leaving a significant gap in understanding the role-specific emotional needs of other key Agile roles namely, the Product Owner (PO), SCRUM Master(SM), and the Development Team.

This study bridges this gap by identifying the emotional challenges experienced by each Agile role during requirement changes. A survey methodology is used to collect the emotional challenges faced by agile teams during requirement change handling, along with an interview to collect the solutions to each challenge. A total of 202 participants contributed insights through the survey, offering a rich dataset to support the development of a structured, role-specific EI framework. It finds out the role-based emotional reactions, identifies related Emotional Intelligence (EI) competencies, and analyzes demographic effects. The study identified and provided solutions to the RCM challenges, providing ground to develop an Agile Role-Based Emotional Intelligence (ARBEI) Framework.

This framework provides practical strategies to foster emotional resilience during requirement change handling. Although the study is limited by its Agile-specific focus and short-term evaluation of EQ training, it opens multiple directions for future research, including cross-methodology and cross-industry comparisons. Ultimately, this research highlights the necessity of embedding emotional awareness and EI competencies into Agile practices to enhance both team dynamics and the success of RCM processes.

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LIST OF ABBREVIATIONS

EI	-	Emotional Intelligence
PO	-	Product Owner
SM	-	SCRUM Master
DT	-	Development Team
AT	-	Agile Team
EQ	-	Emotional Quotient
MSCEIT	-	Mayer-Salovey-Caruso Emotional Intelligence Test
RC's	-	Requirement Changes
XP	-	Extreme Programming
RCM	-	Requirement Change Management
JAWS	-	Job-Affected Well-Being Scale
STGT	-	Socio Technical Ground Theory
ARBEI	-	Agile Role-Based Emotional Intelligence
SA	-	Self-awareness
SM	-	Self-management
SoA	-	Social-awareness
RM	-	Relationship management

LIST OF APPENDICES

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DEDICATION

I wholeheartedly dedicate this research work to my beloved husband, father, parents-in-law, late son, and late mother. Their love and unwavering presence in my heart have been the driving force and deepest inspiration behind this journey.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Requirement engineering (RE) is a crucial stage in the software development lifecycle (SDLC), laying the groundwork for requirement gathering, design, implementation, testing, deployment, and maintenance [6]. Despite established practices for eliciting and documenting requirements to minimize changes, change is constant [7, 8]. These changes, whether adding, modifying, or removing functional or non-functional requirements, significantly impact project scope, cost, and timelines, creating challenges for agile teams [7].

In traditional methodologies like Waterfall, changes are often seen as disruptive, while Agile frameworks such as Scrum, Kanban, SAFe, XP, and Lean are designed to accommodate and adapt to changes, even during later stages of development [9]. However, the dynamic nature of Agile does not eliminate the mental and emotional stress (frustration, anxiety, overwhelm) that the requirement changes can take on team members. The process of handling these changes can evoke emotions that influence cognitive processes, decision-making, and overall emotional well-being, team performance, potentially affecting productivity, creativity, and efficiency[10].

Managing Requirements Changes (RCs), whether adding, modifying, or deleting requirements in software products, creates significant challenges for Agile teams, impacting team dynamics, individual performance, and emotional well-being. These changes can create stress for Agile team members, including Product Owners (PO), Scrum Masters (SM), and Develop-

ment team [11, 12] by affecting key aspects such as communication, adaptability, creativity, empathy, collaboration, and efficiency. Consequently, these factors directly influence overall team performance [7, 8, 9].

Research indicates that integrating Emotional Intelligence (EI) with Agile practices and cognitive intelligence during Requirements Changes (RCs) can reduce stress and build a stronger team that can handle changes more effectively [13, 14, 15]. While some studies emphasize the role of developers' Emotional Intelligence (EI) in managing Requirements Changes (RCs), there is a significant gap in understanding how RCs impact other Agile roles. For example, Kashumi et al [15] found that developers often perceive themselves as emotionally intelligent but feel that their managers and customers lack EI, which can hinder effective RC management. This underscores the need for a broader understanding of how EI influences each role within Agile teams during RCs.

To bridge this gap, our study suggests a role-based framework to incorporate EI within Agile teams, particularly to augment the capacity of each role, Product Owners (PO), Scrum Masters (SM), and Development Teams, to manage requirement changes better. Through this, it hopes to minimize stress, enhance team relationships, and maximize overall performance under constant requirement changes.

1.2 Research Backgrounds

Emotion is a multifaceted psychological and physiological state, influenced by individual feelings, bodily reactions, cognitive appraisals, and behaviors, which has a great impact on human behavior, cognition, and social interactions [7]. Emotions are divided into basic emotions, including happiness, sadness, anger, and fear, which are natural, and complex emotions, such as jealousy and guilt, which are influenced by social and cultural determinants [1, 16, 17, 2]. Individuals differ in emotional identification capacity, with high identification capacity employing a large emotional vocabulary to accurately label feelings and low identification capacity having difficulty in labeling emotions precisely. Dr. Gloria Willcox's "Feeling Wheel" assists in identifying and labeling emotions more specifically, beginning with primitive emotions and moving on to more complex states. This ability to identify emotions enables individuals to actively manage their emotions during critical stages of their lives, leading to the development of

emotional intelligence, a concept that gained widespread popularity in the mid-1990s. [16].

Therefore, Emotional intelligence (EI) refers to the capacity to recognize and understand emotions in one's own self and other people, including skills such as empathy, self-awareness, and emotional control, required for success in personal, professional, and leadership contexts. It was initially introduced by psychologists Mayer and Salovey in 1990 but was popularized on a broad scale after Daniel Goleman published his 1995 book titled "Emotional Intelligence: Why It Can Matter More Than IQ." [16, 17]. Current brain studies have discovered some specific neural circuits associated with emotional intelligence, such as the right amygdala, somatosensory cortex, anterior cingulate, and prefrontal cortex, each responsible for emotional self-perception, empathy, impulse management, and emotional regulation. Drawing on Mayer and Salovey's original theory, Goleman developed the concept further by highlighting the need to perceive, manage, and utilize emotions to make improved decisions and engage more effectively in social relationships [2]. Having established the basic knowledge of emotional intelligence and its neural basis, a number of models have been formulated to elaborate further on how emotional intelligence impacts individual and social functioning.

There are several widely recognized models of Emotional Intelligence (EI), each offering a unique perspective on its components. The models of emotional intelligence vary in their focus, such that Mayer and Salovey's Ability Model is on the cognitive ability to perceive, use, understand, and control emotions as measured by the MSCEIT [16]. The Competency Model of Goleman focuses on emotional and social competencies as the basis for managing oneself and relationships and is measured by the ECI-2 [17]. Bar-On's Trait Model conceptualizes EI as a combination of emotional and social competencies that influence behavior and is measured by the EQ-i[18]. The Emotional and Social Competency Inventory (ESCI) expands Goleman's framework, applied in organizational contexts [19]. Petrides' Trait EI Model, assessed via the TEIQue, emphasizes self-awareness of emotional capacity, with a focus on emotionality, self-control, sociability, and well-being [20]. Based on these emotional intelligence models, it is imperative to investigate how EI can be adapted, particularly in software engineering, where social and emotional competencies become major components of teamwork, decision-making, and coping with challenges.

Software Development Life Cycle (SDLC) is a formal process of defining the phases of software development, from requirement gathering, planning, and design to implementation, testing, deployment, and maintenance. Different methodologies like Waterfall, Agile, V-Model,

Spiral model, and DevOps offer different models for managing these phases, with Agile methodologies prioritizing flexibility, teamwork[21], and iterative development[12]. Agile is an iterative and adaptable approach centered around iterative development, continuous improvement, and collaboration, whereas Waterfall is a sequential, linear process that focuses on the completion of each phase before proceeding to the next [22]. Agile is the mostly used methodology in the modern technology world. Agile can be applied with different frameworks, each with different styles, including Scrum and its time-boxed sprints [**?**], Kanban for workflow visualization [23], Extreme Programming (XP) with a focus on engineering practices, Lean Software Development with an emphasis on waste reduction [24], and SAFe for scaling Agile for big organizations. Each framework has its own different roles, tools, and practices to improve development efficiency and value delivery. Based on the investigation of software engineering, SDLC, and Agile methodologies, it is seen that team dynamics, communication, and the flexibility to change are important factors in ensuring development project success. This reflects the necessity of investigating Emotional Intelligence (EI) in software engineering, because EI can greatly aid collaboration, decision-making, and efficiency in coping with issues like requirement changes and team tensions, leading to enhanced overall project success.

Emotional intelligence is crucial in software development since states of mind influence performance [8, 9, 13], productivity [7], and quality of code[25], where positive states enhance output while negative states cause stress, burnout, and diminished software quality. Emotional intelligence picked up pace in the early 2000s in software development, with studies conducted on how it affected team productivity, problem-solving [15], collaboration [26, 27, 28] , flexibility [29], stress management [30], and project success [31]. Emotional intelligence is an important influence on every stage of the SDLC [32], improving teamwork [21], decision-making, and communication [26]. In the planning stage, EI promotes empathy and active listening to ensure that all the needs of stakeholders are well comprehended [33]. At the stages of design and development, EI assists with stress management, enhanced problem-solving capabilities, and flexibility to adapt changes [34]. In deployment and testing, it helps sustain motivation, solve conflicts, and also manage frustrations that could be caused by failures. During the upkeep phase, emotional intelligence ensures sustained team morale, flexibility to adapt to changing needs, and proper management of client feedback, hence ensuring overall project success[35, 36]. Significantly, Requirement Engineering is the most emotionally charged phase of the SDLC that demands increased emotional support to deal with stakeholder expectations, ambiguity, and

frequent changes and stress to facilitate smooth communication and team collaboration[7, 14, 15].

Few studies have been done to measure emotions in requirement engineering and their impact on team dynamics [7, 14, 15]. Requirement change handling is considered the most frequent challenge [37, 38, 39] of requirement engineering, which causes an emotional breakdown of a development team. John Grundy explored first time the role of emotional intelligence in requirement change handling [7, 14, 15] gave a potential area for research. John Grundy et al[7] examined emotional reactions among developers during requirement changes and discovered frustration in the beginning, a decline during implementation, and an increase towards delivery[15]. Rashina Huda et al[29] suggested an emotion-based approach to requirement change management in agile, incorporating emotional intelligence and offering solutions for emotional handling by developers throughout the process.

Existing studies highlight the importance of Emotional Intelligence (EI) in managing requirement changes, but primarily focus on developers' emotions. This leaves a significant gap in understanding the emotional challenges faced by other Agile roles, such as the Scrum Master, Product Owner, and development team, at various stages (Receiving, Implementing, Delivering) of requirement changes. There is a clear need for a structured, role-specific EI framework that addresses the unique emotional demands of each Agile role. Such a framework could help mitigate emotional challenges across roles, ultimately improving overall team performance [7, 15, 29, 31, 14, 40].

1.3 Motivation For Research

In today's fast-moving software development world, emotional resilience is often ignored. This can lead to emotional breakdowns that hurt teamwork and make communication difficult [33]. Stress, personal conflicts, and anxiety are common causes of these emotional disruptions, which reduce productivity and collaboration [34]. This study focuses on the emotional challenges faced by Agile team members, especially during requirement changes. It aims to develop a framework based on emotional intelligence (EI) to help manage these challenges. The goal is to prevent emotional breakdowns, improve team well-being and performance, and build a healthier, more emotionally intelligent work culture in software development.

1.4 Problem Statement

Requirement changes, including feature addition, modification, and deletion across different stages of the software development life cycle, significantly affect the emotional well-being of primary Agile team roles, namely Product Owners, Scrum Masters, and Development Team members [7, 8, 9, 13, 15, 37]. Prior studies report that such emotional impacts can lead to reduced individual and team performance [8], strained communication [15], and weakened collaboration within Agile teams [15]. These effects directly influence the team's ability to manage requirement changes effectively. Despite growing recognition of these challenges, there is currently no established framework that systematically integrates emotional intelligence (EI) into Agile practices for managing requirement changes. Existing studies suggest that effective requirement change management requires the integration of emotional intelligence alongside agility and cognitive intelligence.[7, 8, 9, 13]. It is also argued that developers have emotional intelligence; however, managers and customers often lack it [8]. However, research also indicates an imbalance in EI across Agile roles, with developers generally demonstrating higher emotional awareness than managers and customers. Furthermore, recent literature highlights a lack of role-based identification of emotional challenges faced during requirement changes. This gap underscores the need to develop a structured framework that incorporates emotional intelligence across all primary Agile roles to support effective requirement change management.

1.5 Research Questions

Building on the motivation of this research, the following research questions are designed to explore the emotional dynamics of Agile teams during requirement changes. These questions will help investigate the specific emotional challenges faced by each role and how emotional intelligence can be integrated to enhance team performance and manage these challenges effectively.

1. **RQ1:** What role-specific emotional challenges are experienced by agile team members during the different stages of requirement change lifecycle?

2. **RQ2:** How do different agile roles (Product Owner, SCRUM Master, Development Team)

emotionally and behaviorally respond at each stage of requirement change lifecycle?

3. **RQ3:** What framework can enhance role-based emotional intelligence in agile teams to improve management of requirement changes and team performance?

1.6 Research Objective

The research objectives of the study are as follows:

1. To identify role-specific emotional challenges experienced by Agile team members, i.e., Product Owners, Scrum Masters, and Development Team members, across the different stages of the requirement change lifecycle.

2. To examine the emotional and behavioral responses of each Agile role at every stage of the requirement change lifecycle in order to understand how these responses influence collaboration and change management.

3. To develop a role-based emotional intelligence framework that supports Agile teams in effectively managing requirement changes and enhancing overall team performance.

Table 1.1 shows the research questions along with associated research objectives, it's methodology, and the output.

Table 1.1: Research Questions

Research Question	Objective	Methodology	Output
RQ1: What role-specific emotional challenges are experienced by agile team members during the different stages of the requirement change lifecycle?	To identify role-specific emotional challenges experienced by Agile team members i.e Product Owners, Scrum Masters, and Development Team members—across the different stages of the requirement change lifecycle in agile project.	Survey (Questionnaire)	1)- Role-based Challenges to manage requirement changes. 2)- Role-Based emotional responses to each requirement change challenge. 3)- Role-Based emotional responses to each stage of RCM lifecycle 4)- Role-Based Emotional Intelligence (EQ) level during Requirement change management.
RQ2: How do different agile roles (Product Owner, SCRUM Master, Development Team) emotionally and behaviorally respond at each stage of the requirement change lifecycle?	To examine the emotional and behavioral responses of each Agile role at every stage of the requirement change lifecycle in order to understand how these responses influence collaboration and change management.	Semi-structured interviews	1)- Role-based industrial solutions for each identified RCM challenge 2)- Role-based EI-trainings for each identified RCM Challenge
RQ3: What framework can enhance role-based emotional intelligence in agile teams to improve management of requirement changes and team performance?	To develop a role-based emotional intelligence framework that supports Agile teams in effectively managing requirement changes and enhancing overall team performance.	Expert Review	Agile Role-based EI (ARBEI) Framework.

1.7 Scope of the Research Work

This research seeks to analyze the emotional issues encountered by Agile teams throughout the Requirement Change Management (RCM) cycle. The study will identify the unique emotional reactions and behavioral tendencies of Agile team members (Development Team, Scrum Master,

and Product Owner) when dealing with requirement changes and suggest remedies via a role-based model.

The scope includes:

- **Role-Based Emotional Challenges:** Determining and breaking down the particular challenges of each role in the Agile team (Product Owner, Scrum Master, Development Team) throughout the RCM lifecycle phases, including requirement arrival, implementation, and delivery.

- **Emotional Responses:** Identifying the emotional reactions and conduct of each role towards the different challenges during the RCM process, and the role their emotional reactions have in decision-making and team collaboration.

- **Emotional Quotient (EQ) Levels:** Assessing the role-based levels of emotional quotient (EQ) and their impact on the team's ability to handle requirement changes efficiently.

- **Development of a Framework:** Establishing and verifying a role-based framework that comprises the emotional challenges, emotional reactions, and role of emotional intelligence throughout RCM. The framework will be utilized to provide recommendations for increasing emotional intelligence and enhancing team dynamics during RCM.

- **Verification of framework by expert review:** Interviews with experts in Agile and Emotional Intelligence researchers were performed in order to validate the findings and refine the suggested framework to be aligned with real-world experiences and make its practical application possible.

- **Target Audience:** Agile Team Members: Product Owners, Scrum Masters, and Development Team members who are responsible for controlling changes in requirements and will find it useful to know about the emotional dynamics of their team. Agile Trainers and Coaches: Individuals who guide Agile teams and are able to leverage the findings and model to enhance the collaboration of teams and emotional intelligence. Scrum Masters and Project Managers: Those accountable for the general welfare and performance of Agile teams, specifically in managing requirement changes and team emotional dynamics. Organizations Applying Agile Methodology: Companies that employ Agile methodology and are looking for ways to increase emotional intelligence and team collaboration during RCM, for higher overall project success rates. Researchers and Scholars: Researchers of

emotional intelligence, teamwork dynamics, and Agile methodologies who can further enhance this framework for research and use.

- **Target Sample**: Registered Technology Parks of Pakistan: The research is targeted at Agile teams who work in Pakistan's 25 registered technology parks. The technology parks are the main target since they offer a concentrated number of Agile teams working in different technology enabled environments, offering a rich context for this study.

- **Sample Size and Data Collection:** Sample Size: The study includes Agile teams of the 25 registered technology parks of Pakistan. A sample of 202 participants (covering Product Owners, Scrum Masters, and Development Team members) is used through snowball sampling to cover the variety of emotional challenges of various roles in Agile teams. Method of Data Collection: The research make uses of questionnaires, interviews, and pilot studies in collecting information from the participants to make sure that there is an in-depth understanding of the emotional dynamics of Agile teams in the given technology parks.

The research seeks to make a contribution to increasing the emotional intelligence of Agile teams and offers pragmatic methods of improving Requirement Change Management (RCM), which in turn promotes better team collaboration, lowers stress, and improves performance.

1.8 Contribution and Significance

This study contributes substantially to the knowledge of emotional dynamics in Agile teams under Requirement Change Management (RCM). It offers critical insights into the following most important features:

- **Role-Based Challenges in Requirement Change Management:** The research identifies the unique problems of various roles (Product Owner, Scrum Master, Development Team) in handling requirement changes. This study enables organizations to discover role-specific pain points and create specific interventions to enhance the RCM process.

- **Role-Based Emotional Reactions towards each RCM challenge:** Through examining the emotional reactions of each role towards overcoming the challenges of RCM, the

research reveals the intrinsic emotional dynamics that affect decision-making, communication, and collaboration between Agile teams. By doing so, it can enhance emotional awareness and improve team interactions.

- **Role-Based Emotional Quotient (EQ) Levels:** The study measures the differing levels of emotional intelligence among Agile team members and the impact these levels have on their capacity to handle requirement changes. By drawing attention to the role of EQ, the research helps improve the emotional resilience and adaptability of team members during RCM.

- **Solutions towards each RCM Challenge:** This research points out real-life approaches taken by Agile team members to successfully overcome each Requirement Change Management (RCM) issue. These solutions not only assist with managing stress brought on by fluctuating requirements but also support overall team performance and personal resilience.

- **Agile Role-Based Emotional Intelligence (EI) Framework Development:** The culmination of the research effort is the development of an Agile Role-Based EI (ARBEI) Framework that combines emotional intelligence, challenges related to roles, and coping mechanisms in the process of RCM. This framework gives Agile teams a useful tool for developing emotional awareness, fostering collaboration, and maximizing RCM results.

In general, the results of this study advance the field's understanding of emotional dynamics in Agile teams, providing theoretical findings and practical recommendations for enhancing team performance and well-being in requirement change management. The Agile Role-Based Emotional Intelligence (ARBEI) Framework is a primary contribution, enabling companies to create a more emotionally intelligent and resilient Agile workforce.

This research holds significant value in both academic and practical domains of Agile software development. While Emotional Intelligence (EI) has been widely acknowledged as an essential factor in effective team performance and change management, its role-specific application during requirement changes in Agile teams remains underexplored. By focusing on the distinct emotional challenges experienced by the Product Owner, Scrum Master, and Development Team throughout the requirement change lifecycle, this study provides a nuanced understanding of how emotions influence performance and collaboration.

The development of a role-based EI framework offers a practical contribution to Agile practice by equipping teams with targeted strategies to enhance emotional resilience, improve

communication, and sustain productivity during periods of change.

This research not only fills a critical gap in existing literature but also supports Agile organizations in fostering emotionally intelligent work environments. By integrating EI into Agile processes, teams can better navigate the complexities of requirement changes, leading to improved project outcomes, higher team morale, and increased customer satisfaction.

1.9 Thesis Organization

This research is organized into six comprehensive sections. *Chapter I* introduces the research problem, outlines the motivation behind the study, and establishes the need to explore Emotional Intelligence (EI) in the context of Agile requirement change management. *Chapter II* discusses background information pertaining to key concepts such as Agile methodologies, requirement engineering, requirement change management, and Emotional Intelligence (EI) in Software Engineering (SE) and Requirement Engineering (RE). It also comprises a literature review of the relevant work, finding past contributions and noting the lack of role-specific EI research within Agile teams.*Chapter III* explains the research methodology, detailing the use of surveys, the application of Grounded Theory for mapping emotions, and Python for analyzing emotional variations based on role, age, gender, and industry experience. This section also clarifies that the study is limited to Scrum roles within the Agile framework and focuses on professionals from the Pakistani IT industry. *Chapter IV* presents the results and analysis, examining emotional trends and statistical findings across different Scrum roles. This chapter introduces the proposed role-specific EI framework, designed to enhance emotional resilience and improve team performance during requirement changes. Finally, *Chapter V* concludes the study by summarizing the key findings, outlining the contributions of the research, discussing its limitations, and suggesting areas for future exploration.

1.10 Summary

Chapter 1 presents the background of the research by describing the context of the study and the rationale. It opens with the research background, providing a description of key concepts like emotions, emotional intelligence, SDLC, the importance of Emotional Intelligence in Software engineering, Agile methodologies, requirement engineering, and the application of emotional intelligence (EI) in these areas. The chapter also introduces the research motivation by emphasizing the current gaps in the knowledge about the emotional dynamics of Agile teams, notably in respect to role-based emotional responses and challenges experienced during requirement change management (RCM). This is followed by emphasizing the need for emotional intelligence in enhancing team collaboration and coping with RCM complexities.

The chapter proceeds to define the problem statement, enumerate the research questions, and set the key goals of the study. The study intends to tackle the issues surrounding emotional intelligence in Agile teams as well as construct a framework that can improve team interactions while undertaking RCM. The scope of the research work is also defined, describing the target market and sample size, focusing on the 25 registered technology parks in Pakistan. The chapter is concluded with an examination of the value and contribution of the research, emphasizing how the results will contribute to knowledge in Agile team dynamics and yield actionable findings for practitioners.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Chapter 2 sets the background to the study by deeply studying emotions, how they are assessed, and the definition of Emotional Intelligence (EI). The chapter begins with defining what emotions are, how they drive human actions, and the measurement of emotional reactions. The chapter then describes various models of EI and illustrates how these models manifest in everyday life. It relates these concepts to Software Engineering (SE) and Requirement Engineering (RE), particularly within Agile development. Different Software Development Life Cycle (SDLC) models are explored, with a particular emphasis on Agile techniques such as Scrum, Kanban, Lean, XP, and SAFe. The chapter highlights the role of EI in requirements management and enhancing communication between stakeholders. It also contrasts Agile and Waterfall methodologies to requirements engineering and highlights the special challenges in Agile environments and how EI can assist in overcoming them. The chapter concludes by discussing previous research in Requirement Change Management (RCM) and how EI can assist in managing associated challenges. It points to a gap in research on role-specific application of EI in Agile teams, which indicates the necessity for an examination in this study of how EI can facilitate improved management of requirement changes in Agile settings.

2.2 Emotions

An emotion is a multifaceted psychological and physiological condition arising from a blend of personal feelings, bodily responses, cognitive evaluations, and outward behaviors. Typically triggered by internal or external stimuli, it encompasses a wide spectrum of affective states, including but not limited to happiness, sadness, anger, fear, and surprise. Emotions wield a foundational influence over human behavior, cognition, and social interactions, shaping how individuals perceive, react to, and adapt to their surroundings. [7].

2.2.1 Emotion's Categories

Emotions can be divided into basic and complex categories [1, 16, 17, 2] :

1. Basic Emotions: Universal and natural emotions experienced by everyone, such as happiness, sadness, fear, anger, surprise, and disgust.

2. Complex Emotions: These are combinations of basic emotions and are shaped by cultural and social factors, including jealousy, guilt, pride, and embarrassment.

2.2.2 Emotion's Components

To understand emotions better, we can look at their three main components:

1. Subjective Experience: This is the personal feeling of the emotion. For instance, your experience of happiness or sadness might be different from someone else's.

2. Physiological Response: Emotions cause physical changes in the body, like a faster heartbeat or sweaty palms, when you're scared.

3. Behavioral Response: This is how you express your emotions through actions or facial expressions, like smiling when happy or frowning when sad.

Emotions are key to human behavior and interaction, shaping how we see, respond to, and adapt to our surroundings [1].

2.2.3 The Feeling Wheel

People vary in how precisely they can identify and describe their emotional experiences. Individuals with high differentiation can convey detailed emotional experiences and use a variety of adjectives to describe different feelings. They can better distinguish between the intensities of their emotions and possess a broader emotional vocabulary. Conversely, individuals with low differentiation tend to rely on a few general emotional terms and often find it challenging to express their feelings specifically [1].

To better understand what exactly a person feels, Dr. Gloria presents a tool named “The feeling wheel”. The purpose of this tool is to help people in learning to identify and recognize emotions more accurately [1]. Gloria Willcox’s Feeling Wheel is a psychological instrument intended to assist people in more accurately labeling, recognizing, and describing their feelings. It is made up of three concentric circles, beginning with six basic emotions (happy, sad, angry, afraid, disgusted, and surprised) and moving outward into increasingly specific and subtle states of emotion. This format facilitates emotional differentiation the skill of identifying and describing emotions specifically. The Feeling Wheel is especially helpful to those who have difficulty getting past general descriptors such as "good" or "bad" because it builds emotional vocabulary and increases self-awareness. It also enhances communication, mood regulation, and mental health by enabling people to identify precisely what they feel. Extensively applied in therapy, coaching, and team settings, the tool promotes emotional intelligence, making it particularly useful within high-pressure environments such as Agile teams dealing with frequent requirement fluctuations. Gloria Willcox’s Feeling Wheel is a simple yet powerful tool to enhance emotional differentiation, self-regulation, and interpersonal communication. It is particularly effective in therapy, leadership coaching, and team settings like Agile environments, where emotional intelligence plays a critical role in handling change and stress.

Drawing on the above knowledge of emotions, it is important to discuss the way that Emotional Intelligence (EI) enables people to successfully identify, comprehend, and regulate these emotional reactions, especially in sophisticated settings such as Software Engineering and Requirement Engineering.

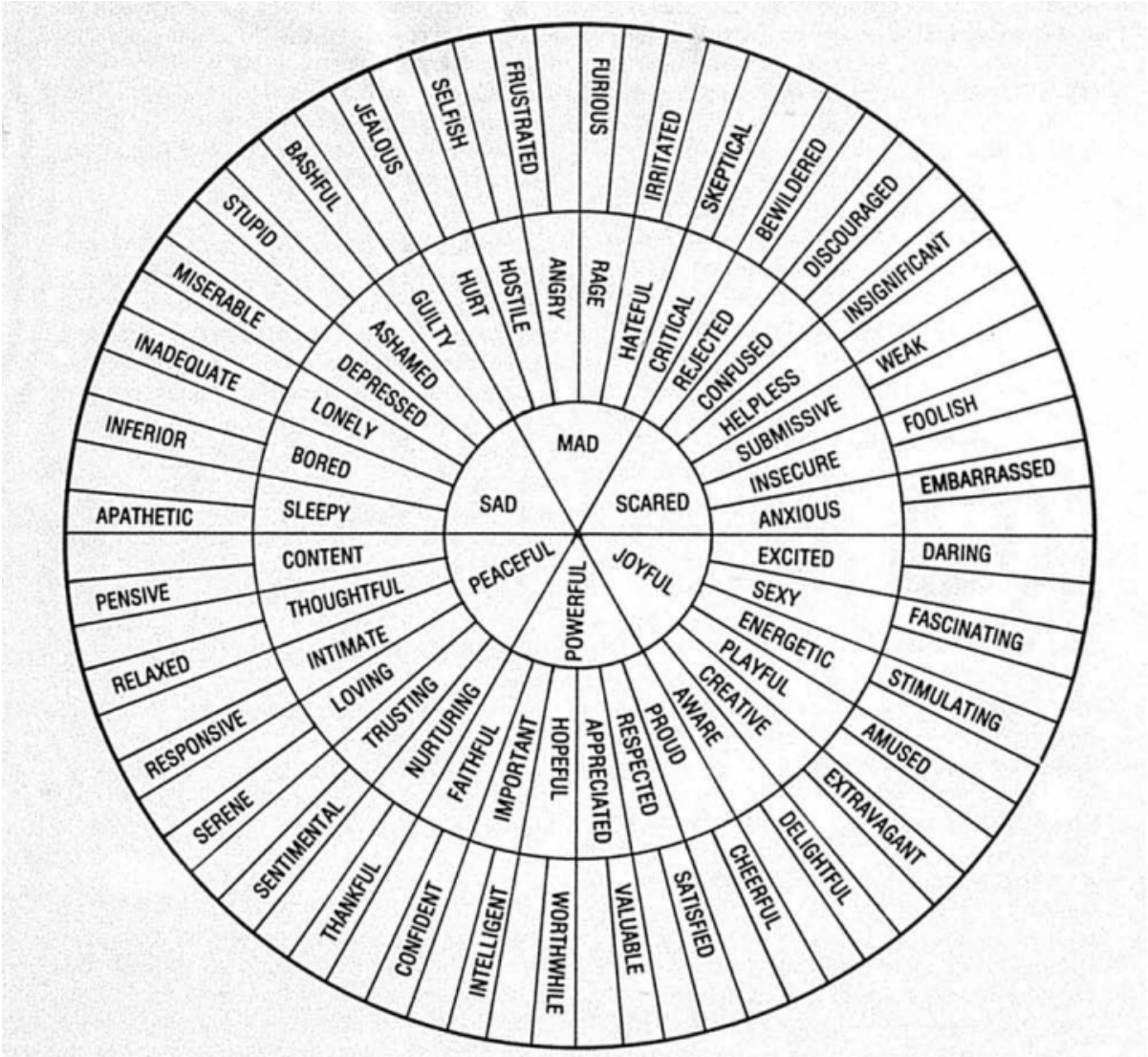

Figure 2.1: The Feeling Wheel [1]

2.3 Emotional Intelligence

Emotional intelligence (EI) can be defined as the capacity to not only perceive and comprehend one's own emotions but also to adeptly manage and utilize them, along with the emotions of others. It encompasses a spectrum of skills and competencies, including empathy, self-awareness, interpersonal proficiency, and emotional self-regulation. The cultivation of emotional intelligence is paramount for achieving success in diverse facets of life, encompassing personal relationships, professional endeavors, and leadership roles [6].

Fast-forward to 1990, The New York Times featured an article from a small academic journal authored by two psychologists, John Mayer, currently affiliated with the University of New Hampshire, and Peter Salovey from Yale University. In this article, Mayer and Salovey

Figure 2.2: Brain circuitry for Emotional Intelligence [2]

introduced the initial formulation of a concept they termed "emotional intelligence [16].

Later, in 1995, Daniel Goleman popularized the concept in his book "Emotional Intelligence: Why It Can Matter More Than IQ", bringing it to widespread public attention and linking it to leadership and workplace effectiveness [17].

2.3.1 Science behind Emotional Intelligence

Recent groundbreaking research by brain scientists has uncovered specific neural circuits associated with emotional intelligence. They pinpoint brain areas linked to specific behaviors and mental functions. This method involves examining patients with brain injuries in specific regions and correlating the injury sites with the resulting impairments.

Using this well-established neurological approach (Lesion Mapping or Lesion Studies), Bar-On and his team identified several brain regions essential for emotional and social intelligence. Bar-On's study provides strong evidence that emotional intelligence is located in different brain areas than those associated with IQ [2]. Figure 2.2 presents the brain circuitry for emotional intelligence.

2.3.1.1 Right Amygdala Neural Hub for emotions

The right amygdala, one of two amygdalae located in each hemisphere of the brain, serves as a central neural hub for emotion in the midbrain. According to the Bar-On study, patients with lesions or injuries to the right amygdala exhibited a loss of emotional self-awareness, which is the ability to recognize and understand one's own feelings [2].

2.3.1.2 Right Somatosensory Cortex

Another critical area for emotional intelligence is the right somatosensory cortex. Injury to this part of the brain can lead to deficiencies in self-awareness and empathy, our ability to recognize emotions in others. Understanding and feeling our own emotions is vital for empathizing with others. Empathy also relies on the insula, a structure in the right hemisphere that monitors our overall bodily state and informs us of our feelings. Being in touch with our own emotions is essential for sensing and understanding the emotions of others [2].

2.3.1.3 Anterior Cingulate

Another important area is the anterior cingulate, located at the front of a band of brain fibers that encircle the corpus callosum, which connects the two brain hemispheres. The anterior cingulate is responsible for managing impulse control and regulating emotions, especially distressing and intense feelings. Damage in this part may cause fear and social phobias [2].

2.3.1.4 Prefrontal Cortex

There's the ventral medial strip of the prefrontal cortex, located just behind the forehead. This area is the last part of the brain to fully mature. It serves as the brain's executive center, housing abilities such as solving personal and interpersonal problems, managing impulses, effectively expressing feelings, and maintaining good relationships with others [2].

Building on these early explorations, the concept of emotional intelligence began to rise in prominence in the late 20th century. John Mayer and Peter Salovey two psychologists initiated the concept of perceiving, understanding, and managing emotions and termed it "Emotional intelligence" Later, Psychologists like Daniel Goleman expanded on earlier research by exploring how humans not only experience emotions but also how they can perceive, manage, and use emotions to guide their behavior and decisions. Emotional intelligence emerged as an essential aspect of human evolution, focusing on the ability to understand and regulate both personal emotions and the emotions of others, thus playing a critical role in social interactions and overall well-being.

2.3.2 Emotional Intelligence Models

There are several widely recognized models of Emotional Intelligence (EI), each offering a unique perspective on its components, and application comparison of each EI model is as below:

2.3.2.1 Salovey and Mayer's Ability Model (1990)

The Ability Model of Emotional Intelligence (EI) by John D. Mayer and Peter Salovey defines EI as the capacity to reason with emotions and use them to aid cognitive processing and decision-making. For the Ability Model, EI is made up of four major branches: Perceiving emotions, Using emotions, Understanding emotions, and Managing emotions. These dimensions capture how people identify emotions in themselves and others, employ emotions to enhance thinking, understand the causes and meanings of emotional experiences, and effectively control emotional responses. To measure EI, the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) is used most often. The MSCEIT measures these capacities by a battery of tasks that assess how effectively people can function in each of these four domains, so it is an all-encompassing measure of emotional reasoning and regulation [16].

2.3.2.2 Goleman's Competency Model (1995)

Daniel Goleman's Competency Model of Emotional Intelligence redefines EI as competencies for emotional management in the self and in relations. Goleman's model is founded on the assumption that EI is composed of five broad domains: Self-awareness, Self-management, Social awareness, Relationship management, and influencing others. These competencies are essential in driving an individual's effectiveness in personal life as well as work. The Emotional Competence Inventory (ECI-2) is used to assess these competencies and comprises a number of self-report and 360-degree feedback instruments. This model underscores the value of regulating one's own emotions and knowledge of others' emotions in order to become successful at leadership, team functioning, and self-leadership. Goleman's model has been widely used in various organizational contexts and is highly regarded in the construction of emotional intelligence as an essential component of leadership and emotional control. Five components: self-awareness, self-regulation, motivation, empathy, and social skills. [17].

2.3.2.3 Bar-On's Trait Model (1997)

Reuven Bar-On's Trait Model of Emotional Intelligence defines EI as a cross-section of emotional and social abilities that impact behavior and overall emotional health. Differing from the ability models that emphasize cognitive ability, Bar-On's model emphasizes personality traits associated with emotional functioning that determine behavior. The Emotional Quotient Inventory (EQ-i) is the primary assessment method for this model. EQ-i assesses five basic dimensions of EI: Intrapersonal (to comprehend and communicate one's feelings), Interpersonal (to work and empathize with others), Adaptability (to adjust with changing situations), Stress management (to manage pressure and tension), and General mood (overall emotional state). Bar-On's model highlights the importance of these characteristics in personal and professional achievement, with a special emphasis on emotional resilience and the capacity to sustain healthy relationships [18].

2.3.2.4 Emotional and Social Competency Inventory (ESCI) (2000)

The Emotional and Social Competency Inventory (ESCI), created by Daniel Goleman and Richard Boyatzis in 2000, is a development of Goleman's Competency Model. It is concerned with the role emotional and social abilities play in personal and work effectiveness, particularly within organizational settings. The ESCI comprises 12 competencies that are categorized under four main areas: Self-awareness, Self-management, Social awareness, and Relationship management. The competencies are assessed using 360-degree feedback, where the feedback is derived from colleagues, supervisors, and direct reports. The ESCI aims to help individuals assess their emotional intelligence in the context of leadership and teamwork, providing a more holistic view of how EI impacts organizational performance. The ESCI's focus on social competence and organizational effectiveness makes it a valuable tool for leadership development [19].

2.3.2.5 Petrides' Trait Emotional Intelligence (TEIQue) Model (2001)

K. V. Petrides and Adrian Furnham's Trait Emotional Intelligence (TEIQue) model defines EI as a group of self-perceived traits of emotional and not cognitive ability. The model describes how one sees their emotional capabilities in aspects such as emotionality, self-control, sociability, and well-being. Measurement is done using the TEIQue (Trait Emotional Intelligence Questionnaire). The model consists of four fundamental factors: Emotionality (the capacity to recognize, express, and regulate emotions), Self-control (the capacity to manage emotions and impulses), Sociability

(the capacity to relate positively with others), and Well-being (general emotional state of the person). TEIQue is of greater value for understanding the emotional traits in non-clinical groups and provides an understanding of how people experience their emotional abilities in daily life, which affects their behavior, relationships, and psychological health [20].

Table 2.1: EI Models Comparison

Model	**Founders**	**Year**	**Key Concepts**	**Measurement Tools**	**Core Dimensions**
Salovey and Mayer's Ability Model[16]	John D. Mayer, Peter Salovey	1990	EI as the ability to reason about emotions and use them to enhance thought.	MSCEIT	Perceiving emotions Using emotions Understanding emotions Managing emotions
Goleman's Competency Model [17]	Daniel Goleman, Richard Boyatzis	1995	EI as a set of competencies for managing emotions in oneself and relationships.	ECI-2 (Emotional Competence Inventory)	Self Awareness Self-Management Social Awareness Relationship Management
Bar-On's Trait Model [18]	Reuven Bar-On	1997	EI as a cross-section of emotional and social competencies that affect behavior.	EQ-i (Emotional Quotient Inventory)	Intrapersonal Interpersonal Adaptability Stress management General mood
Emotional and Social Competency Inventory (ESCI) [19]	Daniel Goleman , Richard Boyatzis	2000	It emphasizes how emotional and social skills contribute to personal and professional effectiveness, especially in organizational settings.	360-Degree Feedback	Self-awareness Self-management Social-awareness Relationship management 12 competencies
Petrides' Trait Emotional Intelligence (TEIQue) Model [20]	K. V. Petrides, Adrian Furnham	2001	Trait EI, focusing on self-perception of emotional abilities rather than cognitive ability.	TEIQue (Trait Emotional Intelligence Questionnaire)	Emotionality Self-control Sociability Well-being

Building on the understanding of emotional intelligence models, it is imperative to investigate how EI contributes importantly in the Software Engineering domain, where successful

collaboration and project delivery depend on mastering emotional regulation and interpersonal competence.

2.4 Emotional Intelligence in Software Engineering

For a long time, there was a common belief that emotions at work were largely viewed as undesirable. Expressing and accepting emotions at work place were generally perceived as indicators of weakness, and departures from good decision-making. Within the corporate environment, there is an increasing recognition that feelings can be a rich source of information, and when properly recognized and tapped, they can be able to deliver exceptional results [8]. Emotional intelligence, as debated by Daniel Goleman in his book 'Emotional Intelligence: Why It Can Matter More than IQ,' includes the ability to recognize and comprehend one's own emotions, listen emphatically to others, and express one's feelings effectively in a positive way[17, 19, 2]. Most of the elements in each emotional intelligence framework can be grouped into four broad categories: self-awareness, self-management, social awareness, and relationship management [16, 17, 18, 19, 20].

Emotions play a critical role in the life of human beings and form the foundation of a person's life in every aspect of life. The research on emotional intelligence is strongly advocated by different field of life. Recently, the role of emotions has been emphasized in the software development field . Software development is largely an intellectual activity performed by groups of intelligent experts. As such, it will benefit from the use of team emotional intelligence (TEI) and team coaching practices that have the potential to improve team members' communication and motivation [41].

Software engineering is a constantly developing field that aims to keep pace with the rapidly changing environment of technology and modern business needs. It attempts to come up with sound methodologies to reach the ultimate goal of producing finished software. Software engineering require collaborative work whose tasks are usually assigned between several teams. These tasks need to be well managed and prioritized according to criteria. There are some tasks that can go on simultaneously, yet there are times when a task needs to wait for the completion of another. Coordination between such tasks, processes, and teams is necessary to attain the best software or product results with fewer costs. The majority of renowned classical software

development methodologies, including the waterfall methodology, spiral methodology, and evolutionary methodology, have been developed to overcome these issues [33].

Emotional intelligence is critical in software development, as emotional states like moods and attitudes impact daily performance, especially in creative, problem-solving tasks [15]. Success in software relies not only on technology but also on human decisions, with studies linking personality traits to productivity and code quality [42, 29]. Employee satisfaction correlates with better productivity and software quality, while unhappiness can lead to stress, burnout, and low-quality output. Positive emotions boost productivity, while negative ones, often triggered by setbacks or time pressure, reduce motivation and increase turnover [40, 29, 31].

Many projects that have followed classical software development methodologies have faced major challenges, especially in terms of maintenance and supporting user-wanted modifications. Some of the changes are likely to lead to sweeping changes, which create remarkable challenges in the software development life cycle. In response to all these challenges, a need for a more streamlined software development process arises. The main aim of these processes is to speed up development and effectively deal with changes requested. These light-weight software development processes are referred to generally as Agile software development methodologies [22].

2.5 Agile Software Development

Agile Software Development is a methodology that emphasizes flexibility, collaboration, and iterative processes in creating software. It was introduced as an alternative to traditional, rigid development methodologies like Waterfall, aiming to deliver high-quality software that meets customer needs in a rapidly changing environment [12, 43, 22, 10, 6, 44, 23, 24].

2.4.1.1 Advantages of Agile Development:

- **Customer-Centric:** Frequent collaboration ensures the product meets user needs [12].
- **Flexibility:** Teams can adapt to changing requirements [43].
- **Early Delivery:** Incremental releases ensure that working features are delivered sooner [22].

- **Improved Quality:** Regular testing and feedback cycles reduce defects [12].
- **Team Collaboration:** Encourages open communication and collective ownership [22].

2.4.1.2 Agile Frameworks:

Agile development can be implemented using various frameworks, each with its unique approach [12, 43, 22, 10, 6, 44, 23, 24]:

- **Scrum:** SCRUM is an iterative development Agile methodology with time-boxed sprints of 2-4 weeks. It prioritizes teamwork and collaboration through prescribed roles: Scrum Master, Product Owner, and Development Team. The main aim is to deliver a potentially shippable product increment at the end of every sprint. SCRUM has several ceremonies like sprint planning, daily stand-ups, sprint reviews, and retrospectives, which ensure constant improvement and evolution. Its most important metrics are velocity and burn-down charts, which measure the advancement of work in the sprint. SCRUM is best applicable for small to medium-sized teams with team-level product development, with a clear structure and role definition. Scaling SCRUM to big teams or organizations proves to be difficult without making some adjustments. [22, 10, 6, 44].
- **Kanban:** Kanban is an Agile flow-based methodology that promotes continuous delivery using an eye-catching management system. Unlike SCRUM, Kanban does not implement rigid iterations and concentrates on the restriction of work-in-progress (WIP) to maximize flow and effectiveness. It enables teams to visualize their workflow by means of Kanban boards, which enable monitoring of the status of tasks at different stages of development. Kanban's flexibility enables the teams to respond to the workload without binding planning ceremonies. Lead time, cycle time, and WIP limits are some of the key metrics employed in Kanban and serve to measure the efficiency of teams and detect bottlenecks. Kanban is very flexible and well suited for service environments or continuous delivery systems but can cause inefficiency in certain situations due to its absence of predefined roles and ceremonies [6, 44].
- **Extreme Programming (XP):** Extreme Programming (XP) is a lightweight Agile methodology with a focus on engineering practices for software development of high quality in unstable and quickly changing requirement environments. XP encourages constant customer participation and feedback, and techniques like pair programming, continuous

integration, and test-first development (TDD). The primary objective of XP is to produce high-quality software in the shortest time possible, responding to changing customers' needs while still ensuring strict engineering disciplines. XP's practices include stand-ups, pair programming, design reviews, and retrospectives, all of which are intended to promote interaction and high-quality results. Though XP excels in fast-paced environments, it can be intense and demanding on team members because of its strict practices, and its emphasis on engineering excellence may entail extensive resource investment [23].

- **Lean Software Development:** Lean methodology involves removing waste and delivering value in the shortest time possible by rationalizing processes. From manufacturing disciplines, Lean principles have been borrowed to be used in software development to minimize inefficiencies and deliver faster. Lean encourages continuous delivery and value stream mapping in order to ensure that all sections of the process create value. It highlights flexibility and responsiveness so that teams can readily adapt to shifting customer needs. The framework is centered on eliminating non-value-added activities and streamlining processes and is best suited for the environment where quick delivery is vital. Lean is not prescriptive and does not work unless there is a cultural transformation in the organization to achieve its full potential. It is not a one-size-fits-all solution either, and it depends on the continuous improvement mindset and the capability to dynamically adapt processes [24].

- **SAFe (Scaled Agile Framework):** The Scaled Agile Framework (SAFe) is intended to extend Agile practices to large-scale enterprises. It adds order to Agile through the adoption of program increments (PIs) and the introduction of roles like Release Train Engineer and Product Management, over and above the traditional roles present in SCRUM. SAFe concentrates on organizing various teams in the organization and is supported by a framework of portfolio management, so it is best used in large product development and enterprise-scale projects. The framework puts great focus on PI planning, which is a joint effort through several teams to plan and deliver features at scale. SAFe's strengths are its capacity for handling complexity and coordination of cross-functional teams, but it is complex and comes with a high training cost that can be a problem for organizations that want to use it [24].

Table 2.2: Comparison of Agile Frameworks

Feature	**SCRUM**	**Kanban**	**SAFe (Scaled Agile Framework)**	**Extreme Programming**	**Lean**
Focus	Iterative development with time-boxed sprints	Continuous flow of tasks	Scaling Agile across large enterprises.	Engineering practices for high-quality software	Eliminating waste and delivering value quickly
Iterations	Time-boxed sprints (typically 2-4 weeks)	No fixed iterations	Program increments (PI), usually 8-12 weeks	Short iterations (1-2 weeks)	Continuous delivery
Team Roles	Scrum Master, Product Owner, Development Team	No fixed roles focus on team collaboration	Additional roles: Release Train Engineer, Product Management, etc.	Developers, Customers, Testers, Coach	Flexible team roles
Planning	Sprint planning and backlog grooming	Visualize workflow, limit WIP	PI planning sessions involving multiple teams	Continuous planning with user stories	Value stream mapping
Work Visualization	Backlog and sprint boards	Kanban board	Portfolio, program, and team Kanban boards	Task boards	Value streams and Kanban boards
Metrics	Velocity, burndown chart	Lead time, cycle time, WIP limits	Team-level, program-level, and portfolio-level metrics	Code quality, velocity, customer satisfaction	Lead time, cycle time
Scalability	Difficult to scale without modifications	Suitable for scaling, particularly	Designed for enterprise-level scaling	Not inherently scalable	Scalable with Lean Portfolio
Customer Feedback	At the end of each sprint	Continuous feedback	Regular integration of customer feedback during PIs	Continuous integration and feedback loops	Integrated through value
Flexibility	Moderate, structured roles and ceremonies	High, minimal structure	Flexible but requires a structured framework	Focused on adapting to changes	Encourages adaptability

Feature	SCRUM	Kanban	SAFe (Scaled Agile Framework)	Extreme Programming	Lean
Ceremonies	Product Backlog Refinement, Sprint Planning, Daily stand-ups, Sprint reviews, Sprint Retrospectives	None specifically defined	PI planning, scrum-of-scrums, system demos, inspection, and adaptation sessions	Stand-ups, pair programming, design reviews, retrospectives	Minimal ceremonies, depending on team preference
Primary Usage	Team-level product development	Continuous delivery and service-oriented environments	Large-scale product development and portfolio management	High-quality software in volatile requirements	Streamlining processes and delivering value
Strengths	Clear structure, role definition, iterative delivery	Flexibility, visual workflow management	Handles complexity at scale	Engineering excellence, high customer involvement	Focuses on eliminating waste and delivering value faster
Weaknesses	Challenging to scale, role dependency	Lack of structure can lead to inefficiencies	Complex framework requiring significant investment in training	Intense and demanding practices	Not prescriptive, requires cultural change

Focusing on the Software Development Life Cycle (SDLC), this study specifically examines the Requirement Engineering (RE) phase, with emphasis on its importance in Agile development contexts where effective management and adjustment of requirements are essential to successful project delivery.

2.6 Requirement Engineering in Agile Software Development

In Agile software development, requirements engineering is more adaptive and continuous compared to traditional development models. Instead of gathering and finalizing all requirements at the beginning, Agile teams manage requirements iteratively, allowing for continuous refinement and flexibility in response to changes in customer needs or market conditions. Ag-

ile requirement engineering emphasizes collaboration, feedback, and maintaining alignment between business goals and development efforts [45, 26, 46].

2.6.1 Waterfall VS Agile Requirement Engineering

Below is a brief comparison of agile and waterfall software development methodologies:

2.5.1.1 Waterfall

Waterfall methodology uses a linear, sequential process towards the Software Development Life Cycle (SDLC) phases. In the Waterfall model, requirements are collected, analyzed, and documented in advance in a structured and fixed way. The process tends to be inflexible, with every phase having to be finished before advancing to the next one. The Waterfall Requirement Engineering (RE) process involves activities like elicitation, analysis, documentation, validation, and management, which are normally performed during the early phases of the project. This model presupposes that requirements can be completely specified and set at the beginning, and allows minimal room for change after the development process starts. Stakeholder input is focused in the initial stage of the project, and feedback is minimized until the test phase, which complicates adapting to new or changing requirements. Documentation is heavy and strict, intended to direct the overall development process, but it can render the model unyielding and expensive to adapt once development has begun. From a risk management standpoint, the risk is usually determined late in the process, and correcting or changing it would be time-consuming and expensive. The cost and time to develop are more certain but involve greater up-front expense because extensive planning is involved [26].

2.5.1.2 Agile Software Development

In contrast to Waterfall, Agile methodologies embrace an evolving, iterative, and flexible approach to Requirement Engineering (RE). Agile emphasizes continuous stakeholder involvement and adaptability throughout the project lifecycle, allowing requirements to evolve as the project progresses. Unlike Waterfall, Agile prioritizes face-to-face communication and frequent collaboration with stakeholders, ensuring that requirements can be adjusted regularly based on feedback. The RE process in Agile is highly iterative and flexible, incorporating practices such as extreme prioritization, constant planning, prototyping, test-driven development, and regular

reviews and tests. Agile projects are structured around sprints, with feedback being gathered at the end of each sprint, ensuring that adjustments can be made promptly. Documentation in Agile is minimal and just enough to guide development, as opposed to the extensive and rigid documentation required by Waterfall. Flexibility in Agile is high, enabling teams to integrate changes throughout the project. Risk management in Agile is ongoing, with continuous risk identification and adaptation to emerging challenges. Development time and cost in Agile can vary, as they are more dependent on prioritization, but costs are generally controlled by adjusting priorities and integrating feedback on a continuous basis. Agile's adaptability allows it to be more responsive to changes in requirements, making it ideal for projects where flexibility and customer feedback are crucial [46, 45, 26].

Table 2.3: Waterfall Vs Agile RE comparison

Aspect	**Waterfall**	**Agile**
Approach to Requirements	Upfront and fixed	Evolving, iterative, and flexible
RE Process	Elicitation, Analysis, Documentation, Validation, Management	Face-to-face communication, Iterative RE, Extreme prioritization, constant planning, prototyping, test-driven development, reviews, and tests
Stakeholder Involvement	Initial phase only	Continuous throughout the project lifecycle
Document-ation	Extensive and rigid	Minimal, just enough to guide development
Flexibility	Low, changes are costly	High, changes can be integrated regularly
Scope	Fixed early	Evolving, adjusted based on feedback
Risk Management	Identified later	Risk accumulates. Ongoing and continuous risk identification
Feedback	Limited until the testing phase	Continuous, with feedback at the end of each sprint

Aspect	Waterfall	Agile
Development Time and Cost	Predictable but higher upfront cost	Variable, with costs controlled by priority

2.6.2 Benefits of Agile Requirement Engineering

2.5.2.1: Flexibility and Adaptability

Requirements evolve as new information emerges, enabling the product to better align with customer needs [47].

2.5.2.2 Reduced Waste

The just-in-time approach prevents unnecessary work by focusing on current needs rather than speculative future features[47].

2.5.2.3 Improved Customer Satisfaction

Continuous involvement of stakeholders ensures the product meets customer expectations and delivers value[46].

2.5.2.4 Enhanced Collaboration

Cross-functional teams and frequent communication ensure that everyone has a shared understanding of requirements [46].

2.6.3 Challenges in Agile RE

In agile software development, several challenges can hinder effective requirement engineering. One major issue is minimal documentation [48, 49], which may lead to misunderstandings or the loss of critical information over time. Additionally, using inappropriate prioritization methods [49, 50, 51] can result in focusing on less valuable features, thereby wasting time and resources. Teams often struggle with managing changing requirements [49, 48, 52], as frequent changes can disrupt workflows and cause significant rework if not handled properly. Another

common problem is poorly written requirements [49], vague or unclear statements [52, 48] that are easily misinterpreted, leading to low-quality outputs. This is compounded by inaccurate effort estimation [52], which can negatively affect sprint planning and overall project timelines [49, 53, 54].

Limited customer availability and communication challenges [48, 52] further exacerbate these issues, hindering feedback loops and misaligning stakeholder expectations [52]. Customers may also have limited technical knowledge [48, 22], making it difficult for them to convey clear requirements. Moreover, selecting an inappropriate architecture[48] can restrict the system's flexibility and scalability, complicating future enhancements. Ineffective communication [48, 52] methods within the team can cause misunderstandings, information loss, and project delays [55].

Maintaining a Software Requirements Specification (SRS) [49, 56] document is particularly challenging in agile's dynamic environment, and the neglect of quality requirements[49] such as performance, reliability, and security can lead to subpar product performance. Teams may also face missing, ambiguous, or conflicting requirements [48, 52] resulting in confusion and rework. A lack of preliminary planning and delayed team involvement[48] at the project's outset can further cause misalignment and inefficiencies. Furthermore, a less experienced or skilled team [22, 48] is more likely to produce lower-quality work and operate inefficiently. Heavy reliance on tacit knowledge[48], or undocumented information, creates a risk of knowledge loss when key team members leave. Finally, poor requirement prioritization and the neglect of nonfunctional requirements [48], such as usability, scalability, and security, can lead to a product that ultimately fails to meet user expectations [48, 57].

Table 2.4: Requirement Engineering Challenges

RE Challenge	**References**
Minimal Documentation	[48], [49],[50]
Inappropriate Prioritization Method	[48], [49],[50],[51]
Managing Changing Requirements	[49],[48],[52],[22],[56]
Poorly Written Requirements	[49]
Inaccurate Effort Estimation	[52]
Limited Customer Availability and Communication Challenges	[22]
Limited Customer Knowledge	[49]
Inappropriate Architecture	[49]
Communication Methods	[49], [48]

RE Challenge	References
Maintaining a Software Requirements Specification	[49],[56]
Neglect of Quality Requirements (QRs)	[49]
Missing, Ambiguous, and Conflicting Requirements	[52], [48]
Lack of Preliminary Planning and Initial Team Involvement	[48]
Less Experienced and Skilled Team	[48]
Negligence of Nonfunctional Requirements	[52]

2.7 Requirement Change Management

Change in requirement is also one of the most frequent and serious issues in requirement engineering since it influences the overall success of a project considerably. Requirement changes can take place because of changing business needs, market situations, or unexpected technical issues [3]. Such changes impact not just the project schedule and budget but also the dynamics of the team and their productivity [7]. For the development team, frequent changes in requirements can cause confusion, rework, and reduced morale, usually promoting frustration, stress, and breakdowns. Constant adaptation to changing goals can generate adverse feelings like anxiety, resentment, and burnout, causing team performance to decline [7]. Stakeholders can also get frustrated by trying to match the changing project scope with their original expectations and thus lose confidence in the project. Getting these changes managed correctly is essential to the project's success since it involves good communication, flexibility, and fast adaptation without violating quality or delivery deadlines [29].

In order to overcome the challenges presented by constant requirement changes and reduce their adverse emotional and operational effects, having an effective Requirement Change Management Life Cycle in place is necessary to ensure project stability and team morale [4].

2.7.1 Requirement Change Management Lifecycle

The Requirement Change Management (RCM) Lifecycle is a systematic process designed to handle changes in requirements throughout the software development life cycle (SDLC). It ensures that changes are assessed, implemented, and tracked efficiently without compromising

project quality or objectives [5]. The lifecycle includes the following stages [3, 4, 5]:

- **Arrival:** The process begins with the arrival of a change request. This request can originate from stakeholders, users, or team members and serves as the initiation point for assessing and addressing changes in requirements.
- **Impact Analysis:** Once a change request is submitted, an impact analysis is conducted to evaluate its potential effects on the system, project scope, timeline, and resources. This step ensures that all implications of the proposed change are thoroughly understood before proceeding.
- **Validation:** After the impact analysis, the proposed change undergoes validation. This step ensures the change aligns with the project goals, requirements, and constraints, verifying its feasibility and relevance.
- **Change Control Board (CCB):** The validated change request is then presented to the Change Control Board (CCB). This group of decision-makers reviews the request and determines whether it should move forward. The CCB evaluates the change based on its impact, priority, and necessity.
- **Consultation:** The next step involves consultation with relevant stakeholders and team members. This ensures that all perspectives are considered, and a collaborative decision can be made regarding the change.
- **Change Request Decision:**The consultation process leads to a decision point: whether to accept or reject the change request. If rejected, the origin of the request is informed about the decision and its rationale. If accepted, the process moves forward.
- **Implementation:** For accepted changes, the implementation phase begins. The approved change is integrated into the project, ensuring it is executed effectively and in alignment with the project plan.
- **Verification:** After implementation, the change is verified to ensure it meets the intended requirements and does not introduce errors or inconsistencies in the system.
- **Delivery:** The verified change is then delivered, becoming an official part of the project or system. This ensures that stakeholders receive the updated system or product as agreed.

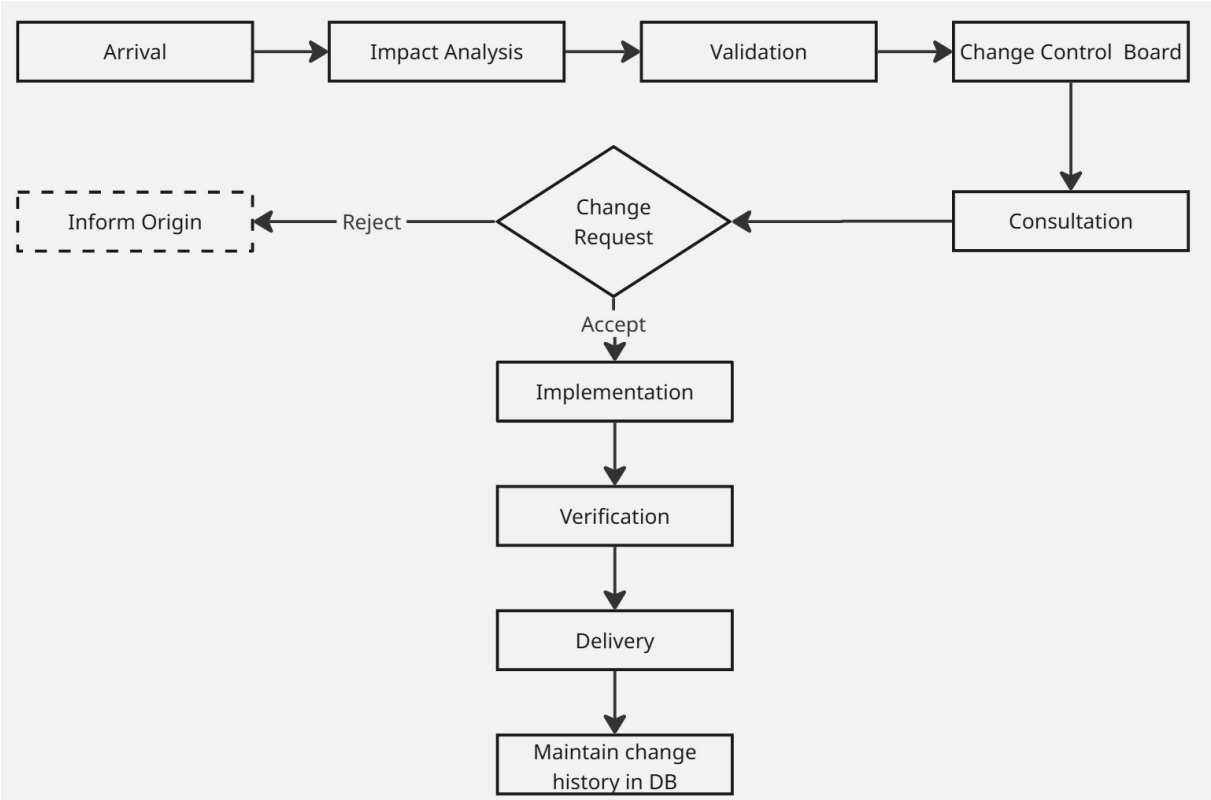

Figure 2.3: Requirement Change LifeCycle [3, 4, 5]

- **Maintain Change History in Database (DB):** The final step involves recording the change details in a database to maintain a comprehensive history. This helps in future audits, traceability, and continuous improvement of the Requirements Change Management (RCM) process.

The Requirement Change Management Life Cycle provides a structured approach to handling changes, but it comes with its own set of challenges that need to be addressed to ensure smooth adaptation and project success.

2.7.2 Requirement Change Management Challenges

Managing requirement changes (RC) in software projects presents a wide range of challenges that can significantly affect project success. One key factor is impact analysis [58], where high-impact changes can disrupt schedules and deliverables, while low-impact changes are easier to accommodate. Accurate cost and time estimation [59] becomes essential, particularly when RCs significantly affect budgets or timelines. Requirement traceability[5] is also crucial; when traceability is poor, it becomes difficult to understand the ripple effects of changes across the

system. RCs may also lead to system instability, especially when they influence a complex web of requirement dependencies, causing widespread disruptions [53].

Effective change prioritization[5] ensures that critical changes are addressed promptly, while low-priority ones do not consume unnecessary resources. User involvement [58] is another significant factor; when users or stakeholders fail to provide timely feedback [60], or are unavailable, delays and misaligned expectations [58] often occur. Frequent changes compromise requirement consistency, and if artifacts and documentation[5] are not maintained or updated, tracking and validating changes become nearly impossible [61].

The "3Cs"communication, coordination, and control [62] are vital for synchronizing team efforts [60], and breakdowns in these areas can severely hinder change management. Knowledge management [5, 58, 59] and sharing are also essential; without proper domain understanding, team members may misinterpret or mishandle changes. The absence of an effective Change Control Board (CCB) [59] further complicates decision-making and accountability. Changes with potentially severe consequences may result in product failure, emphasizing the need for thorough effort estimation, especially for large, complex RCs [63].

Interlinked or conflicting requirement [5] relationships must be carefully analyzed to avoid unintended consequences. Ambiguous requirements [58] and unclear change scopes [59] introduce confusion and risk mitigation [58]. A lack of a flexible strategy for managing changes, strategic inflexibility [64] in RCM prevents teams from adapting efficiently. Unclear roles and responsibilities [5], technical skill gaps[58], and language or cultural differences can all lead to breakdowns in managing RCs effectively. Without top management commitment [5], projects may lack the necessary support and resources for successful change management[57].

In addition, poor team relationships and trust [58] impair collaboration, while ineffective or absent risk analysis leaves projects vulnerable to unforeseen setbacks. Involving inexperienced staff [58] in change processes can result in poor decisions and inefficiencies. The absence of reusability, such as standardized templates or tools, leads to wasted effort in handling similar changes repeatedly [58]. Conflicts between stakeholders [59] over changing priorities further complicate consensus-building. Lastly, a lack of requirement change management (RCM) maturity models [60] limits an organization's ability to assess and improve its change management practices over time, hindering long-term improvement and adaptation[53, 63, 57].

Table 2.5: Requirement Change Management Challenges

RCM Challenge	**References**
Inadequate Change Management Planning	[60]
Lack of Cross-functional Collaboration	[64],[59],[60]
Ineffective Communication of Requirement Changes	[5],[60],[64],[58],[59]
Resistance to Change	[65],[66]
Unclear Requirement Prioritization	[5]
Inadequate Feedback Loops	[58]
Lack of Stakeholder Involvement	[58]
Unclear Business Objectives	[5]
Conflicting Requirements	[58]
Poor Impact Analysis	[5]
Inadequate Documentation of Requirements	[58]
Cost Overrun	[5],[58],[64]
Lack of Proper Change Control Process	[60],[64]
Scope Creep	[5]
Unclear scope of requested changes	[60],[59]
Unrealistic Expectations from Clients/Stakeholders	[5]
Overloaded Sprint/Backlog	[5],[62],[58]
Lack of Defined Roles and Responsibilities in Change Management	[64],[60],[58]
Ineffective Agile Ceremonies for Change Communication	[64],[58],[59]
Conflict between Agile Flexibility and Change Control	[5]
Limited Knowledge Transfer Between Teams	[58],[5],[60],[59]
Inadequate Handling of Emergent Requirements	[5]
Fear of Expressing Feelings	[58]
Fear of Losing a Job	[58]
Lack of RCM Maturity Models	[59]
Impact of Requirement Changes on System Quality	[59]
Lack of Motivation	[58]
Lack of Trust Among Team Members	[58],[59],[5]

Successful management of requirement changes is not merely a matter of overcoming organizational and technical hurdles. It is equally about understanding the emotional challenges

that teams encounter in addressing requirements changes. Emotional reactions, such as resistance, frustration, or anxiety, can pose obstacles to teamwork, resist decision-making, and affect the overall success of the change process. Hence, it is important not just to deal with the management of logistical aspects of change but also to identify the emotional forces at work in the team. By understanding and managing these emotional reactions, teams are able to progress with changes in requirements better and sustain high levels of alignment and productivity. This emphasizes the significance of investigating the emotional issues faced by agile teams in requirement change management since such efforts may improve teams' ability to adapt and be resilient, finally resulting in more successful projects.

2.8 Existing Research on EI in Requirement Engineering

The term Emotional Intelligence (EI) was first explicitly connected to software engineering in academic discussions in the early 2000s, as the importance of interpersonal and emotional skills in software development began to be recognized [7, 39]. Existing research focused on the Impact of emotional intelligence on a development team's productivity [9, 62, 12, 43, 22], problem-solving [7, 67, 22], work performance [40, 12], unity[9, 43], self-control, empathy [62, 67, 40], communication and collaboration [40, 68], adaptability, stress management[42], well being [7, 14, 15, 29, 31, 67], team goals [62], project success [27, 69], team dynamics, team conflicts [42, 28], and creativity[62, 67]. Requirement change handling is considered the most frequent challenge [69, 70, 55] of requirement engineering, which causes an emotional breakdown of the development team. John Grundy explored for the first time the role of emotional intelligence in requirement change handling [7, 8, 9, 13] gave a potential area for research.

John Grundy proposed the very first theoretical framework on emotional intelligence in software engineering. In the study [29] author figures out the influence of different stakeholders on developers during requirement change and proposes theoretical recommendations. In the study [7], the author identifies developers' emotional responses (positive, negative, or neutral) during the three phases of requirements changes: receiving, implementing, and delivering [7]. The study [15] investigates key challenges in handling requirements changes, their impact on developers' emotions, and the influence of stakeholders on these emotions, and provides recommendations for improving developers' ability to manage requirement changes effectively.

The study [40] provides a theoretical framework identifying the six Cs conditions, causes, consequences, contingencies, strategies, and covariance of software developers' emotional Intelligence during requirements change handling.

Table 2.6: Literature Review

Study ID	**Author(s)**	**Year**	**Method**	**Key Findings**	**Limitations**	**Ref**
S-01	Pushpamalar Rajendran, et al.	2024	Survey	Emotional intelligence (EI) is essential for software testers, enhancing stress management, team communication, and adaptability.	Limited by sample size within Sweden, potential bias in self-reported experiences, and a focus on only a few industries.	[62]
S-02	Kashumi Madampe, et al.	2024	Survey	EI strategies (communication, empathy, awareness) support productivity and team goals during requirements changes.	Regional sample limits generalization; self-reported data introduces potential response bias.	[31]
S-03	Maud Nijland	2024	Observation and Survey	Positive feedback, humor, and teamwork, particularly during planning meetings, are ways that Product Owners (POs) exhibit emotional intelligence, which enhances team cohesiveness, conflict resolution, and overall performance. Effectiveness in self-managing Agile teams is further enhanced by IE training.	Generalization is limited by the study's focus on three teams from a single organization, and results may be skewed by subjective verbal behavior coding and the preference for POs over other participants. Technical difficulties with the video and audio may also affect the accuracy of the data.	[71]
S-04	Abdulmajeed Aljuhani	2024	Survey	The study highlights "Communication, Coordination, and Control" as the most important of the six criteria and nine success factors for ARCM in GSD."	Future work could improve accuracy by combining BWM with techniques like fuzzy sets to better manage subjective judgments; however, the study's focus on particular GSD settings restricts its wider applicability.	[72]

Study ID	Author(s)	Year	Method	Key Findings	Limitations	Ref
S-05	Zoe Hoy, et al.	2023	SLR	While acknowledging that some problems go beyond agile practices, the study identified 11 major obstacles in agile requirements engineering and gave a three-dimensional framework that balances agile methods, project management, and organizational factors.	Limited by the scope, possibly missing recent studies or challenges. Potential bias in the subjective classification of challenges and solutions. The framework needs further validation through empirical research.	[49]
S-06	Alba Yela Aránega, et al.	2023	Survey	To improve emotional competencies and demonstrate the beneficial effects of agile methods on teamwork and engagement, the study positioned 300 employees in Spain through a Kanban-based agile training program.	Collaboration was affected by varying motivation, high turnover, and unfavorable work environments. The long-term effects of agile approaches on team dynamics and emotional intelligence require more investigation.	[27]
S-07	Kjeld Grob	2023	Survey	According to the study, a Product Owner's high emotional intelligence improves team dynamics, cohesion, and conflict resolution, which increases the effectiveness and resilience of agile teams through stronger affective bonds.	A small sample size, problems with data collection (timing, attendance, video quality, observer bias), and contradicting quantitative and qualitative data that compromise robustness are some of the study's limitations.	[70]
S-08	Aamir Amin, et al.	2023	Survey	The study looks at the relationship between personality traits, knowledge acquisition, and programmers' creativity. It finds that moderate stress increases the intention to be creative, and that certain traits are positively influenced by things like job complexity and fear of obsolescence.	Generalization is limited by the study's Pakistani setting, self-reported data may introduce bias, and results may vary under high-stress conditions.	[30]

Study ID	Author(s)	Year	Method	Key Findings	Limitations	Ref
S-09	Kashumi Madampe, et al.	2023	Survey	Throughout the requirements change (RC) lifecycle, during receiving, developing, and delivering, software developers' emotions fluctuate, impacting their productivity and cognitive abilities. To improve RC handling, a framework is suggested to control these emotions.	Limited geographic diversity in the sample, possible gender imbalance, and potential impact of COVID-19 on participants' responses.	[15]
S-10	Kashumi Madampe, et al.	2023	Survey	A framework that combines agility, emotional intelligence, and cognitive intelligence addresses key emotional challenges in requirements change (RC) handling, including complexity, cascading impact, and limited customer access.	The study's limitations include its small sample size, its reliance on self-reported emotions, and its exclusive focus on managing developers' emotions, as well as possible cultural influences on emotional responses.	[29]
S-11	Kashumi Madampe, et al.	2022	Survey	Researchers determined that emotional intelligence (EI) is essential for handling requirements changes (RCs), and team cohesion and productivity are improved by techniques like emotional awareness and open communication.	limited by a small sample size and a regional emphasis on Australasia's developers, which could restrict generalizability.	[14]
S-12	Liliana Fitzpatrick	2022	Survey	By enhancing project managers' communication, empathy, and resilience, emotional intelligence (EI) improves team cohesion and lowers turnover, which in turn increases the success of agile projects.	Reliance on qualitative data, limited sample diversity, and possible bias in self-assessed EI measurements.	[73]

Study ID	Author(s)	Year	Method	Key Findings	Limitations	Ref
S-13	Kashumi Madampe, et al.	2022	Survey	To manage requirements changes (RCs) effectively, the study identifies emotional challenges, including complexity, cascading impact, and stakeholder influence. It then suggests a framework that combines agility, emotional intelligence, and cognitive intelligence.	Limited longitudinal data, possible self-reporting response bias, and the generalizability of the regional sample limit.	[40]
S-14	Shafia Khatun, et al.	2022	Survey	Work ethics and Emotional Intelligence (EI) significantly influence software engineers' job performance and satisfaction, with EI enhancing team cohesion and stress management.	The study's focus on a single industry and reliance on self-reported data limit its applicability to more diverse work environments.	[13]
S-15	Nassim Saghir, et al.	2022	Observation and Survey	Performance, teamwork, and conflict resolution have all been demonstrated to be improved by training; high EI teams had more fruitful meetings, and while EI behaviors were uncommon during task or relationship conflicts, they improved team cohesion and reduced the length of conflict.	Subjective EI coding and self-reported ratings could introduce bias; the study's focus on the short-term effects of EI in nine Agile teams from a single company restricts generalizability and ignores other dynamics of Agile meetings.	[28]
S-16	JAMSHED AHMAD, et al.	2022	SLR	With enduring problems like inadequate communication, cultural differences, and antiquated tools, an SLR identifies "incomplete requirements" as the top challenge out of 14 in managing QRCM in GSD. To address these changing issues, the SOQEMM model is suggested.	Reliance on just four databases may have overlooked relevant studies, subjective challenge categorization restricts generalizability beyond GSD, and suggested solutions may be skewed or lack empirical validation because they rely on the work of the first author.	[74]

Study ID	Author(s)	Year	Method	Key Findings	Limitations	Ref
S-17	Aqsa Rasheed, et al.	2021	SLR	In order to address RE challenges in Agile Software Development, such as insufficient tools for non-functional needs, shifting requirements, and minimal documentation, the study recommends better documentation, improved communication, increased customer involvement, and formal methods for clarity.	Although the study lacks empirical validation and may not be broadly applicable across different project environments, it does highlight the need for targeted research on large-scale Agile RE challenges.	[48]
S-18	Daniela Girardi, et al.	2021	Survey	Higher productivity among software developers is correlated with positive emotions, particularly in the afternoon. The study tested non-invasive sensors for emotion detection and created a taxonomy of emotion triggers.	The study needs more validation for wider generalization because of its limitations, which include a small sample size and individual response variability.	[42]
S-19	Marcelo Marinho, et al.	2021	Survey	Happiness increased software team cohesion and productivity during COVID-19, and team behavior had a major impact on developers' well-being and ability to collaborate remotely.	Restricted by a particular pandemic context and a regional focus (Brazil), which might not apply to other settings or eras.	[68]
S-20	Abraham Chaffin	2021	SLR	EI in teams improves communication, problem-solving, and productivity, indicating that high EI is necessary for team cohesiveness and effectiveness.	Limited sample diversity and reliance on secondary data.	[11]
S-21	M.Jonathan Mvududu	2020	Survey	Software engineers' creativity is significantly predicted by trait emotional intelligence (EI), which enhances creative potential. EI components include well-being, self-control, emotionality, and sociability.	Restricted by the use of self-reported data, which may introduce response biases and a regional focus on engineers in the Seattle area.	[67]

Study ID	Author(s)	Year	Method	Key Findings	Limitations	Ref
S-22	B. Imran Basha, et al.	2020	Survey	Employee work attitudes in the software industry are not significantly impacted by emotional intelligence (EI), with emotions' control, comprehension, and use having a negligible effect.	Because the study relies on self-reported data, bias may be introduced, and the small sample size may not accurately represent attitudes in the industry as a whole.	[9]
S-23	Chris Sleurink	2020	Survey and video observation	Self-rated emotional intelligence (EI) and work performance in agile teams were found to be moderately positively correlated in the study; reflective meetings showed higher EI behaviors.	There is a need for additional validation with diverse samples and the inclusion of non-verbal cues because the study's small sample size and possible biases in the EI measure limit generalizability.	[69]
S-24	Luís Felipe Amorim, et al.	2020	survey and interviews	In agile teams, contentment increases output, communication, and teamwork, while discontent results in frustration and degrades quality.	The study is restricted to a single Brazilian company, has little generalization outside of its particular context, and might be biased as a result of self-reporting.	[75]
S-25	Nabiha Batool	2020	SLR and Survey	Project success is increased by EI in agile teams, and this effect is mediated by team composition; transformational leadership had no moderating effect.	The study's conclusions might not be generally applicable because it is restricted to Pakistan's software sector.	[76]
S-26	SAJID ANWER, et al.	2019	SLR and Survey	Geographical and cultural disparities make Global Software Development (GSD) more difficult by making communication, knowledge sharing, and change control more difficult. Impact analysis, along with cost estimation, artifact management, and user involvement, is the most important challenge in requirement change management.	The findings are context-specific and might not be broadly applicable; important subjects like rules, regulations, and technical issues were not given enough attention. The small survey sample restricts representativeness, and the recommended solutions rely on complex tools that might not be appropriate in all circumstances.	[57]

Study ID	Author(s)	Year	Method	Key Findings	Limitations	Ref
S-27	Arif Ali Khan, et al.	2012	Survey	Effective requirement change management (RCM) frameworks are frequently absent from global software development (GSD), which results in communication problems due to time zones, language, and cultural differences. These problems lead to rework and delays. Usually, changes are brought about by strategic updates, functional changes, or changing needs.	The framework's scalability is limited by its lack of real-world GSD testing; it prioritizes communication while ignoring tool integration, project management, regulations, and more general technological, financial, and environmental considerations.	[77]

This study integrates Emotional Intelligence (EI) with agile practices to help manage emotions in requirements changes (RCs) of developers, focusing on self-awareness, emotion regulation, and relationship-building. Strategies like open communication, empathy, and team understanding enhance EI, supporting productivity and team goals during RC handling [54].

Handling requirement changes (RCs) is a critical task that can greatly impact the success or failure of software. It requires significant effort and spans multiple phases of software development. Developers often invest emotionally in managing RCs throughout the process. By being aware of their emotions while working, they can manage negative feelings, which helps them perform better [7].

2.9 Gap Analysis

In order to understand the state of current research, we have compared and reviewed major studies focused on the contribution of Emotional Intelligence (EI) in Agile Software Development (ASD) and Requirement Engineering (RE). Although many of these studies include worthy contributions to emotional aspects, numerous ones lack emphasis on the handling of requirement change, do not identify role-level emotional intelligence, or do not suggest a formalized framework for application. Furthermore, performance measurement approaches and

target audiences differ considerably throughout the literature. To highlight these limitations and clarify the contribution of our research, we present a comparison table summarizing what each study offers and where gaps remain. This table outlines aspects such as Study ID, Year, coverage of Agile Software Development, Requirement Engineering, Requirement Change handling, methods of measuring performance, identification of emotional intelligence, target audience, and whether a framework was proposed.

Table 2.7: Comparison with Existing Studies

Study ID	**Year**	**ASD**	**RE**	**RC handling**	**Measuring Performance**	**Identify EQ**	**Target Audience**	**Framework**	**Ref**
S-01	2024	Yes	No	No	No	Yes	DT	No	[62]
S-02	2024	Yes	Yes	Yes	No	Yes	DT	Yes	[31]
S-03	2024	Yes	No	No	Yes	Yes	PO	No	[71]
S-04	2024	Yes	Yes	No	No	No	N/A	Yes	[72]
S-05	2023	Yes	No	No	Yes	Yes	AT	No	[49]
S-06	2023	Yes	No	No	Yes	Yes	AT	No	[27]
S-07	2023	Yes	No	No	Yes	Yes	PO	No	[70]
S-08	2023	No	No	No	Yes	Yes	DT	No	[30]
S-09	2023	Yes	Yes	Yes	No	Yes	DT	No	[15]
S-10	2023	Yes	Yes	Yes	No	Yes	DT	Yes	[29]
S-11	2022	Yes	Yes	Yes	No	Yes	DT	No	[14]
S-12	2022	No	No	No	No	Yes	DT	No	[73]
S-13	2022	Yes	Yes	Yes	No	Yes	DT	Yes	[40]
S-14	2022	No	No	No	Yes	Yes	DT	No	[13]
S-15	2022	Yes	No	No	No	No	AT	No	[28]
S-16	2022	No	Yes	Yes	No	Yes	N/A	No	[74]
S-17	2021	Yes	Yes	No	No	No	N/A	No	[48]
S-18	2021	No	No	Yes	Yes	Yes	DT	No	[42]
S-19	2021	No	No	No	Yes	Yes	DT	No	[68]
S-20	2021	No	No	No	Yes	Yes	DT	No	[11]
S-21	2020	No	No	No	Yes	Yes	DT	No	[67]
S-22	2020	No	No	No	Yes	Yes	DT	No	[9]
S-23	2020	Yes	No	No	Yes	Yes	AT	No	[69]

Study ID	Year	ASD	RE	RC handling	Measuring Performance	Identify EQ	Target Audience	Framework	Ref
S-24	2020	Yes	No	No	Yes	Yes	DT	No	[75]
S-25	2020	Yes	No	No	Yes	Yes	AT	No	[76]
S-26	2019	Yes	Yes	Yes	No	No	AT	No	[57]
S-27	2012	Yes	Yes	Yes	No	No	AT	Yes	[77]
ARBEI Framework	**2025**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**AT**	**Yes**	

* Product Owner(PO), Scrum Master(SM), Development Team(DT)

Initially, there are no role-specific emotional intelligence applications in existing agile practices. While most research explores the effect of EI on collaboration and teamwork, it is applied as a broad concept and not as a specific solution for definite roles in agile teams (e.g., [29], [49],[30]). This is a primary gap since every role in an agile team encounters unique emotional challenges in RCs. For instance, Product Owners can encounter emotional pressure concerning stakeholder expectation management and requirement prioritization, whereas Scrum Masters have to deal with team dynamics and conflict resolution within sprints. Development Teams get emotionally strained while handling the technical uncertainty and complexity of RCs. There is an urgent need for frameworks addressing the unique emotional demands of every role and delivering personalized EI strategies to enhance emotional regulation, empathy, and communication across the RC lifecycle.

Second, there is a clear absence of empirical frameworks for applying EI to RC management, especially in agile software development (e.g., [62], [31], [30]). Most research fails to provide useful recommendations or practices for integrating EI into the real process of dealing with RCs. For instance, although research can explain the emotional issues that developers encounter when dealing with RCs, there is less attention to useful EI interventions through which agile teams can effectively manage those emotions (e.g., through emotion regulation, empathy building, or communication). This discrepancy suggests a lack of clear, actionable guidelines that offer specific EI-based solutions to agile teams for handling requirement changes.

Moreover, there is too little attention paid to measuring the effect of EI on the performance of the team when RCs are implemented (e.g., [31], [11], [42]). Though some research recognizes EI as a factor contributing to improved collaboration and communication, no empirical connection

between EI improvement programs and concrete results in RC handling, like conflict reduction, stakeholder communication improvement, or enhanced decision-making efficiency, has yet been established. To fill this gap, the framework must be equipped with metrics for measuring the influence of enhanced EI on team dynamics, RC handling efficiency, and overall team performance throughout agile sprints. This would offer the empirical basis required to prove the effectiveness of the framework and create a strong argument for its implementation within agile teams.

The other critical gap is the lack of proper acknowledgement of the emotional richness of RCs, especially in light of agile's rapid-fire, iterative environment. Although agile approaches promote flexibility and responsiveness, the emotional reaction to constant changes in requirements can lead to extreme stress, frustration, and burnout for team members, which have been long neglected in research. An EI-based role structure can address these emotional problems by providing each member of the team with the emotional instruments they need to effectively cope with RC stress and unpredictability. For example, Scrum Masters may receive techniques to help build empathy and trust in sprint retrospectives to troubleshoot emotional conflict, while Product Owners may learn to handle their own emotional reactions to changing client needs and prioritization under stress.

Last but not least, emotional literacy in agile teams is undeveloped for requirement change management. The approach would have to tackle the emotional unawareness in agile methodology, specifically regarding understanding the emotional state induced by RCs and the impact of these states on team performance. Training in emotional intelligence can form a major part of the approach, enabling teams to recognize and communicate emotions constructively, resulting in healthier team dynamics and effective handling of requirement changes.

In summary, while existing literature emphasizes the importance of EI in agile environments, there is a clear gap in the role-based application of EI in RC handling. The proposed framework fills this gap by offering tailored EI strategies for each role within an agile team to manage emotional responses during requirement changes. It also addresses the lack of empirical evidence, actionable interventions, and emotional awareness tools that are essential for improving team performance and communication in the face of changing requirements. This role-based EI framework aims to enhance collaboration, reduce emotional stress, and ultimately improve the handling of RCs within agile teams. The figure 2.4 shows how this research identifies the problem.

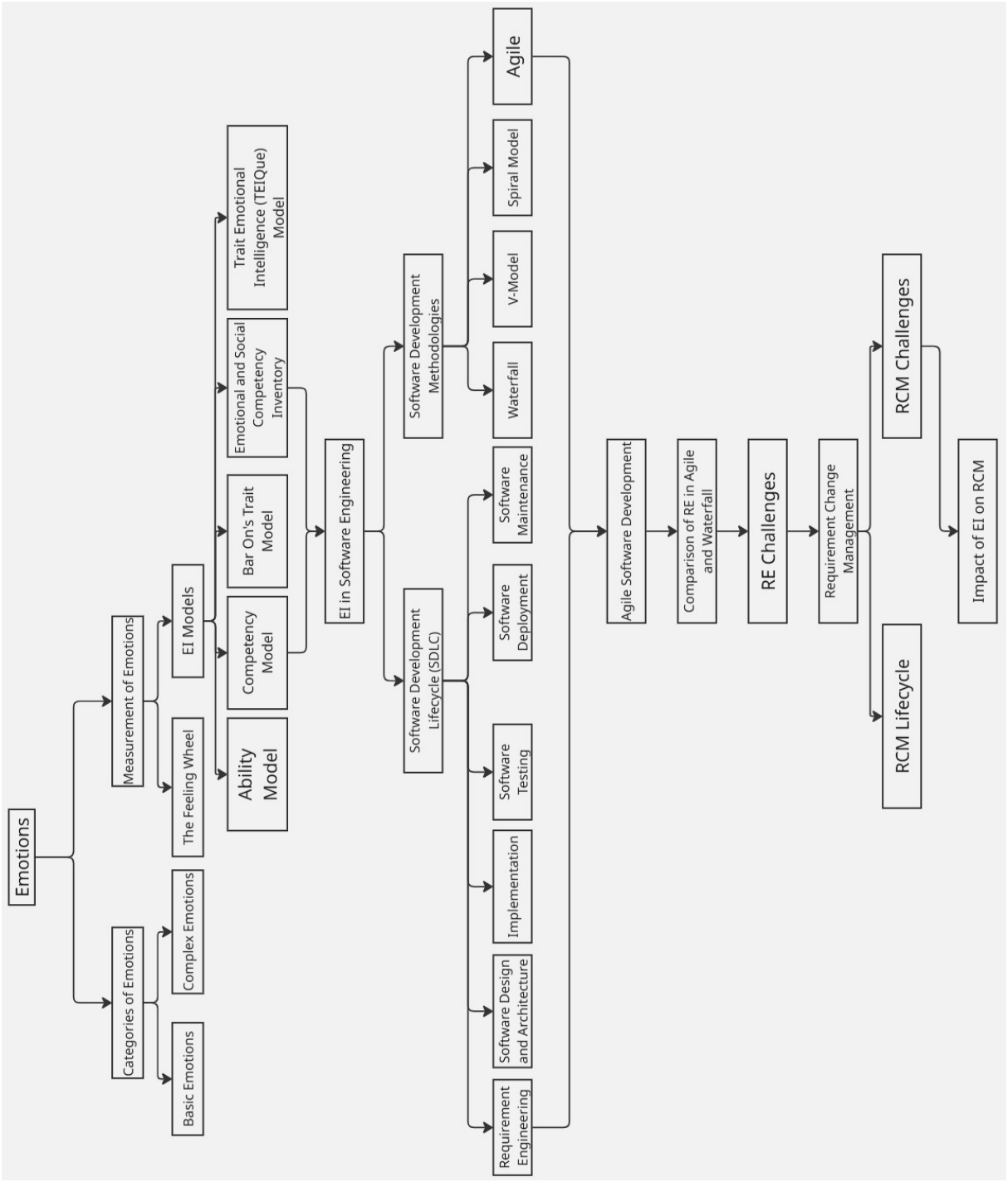

Figure 2.4: Problem Identification

Figure 2.4 illustrates how this research systematically identifies the problem by establishing a clear linkage between emotions, emotional intelligence (EI), and requirement change management (RCM) in software engineering. The figure begins with emotions as the foundational concept, categorizing them into basic and complex emotions and presenting established approaches for their measurement through EI models. These models provide the theoretical grounding needed to understand how emotional and social competencies influence human behavior and interactions within software development teams.

The figure then positions EI within the context of software engineering, mapping its influence across the Software Development Life Cycle and different development methodologies. By narrowing the focus to Agile software development and comparing requirement engineering practices in Agile and Waterfall models, the figure highlights how frequent changes, continuous stakeholder interaction, and evolving requirements intensify emotional challenges. This progression helps identify gaps in existing practices where traditional technical approaches are insufficient to manage human-centric issues.

Finally, Figure 2.4 converges on Requirement Change Management, explicitly showing the RCM lifecycle and its associated challenges. Through this structured flow, the figure identifies the core problem addressed by this research: current RCM practices inadequately consider emotional and EI-related factors, leading to communication breakdowns, resistance to change, and decision-making difficulties. The figure therefore, establishes the need to examine the impact of emotional intelligence on RCM, particularly in Agile environments, as a means to address these challenges effectively.

2.10 Summary

The chapter builds the theoretical and empirical underpinnings of the research by investigating the place of emotions in software engineering, specifically the setting of Requirement Change Management (RCM) in agile environments. This article starts by deconstructing three major components of the emotional experience: subjective experience, physiological response, and behavioral response, which go into showing how each component contributes to how emotions are perceived, processed, and communicated in any working environment, more so when under pressure or stress.

The overall aim is to increase emotional sensitivity, and so the chapter introduces the Feeling Wheel as a therapeutic tool to identify and define a broad spectrum of emotions. This is a tool that links specific emotional conditions, for example, frustration, nervousness, or calm, with specific challenges in software development. The chapter also elaborates on emotional literacy by providing an in-depth examination of Emotional Intelligence (EI), its theoretical roots, neurobiological foundations, and its application in workplace collaboration and decision-making. It explores the neurobiology of emotion based on neuroscientific evidence, describing the roles of the major brain areas, such as the right amygdala, somatosensory cortex, anterior cingulate, and prefrontal cortex that process emotional stimuli. This section connects the physiological basis of emotion with the day-to-day life of software professionals, especially when dealing with altered requirements or team conflicts. The chapter goes on to explore prominent models of emotional intelligence, such as Mayer and Salovey's ability model and Goleman's blended model, as theoretical foundations for the measurement and enhancement of emotional control and interpersonal sensitivity in development teams. It underlines the importance of EI in software development, particularly in agile environments, where close interaction, quick decision-making, and shifting requirements are inherent. The review depicts how EI helps to build team resilience, improve communication, and flexibility.

The chapter further gives a comprehensive overview of Requirement Engineering (RE) in agile software development, contrasting Waterfall vs. Agile methodologies and how agile models are more change-adaptive. The benefits of agile RE, such as lower wastage, customer satisfaction, and improved team collaboration, are enumerated, highlighting its growing use in the discipline. Yet, the chapter also discusses the challenges of agile RE, including continuous scope change, undefined prioritization, and stakeholder misalignment. It introduces the Requirement Change Management lifecycle, providing a process-based approach to how changes are to be managed.

The chapter ends by listing common RCM challenges in laying the groundwork for the primary research, such as poor communication, undefined roles, the effect of change, and a lack of emotional sensitivity factors that lead to team dysfunction. The review highlights the necessity for more research on emotional reactions to difficulties during RCM, stressing the relevance of coping with emotional stressors to agile software development. The review of literature also identifies the central role played by Emotional Intelligence (EI) in requirement changes (RCs) and enhanced team performance in Agile Software Development. EI facilitates stress management, communication, flexibility, and team building, particularly among developers, product owners,

and scrum masters. Research has shown that higher EI individuals better manage negative emotions, leading to higher collaboration during agile activities like planning, refinement, and retrospectives. Major emotional issues in RCs are complexity, influenced by stakeholders, and cascading effects, with developers showing positive, negative, or neutral emotional responses during the course of an RC throughout its lifecycle. Many studies suggest models that incorporate EI and agility, emphasizing self-awareness, empathy, and transparent communication to enhance RC management as well as team performance. Although promising results are presented, the majority of studies are limited by small sample sizes, regional concentration, self-reported bias, and the absence of empirical validation. However, incorporating EI training and models into Agile teams can be promising in increasing productivity, creativity, and emotional resilience during emotionally taxing tasks such as dealing with requirement changes.

CHAPTER 3

DESIGN METHODOLOGY

3.1 Introduction

This research employs a mixed-methods strategy, integrating both quantitative and qualitative data in a structured survey and interviews. Quantitative data are gathered for emotional reactions, team relationships, and the effects of changes in requirements using closed-ended questions, while qualitative data examine individual experiences and coping mechanisms with open-ended questions. This hybrid approach provides a richer understanding of how stress, emotional intelligence, communication, and empathy influence Agile teams under requirement changes so that major issues can be identified and practical measures proposed to enhance emotional well-being, team cooperation, and project performance. Figure 3.1 explains the overall approach to conducting this study.

3.2 Literature Review

The research began by conducting a detailed literature review to build a theoretical background and determine the existing gaps in research with regard to Emotional Intelligence (EI), Agile software development, and the adoption of EI in Agile team environments. The aim of the review was to examine how emotional intelligence crosses over with Agile roles and practices,

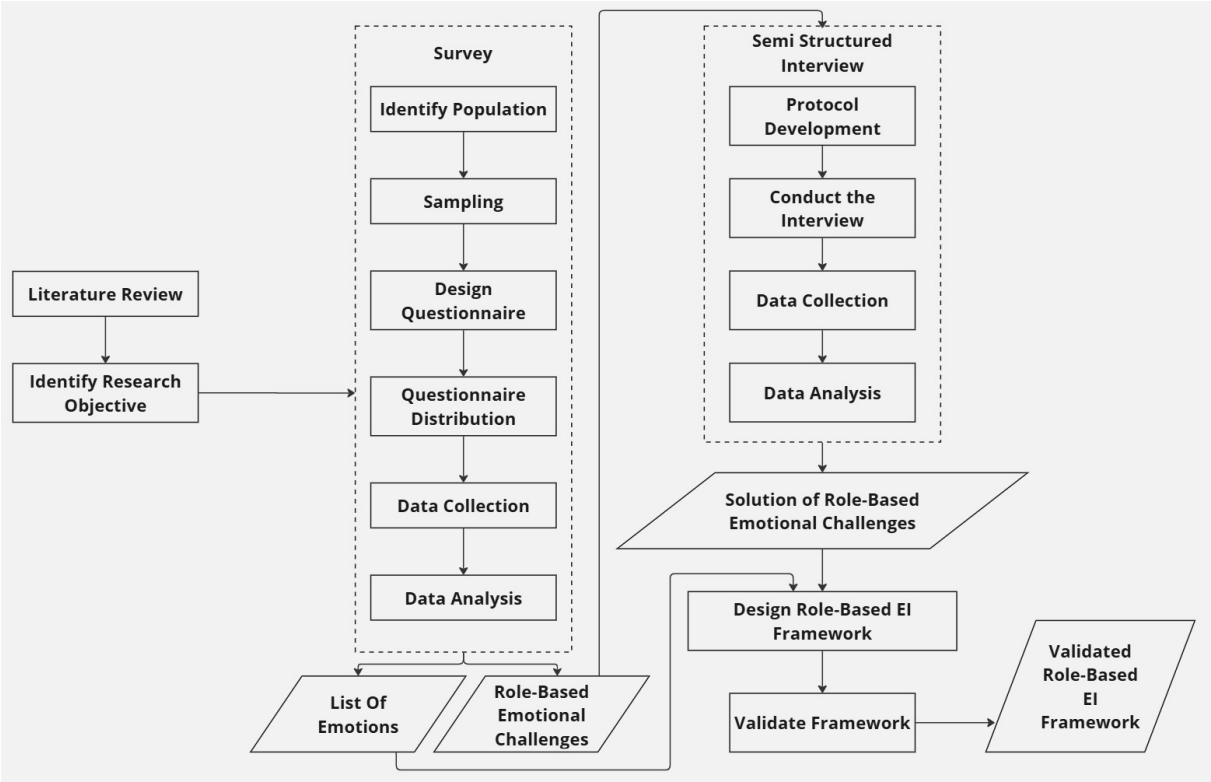

Figure 3.1: Research Methodology

especially with regard to handling requirement changes as well as team dynamics.

In order to provide a structured and academically sound method, the literature search was undertaken by means of three leading scholarly databases: IEEE Xplore, ScienceDirect, and SpringerLink. These databases were chosen because they are reputable, relevant to the subject areas of software engineering and management, and comprehensively index peer-reviewed journals and conference papers.The process of searching was instructed by a precisely crafted keyword phrase designed to locate the literature from various relevant viewpoints, such as emotional intelligence, changes in requirements, Agile practices, and role-based issues in Agile teams. Search strings are mentioned in the Appendix.

3.3 Identify Research Objective

The initial search yielded a total of 230 articles from the three databases. The articles were initially screened on title and abstract to ascertain if they were relevant to the research questions. In this process, duplicate hits and those that were not related to software engineering, team

dynamics, or emotional intelligence were removed. Following this initial screening, 162 articles were left to be reviewed in full text.

The next step was a thorough screening of the 162 articles to determine how directly they addressed the major theme of the study: challenges with emotional intelligence in Agile positions and the application of EI in requirement change management and team performance improvement. Articles that were only devoted to general project management, non-Agile approaches, or EI in non-technical environments were also eliminated.

After this filtering, 39 articles were found to be very relevant and were chosen for further in-depth analysis. These 39 articles gave straightforward and significant information regarding the emotional dynamics of Agile teams, the effects of EI on role-based collaboration, and practices for change management in Agile settings. These studies comprised the essence of the literature base and facilitated the construction of the research problem, objectives, and framework directly.

The other articles, not directly focused on the research core area but contributing context-wise in support of the wider theoretical base, illustrated how Agile methods have evolved, how soft skills in software development have become increasingly vital, and how requirement change management is difficult.

3.3.1 Thematic Insights from the Literature Review:

The reading indicated that Emotional Intelligence (EI), consisting of self-awareness, self-management, social awareness, and relationship management, is increasingly understood as a key competency in team-based software development. Agile teams operate in iterative and team-oriented settings and depend on interpersonal dynamics, so EI is especially vital. Research indicated that EI improves teamwork, conflict resolution, communications, and flexibility, abilities crucial to Agile success.

At the same time, the analysis of Agile methodologies, specifically Scrum, emphasized their reliance on self-organizing teams, persistent interaction, and adaptability to change. Agile frameworks require close collaboration among the team members and stakeholders, and mutual responsibility for the results, all of which could be disturbed by unchecked emotional tension or poor interpersonal relations.

In light of these findings, an evident research gap was established: While there is a vast literature on overall team dynamics and EI in the workplace, there are limited studies of the

emotional difficulties faced by central Agile roles: Product Owners, Scrum Masters, and Developers. Each role involves unique tasks and interpersonal tensions that influence their emotional behaviors in Agile workflows. For instance, Product Owners are under pressure to manage stakeholder expectations as well as prioritize the backlog, Scrum Masters are expected to ensure team harmony and eliminate blockers, and Developers tend to be stressed regarding technical complexity and requirement clarity.

This lack highlighted the need for a role-specific Emotional Intelligence framework suited to the individual emotional requirements of each Agile role. This kind of framework could enable better communication, teamwork, and flexibility among agile teams, ultimately leading to better performance and easier management of requirement changes.

3.4 Survey Methodology

Survey research is a common quantitative technique that enables researchers to collect data through a large sample in order to detect patterns, behaviors, and attitudes among a population. In this research, a survey was used as a primary data collection tool to supplement qualitative findings from interviews and cross-verify results about the position of Emotional Intelligence (EI) among Agile software teams. The survey was intended to measure the emotional issues posed by various Agile roles like Product Owners, Scrum Masters, and Developers, and determine how EI influences teamwork, collaboration, Performance, and requirement change management.

3.4.1 Purpose of the Survey

The aim of the survey in this research was to capture quantitative data to facilitate the development and validation of a role-based Emotional Intelligence (EI) model for enhancing team performance, teamwork, and emotional well-being of agile teams during requirement change management. This survey was particularly designed to mirror and meet the following research goals:

1. To investigate the significance of Emotional Intelligence components like self-awareness, empathy, social skills, self-management, and motivation among various roles during

Agile teams, Product Owners, Scrum Masters, and developers during requirement change handling.

2. To determine and measure the emotional issues usually faced by Agile experts while facing requirement changes and their management.

3. To analyze the role-specific usage of EI competencies in Agile teams and how such competencies support managing requirement changes, building team bonding, and improving inter-role communication.

4. To confirm qualitative findings based on semi-structured interviews by investigating if identified patterns and challenges persist statistically in the Agile population.

5. To gather data that would directly influence designing a real-world, role-specific EI framework, offering role-specific strategies for overcoming emotional challenges more effectively.

Thus, the survey acted as that critical link between the qualitative findings and the framework development process, ensuring that the results were not only qualitatively based on actual Agile practices but also statistically validated. It gave empirical backing to the premise that Emotional Intelligence, when treated and applied role wise can dramatically enhance the capacity of Agile teams to handle emotional complexity and react to requirement changes with more adaptability, cohesion, and performance.

3.4.2 Survey Design

The survey was carefully crafted in compliance with Kishenhoff's guidelines for organized survey research, which call for four primary principles: (1) clear and concise language, (2) neutrality and lack of leading wordings, (3) logical question ordering, and (4) reduction of respondent fatigue and bias. All these principles were meant to ensure that the data gathered would be valid and reliable for evaluating Emotional Intelligence (EI) in Agile software teams.

3.4.3 Identify Target Population:

In order to guarantee relevance, dependability, and depth of information gathered in the course of the study, there was a transparent and intentional choice of the target population. The subjects were chosen for their active engagements in Agile teams and professional experience with emotionally charged events connected with requirement change management. The recruitment process was in tandem with the study's aim of investigating how emotional intelligence (EI) is exhibited and handled by various Agile roles during encountering changes to requirements.

3.4.4 Key Roles in Agile Teams:

Participants were chosen from three main Agile roles to provide a broad representation of the diverse responsibilities and emotional experiences of Agile software development teams. All roles contribute differently to managing requirements and team dynamics, which makes it important for them to be included within the scope of this study.

1. **Product Owners (POs):**Product Owners have the mandate to define and maintain the product vision, handle the product backlog, set priorities based on business value, and serve as the primary interface between stakeholders and the development team. Their work often entails dealing with stakeholder expectations, negotiating for changes in requirements, and making key decisions that can result in stress or conflict. Consequently, they are likely to be involved in emotionally charged situations.

2. **Scrum Masters (SMs):**Scrum Masters are Agile facilitators who make sure that the Scrum process is correctly applied in the team. They are tasked with upholding Agile values, clearing impediments, encouraging teamwork, and ensuring team spirit. They usually resolve interpersonal conflicts and negotiate team dynamics, so emotional intelligence becomes a necessary competence in their job.

3. **Development Team Members:**This group consists of software developers, testers, UI/UX designers, DevOps engineers, and other technical contributors who are working together to provide the product increment. Development team members are intricately involved in the actual execution of tasks and tend to face emotional stress because of technical issues, unclear requirements, stringent deadlines, or last-minute changes. Their insights

are critical to comprehending how requirement changes emotionally affect day-to-day operations.

By engaging these three central roles, the study facilitated a comprehensive analysis of the emotional and intellectual aspects of handling requirement change across functional boundaries in Agile teams. This study specifically focused on developers from the development team of the agile team.

3.4.5 Experience-Based Eligibility Criteria:

In order to guarantee the accuracy and validity of the data gathered, rigid inclusion criteria for participant recruitment were applied:

1. **Minimum One Year of Agile Experience:** They needed at least one year of professional experience in working within Agile settings and were directly involved in software development projects using frameworks like Scrum. This ensured that the participants understood Agile practices, team dynamics, and iterative models of development.

2. **Training on Emotional Intelligence Challenges:** They were supposed to have encountered circumstances in their work requiring emotional control, empathy, conflict management, or adaptive behavior. These include managing requirement shifts with close deadlines, dealing with interpersonal conflict in cross-functional teams, negotiating with stakeholders, or addressing changing business needs. Their capacity to connect personal experience with emotionally stimulating project situations was critical in assessing the actual application of EI skills.

These inclusion criteria guaranteed that the chosen participants not only had knowledge of Agile frameworks but also experience working with emotionally complicated and dynamic team settings. This specific approach added depth to the study by obtaining varied, experiential insights into the emotional stressors and EI behavior in Agile positions.

3.4.6 Sampling Strategy

A well-planned sampling scheme was used to establish representativeness as well as data validity of the data gathered from Agile professionals employed within Pakistan's IT sector. This

study focused on individuals playing important Agile roles, such as, Product Owners, Scrum Masters, and developers defined the Population Frame from firms located within registered technology parks in Pakistan. To get a representative and diverse dataset, a mixed approach of sampling was used within this study. This incorporated the use of statistical sample size estimation based on a specified population alongside a snowball non-probability sampling method of practical participant recruitment.

3.4.6.1 Defined Population Frame:

The study was conducted on Agile practitioners working in technology firms across Pakistan's 25 registered technology parks, found in major cities like Islamabad, Lahore, and Karachi. Based on information from the Ministry of Foreign Affairs, Government of Pakistan, each park has around 60 software firms, providing an estimated overall of:

25 technology parks $\times$ **60** companies per park $=$ **1**,**500** companies

From each company, the study aimed to include three key Agile roles:

- Product Owner (PO)
- Scrum Master (SM)
- Development Team (DT)

This resulted in an estimated total population (N) of:

$$N = 1,500 \text{ companies} \times 3 \text{ individuals per company} = 4,500 \text{ Agile professionals}$$

3.4.6.2 Sample Size Determination

Using the standard formula for calculating a sample size with a 95-percent confidence level and a 5-percent margin of error, the following equation was applied:

$$n = \frac{Z^2 \cdot p \cdot (1-p)}{e^2}$$

Where:

- Z=1.96 (Z-score for 95-percent confidence)
- p=0.5 (proportion assumed for maximum variability)

- e=0.05 (margin of error)

$$n = \frac{(1.96)^2 \cdot 0.5 \cdot (0.5)}{(0.05)^2} = 384$$

Because the population is finite, the finite population correction (FPC) was applied:

$$n_{adj} = \frac{n}{1 + \left(\frac{n-1}{N}\right)} = \frac{384}{1 + \left(\frac{383}{4500}\right)} \approx \frac{384}{1.0851} \approx 354$$

Thus, the final sample size required for representativeness was approximately 354 participants.

3.4.6.3 Snowball Sampling Technique

In spite of having a clearly delineated population and sample size calculation, actual participant recruitment was carried out employing a snowball sampling approach, a common non-probability sampling technique, highly effective while dealing with hard-to-reach groups like Agile professionals who are skilled in emotional intelligence and requirement change management.

The snowball technique involved the following steps:

1. **Initial Participants (Seeds):**First respondents were gathered through professional networks, industry groups, LinkedIn, Agile groups, and personal connections in Islamabad, Lahore, and Karachi. These initial participants were used to originate the sampling process.

2. **Referral Process:**Upon finishing the survey, each respondent was asked to refer other professionals in their network that meet the study's inclusion criteria namely those occupying Agile jobs (Product Owner, Scrum Master, Developer) with one year of Agile experience and having been exposed to emotionally charged situations like requirement changes.

3. **Chain Expansion:**Each new connection resulted in subsequent referrals, and the sample expanded in an organic chain referral network. This method overcame access restrictions and guaranteed a rich diversity of respondents from various industries and organizations.

4. **Pilot and Final Sample Size:**A pilot study was conducted with 10 participants to validate the survey instrument. After refinement, the full-scale data collection continued until 202 responses were gathered. The final number of participants was set based on theoretical saturation and comparative alignment with the base study referenced, which also concluded at 201 respondents.

Rationale for Snowball Sampling: The choice to use snowball sampling was motivated by a number of considerations:

1. Inaccessibility of having a centralized database of Agile practitioners within Pakistan.
2. Greater trust and higher response rate due to word-of-mouth recommendations among the Agile community.
3. Focusing on specific experience requirements, i.e., knowing emotional intelligence in Agile environments, which cannot be identified easily using traditional sampling frames.

3.4.7 Design Questionnaire

The survey was a series of structured, closed-ended questions used to capture quantifiable aspects of Emotional Intelligence and its impact on Agile role performance, requirement change management, and team dynamics. The questions were crafted to be unambiguous and pilot-tested to ensure interpretability and validity.
The survey was separated into ordered sections as follows:

3.4.7.1: Participant's Age

The following predetermined options were used to ask participants to choose their age group:

- 20–25
- 25–30
- 30–35
- 35–40+

This age data enabled the study to conduct comparative analyses across different age groups, particularly concerning emotional responses and stress patterns within Agile project settings.

3.4.7.2 Participant's Gender:

The following predetermined options were used to ask participants to choose their gender group:

- Male
- Female

The study is able to perform gender-based comparative analyses thanks to this data, especially when it comes to the emotional categories and stressors connected to Agile project environments.

3.4.7.3: Participant Roles:

Respondents were asked to choose one of the following categories to represent their primary role within the Agile team:

1. **Product Owner:** In charge of stakeholder communication, requirement prioritization, and backlog management.
2. **Scrum Master:**Serves as the team's coach and facilitator, assisting with conflict resolution and making sure the Scrum framework is correctly implemented.
3. **Development Team:**Members of the development team, such as software engineers, QA specialists, UI/UX designers, and other contributors, are in charge of putting functional increments into practice and delivering them. This study specifically focuses on developers role from the development team of the agile team.

Analyzing the differences in requirement change challenges and emotional intelligence among the three primary Agile roles required this classification.

3.4.7.4 Professional Experience:

Participants were asked to list the number of years they had worked in a variety of professional settings, including Agile ones. This made it possible for the study to determine whether knowledge of Agile principles and extended exposure to Agile practices affected the way in which requirements change and emotional stressors were handled. To make comparative analysis easier, responses were categorized by experience brackets (1–2 years, 3-5 years, 5-7 years, 7-10+ years).

3.4.7.5 Organization Size:

In addition, respondents gave details about the size of their company (5-20, 20-40, 40-60) and industry (IT, Finance and Banking, Transport, Medical, Telecom, Healthcare, Manufacturing).

The information provided shed light on whether the size of the organization and the type of industry affected the frequency and psychological effects of requirement changes.

3.4.7.6 Project Category:

Participants were asked which project category they were working on at the time or had worked on most recently. The following choices were made to represent typical software development classifications:

1. **Maintenance:** Initiatives aimed at improving, repairing, or modernizing current systems.
2. **Migration:** Projects that involve moving systems or data from one platform or environment to another are called migrations.
3. **New Development:** Projects that require creating brand-new software programs or systems from the ground up are referred to as new developments.
4. **Software as a Service (SaaS):** Projects that offer software functionality on a subscription basis and are based on web-based or cloud-based delivery models.

3.4.7.7 Working-Mode

To further understand the environmental and context factors that could affect the emotional experience and the management of requirement changes by Agile teams, the survey also collected information on participants' working mode during the mentioned project. The aim was to investigate whether the way of working specifically in the post-pandemic scenario had an effect on emotional stressors like communication challenges, teaming obstacles, or loneliness, which can influence requirement change management in Agile contexts.
Participants were requested to indicate their work arrangement on the project from the following set of categories:

1. **Remote (from home):** Participants who carried out all their work from a remote location, normally home, and communicated with their team through digital means.
2. **In-office:** Participants who worked from the organization's office or development center throughout the project.
3. **Remote and in-office/ Hybrid:** Subjects that used a combination model, alternating between working from home and working from the office.

Having this variable helped provide significant background to the emotional dynamics noted in the study, as the working environment significantly affects interpersonal interaction, stress management, and teamwork, all of which are essential when managing requirement volatility and change.

3.4.7.8 Iteration Length

The survey also gathered information on the duration of iterations (sprints) employed by Agile teams throughout the project. The aim of measuring this variable was to check if the length of development cycles bears any impact on the emotional experience of Agile team members, especially concerning managing changes in requirements and time-related stressors like deadline pressure, workload allocation, and change integration within short time horizons.

Respondents were also requested to select the approximate length of their iteration cycles from the following pre-specified options:

- 1–3 weeks
- 3–5 weeks
- 5–7 weeks
- 7–10 weeks

Knowledge about the iteration length sheds light on the impact of iteration planning on emotional pressure, especially when teams face urgency to conform to last-minute requirement changes, deliver on commitments, or cope with interdependencies between cycles.

3.4.8 Requirement Change Management

The objective of this study is to explore the current practices and issues related to requirement change management in the software industry with the ultimate aim of creating an effective and real-life framework that can facilitate this process. For this purpose, a systematic survey was completed to gather input from the agile experts who play a direct role in managing the change in requirements in the agile environment.

The survey was aimed at learning the way requirement changes are being dealt with in actual agile projects these days, the tools and techniques used, and the strengths and weaknesses people

see in these practices. By limiting the scope to requirement change management, the research aims to achieve targeted insight into the state of practice and the particular challenges encountered by agile teams like fast-changing stakeholder expectations, communication breakdowns, and managing the complexities of achieving consistency and traceability in constant change.

The answers received from agile experts offer a rich source to determine the major challenges and areas for improvement. These findings guided the construction of a role-aware and context-aware framework intended to increase the effectiveness, responsiveness, and sustainability of requirement change management in agile software development.

3.4.8.1 Measurement of factors that make RCM challenging for Agile Team

In order to fully evaluate the emotional experience of Agile team members, and more specifically regarding requirement change management and day-to-day Agile practice, the research included a rigorous item set assessing both frequency and intensity of emotional stressors and the breadth of affective states engaged in by participants in their work. The chosen challenges are the most common factors faced by Agile team members in dealing with changing or unstable requirements. Each respondent was requested to think about how often they encountered each of these issues in their work and to mark the emotional significance involved with them. Emotions were assessed with the JAWS (Job-related Affective Well-being Scale) abbreviated form, as outlined above, conforming to Rushna Huda's affect categorization framework[15].

The following requirement change-related challenges formed the basis of the emotional evaluation:

1. **Inadequate Impact and Risk Assessment:**Respondents indicated emotional reactions caused by insufficiently evaluated requirement change impacts, such as unforeseen downstream effects, scope creep, or project derailment as a result of uninformed decisions.

2. **Incorrect Cost, Time, and Effort Estimation:**This issue reflected the emotional cost of persistent problems with resource estimation, which resulted in overloading, delayed deadlines, or rework.

3. **Inefficient Requirement Management and Tracking:**Members evaluated the emotional cost of not having defined processes or mechanisms for monitoring changes, updating documentation, and providing transparency throughout the lifecycle.

4. **Unclear Prioritization and Scope Ambiguity:**Emotions were quantified in reaction to confusion or frustration caused by unclearly defined priorities, imprecise acceptance criteria, or conflicting stakeholder requirements.

5. **Requirement Interdependencies and Instability:**The poll measured emotional stress associated with the way interdependent needs caused cascading transformations and uncertainty, particularly in systems of intricate architecture.

6. **Poor Communication and Collaboration:**Respondents assessed emotional disruptions due to communication failure, lacking feedback loops, stakeholder silos, and misunderstandings among cross-functional teams.

7. **Inconsistencies and Ambiguities in Change Requests:**Emotional reactions were found in situations with inconsistent or contradictory requirements, unclear change requests, or ambiguous terminology leading to misalignment.

8. **Lack of Necessary Skills, Tools, or Domain Knowledge:**The survey probed the affective impact of the inadequacy of preparation for facing certain changes—either lack of knowledge, lack of automation tools, or lack of training.

9. **High Cross-Functionality Demands:**Respondents indicated emotional responses to having to do things outside their core skill area, experiencing stress or disengagement due to ambiguous role boundaries or competency mismatches.

10. **High-Stakes Requirement Changes:**Emotions were also assessed in high-stress situations where changes in requirements had important ramifications—financial loss, regulatory non-compliance, or customer dissatisfaction.

3.4.8.2 Assessment of Role-based Emotional Responses to Requirement Change Management Challenges

In an attempt to obtain meaningful insights into the emotional aspects involved in the handling of requirement changes within Agile teams, the survey instrument was structured to assess the emotional reactions of participants in a direct context to a set of well-identified requirement change-related issues. These challenges, inferred from a consolidation of existing research literature, expert input, and actual observations in Agile environments, were used as independent stressor variables within the questionnaire.

All the above factors are introduced as a prompt in the survey, preceded by a matrix of emotions drawn from the JAWS scale. Participants rated the intensity and frequency with which each factor triggered certain emotions (e.g., frustration, anxiety, excitement, confidence).

Subsequent analysis of these answers helped to guide the creation of a role-specific Emotional Intelligence framework, designed to provide targeted solutions for Product Owners, Scrum Masters, and the Development team to enhance emotional control, decision-making, and teamwork in the RCM Lifecycle.

In order to determine participants' affective states with scientific reliability, the study utilized the Job-related Affective Well-being Scale (JAWS) Short Form, a standardized and widely used measure constructed to gauge emotional reactions in workplace settings. The scale applied in the current study was derived from the adaptation and application in Rushna Huda's research study, specifically tailored to high-performance work systems and employees' psychological well-being in changing settings [15].

The JAWS Short Form comprises 20 specific emotions, which are categorized into six more general affective categories, allowing for a thorough but brief assessment of emotion in the workplace:

1. **Positive and Energetic Emotions:**Such as Ecstatic, Enthusiastic, Excited, Energetic, and Inspired, describing commitment and high energy.

2. **Positive and Calm Emotions:**Comprises emotions like At ease, Calm, Content, Relaxed, and Satisfied, describing emotional equilibrium and comfort in the work environment.

3. **Negative and Angry Emotions:**Captures Angry, Furious, and Disgusted feelings commonly associated with interpersonal conflict or failing expectations.

4. **Negative and Fearful Emotions:**Includes Anxious and frightened emotions often caused by uncertainty or loss of control in changing Agile environments.

5. **Negative and Sad Emotions:**Includes Depressed, Discouraged, Gloomy emotions usually associated with frustration, rejection of work, or lack of alignment with team objectives.

6. **Neutral or Low-Energy Emotions:**Contains emotions like indifference, Bored and Weary indicates disengagement or absence of stimulation.

Respondents also assessed the frequency with which they felt each emotion within their Agile role on a 5-point Likert-type scale (Never, Sometimes, About Half time, Often, Always).

This method facilitated the measurement of emotion patterns for various Agile roles (Product Owner, Scrum Master, Development team) and allowed quantitative anchoring for the emotional intelligence constructs under study. These formats enabled significant statistical analysis, such as cross-role comparisons, and correlation against variables like age, experience, and gender.

Through the combination of the rating of particular stressors and affective states from a proven emotional inventory, the questionnaire was rich in multidimensionality in its data set to determine how emotional intelligence can be enhanced role-specifically to improve team performance, flexibility, and change management in Agile settings.

3.4.8.3 Assessment of Role-based Emotional Responses to the stages of RCM Lifecycle

In order to acquire insightful knowledge about the emotional dynamics faced throughout various phases of the Requirement Change Management (RCM) Lifecycle, i.e., Arriving, Implementation, and Delivery, this research utilized a formatted survey instrument for measuring participants' emotional responses in direct correlation to stage-related issues. Such issues were established through the synthesis of literature, expert commentaries, and field observations of practical Agile teams, and were presented as standalone stressor prompts within the questionnaire. Emotional reactions were assessed with the Job-related Affective Well-being Scale (JAWS) Short Form, modified from Rushna Huda's work[15] to suit the Agile environment. The scale encompasses 20 unique emotions grouped into six more general emotional categories (e.g., Positive and Energetic, Negative and Angry), making it possible to assess affective states in a sensitive yet effective manner. Participants used a 5-point Likert scale to rate both intensity and frequency of these emotions for the three RCM stages. This method allowed multi-dimensional insights into emotional experiences across Agile roles (Product Owner, Scrum Master, Development team), and supported quantitative analyses like cross-role and demographic (age, gender, experience, role) comparisons. The resultant data validated the creation of a role-specific Emotional Intelligence framework for enhancing emotional management, communication, and group performance during the RCM process.

3.4.8.4: Measuring Role-based Emotional Intelligence in RCM Context

In order to measure emotional intelligence while dealing with requirement changes in Agile software development teams, a 40-item structured instrument was crafted, spread over four main EI domains: Self-Awareness, Self-Management, Social Awareness, and Relationship

Management. All the items were measured on a five-point Likert scale, where respondents chose one of the following five options (1–Never, 2–Sometimes, 3–About Half the Time, 4–Often, 5–Always)

Self-Awareness: This subscale quantified the capacity of individuals to realize their own emotions and their impact on coping with requirement changes. Items gauged clarity in comprehending project dynamics, self-expression, and the impact of outside influences.

1. My understanding of the impact of requirement changes is clear at any given moment.
2. Requirement changes play an important part in the success of my projects.
3. My responses to requirement changes impact the team and stakeholders around me.
4. I find it easy to express the impact of requirement changes to others.
5. My decisions regarding requirement changes are easily influenced by external factors, such as stakeholder requests or market shifts.
6. I can easily sense when a requirement change may lead to conflict or frustration.
7. I openly communicate the impact of requirement changes to my team and stakeholders.
8. I find it easy to describe the implications of requirement changes.
9. Even when I'm concerned about a requirement change, I remain aware of its potential impact on the project.
10. I am able to step back and critically analyze the implications of requirement changes, separating them from my emotional reactions.

Self-Management: This subscale centered on the capacity of the individual to control his or her emotional reactions and behaviors when faced with change requirements. Items assessed emotional regulation, resilience, and goal commitment during stress.

1. I accept responsibility for my reactions to requirement changes and their impact on the project.
2. I find it easy to set goals for managing requirement changes and stay committed to them.
3. I maintain emotional balance when handling requirement changes, even under pressure.

4. I am patient when dealing with delays or challenges related to requirement changes.
5. I can accept critical feedback about requirement changes without becoming defensive or upset.
6. I remain composed and focused, even during stressful periods caused by requirement changes.
7. If a requirement change does not directly affect my work, I do not let it distract or concern me.
8. I can restrain myself from reacting impulsively when I disagree with a requirement change or decision.
9. I control urges to resist necessary requirement changes that could benefit the project's success or well-being.
10. I channel my energy into problem-solving and creatively addressing challenges brought by requirement changes.

Social Awareness: This area measured the participant's capacity for empathy with team members and stakeholders and being sensitive to social cues in phases of change. The items measured awareness of the emotional state of others and adaptive communication.

1. I consider the impact of my decisions regarding requirement changes on the project team and stakeholders.
2. I can easily tell if team members or stakeholders are becoming frustrated or dissatisfied with a requirement change.
3. I sense when there's a shift in a stakeholder's attitude or mood regarding requirement changes.
4. I am able to provide support and clear communication when delivering difficult news about requirement changes to the team.
5. I can generally understand how my team members and stakeholders feel about proposed requirement changes.

6. Team members feel comfortable sharing their concerns or thoughts about requirement changes with me.
7. It genuinely bothers me when requirement changes negatively affect others or cause unnecessary difficulties.
8. I usually know when to offer my input on requirement changes and when to listen or remain silent.
9. I care about how requirement changes impact the team and stakeholders involved.
10. I understand when stakeholders' priorities or plans need to change in response to evolving requirements.

Relationship Management: This scale assessed the extent to which people sustain and foster relationships in emotionally charged contexts brought about by changing needs. The items emphasized conflict resolution, influence, collaboration, and support mechanisms.

1. I am able to show support and empathy when handling concerns about requirement changes.
2. My relationships with stakeholders are built on trust and provide a safe space for open discussions about requirement changes.
3. I find it easy to share my thoughts and insights about requirement changes with others.
4. I am good at motivating team members and stakeholders to embrace necessary requirement changes.
5. I maintain a positive attitude when dealing with requirement changes, even during challenging times.
6. It's easy for me to build strong relationships with team members and stakeholders while managing requirement changes.
7. People describe me as approachable and engaging when discussing or managing requirement changes.
8. I enjoy helping others navigate through the challenges and concerns related to requirement changes.

9. Others can depend on me to follow through with decisions and actions regarding requirement changes.

10. I can help calm team members or stakeholders if they are upset or frustrated by requirement changes.

In order to minimize fatigue and maximize response rate levels, the total number of questions remained within a reasonable length (approximately 50 closed-ended), and brief navigation instructions were provided.

3.4.9 Survey Administration:

The questionnaire was collected through online means via data collection tools (e.g., Google Forms and Microsoft Forms), which offered a simple and effective way to reach a geographically spread-out target population in multiple cities of Pakistan, such as Islamabad, Lahore, and Karachi.
To increase participation and the validity of data, the following were implemented:

1. **Anonymity and Confidentiality:**Participants' anonymity and confidentiality of answers were guaranteed. No personal information was gathered, and informed consent was received at the start of the survey.

2. **Clear Instructions:**Definitions and detailed instructions (e.g., requirement change management challenges, categories of emotions, emotional intelligence dimensions) were given to make sure respondents knew the context of every question.

3. **Multi-role Representation:** The survey sought to gather feedback from three different Agile roles in each company: Product Owners, Scrum Masters, and the development team. This enabled variety across job functions.

3.4.10 Pilot Testing

Prior to the administration of the full-scale survey, there was a rigorous pilot testing process to qualify the quality, reliability, and precision of the instrument [78]. This step was vital to

improve the questionnaire, validate its correspondence with the study objectives, and resolve any uncertainty in the wording of the item, the design, or the type of response.

3.4.10.1 Purpose of the Pilot Study:

The primary objectives of the pilot test were:

- Assess the readability and concision of survey items, especially in the specific areas of emotional intelligence and requirement change issues within Agile contexts.
- Measure the response time to verify that the survey wasn't too lengthy or exhausting for respondents.
- Validate the reliability and internal consistency of the tool by means of measurements like **Cronbach's Alpha**.
- Obtain preliminary feedback and response trends that may guide final changes prior to final distribution.

3.4.10.2 Sample and Method

The pilot test covered a group of 10 Agile practitioners, recruited using purposive and convenience sampling. The participants were Product Owners, Scrum Masters, and Developers with prior working experience using Agile approaches and accommodating changes in requirements. The participants were contacted by professional networks and industry relationships and gave their comments voluntarily to assist in the instrument refinement.
The pilot ran in four iterative cycles, with the same set of professionals examining revised versions of the questionnaire at each iteration:

- **Iteration 1:** Was concerned with the overall layout, item wording clarity, and ease of movement.
- **Iteration 2:** Made adjustments based on initial feedback and reassessed scaling and demographic question construction.
- **Iteration 3:** Was aimed at addressing the emotional classification of response items and matching of Likert scales.

- **Iteration 4:** Final check to ensure consistency and usability of the instrument before large-scale implementation.

All iterations were insightful, and the participating members' regular participation ensured continuity and richness in the evaluation process.

3.4.10.3 Reliability Testing

In order to make sure that the survey tool utilized in the present research was internally consistent and reliable, a reliability analysis was performed using Cronbach's Alpha. This analysis was run on the primary constructs assessed in the questionnaire, which were:

1. Requirement Change Management Challenges (10 items)
2. Emotions Experienced During Requirement Changes (13 items)
3. Emotional Intelligence (40 items) which were split into:
   Self-awareness (10 items)
   Self-management (10 items)
   Social-awareness (10 items)
   Relationship management (10 items)

Reliability testing was conducted to determine if the items in each section consistently operated to measure the intended construct. The change in requirements challenges items that had been designed to measure perceived difficulty and operational barriers faced by Agile team members. The emotions section operated to measure the frequency of emotional experiences (positive, negative, neutral) regarding those challenges. The dimensions of emotional intelligence measure how employees manage emotions, get along with others, and cope with change as a team.

Cronbach's Alpha: The internal consistency of each group of items was measured using Cronbach's Alpha, a statistical coefficient that is widely used to quantify internal consistency, that is, how much a set of items relates to one another as a group. It is especially helpful for use with Likert-type scales, as applied in this study. The formula for Cronbach's Alpha is:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}}$$

Where:

- α: Cronbach's Alpha
- N: Number of items
- $\bar{c}$: Average inter-item covariance
- $\bar{v}$: Average variance of each item

Reliability analysis was carried out after the pilot test with 10 Agile practitioners, who responded to all 63 items in the questionnaire. The Cronbach's Alpha analysis results for each section are given below:

Table 3.1: Cronbach's Alpha

Section	**Number of Items**	**Cronbach's Alpha**	**Interpretation**
Requirement Change Challenges	10	0.82	Good
Emotions During Requirement Changes	13	0.85	Good
EI – Self-awareness	10	0.81	Good
EI – Self-management	10	0.84	Good
EI – Social-awareness	10	0.80	Good
EI – Relationship Management	10	0.88	Excellent
Overall EI – Scale	40	0.87	Excellent

As Alpha values were described using a variety of qualitative terms across studies, including: excellent (0.93–0.94), strong (0.91–0.93), reliable (0.84–0.90), robust (0.81), fairly high (0.76–0.95), high (0.73–0.95), good (0.71–0.91), relatively high (0.70–0.77), slightly low (0.68), reasonable (0.67–0.87), adequate (0.64–0.85), moderate (0.61–0.65), satisfactory (0.58–0.97), acceptable (0.45–0.98), sufficient (0.45–0.96), not satisfactory (0.40–0.55), and low (0.11) [79]. These findings confirm that every part of the questionnaire had a Cronbach's Alpha of more than 0.80, which indicates excellent to good internal consistency. This verifies that the items in each construct are well-correlated and measure reliably the intended dimensions of emotional intelligence, emotional response, and requirement change challenges within Agile teams.

3.4.11 Distribute Questionnaire and Collect Data

Following the completion of the survey instrument through expert verification and iterative pilot testing, the subsequent stage of research included the dissemination of the questionnaire and the systematic gathering of information from the study population. The stage was essential in procuring empirical evidence to respond to the study's primary aims: to assess levels of emotional intelligence, determine emotional reactions, and record issues encountered by members of an Agile team during requirement changes.

3.4.11.1 Questionnaire Distribution Strategy

The 63 closed-ended item questionnaire was designed and administered through secure online platforms such as Google Forms. The platform was chosen because of its availability, usability, and accessibility across devices (e.g., laptops, tablets, smartphones).

To elicit a response and provide transparency:

- A cover letter that highlighted the purpose of the research, objectives, confidentiality, and approximate time to complete was sent to each participant.
- An informed consent was included at the start of the form.
- No personnel data were gathered, guaranteeing anonymity and ethical adherence.

The link to the questionnaire was distributed through:

- Email (to organizational contacts and industry networks),
- Agile professional forums
- LinkedIn messages and postings
- Direct WhatsApp messages in software development and project management, WhatsApp groups.

3.4.11.2 Data Collection Period

The data collection process was spread out over eight weeks (two months) to give participants sufficient flexibility to respond to the survey. In Week 1, the questionnaire was formally launched

and rolled out on different professional networks and sites. In Weeks 2 and 3, initial responses were tracked, and a light reminder was sent to participants who had not yet responded to the survey. By Week 4, a follow-up survey in the second round was started to keep participants engaged and enhance the response rate.

Throughout Weeks 5 and 6, the survey was kept open without heavy communication to ensure organic participation and avoid pressure on respondents. The final reminder was issued during Week 7 with a push for last-minute completion and a reminder of the closing deadline. The survey was formally closed at the end of Week 8, and the gathered data was consolidated, checked, and prepared for analysis.

During the data collection process, quality and completeness were checked through monitoring responses:

- Incomplete submissions were detected and eliminated.
- Duplicate submissions (by timestamp and duplicate answers) were excluded.
- Any technical problems encountered by respondents (for example, display errors or ambiguous items) were resolved immediately.

At the completion of the collection period, the dataset was exported into Microsoft Excel and made ready for statistical analysis. There were 202 valid responses retained for analysis, near the base study's sample size (n = 201), and regarded as adequate for meaningful interpretation and generalizability.

3.4.12 Data Analysis

Following the culmination of the data collection process, an extensive data analysis procedure was undertaken to assess the variables of the research and respond to the objectives of the study. The analysis was intended to distill significant meaning from the raw data by implementing descriptive and inferential statistical methods, as well as categorizing data based on the prime constructs of the research tool.

The data analysis procedure entailed the following sequential steps:

3.4.12.1 Data Preparation and Cleaning:

The first step in the analysis process involved preparing the dataset for statistical testing:

The information gathered using the web-based survey instrument Google Forms was exported to Microsoft Excel for analysis. The data set was also thoroughly screened to capture and delete missing or invalid responses, for example, questionnaires that were left incomplete or repeated entries, to ensure data quality and integrity. Variables were named and labeled based on the corresponding sections of the questionnaire, i.e., requirement change challenges, emotional response, and the different facets of emotional intelligence. This was done for ease of systematic analysis. The master dataset was then built up with all data being collated into a well-defined format with distinct columns for every variable. Standardized response scales were used, such that Likert scale responses were converted into numbers from 1 to 5, which allowed for effective statistical analysis and interpretation of the survey results.

3.4.12.2 Descriptive Statistical Analysis

Descriptive statistics were computed to present an overall summary of the data and to condense the sample's important features. Frequency distributions were used in reporting demographic variables like age, gender, Agile role, organization size, project type, iteration duration, working mode, and industry sector, and gave insight into the participants' composition. Furthermore, measures of dispersion and central tendency, such as mean, median, mode, standard deviation, and variance, were calculated on important variables like age, gender, Agile role, organization size, project type, iteration duration, working mode, and industry sector, requirement change challenges, emotional experiences, and the four emotional intelligence dimensions. Statistical analysis helped to better grasp the central tendencies and variation with which Agile professionals subjectively experience and respond emotionally to changes in requirements, pointing out patterns and distinctions within the sample.

3.4.12.3 Categorization of Responses

For easier analysis, the information on requirement change challenges was grouped according to how often each challenge occurred. The challenges were ranked from highest to lowest frequency of occurrence so that the most common issues faced by Agile practitioners in requirement changes could be established. The emotional reactions were systematically categorized into six categories to grasp the emotional environment of the participants more accurately. These types

were Positive-Energetic (for example, enthusiastic, excited), Positive-Calm (for example, content, relaxed), Negative-Angry (for example, frustrated, irritated), Negative-Fearful (for example, anxious, worried), Negative-Sad (for example, disappointed, discouraged), and Neutral/Low Energy (for example, indifferent, fatigued). This typology presented a systematic means of examining the emotional effect of requirement changes. In relation to emotional intelligence, individual scores were determined for each participant on the four facets of emotional intelligence. These single scores were then combined in order to calculate mean scores by role, that is, Product Owners (POs), Scrum Masters (SMs), and the development team. This facilitated a comparison of emotional intelligence by role, providing some insights into how various Agile roles view and handle emotional and cognitive pressures under changes in requirements.

3.4.12.5 Inferential Statistical Analysis

To validate the research hypotheses and make effective comparisons among groups, like Agile roles and project types, inferential statistical methods were utilized. Python is used to assess whether there were significant differences in emotional intelligence scores among different Agile roles, viz. Product Owners, Scrum Masters, and Developers. This questionnaire was also employed to contrast the ways various roles or organizational settings viewed the requirement change challenge, and so that role-based or contextual differences could be understood. Further, Pearson correlation coefficients were employed to examine the correlations among age, gender, experience, and role with both the general categories of emotions and with negative emotions in particular. This was done to see if these demographic and professional variables were related to differences in emotional reaction.

3.4.13 Findings Overview

The survey data analysis produced some primary findings concerning role-based challenges, emotional reactions, and emotional intelligence of Agile team members during requirement change management. The focal roles under investigation in the current research were Product Owners (POs), Scrum Masters (SMs), and Developers, representing the core functions within Agile project settings.

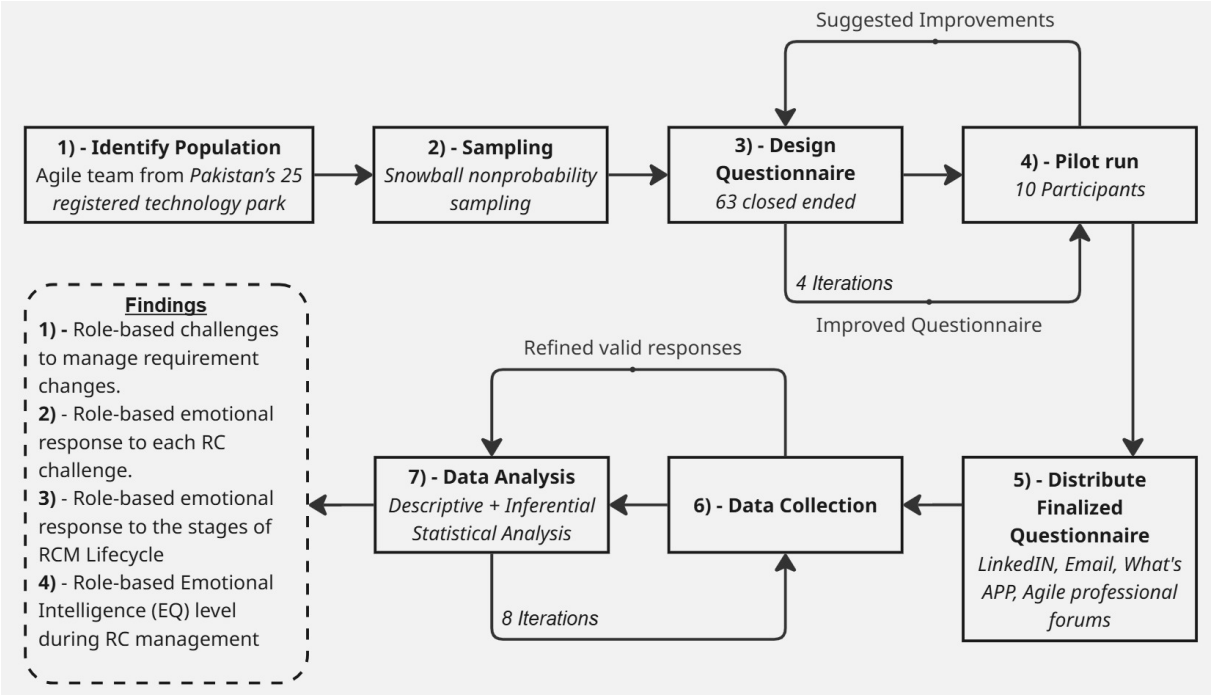

Figure 3.2: Survey Approach

3.4.13.1 Role-Based Requirement Change Management Challenges

The study's main finding was the identification of role-based challenges experienced while dealing with requirement change. Using frequency analysis and ranking, clear patterns in the nature and scale of challenges for each role were found. Product Owners most often reported issues in stakeholder communication, conflicting priorities, and pressure to make last-minute changes without losing product vision. Scrum Masters mentioned, conversely, challenges to sustaining team cohesiveness, controlling disruptions caused by changes during sprints, and reconciling expectations of the development team and external stakeholders. Developers most frequently encountered challenges with unclear or changing requirements, workload intensification stemming from rework, and technical sophistication brought about by requirement changes at later stages. These differences in terms of roles highlight the importance of having customized strategies to enable each Agile role throughout the change management process.

3.4.13.2 Emotional Responses to each Requirement Change Management Challenge

The investigation also inquired into the emotional reactions that were provoked by requirement changes and how these reactions differed between different roles. Emotions were examined both with respect to their type (e.g., positive, negative, or neutral) and intensity. Findings showed that Product Owners tended to feel high stress and anxiety levels during the negotiation and

stakeholder alignment processes, especially when changes were at odds with priorities previously agreed upon. Scrum Masters expressed feelings of pressure and frustration, particularly when change impacted team velocity or sprint objectives. Developers were shown to have a wider range of emotions, ranging from curiosity and interest when changes brought innovation, through to irritation and disappointment when confronted with unclear or poorly documented requirements. Emotional reactions were mapped into six predetermined categories—Positive-Energetic, Positive-Calm, Negative-Angry, Negative-Fearful, Negative-Sad, and Neutral/Low Energy—to facilitate systematic analysis. This classification uncovered that even though negative feelings were more common across disruptive changes, there were examples of positive reactions when changes were adequately warranted and handled collaboratively.

3.4.13.3 Emotional Responses Across the Requirement Change Life Cycle

Additional analysis was directed toward charting emotional responses against stages of the requirement change life cycle: arrival, implementation, and delivery. At the arrival phase, when a change request is initially presented, most participants in all roles identified feelings of uncertainty, concern, or frustration, especially if the change was unexpected or unclear. During the implementation phase, emotional intensity tended to peak. Developers showed more stress from time pressures and complexity, while Scrum Masters indicated needing to stay calm and solution-oriented when under pressure. Product Owners fluctuated between stress and determination because they were attempting to balance stakeholders and the development team. At the delivery phase, emotional reactions became more extreme. Implemented changes that worked generally led to relief, satisfaction, or pride, particularly if the process was collaborative. In contrast, if the change resulted in lower product quality or team exhaustion, feelings of disappointment and exhaustion were expressed.

3.4.13.4 Role-Based Emotional Intelligence in Requirement Change Management

The last dimension of the results dealt with the evaluation of emotional intelligence (EI) across positions under requirement change management. Emotional intelligence was assessed in four central dimensions: self-awareness, self-management, social awareness, and relationship management. Product Owners tended to have higher ratings in self-awareness and social awareness due to their requirement to handle intricate stakeholder relationships and make value-based decisions. Scrum Masters displayed dominant self-management and relationship

management skills, in keeping with their position as facilitators and conflict resolvers in the team. The development team showed fluctuating EI scores, with high levels of self-management but weaker social awareness, perhaps a reflection of the task-based focus of their work. When rolled up by role, the data indicated that emotional intelligence not only differed by role but also had an impact on the way people reacted to and coped with requirement changes. Greater EI levels tended to correlate with more positive emotional reactions and adaptability, highlighting the promise of emotional intelligence as a key driver in Agile change management success.

3.5 Interviews for Framework Development

After the quantitative analysis of the survey, the study moved on to the qualitative stage, where semi-structured interviews were conducted. The main purpose of this stage was to delve deeper into the challenges identified in the survey and to get a better understanding of the emotional dynamics and coping mechanisms involved in requirement change management in Agile development. The challenge-based issues that were revealed through the survey acted as a stimulus to develop the interview questions, thus making the discussions based on actual and applicable situations. The participants, Product Owners, Scrum Masters, and the development team were requested to discuss their own experiences concerning each challenge in detail, outline the emotional patterns they went through at varying phases of requirement change, and provide insights into how they handled or overcame them. This qualitative data brought context and depth to the emotional reactions and behaviors that were first noted in the survey. In addition, it provided experience-based solutions and coping strategies employed by Agile professionals. These findings were central to highlighting common emotional themes, contextual cues, and successful interventions, all of which informed the creation of a role-based emotional intelligence framework. This framework seeks to assist Agile teams in better handling requirement changes by promoting emotional awareness, resilience, and collaboration that is specifically attuned to the needs and challenges of each role.

3.5.1 Interview Protocol Development

To ensure methodological consistency and applicability to the software engineering environment, the interview protocol for this research was developed using a hybrid approach based on Kvale and Brinkmann's (2022) Seven Stages of Interview Inquiry and Runeson and Höst's (2009) empirical research guidelines. This hybrid approach ensured that the interview protocol addressed both the psychological and emotional aspects of requirement change management as well as the practical, real-world considerations of Agile software development teams [80, 81].

3.5.1.1 Thematizing

The initial step, thematizing, was about specifying the interview purpose definitively and converting the researchable theme of key concepts into the study. These were:

- Role-based requirement change management challenges
- Emotional reactions at all stages of the requirement change life cycle (arrival, implementation, and delivery)
- Aspects of emotional intelligence as displayed by different Agile roles (Product Owner, Scrum Master, the development team)

Themes were inferred from the quantitative survey results, which were used as input for developing questions in an effort to better understand these phenomena.

3.5.1.2 Designing

At the design phase, we decided to use a semi-structured interview to achieve consistency among participants while having the provision to cover individual experiences and perceptions. To map the interviews against our research aims and the role-specific outcomes of the survey phase, we grouped questions under thematic headings. Overall, we developed 18 open-ended questions to facilitate effective discussion.

The protocol design involved:

- An introduction that presented the research aim, assured confidentiality, and secured informed consent.
- Background questions to situate each participant's Agile role and project experience.

- Affective core interview questions focused on personal challenges, emotional responses, and actions in response to requirement changes.
- Probes that were developed to investigate emotional patterns and coping strategies, based on emotional intelligence dimensions like self-awareness, self-management, social awareness, and relationship management.

Pilot testing was done with two subjects, a Scrum Master and a Developer, to enhance the flow and precision of the questions, as Runeson and Höst suggested, validating the interview guide before full deployment.

3.5.1.3 Interviewing

Interviews were carried out in an informal, conversational, and contemplative style, as conceived by Kvale and Brinkmann as "a professional conversation." All sessions took about 45 to 60 minutes and were audio-recorded with the explicit consent of the participants to guarantee data accuracy and dependability. Interviewers stayed neutral and used active listening skills to create openness and prompt participants to share rich, unvarnished descriptions. 25 industry professionals were interviewed in this study, including 10 Scrum Masters, 5 Product Owners, and 10 Developers, to provide a wide range of views across the principal Agile roles.

3.5.1.4 Transcribing

All the interviews were transcribed soon after data collection. Nonverbal indicators, pauses, and emotional expressions (e.g., laughter, hesitation) were recorded where appropriate, as these aspects contained valuable context information, particularly in deciphering emotional patterns and responses.

3.5.1.5 Analyzing

Thematic analysis informed by the tenets of Socio-Technical Grounded Theory (STGT) was used to code and interpret interview data. Through a mix of open and axial coding, emotional response themes, coping strategies, and role differences were established. Qualitative data analysis software MAXQDA was used to aid coding, with informed by the survey outcome as

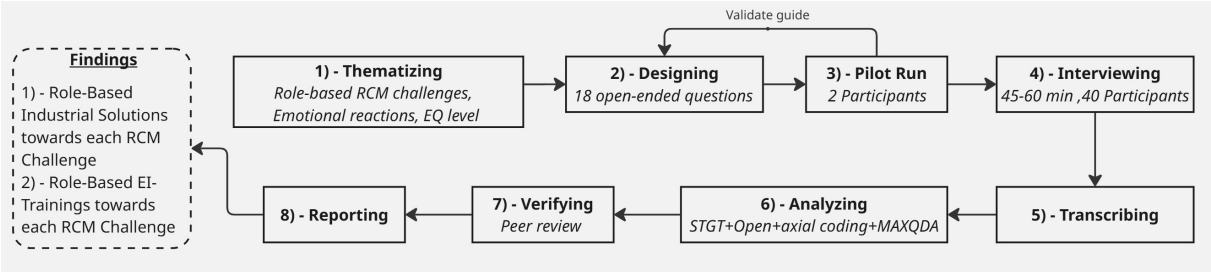

Figure 3.3: Kvale and Brinkmann's (2009) Seven Stages of Interview

well as extant emotional intelligence models. This method facilitated greater incorporation of requirement change challenges in terms of role-specific emotional and behavioral responses.

3.5.1.6 Verifying

In order to guarantee credibility and trust, the most popular verification method is used:

Peer review: Coded transcripts and theme categorization checked against academic experts and industrial experts.

3.5.1.7 Reporting

Finally, the last phase uncovered the results in the form of analytically robust and hard-lined experiences. Role-oriented narratives and emotional responses were viewed as indicating the vital perceptions.These findings directly informed the development of (1) Role-Based Industrial Solutions for each identified RCM challenge, and (2) Role-Based Emotional Intelligence (EI) Trainings tailored to how each role, Product Owner (PO), Scrum Master (SM), and Development Team perceives and responds to the pressures of requirement changes.

3.6 Framework Design

A Role-Based Emotional Intelligence (EI) Framework was designed to translate qualitative findings into a practical, Agile-specific structure that addresses Requirement Change Management (RCM) challenges. The framework's development was guided by thematic insights from surveys and semi-structured interviews, along with emotional patterns and coping strategies identified through Socio-Technical Grounded Theory (STGT).

This framework emphasizes the three core Agile roles—Product Owners (POs), Scrum

Masters (SMs), and the Development Team (DT)—and integrates the four foundational EI domains: self-awareness, self-management, social awareness, and relationship management. Each role's emotional responses and behavioral responsibilities were analyzed in the context of specific RCM challenges.

To ensure practical relevance, the framework provides:

- Role-based industrial solutions tailored to each identified RCM challenge
- Role-based EI trainings aligned with the emotional demands and coping needs of each role

Overall, the Role-Based EI Framework offers a theoretical and application-based basis for developing emotionally intelligent Agile teams and presents a path to resolve the human-oriented issues of requirement volatility in software development.

3.7 Summary

Chapter 3 describes the details of the methodology used to study the emotional dynamics of Requirement Change Management (RCM) within an Agile context. It starts with defining the research aims and deriving thematic insights from the literature review to inform the design of the survey. The survey was aimed at primary Agile roles: Product Owners, Scrum Masters, and Development Team, with precise eligibility conditions involving skills based on professional experience. A snowball sampling method was utilized to access a diverse sample population, and the survey was carefully crafted to gather demographic data, quantify role-based affective reactions to RCM challenges, and evaluate Emotional Intelligence (EI) within the context of RCM. Pilot testing was done for survey items' clarity, reliability, and pertinence, with Cronbach's Alpha utilized for verifying reliability.

The process of data collection was marked by a clearly defined methodology of distribution and a static time period of data collection, complemented by strict data cleaning and preparation. The analysis had both descriptive and inferential statistics to determine patterns in emotional reactions and EQ competencies by roles and RCM lifecycle phases. The chapter also presents the qualitative aspect of the study through semi-structured interviews for supporting framework development. Applying a structured procedure ranging from thematizing to reporting, interview data were applied to substantiate and enhance the quantitative results. The combination of both

data sources provided the foundation for developing the Agile Role-Based Emotional Intelligence Framework (ARBEI-Framework) for Agile teams in order to enhance RCM practice.

CHAPTER 4

REPORTS AND DISCUSSIONS

4.1 Introduction

This chapter provides the details regarding the result analysis of the survey, interview, and design of the Agile Role-Based Emotional Intelligence (ARBEI) framework. It also provides the details regarding the result analysis of the expert review to validate the framework.

4.2 Pilot Test Result Analysis

The pilot test was conducted with ten agile practitioners. The details of the pilot test design are given in Chapter 3. From the responses obtained from the four pilot testing drafts, some key changes were incorporated to improve the clarity and organization. Wording changes were first made to remove ambiguity, especially in questions about emotional intelligence and challenges in Agile requirement changes, so that participants would be able to correctly interpret the items. The overall organization and sectioning of the questionnaire were also enhanced with clearly differentiated emotional intelligence items and requirement change management challenges, creating a clearer and more structured format. Moreover, the response options, particularly the Likert scale options, were made more uniform in the sections so that participants can respond more easily and confidently. Lastly, visual styling improvements were added to

enhance readability and provide an improved user experience on desktop and mobile browsers. These changes collectively contributed to creating a more effective and user-friendly survey questionnaire for data collection.

4.3 Survey Execution

This section highlights the details regarding the survey conducted. The survey design details are provided in Chapter 3. The guidelines by Mark Kasunic were utilized for the survey. The survey was conducted after the finalization of survey questions through a pilot test. The survey was conducted with 202 respondents. The survey respondents included agile development team members, product owners, scrum masters, and development team members of the organization in 25 registered technology parks in Pakistan. Participants were chosen according to their experience with Agile practices and engagement in requirement change management processes. In order to facilitate wide accessibility and ease of use, the survey was conducted online so that participants could respond at their convenience. Initial clear instructions were given at the start of the questionnaire to help direct the respondents, and steps were taken to guarantee confidentiality and voluntariness. The survey sought to gather information on emotional intelligence aspects and the issues encountered during requirement changes in Agile settings. These gathered responses were quantitatively analyzed to identify how emotional intelligence is connected with being able to effectively deal with the challenges of requirement change. The data collection and analysis details of the survey are given in the upcoming subsections.

4.3.1 Demographics Section

The demographic section of the survey was strategically constructed to capture critical background information of the respondents. The demographic variables were age, gender, professional experience, domain of the project, working mode, role, project contract type, iteration length, project category, and team size. The subsection presents the details regarding the descriptive statistics of respondents' demographic variables

4.3.1.1 Descriptive Statistics Based on Age

The age of participants was noted in order to analyze the possible generational effect on workplace emotional intelligence. For example, younger participants would reflect good adaptability but low emotional resilience, while older participants would use the experience to control emotions and cope with change. Insights from age help explore *"how emotional responses change with maturity and tenure in the workplace"*.

Table 4.1 shows the descriptive statistics in the form of frequency and percentage of participants based on age. The findings show that most of the participants were within the age groups 20–25 and 25–30, representing 38.12% and 36.14% of the sample size, respectively. These two age groups together represent about 74.26% of all the respondents, which means that the survey was largely done by young adults. Less than 30 respondents are in the 30–35 and 35–40+ age groups, with a total frequency of only 15.84% above 30. In total, the evidence indicates that the survey captured mainly a younger section of the population.

Table 4.1: Age Frequency Percentage Table

Range	**Frequency**	**Percent**	**Cumulative Percent**
20-25	77	38.1%	61.9%
25-30	73	36.1%	84.1%
25-35	2	1%	84.8%
30-35	32	15.8%	94.5%
35-40+	18	8.9%	100.0%
Total	**202**	**100.0%**	

Table 4.2 shows the descriptive statistics of participants based on age. The average age of the respondents is 27.30 years, which means that on average, the participants are in their late 20s. The median age is 27.5 years, which is almost the same as the average, so it is inferred that the ages are more or less symmetrical in distribution and are not very skewed. The mode of the age data is 22.5 years, and this is the most common age present in the sample. This presents a unimodal distribution, and there is a clear peak of younger participants present at this age. Minimum age reported is 22.5 years and maximum age is 37.5 years, leading to an age gap of 15 years. This reveals that although the majority of the respondents are in their 20s, the sample

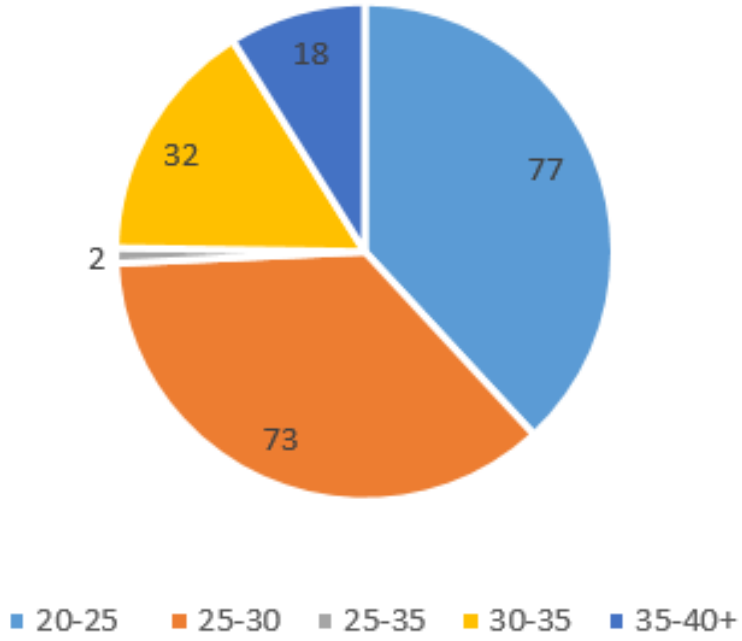

Figure 4.1: Descriptive Statistics based on Age

comprises people up to their late 30s, indicating a moderately heterogeneous group regarding life and work experience.

Table 4.2: Descriptive Statistics based on Age

Statistics	**Value**
Mean	27.30
Median	27.5
Mode	22.5 – unimodal
Minimum	22.5
Maximum	37.5

Figure 4.1 displays a pie chart showing the percentage distribution of respondents in relation to their different ages. It visually emphasizes the ratio of participants in each age group, providing a quick overview of the age profile.

4.3.1.2 Descriptive Statistics Based on Gender

Gender distribution was gathered to provide diversity and to determine if there could be gender-related differences in emotional intelligence characteristics or stress management. A total of 202 individuals participated in the survey. The result analysis shows that out of 202 survey participants 30 respondents were female and 172 were male. Table 4.3 shows the descriptive statistics based on gender.

Table 4.3: Gender Frequency Percentage Table

Gender	**Frequency**	**Percent**	**Cumulative Percent**
Female	30	14.85%	14.9%
Male	172	85.15%	85.1%
Total	**202**	**100%**	**100%**

The gender ratio of the 202 individuals who participated in the survey, however, shows a vast imbalance, with 172 individuals (85.15%) reporting being male and 30 individuals (14.85%) reporting being female. The overwhelming number of male participants may affect overall emotional response patterns and perceptions regarding challenges in requirement change, particularly in predominantly male roles like developers and product owners. But while the number of female respondents is proportionally smaller, it does offer rich insights into gendered experience and emotional dynamics within Agile environments. They add diversity to a complete picture of emotional intelligence and can be used to highlight distinct coping strategies or communication styles well-represented among male participants.

Figure 4.2 is a pie chart illustrating the percentage distribution of the respondents by gender groups. It provides a clear visual representation of how participants are distributed between various genders.

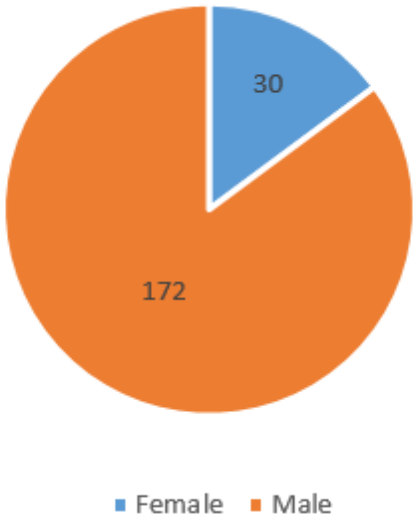

Figure 4.2: Descriptive Statistics based on Gender

4.3.1.3 Descriptive Statistics Based on Professional Experience

Experience assists in gauging the maturity and exposure of participants in coping with requirement changes. Table 4.4 shows the frequency and percentage distribution of respondents in terms of their work experience. There were 202 participants, and the largest category was individuals with 2 to 5 years of experience (82 respondents, 40.6%), which indicates that a good number of the sample is at mid-level experience within the Agile environment. Both the under 2 years and 7 to 10+ years brackets were chosen by 47 respondents (both 23.3%), representing an even spread of early-career professionals and long-serving experts within the sample. This gives a wide-ranging overview of requirement change management practice against varying degrees of maturity. The 5 to 7 years experience group consisted of the lowest proportion, with 26 respondents (12.9%), although it still shares valuable insights of mid-to-senior level professionals. Overall, the distribution indicates that the survey encompasses views of participants across a broad experience range and enriches the findings with both new and experienced Agile perspectives.

Table 4.4: Professional Experience Frequency Percentage Table

Professional Experience	**Frequency**	**Percent**	**Cumulative Percent**
less than 1 year- 2 year	47	23.3%	23.3%
2 year - 5 year	82	40.6%	63.9%
5 year - 7 year	26	12.9%	76.7%
7 year - 10+ year	47	23.3%	100.0%
Total	**202**	**100%**	**100%**

Table 4.5 shows descriptive statistics of respondents' professional experience, which describes measures like the mean, median, mode, minimum value, and maximum value. The mean experience is 3.8 years, implying that, on average, the participants have a moderate level of professional exposure, especially in Agile environments.The 5 years median means that half the sample has up to 5 years of experience, and the other half have greater than that, showing a slightly more experienced sample set. The 2 years mode (unimodal) tells us that the most common individual experience value is in the early-career range. The lowest reported experience is 1 year, while the highest is 7 years, showing a diversified range of experience among the sample, from relatively junior practitioners to very experienced professionals. The range allows for a balanced assessment of Agile requirement change practice at different maturity levels.

Table 4.5: Descriptive Statistics based on Professional Experience

Statistics	**Value**
Mean	3.8
Median	5
Mode	2 – unimodal
Minimum	1
Maximum	7

Figure 4.3 displays a pie chart showing the percentage distribution of respondents in relation to their professional experience. It visually emphasizes the ratio of participants in each professional experience level, providing a quick overview of the experience profile.

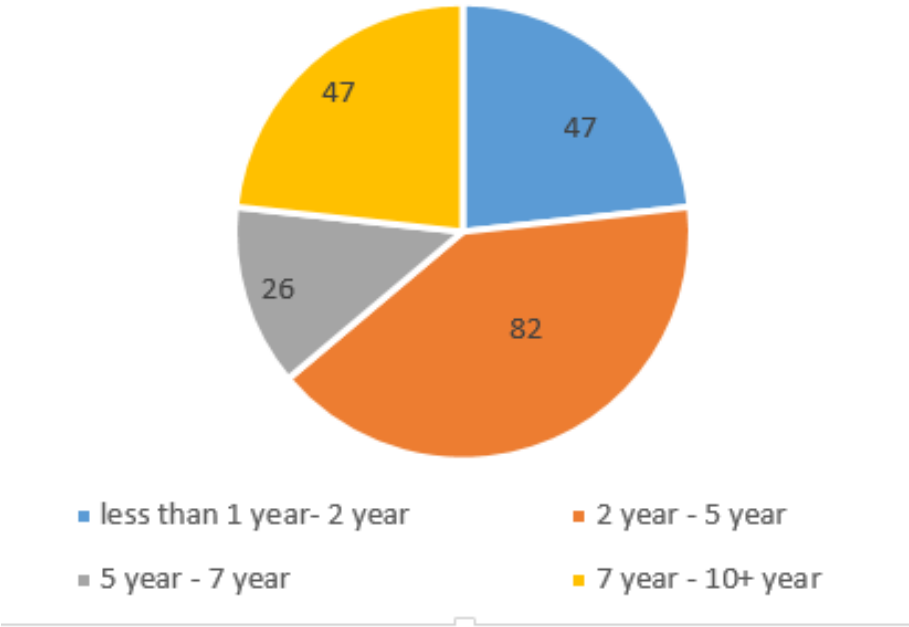

Figure 4.3: Descriptive Statistics Based on Professional Experience

4.3.1.4 Descriptive Statistics Based on Domain of the project

The domain-specific experience of participants offers important context for interpreting the findings of this study on emotional intelligence and requirement change management in Agile teams. As shown in Table 4.6, the majority of respondents 171 out of 202 participants (84.65%) belong to the Information Technology (IT) sector, indicating that the survey results are predominantly influenced by IT-based Agile professionals. The finance and banking sector is represented by only 2 participants (0.99%), while the healthcare sector includes 1 participant (0.50%), together comprising less than 2% of the total sample. Furthermore, 12 participants (5.94%), 5 participants (2.48%), and 11 participants (5.45%) representatives come from the manufacturing sector, the telecom sector, and other sectors, respectively as shown in the chart below. Although the dataset includes a variety of professional backgrounds, the distribution is clearly skewed toward IT. As a result, the conclusions drawn from this research are most applicable to Agile practices within the IT industry, with limited generalizability to other domains due to the low response rate from non-IT sectors.

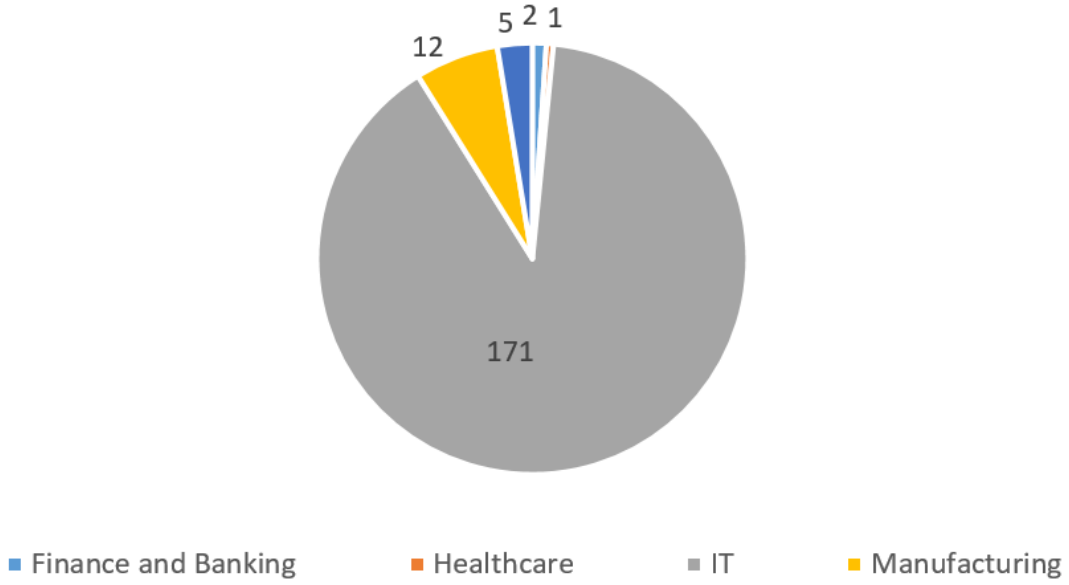

Figure 4.4: Descriptive Statistics Based on Domain of the project

Table 4.6: Domain Frequency Percentage Table

Domain	**Frequency**	**Percent**	**Cumulative Percent**
Finance and Banking	2	0.99%	0.99%
Healthcare	1	0.50%	1.49%
IT	171	84.65%	86.14%
Manufacturing	12	5.94%	92.08%
Other	11	5.45%	97.53%
Telecom	5	2.48%	100.00%
Total	**202**	**100.00%**	

Figure 4.4 is a pie chart illustrating the percentage distribution of the respondents by domain of the project. It provides a clear visual representation of what the domains are in the project participants are working.

4.3.1.5: Descriptive Statistics Based on Working Mode

The descriptive statistics based on Working Mode shows that the majority of the respondents operated in the office full-time, pointing to the persistence of conventional working environments that support face-to-face interaction and real-time coordination. The majority of surveyed people worked in a hybrid mode, mirroring contemporary flexible work habits, which brings emotional issues such as virtual fatigue and context switching, as well as advantages such as better work-life balance. Another group consisted of those who worked remotely or in other less common arrangements, experienced specific stressors such as communication latency and tool dependency. These diverse working contexts provided the critical background for comprehending role-specific emotional dynamics. Furthermore, they suggested applying to emotional intelligence framework across various Agile contexts.

Table 4.7 shows that most participants, 116 respondents (57.43%), working in-office, indicate that traditional on-site collaboration remains prevalent in many Agile environments. A notable surveyed participants, 57 respondents (28.22%), reported following a hybrid working model that is a combination of remote and in-office work, reflecting a growing trend toward flexible working arrangements. Additionally, 23 participants (11.39%) indicated they worked remotely from home, while 2 participants (0.99%) worked remotely from other, unspecified locations. A small number, 4 respondents (1.98%), selected "Other" as their mode of work. Overall, while in-office work continues to dominate. The data highlights a significant shift towards hybrid and remote work setups, emphasizing the evolving nature of Agile workspaces in response to modern professional demands.

Table 4.7: Work Mode Frequency and Percentage Distribution

Mode	**Frequency**	**Percent**	**Cumulative Percent**
In-office	116	57.43%	57.43%
Other	4	1.98%	59.41%
Remote	2	0.99%	60.40%
Remote (from home)	23	11.39%	71.79%
Remote and in-office combination	57	28.22%	100.00%

Figure 4.5 is a pie chart illustrating the percentage distribution of the respondents by working mode. It provides a clear visual representation of the working mode of the participants.

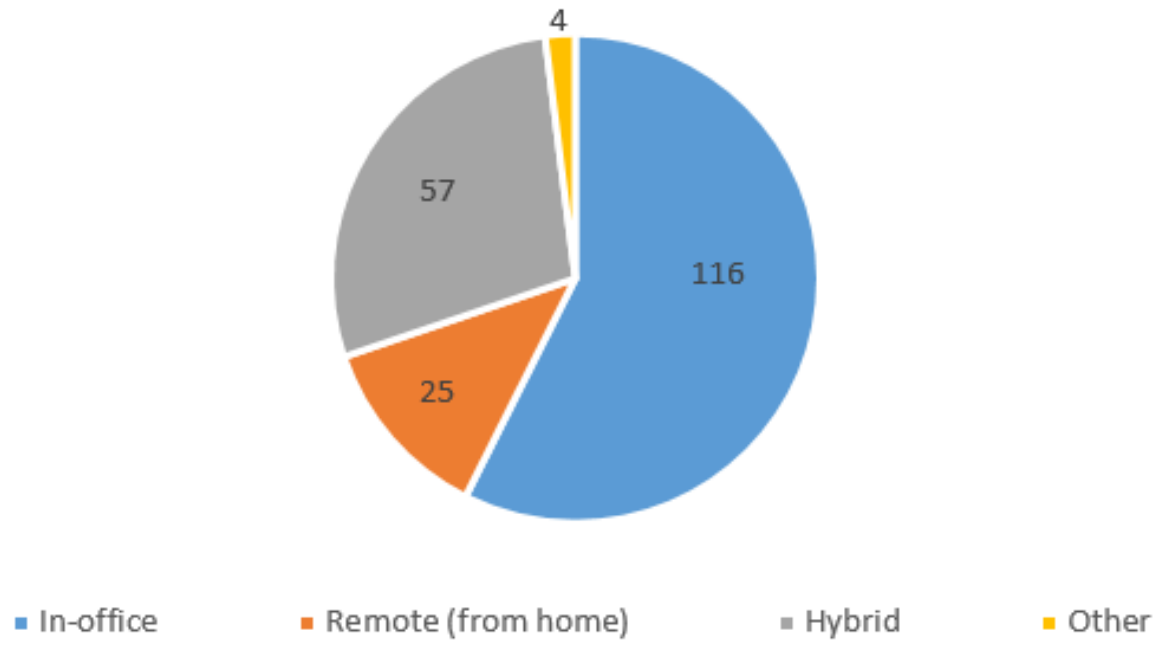

Figure 4.5: Descriptive Statistics Based on Working Mode

4.3.1.6 Descriptive Statistics Based on Team Role in the Project

The different roles of Product Owner, Scrum Master, and Development team provided useful information regarding differences in emotional challenges by Agile responsibilities. The largest group, Development team members, reported emotions related to workload, clarity of instructions, and facing close deadlines. Scrum Masters experienced stress due to a lack of coordination, inconsistent team sentiments, and conflicts. Scrum masters play a central role in sustaining flow and communication. On the other hand, Product Owners coped with stakeholders' demands, prioritization, and planning.

Table 4.8 shows the distribution of participants by their roles in Agile teams. A high concentration in the Development Team represents 63.37% of the total answers. This aligns with the common configuration of Agile environments, where developers, testers, business analysts, and similar roles constitute the core of the project implementation. Their high representation offers valuable insight into the emotional and working difficulties that they encountered during requirement changes. Scrum Masters made up 25.25% of the surveyed population. As the process and team facilitators, their responses revealed stress coordination and conflict resolution. In addition to this, this highlighted how they kept their team spirits high in facing the changing requirements. Product Owners at 11.39% brought insights, corresponding to balancing stake-

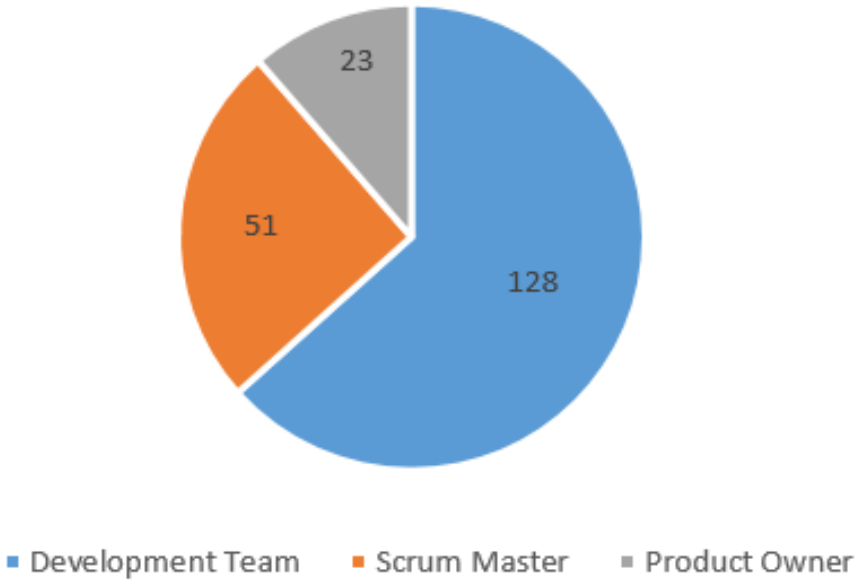

Figure 4.6: Descriptive Statistics based on Role

holders' expectations, backlog management, and prioritization while being under pressure. The smallest group, yet strategic in role, their emotional insight is particularly valuable during the early stages of requirement changes.

Table 4.8: Role Frequency Percentage Table

Role	Frequency	Percent	Cumulative Percent
Development Team	128	63.37%	63.37%
Scrum Master	51	25.25%	88.61%
Product Owner	23	11.39%	100%
Total	**202**	**100%**	

Figure 4.6 is a pie chart, illustrates the percentage distribution of the respondents by agile roles. It provides a clear visual representation of the roles of the participants.

4.3.1.7 Descriptive Statistics Based on Project Contract Type

The examination of project contract types indicates varied practices in Agile projects. Fixed Price contracts emphasize defined work and rigid schedules, which tend to cause issues and emotional tension while handling requirement changes. Time and Material contracts are more flexible to change, but can produce tension resulting from continuous bargaining and workload uncertainty. The other unknown types of contracts were mentioned by some participants, which account for diverse arrangements that influence how requirement changes and associated emotions are managed. Awareness of these types of contracts explains their influence on the emotional responses of Agile teams and RCM.

Table 4.9 illustrates the distribution of the respondents by the type of project contract that they are currently conducting. The majority of the contract type is Fixed Price, used by 77 respondents (38.1%), where clients pay exclusively for work that is predefined and agreed upon. This demonstrates a high prevalence of scope-bound and structured projects in the sample. The second most frequent is Time and Material, cited by 68 respondents (33.7%), indicating contracts under which clients are charged for the actual work done. This approach has a tendency to facilitate more flexibility and is prevalent in Agile settings. In a surprising twist, 21 respondents (10.4%) indicated they did not know their contract type, and perhaps this might reflect a lack of engagement in project management or decision-making roles.

Moreover, 36 interviewees (17.8%) chose "Other", possibly hybrid or performance-based contracts. Overall, the results indicate an even balance of traditional and flexible project pricing systems, with a large percentage of the sample being accustomed to Agile-compatible contract types.

Table 4.9: Project Contract Type Frequency Percentage Table

Contract Type	**Frequency**	**Percent**	**Cumulative Percent**
Fixed Price (Client pays only for the predefined work)	77	38.1%	38.1%
Time and Material (Client pays for any development work)	68	33.7%	71.8%
I don’t know	21	10.4%	82.2%

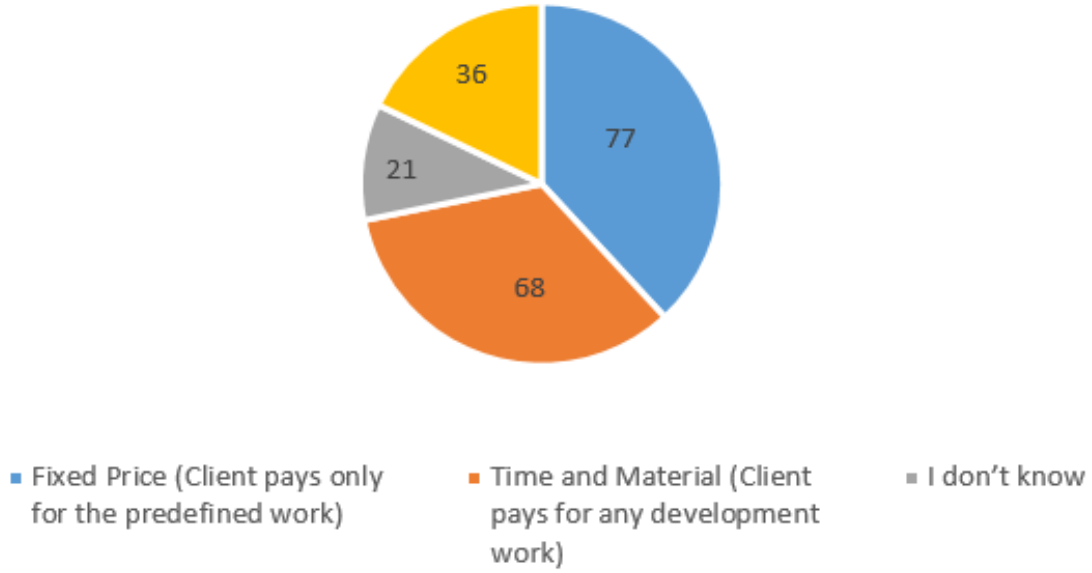

Figure 4.7: Descriptive Statistics Based on Project Contract Type

Contract Type	Frequency	Percent	Cumulative Percent
Other	36	17.8%	100%
Total	**202**	**100%**	

Figure 4.7 is a pie chart illustrating the percentage distribution of the respondents by project contract type. It provides a clear visual representation of the project contract type.

4.3.1.8 Descriptive Statistics Based on Iteration length

The iteration length analysis shows different Agile practices that impact emotional dynamics and requirement change management. The majority used 1 to 3 week iterations, which comply with fundamental Agile values in providing fast feedback and flexibility, even if the speed may add pressure from constant deadlines. Iterations between 3 to 5 weeks provide a middle-ground approach in taking care of flexibility while avoiding stressing out. Less frequently, 5 to 7 weeks iterations permit more in-depth work but can inhibit responsiveness, while occasional 7 to 10 weeks iterations are similar to old approaches, inhibiting feedback and adding emotional pressure from delayed changes. These cycles illustrate how iteration duration affects team responsiveness as well as individual well-being.

Table 4.10 reflects the distribution of respondents by the length of their Agile iteration cycles (e.g., sprints). Most participants, 100 respondents (47.2%), had iterations of 1 to 3 weeks,

following typical Agile and Scrum practices that stress short, iterative development cycles for quicker feedback and flexibility. A smaller subset, 33 participants (15.6%), uses 3–5 week iterations, and 17 participants (12.7%) operate using 5 to 7 week iterations, which could imply more intricate deliverables or less frequent shipments. Interestingly, 52 participants (24.5%) indicated longer iterations of 7 to 10 weeks, which could be indicative of hybrid or customized Agile practice. In general, the data shows that short iterations dominate, but there is a certain variation in the length of iterations, which implies that teams are making Agile practices flexible to meet the project complexity, company structure, or customer requirements.

Table 4.10: Iteration Length Frequency Percentage Table

Iteration	**Frequency**	**Percent**	**Cumulative Percent**
1–3 weeks	100	47.2%	47.2%
3–5 weeks	33	15.6%	65.8%
5–7 weeks	17	12.7%	74.2%
7–10 weeks	52	24.5%	100%
Total	**202**	**100%**	

Table 4.11 presents the most important descriptive statistics for the iteration lengths provided by the survey respondents. The mean iteration length is 4.3 weeks, which implies that Agile teams are generally working in a moderate-sized iteration cycle, more than the standard 2–3 weeks Scrum sprint. Median iteration length is 4 weeks, which implies that half of the teams employ iteration lengths of 4 weeks or less, and the other half employ longer iterations. Mode is 2 weeks, which indicates that this is the most commonly observed iteration length, which aligns with typical Agile and Scrum practices. The shortest reported iteration duration is 2 weeks, with a highest value of 8.5 weeks, suggesting that some teams use much longer iterations, perhaps due to complicated projects, fewer client reviews, or blended development methodologies. Generally, the data shows a wide variation in iteration practices, with the core relying on short to medium cycles, and a smaller group using longer, less common iteration durations.

Table 4.11: Descriptive Statistics Based on Iteration Length

Statistics	**Value**
Mean	4.3
Median	4

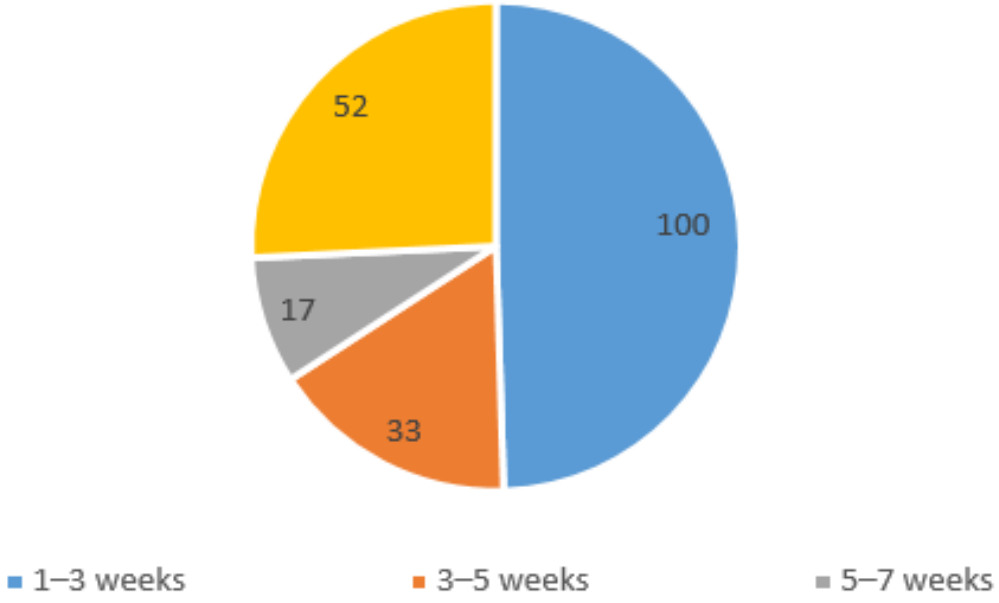

Figure 4.8: Descriptive Statistics Based on Iteration Length

Statistics	Value
Mode	2 – unimodal
Minimum	2
Maximum	8.5

Figure 4.8 is a pie chart that illustrates the percentage distribution of the respondents by Iteration length. It provides a clear visual representation of the variations in the length of iterations.

4.3.1.9 Descriptive Statistics Based on Project Category

The project category analysis shows the varied Agile contexts, effect on requirement change management, and team emotions. The most common category, new development projects, requires high flexibility, encourages excitement, and creates pressure on agile teams to meet innovation and deadlines. Maintenance projects, though more stable, can be emotionally charged by the immediacy of bug fixes and responsibility. Migration initiatives are technologically challenging and emotionally taxing because of the need for precision and the risk of data loss. SaaS initiatives have continuous updates according to user feedback, adding pressure towards fast delivery and high user satisfaction. Other initiatives, such as Research and Development or mixed models, are highly variable in impact. Identification of these types assists in knowing

how project types influence Agile team dynamics and their emotional tolerance to requirement changes.

Table 4.12 illustrates the distribution of survey respondents by the nature of the project they are working on. About 99 respondents (49.01%) indicated that they are working on new development projects, which suggests that close to half of the sample is working on constructing new software systems or products from scratch, usually with dynamic requirement changes and heavy collaboration. A large number, about 65 (32.18%) are engaged in Software as a Service (SaaS) projects, an indicator of the industry's emerging trend of using cloud-based and subscription-based platforms. The segment tends to need constant updates and rapid iteration cycles. Maintenance projects were chosen by 20 respondents (9.90%), indicating that a smaller percentage of the sample is concerned with maintaining and renewing current systems. At the same time, 15 respondents (7.43%) chose "Other", which may account for consultancy, integration, or support projects, and 3 respondents (1.49%) reported working on migration projects, showing infrequent but important transformation efforts. In general, the data indicates that most of the participants are working on new or changing kinds of projects, i.e., development and SaaS, where the use of Agile practices and requirements changes is more frequent and complex.

Table 4.12: Project Category Frequency Percentage Table

Category	**Frequency**	**Percent**	**Cumulative Percent**
New development	99	49.01%	49.01%
Software as a Service (SaaS)	65	32.18%	82.67%
Maintenance	20	9.90%	92.57%
Other	15	7.43%	100.0%
Migration	3	1.49%	100%
Total	202	100%	

Figure 4.9 is a pie chart illustrating the percentage distribution of the respondents by Project Type. It provides a clear visual representation of the variations in the Project Types respondents were working on.

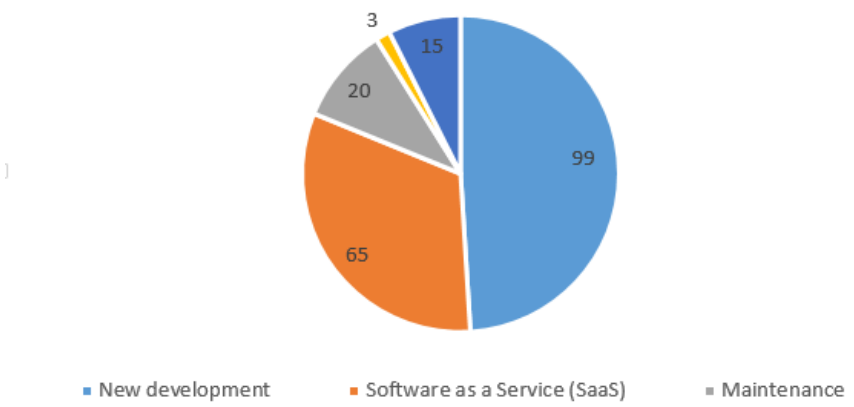

Figure 4.9: Descriptive Statistics Based Project Category

4.3.1.10 Descriptive Statistics Based on Team size

Team size has a strong impact on Agile project management, emotional dynamics, and change management. Small teams, 5 to 20, are very good at communication, trust, and rapid adjustment, well suited for Agile's collaboration style. However, medium teams, 20 to 40, balance scalability with manageability, having specialized skills but needing more organized communication and emotional intelligence efforts. Large teams, 40 to 60, typical in scaled Agile models, require formalized change management and effective leadership to avoid delays in communication and emotional disconnection. Extremely large teams, 60 to 80+, struggle with coordination, emotional coherence, and slower response to change, and depend strongly on strong structures. Overall, small teams have higher flexibility and emotional resilience, whereas large teams require customized processes and emotional intelligence practices to keep effectiveness and team wellness intact.

Table 4.13 shows the distribution of respondents according to the size of the Agile teams they belong to. Most participants, about 145 respondents (71.78%) indicated they work in teams ranging from 5 to 20 members, which fits the suggested size of Agile teams that enables close interaction, flexibility, and adequate communication overhead. Another 27 (13.37%) respondents also indicated working in groups of 5 to 20 people, but the entry seems to be a duplicate, perhaps reflecting an error in data entry or categorization that must be corrected for accuracy. Outside of small teams, 17 (8.42%) work in larger teams of 20 to 40, and 13 (6.44%) are in larger teams of 40 to 60, which can involve greater complexities and possibly call for scaled Agile methodologies like SAFe or LeSS.Overall, the evidence indicates that most Agile teams have a size that lies

within the optimal range of 5 to 20 members, facilitating successful Agile implementation, while a smaller percentage work in larger team environments where further coordination mechanisms might be required.

Table 4.13: Team Size Frequency Percentage Table

Team Size	**Frequency**	**Percentage**	**Cumulative Percentage**
05 - 20	145	71.78%	71.78%
05 - 20	27	13.37%	85.15%
20 - 40	17	8.42%	93.57%
40 - 60	13	6.44%	100.00%
Total	202	100.00%	

Table 4.14 presents the summary statistics of team sizes as reported by survey respondents. The average team size is 17.85 members, which means that on average, participants are working in relatively moderately sized Agile teams that fit well with Agile values supporting small, cross-functional teams. The median team size is 20, which indicates that half of the teams consist of 20 or fewer members, and the remaining teams have more, indicating a slightly skewed distribution in favor of larger teams. The distribution is multimodal, with modes at 5 and 20, indicating that both small-sized teams e.g., Scrum-sized, and large teams at the maximum recommended Agile size are found frequently. Minimum team size is 5, and maximum team size is 70, reflecting the broad range of team configurations. Teams of 70 would most probably use scaled Agile frameworks, which can have implications for communication and coordination dynamics. On the whole, the figures do indicate that the majority of Agile teams fall into the optimum size bracket, while the occurrence of very small and large teams indicates diverse scales of Agile adoption, perhaps influenced by project complexity, organizational size, or delivery modes.

Table 4.14: Descriptive Statistics Based on Team Size

Statistics	**Value**
Mean	17.85
Median	20
Mode	05, 20 - multimodal
Minimum	05
Maximum	70

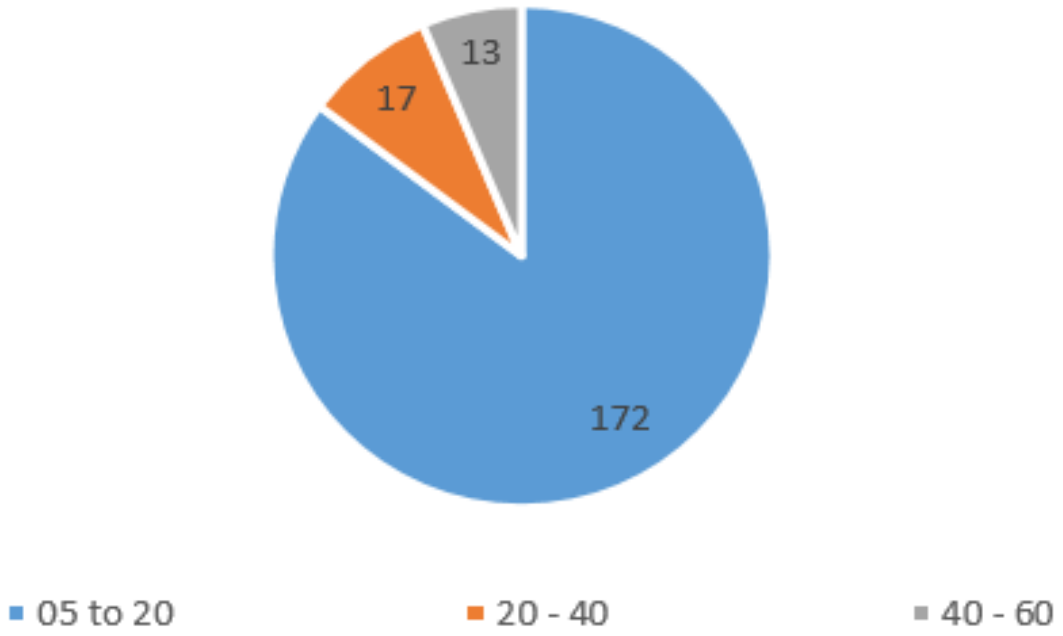

Figure 4.10: Descriptive Statistics Based on Team Size

Figure 4.10 is a pie chart illustrating the percentage distribution of the respondents by Team Size. It provides a clear visual representation of the variations in the Team Size that respondents were working with.

4.3.2 Emotional Challenges faced by Agile Team during Requirement Change Management

This section provides the details regarding the research question 1 *"What are the emotional challenges faced by the Agile team during the requirement change lifecycle?"*
The aim of the research question is to discover and examine the emotional challenges faced by members of Agile teams, such as Product Owners (POs), Scrum Masters (SMs), and the Development Team (DT), during the various stages of the RCM life cycle, i.e., arrival, implementation, and delivery stages of change. In Agile settings, changes to requirements occur frequently and sometimes suddenly, serving as both technical and emotional stressors for team members. The changes can stem from changing client requirements, stakeholder input, market forces, or internal project re-evaluations. Although Agile methods promote flexibility, the emotional implications of such frequent changes are not generally considered, but in fact significantly

influence individual performance, teamwork, and project success.

The identified emotional challenges will help shape a Role-Based Emotional Intelligence Framework, providing useful insights for building greater emotional resilience, team cohesiveness, and the overall efficiency of Agile change management. Subsection 4.3.2.1 shows the results analysis regarding the RCM process. Subsection 4.3.2.2 shows the result analysis regarding challenges faced by the agile team during RCM.

4.3.2.1 Descriptive Statistics Based on RCM Process

To get the information regarding current requirement change management practices in the IT industry, participants were asked to answer: *"Does your organization follow any Requirement change management process?"*

Table 4.15 shows descriptive statistics of the RCM process. From a sample of 202 respondents, 67.33% reported that their organizations have established a formal Requirement Change Management (RCM) process, while 32.67% indicated that there is no such process in their organizations. This result implies that most professionals in the Pakistani IT sector work in environments where structured processes of handling changes in software requirements are prioritized. The use of systematic RCM procedures suggests an organizational investment in managing changing project requirements, reducing risks inherent in requirement volatility, and improving communications among stakeholders. Additionally, that close to one-third of the respondents indicated the lack of RCM processes indicates a gap in practice that may be due to financial constraints, ignorance, or organizational reluctance to change. This deviation also indicates that although most firms are moving in line with global best practices in software development and project management, there is still a need for improvement in driving the widespread adoption of formalized requirement change frameworks within the industry.

Table 4.15: RCM Process Frequency Percentage Table

Response	**Frequency**	**Percentage**	**Cumulative Percentage**
Yes	136	67.33%	67.33%
No	66	32.67%	100%
Total	202	100.00%	

Knowing the number of organizations that have implemented RCM is of paramount impor-

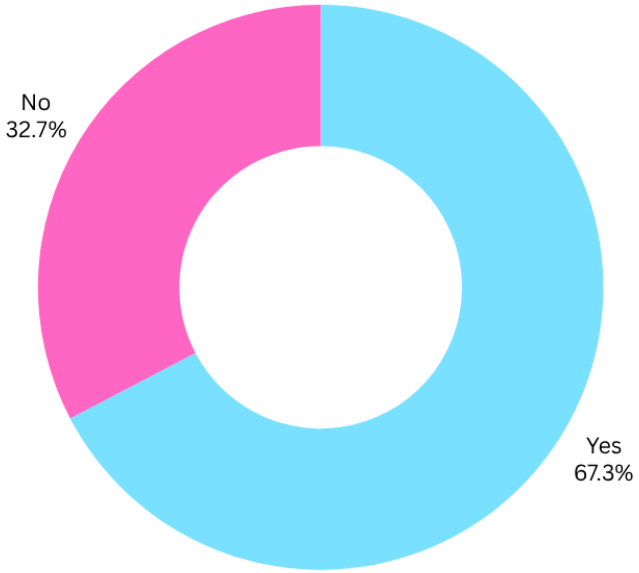

Figure 4.11: Descriptive Statistics Based on RCM Process

tance as it has a direct impact on project stability, stakeholder satisfaction, team effectiveness, and software quality. The findings thus emphasize the need to convey RCM awareness and adoption, particularly in Agile-based environments where requirement evolution is common and fundamental to project success.

Figure 4.11 is a pie chart illustrating the percentage distribution of the respondents by RCM Process. It provides a clear visual representation of the variations regarding RCM Process.

4.3.2.2 Challenges that agile team members face during RCM

Grounded on a comprehensive literature review, the most essential challenges contributing to the issues in Requirement Change Management (RCM) were established. These challenges were repeatedly mentioned in studies from academia and business as having a great influence on the success and stability of software requirement change management. To empirically examine the degree to which these challenges are felt in actual agile software development settings, specifically in the case of the Pakistani IT industry, a purpose-built survey was created.

The challenges identified were converted into a list of survey items, each pointing towards a particular challenge that is typically encountered during RCM. Respondents were then requested to rate their experience with every challenge using a five-point Likert scale [15] with values like: Number 1 represents "Never", Number 2 represents "Sometimes", Number 3 represents "About Half the Time", Number 4 represents "Often", and Number 5 represents “Always” This scale permitted participants to indicate the frequency and severity with which they face each

RCM challenge within their organizational environment. The method guaranteed quantitative robustness and correspondence with common measurement methods, allowing for a more in-depth analysis of the occurrence and effects of these difficulties on software projects. The data gathered through the method is useful in shedding light on real-time problems professionals encounter and presents a base upon which targeted improvements or interventions in requirement change processes can be suggested.

Table 4.16: RCM Challenges Frequency Table

CH-ID	**Challenge**	**Never**	**Sometimes**	**About Half the Time**	**Often**	**Always**	**Total Frequency of challenge faced**
CH-01	Not properly evaluate the impact and risks of requirement changes.	31	**69**	**49**	32	22	172
CH-02	Poor estimation of the cost, time, and effort for requirement changes.	35	**75**	**42**	33	17	167
CH-03	Inefficient management and tracking of requirements and changes.	40	**57**	**52**	34	19	162
CH-04	Unclear prioritization and scope of requirement changes.	34	**66**	37	**47**	18	168
CH-05	Instability and conflicts caused by high interdependencies among requirements.	30	**58**	**62**	30	22	172
CH-06	Poor communication and collaboration among team members and stakeholders.	43	**70**	**44**	20	25	159

CH-ID	Challenge	Never	Sometimes	About Half the Time	Often	Always	Total Frequency of challenge faced
CH-07	Inconsistencies and ambiguities in requirement changes.	24	**79**	**49**	29	21	178
CH-08	Lack of necessary skills, tools, resources, or domain knowledge to handle requirement changes.	**50**	**72**	45	21	14	152
CH-09	High cross-functionality across team members.	38	**60**	**49**	37	18	164
CH-10	High consequences of requirement changes.	31	**64**	**59**	30	18	171

Table 4.16 points out several key drivers that dictate the handling of requirement changes in software development projects. The most commonly faced challenge was CH-07: *"Inconsistencies and ambiguities in requirement changes"*, cited by 178 respondents. This is an indicator of a widespread challenge in Agile settings where requirement changes are frequently vague, incomplete, or contradictory, resulting in miscommunication, time lag, or rework. Its high occurrence indicates a pressing need for better requirement documentation, verification, and communication with stakeholders to facilitate clarity and concurrence. Close to that are CH-01: *"Not properly analyzing the effects and risks of changes in requirements"*, and CH-05: Instability and conflicts due to high interdependencies between requirements, both noted by 172 respondents. The commonality of CH-01 shows that there are many teams without formal processes to evaluate how the changes will impact the system, timelines, or costs, posing major threats to project stability. Likewise, CH-05 illustrates the complexity of tightly coupled requirements where alterations in a given area tend to destabilize other components. This shows the necessity of modular system design and full impact analysis for avoiding cascading failure and conflicts in implementation. Another very common problem is CH-10: *"High consequences of requirement changes"*, experienced by 171 participants. This problem highlights the sensitivity and risk related to any small changes, perhaps because of legacy systems, poor documentation, or insuffi-

cient flexibility in project scope. It indicates the need for strategic change control processes and continuous integration/testing practices.

One of the moderately frequent issues is CH-04:*"Vague prioritization and scope of requirement changes"*, affecting 168 respondents. The problem shows an inadequate common understanding or alignment in backlog refinement and sprint planning, where teams cannot determine their most important or valuable changes. It may cause wasted effort, creeping scope, or delayed deadlines. CH-02: *"Inaccurate cost, time, and effort estimation for requirement changes"*, with 167 votes, is another significant issue. This indicates gaps in planning in Agile, where teams might not entirely factor in the effort or complexity involved in making a change. These errors in estimation can cause disruptions in delivery schedules and result in stakeholder frustration. CH-09: *"High cross-functionality among team members"*, shared by 164 respondents, identifies a special Agile team challenge. Agile does promote cross-functional roles, yet this finding indicates that role ambiguity, duplication of responsibilities, or shortage of specialization sometimes lead to confusion, delay, or inefficiency in handling change. CH-03: *"Poor management and tracking of changes and requirements"*, experienced by 162 participants, supports this further. It indicates that even with Agile's lightweight documentation focus, teams require solid tracking tools, simple workflows, and traceability to manage changes effectively and not lose valuable context.

One of the less commonly cited issues is CH-06: *"Inadequate communication and cooperation between team members and stakeholders"*, with 159 votes. Although still considerable, this means that the majority of Agile teams might have developed fairly good communication habits, yet there are still gaps, particularly in distributed teams or high-speed scenarios. The least reported issue was CH-08: *"Insufficient required skills, tools, resources, or domain knowledge"*, reported by 152 respondents. This indicates that technical proficiency and tool assistance are not the main impediments to handling requirement changes. The majority of Agile teams seem to be adequately resourced, and the main problems are more in process, coordination, and requirement definition than in the availability of resources.

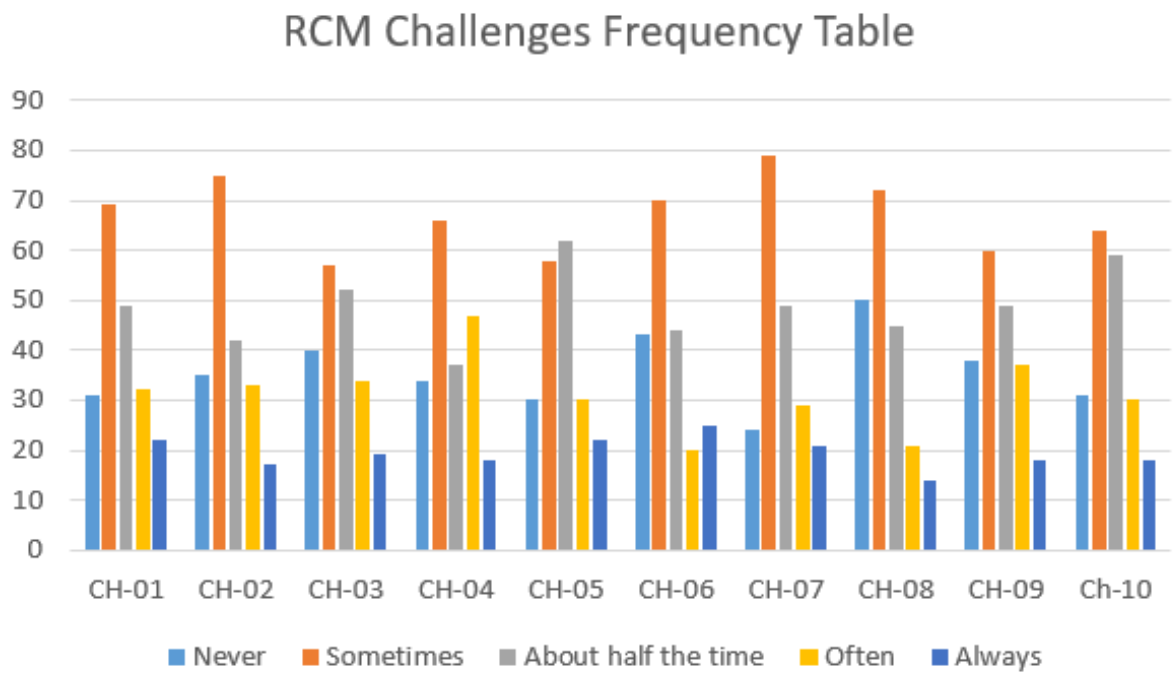

Figure 4.12: RCM Challenges Frequency

4.3.3 Role-Based Challenges to Manage Requirement Changes

In section 4.3.3, three important agile team roles, such as Product Owner, Scrum Master, and Development Team, were analyzed with respect to RCM challenges. This structure facilitated the gathering of role-specific information, identifying how the effect of RCM challenges differs between agile roles. To figure out *how often does each role face particular RCM challenges?* researcher performed a detailed analysis to differentiate the challenges based on agile team roles. Table 4.17 shows the role-based frequency of RCM challenges faced by the agile team.

Table 4.17: Role-Based Frequency of Agile Team Facing RCM Challenges

Challenge	**Role**	**Never**	**Sometimes**	**About Half the Time**	**Often**	**Always**
CH-01	Development Team	19	**43**	29	21	16
CH-01	Product Owner	4	**9**	4	5	1
CH-01	Scrum Master	8	**17**	16	6	4
CH-02	Development Team	19	**49**	24	23	13
CH-02	Product Owner	5	**10**	3	4	1

Challenge	Role	Never	Sometimes	About Half the Time	Often	Always
CH-02	Scrum Master	11	**16**	15	6	3
CH-03	Development Team	24	31	**32**	27	14
CH-03	Product Owner	4	**9**	5	4	1
CH-03	Scrum Master	12	17	**15**	3	4
CH-04	Development Team	24	**36**	23	32	13
CH-04	Product Owner	4	**9**	3	5	2
CH-04	Scrum Master	6	**21**	11	10	3
CH-05	Development Team	22	34	**36**	19	17
CH-05	Product Owner	2	**9**	8	2	2
CH-05	Scrum Master	6	15	**18**	9	3
CH-06	Development Team	34	42	**22**	11	19
CH-06	Product Owner	1	10	**6**	4	2
CH-06	Scrum Master	8	**18**	16	5	4
CH-07	Development Team	18	**44**	31	19	16
CH-07	Product Owner	2	**10**	7	3	1
CH-07	Scrum Master	4	**25**	11	7	4
CH-08	Development Team	30	**46**	27	15	10
CH-08	Product Owner	5	**9**	6	2	1
CH-08	Scrum Master	15	**17**	12	4	3
CH-09	Development Team	25	**35**	34	26	8
CH-09	Product Owner	3	**10**	4	3	3
CH-09	Scrum Master	10	**15**	11	8	7
CH-10	Development Team	22	**42**	35	16	13
CH-10	Product Owner	4	**7**	7	5	0
CH-10	Scrum Master	5	15	**17**	9	5

1. **Not Properly evaluate the Impact and Risks of Changes in Requirements:**For the challenge of not having adequately assessed the effect and risks of requirement changes, the Development Team most often chose the intensity "Sometimes" (43), which means that this problem does not always happen but is a standard issue that impacts their capability to plan and evaluate risks accordingly. Product Owner also indicated "Sometimes" as the most frequent (9), but with much lower incidence, indicating some concern and perhaps

less involvement in the technical assessment process. Scrum Masters also indicated "Sometimes" (17) as the most common frequency, indicating periodic difficulties with facilitating or aiding impact analysis in the team. The Development Team gave this as a frequent problem, with 29 of them reporting it "About Half the Time" and 21 "Often." Product Owners and Scrum Masters reported it less frequently, with most in the "Sometimes" response. This could indicate that the Development Team does not have good enough upstream visibility or impact analysis support when changes occur.

2. **Ineffective Estimation of Cost, Time, and Effort:**For the poor estimation of cost, time, and effort for requirement changes challenge, the Development Team most commonly chose "Sometimes" (49), reflecting that it is a regular problem they encounter during project implementation. Product Owners similarly indicated "Sometimes" as the most prevalent answer (10), reflecting sensitivity to the problem, though perhaps witnessing it with less direct effect. Scrum Masters also chose "Sometimes" most frequently (16), indicating that although they are impacted by this challenge, it is a more secondary issue in their facilitation capacity. This difficulty is especially evident among the Development Team, where 49 answered "Sometimes" and 24 answered "About Half the Time." The Product Owner and Scrum Master also admit to this difficulty, although less so, implying estimation errors typically arise more visibly in implementation than in planning.

3. **Inefficient Management and Tracking of Requirements and Changes:**On the challenge of ineffective management and tracing of requirements and changes, the Development Team most frequently opted for "About Half the Time" (32), reflecting a consistent deficiency in properly managing and tracing updates to requirements. The role of the Product Owner reflected "Sometimes" (9), proposing a sporadic lack of oversight or inadequate visibility into the process of tracking. Likewise, Scrum Masters also indicated "Sometimes" (17) most often, reflecting occasional challenges in coordinating and tracking requirement changes across the team. Ineffective Management and Tracking of Requirements and Changes Development Team again had significant exposure, with many of them having it "About Half the Time" (32) and "Often" (27). Scrum Masters and Product Owners are less likely to have frequent occurrences, indicating potential incongruities between the tools or procedures being used for tracking requirements and those of the implementation team.

4. **Unclear Prioritization and Scope of Requirement Changes:** With regard to the problem

of unclear prioritization and scope of requirement changes, the Development Team selected "Often" (32) most often, which identifies a strong and ongoing problem with knowing change priorities and scope. Product Owners chose "Sometimes" (9) most often, which indicates average knowledge but quite possibly less hands-on involvement with day-to-day prioritization issues. Scrum Masters also most often chose "Sometimes" (21), indicating they face confusion in this category more often than Product Owners, probably because it is their job to organize and facilitate the work of the team. Each of the three roles identified this as a typical problem, but the Development Team felt it most strongly, with 32 of the "Often" and 23 of the "About Half the Time" responses. This implies that while higher-level prioritization may be established, the interpretation usually weakens as requirements change and arrive at the implementation level.

5. **Instability and Conflicts Due to Interdependencies:**The Development Team had the highest rate of instability due to interrelated requirements, with "About Half the Time" (36) being the most common answer, and 19 more opting for "Often," meaning they typically encounter these issues. In contrast, Product Owners answered most often with "Sometimes" (9), implying they have such issues less often. Scrum Masters also recognized this problem, with "About Half the Time" (18) being their most frequent answer, indicating its importance to their coordination role. The greater response frequency likely results from their direct interaction with sophisticated technical interdependencies.

6. **Poor Communication and Collaboration:** Poor communication and collaboration between team members and stakeholders were a recurring issue. The Development Team reported most often selecting "Sometimes" (42), which reflected frequent, but not consistent, difficulties in collaboration. Yet, they also reported higher frequencies for more extreme levels, as 22 chose "About Half the Time" and 19 chose "Always," reflecting ongoing barriers in cross-functional communication. Product Owners selected "Sometimes" most frequently (10), paralleling episodic failure, whereas Scrum Masters indicated the same answer (18), in line with their pivotal position as facilitators of team communication. All three roles recognized this difficulty, but the figures suggest that the Development Team has more to bear in terms of communication, presumably because they are closely engaged in everyday implementation work.

7. **Inconsistencies and Ambiguities in Requirement Changes:** For the challenge of ambi-

guities and inconsistencies in requirement change, the Development Team most frequently chose "About Half the Time" (31), reflecting that ambiguous or conflicting requirements are an appreciable and frequent problem impeding their work. Product Owners cited "Sometimes" (10) as the greatest frequency, indicating they are aware of the problem but might experience it less directly. Scrum Masters also selected "Sometimes" the most often (25), again showing their role to interpret confusing requirements and act as mediators often in the team. Across all roles, this was the most frequent problem. Both the Development Team indicated 31 occurrences for "About Half the Time" and 19 occurrences for "Often," and Scrum Masters and Product Owners indicated lower frequencies generally. The disparity may be because of late coming to terms with ambiguities during the implementation or testing phases.

8. **Lack of Skills, Tools, Resources, or Domain Knowledge:**For the difficulty of missing skills, tools, resources, or domain expertise, the Development Team responded most often with "Sometimes" (46), seconded by "About Half the Time" (27), showing that this is a frequent problem that compels them to compromise on effective implementation of requirement changes. This indicates that the problem might not always be severe, but often hampers smooth development processes. Product Owners indicated "Sometimes" most frequently (9), referring to frequent gaps in tool knowledge or domain know-how. Scrum Masters had the same pattern with "Sometimes" (17) being the preferred answer, indicating even facilitators sometimes feel inadequately prepared. The general higher concern of the Development Team highlights upskilling and more effective resource allocation requirements for role-specific parties, particularly those directly managing technical implementation.

9. **High Cross-Functionality Among Team Members:**For the problem of high cross-functionality between team members, the Development Team voted most often for "About Half the Time" (34), next "Often" (26), which reflects that having cross-functional roles is good but frequently creates coordination stress, role ambiguity, or difficulty with task ownership. Product Owners voted "Sometimes" (10) most often, and it indicates that they see occasional problems but are less directly affected. Scrum Masters also chose "Sometimes" (15) as the leading answer, indicating how they deal with cross-functional dynamics, although they, too, struggle with keeping expectations in check. While high cross-functionality has its benefits, it can add complexity that brings collaboration and

efficiency into question, particularly for technical team members.

10. **High Consequences of Requirement Changes:**For the challenge of the high consequence of requirement change, the Development Team most often picked "About Half the Time" (35), and then "Often" (16), showing that they often feel the strain and severe consequences of such changes throughout the development process. Scrum Masters likewise reported "About Half the Time" (17) most frequently, demonstrating they are strongly affected by the ripple effects of changing requirements on team coordination and delivery schedules. Product Owners had "Sometimes" (7) as their top response, indicating that they are aware of the problem but are less likely to feel its impact directly. On balance, this problem was prominent for all roles, with the Development Team feeling it most directly. These findings emphasize the importance of having strong impact analysis techniques in place to address and mitigate the effects of requirement changes.

Figure 4.12 shows a role-based comparison of the emotions of Agile team members, such as the Development Team, Product Owner, and Scrum Master, for identified RCM challenges. Each set of bars is for a particular issue, with each bar representing a different team role. Although all roles collectively exhibit 202 emotional reactions per challenge, they differ strongly in their distribution. For example, the Development Team tends to demonstrate a greater proportion of strong emotional reactions (e.g., frustration or stress), particularly in the initial challenges, than the more equitable emotional patterns of Scrum Masters. This indicates that Development Teams are more emotionally affected by changes, probably because they are directly involved in implementation. Scrum Masters can be more emotionally consistent because they play facilitating and conflict-resolution roles.

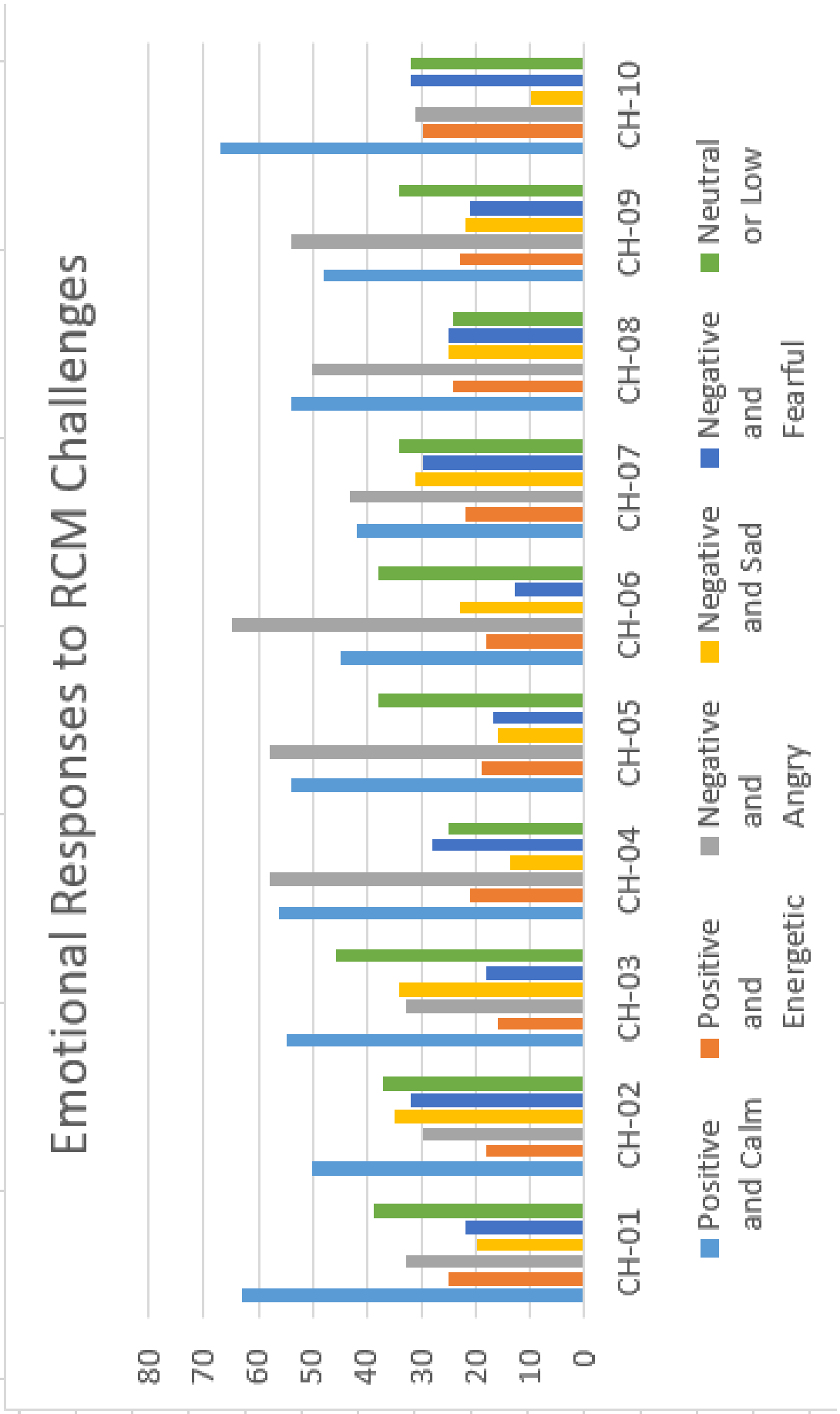

Figure 4.13: Role-Based comparison of the agile team facing RCM challenges

4.3.4 Emotional Responses to RCM Challenges

To enrich the assessment of Requirement Change Management (RCM) issues with a human element, this research incorporated an emotional rating framework from the Job-related Affective Well-being Scale (JAWS) – Short Form [7, 15]. Relying on well-established literature in occupational psychology and emotional intelligence within software teams, the JAWS short form, consisting of 20 specific emotions, was chosen because of its reliability and real-world applicability in working settings. For the sake of interpretive clarity and analytical consistency, these feelings were deliberately categorized into six broad categories according to their valence (positive versus negative) and level of activation (high versus low energy). The emotion categories are: Positive and Energetic Emotions (Ecstatic, Enthusiastic, Excited, Energetic, Inspired), Positive and Calm Emotions (At ease, Calm, Content, Relaxed, Satisfied), Negative and Angry Emotions (Angry, Furious, Disgusted), Negative and Fearful Emotions (Anxious, Frightened), Negative and Sad Emotions (Depressed, Discouraged, Gloomy), and Neutral or Low Energy Emotions (Bored, Fatigued).

When rating RCM challenges, subjects were requested to indicate the most common emotional reaction when they encountered each respective challenge. The aim was to determine patterns of emotion that consistently occur in repeated problems in requirement change processes, like miscommunication, imprecise prioritization, or uncontrolled scope changes. Each problem described in the survey was matched to a selection of emotion categories by respondents, making it possible to cluster the emotional patterns across the software teams. This approach allowed the study to reveal emotional indicators of technical dysfunction, for instance, excessive anger and sadness tended to accompany poor collaboration and unclear prioritization, while fear and tiredness tended to accompany insufficient tools or ambiguity of role. Surprisingly, Despite technically demanding environments, some proportion of respondents indicated neutral or calm emotional states, perhaps indicative of desensitization, emotional repression, or coping responses occurring.

By this classification and interpretation, emotional reactions are not simply considered discrete reactions but an indication of systemic stress points within RCM processes. The occurrence of strong negative emotions like anger, fear, and sadness tied to certain challenges attests to the psychological toll of inadequately managed requirement changes, potentially resulting in lower morale, misalignment, or burnout. Conversely, the moderate occurrence

of positive and serene emotions in a few instances indicates resilience or emotional maturity among professionals, especially inexperienced teams or those having set change procedures. These results highlight the value of addressing and managing the emotional aspect of software development since repeated exposure to emotionally stressful issues can erode both productivity and team solidarity. Therefore, incorporating emotional intelligence into RCM approaches could be a requirement for enabling more adaptive, healthier teams that can deal with repeated requirement evolution. Table 4.18 shows the emotional response towards each RCM challenge.

Table 4.18: Emotional Responses to Requirement Change Challenges

CH-ID	**Challenges**	**Positive and Calm**	**Positive and Energetic**	**Negative and Angry**	**Negative and Sad**	**Negative and Fearful**	**Neutral or Low**
CH-01	Not properly evaluated the impact and risks of requirement changes	**63**	25	33	20	22	**39**
CH-02	Poorly estimated the cost, time, and effort for requirement changes	**50**	18	30	35	32	**37**
CH-03	Not managed and tracked requirements changes	**55**	16	33	34	18	**46**
CH-04	Unclear prioritization and scope of requirement changes	**56**	21	**58**	14	28	25
CH-05	Instability and conflicts caused by high interdependencies among requirements	**54**	19	**58**	16	17	**38**

CH-ID	Challenges	Positive and Calm	Positive and Energetic	Negative and Angry	Negative and Sad	Negative and Fearful	Neutral or Low
CH-06	Poor communication and collaboration among team members and stakeholders	**45**	18	**65**	23	13	**38**
CH-07	Inconsistencies and ambiguities in requirement changes	**42**	22	**43**	31	30	34
CH-08	Lack of necessary skills, tools, resources, or domain knowledge	**54**	24	**50**	25	25	24
CH-09	No defined roles and responsibilities among team members	**48**	23	**54**	22	21	**34**
CH-10	High consequences of requirement changes	**67**	30	31	10	**32**	**32**

The findings identify significant trends in the emotional reactions of software professionals when faced with different challenges during requirement change management. Every challenge has varied emotional states ranging from positive (calm and energized) to negative (anger, sadness, fear), accompanied by neutral or low emotional intensity. Examining each situation separately gives meaning to emotional trends and the emotional influence of requirement changes in software development.

The most frequent emotional rating,*"Not properly evaluated the impact and risks of requirement changes,"* indicates that the dominant affect was Positive and Calm (63) followed by a large number of Neutral or Low (39). Yet, 33 people reported experiencing anger, indicating frustration among team members resulting from the failure to evaluate risk. This reflects a mixed emotional state where some individuals feel composed, due to experience, while others are

clearly affected by the consequences of oversight and uncertainty.

The second challenge, *"Poorly estimated the cost, time, and effort for requirement changes,"* brings about a negative emotional pattern. In this, 35 subjects reported sadness, and 32 were sadness or fear, reflecting strongly on the emotional impact. Defeat or fear is due to pressure to deliver under unrealistic expectations. Despite 50 still reporting being calm, the emotional balance is skewed towards demotivation and anxiety, implying this is a highly demoralizing challenge when estimates go wrong.

The third one, *"Not managed and tracked requirement changes,"* highlights the anxiety brought about by a lack of traceability or control in project changes. Although 55 respondents reported feeling calm, negative emotions were also high, particularly anger (33) and sadness (34). In addition, the peak number of low or neutral responses (46) here might suggest emotional detachment or burnout, which is an alarming sign for long-term project well-being and team involvement.

The fourth problem, *"Unclear prioritization and scope of requirement changes,"* elicited the maximum anger rating (58) in the dataset. This indicates strong irritation on the part of team members when requirements are unclear or keep changing without a defined direction. While 56 people kept their cool, the stress of ambiguity is certainly visible, with fear (28) and sadness (14) also observed. This gives proof of the imperative necessity of prioritization with a structured approach and clearly defined scope in change management.

Then, the problem of *"Instability and conflicts caused by high interdependencies among requirements"* also elicited 58 indignant responses, reflecting the irritation that occurs with uncertain prioritization. Such interdependencies tend to create a ripple effect, having one change destabilize several components, resulting in stress and tension. While 54 respondents felt calm, the affective toll of handling such complexity is reflected in a large number of neutral (38) and angry (58) responses.

The sixth row, *"Poor communication and collaboration among team members and stakeholders,"* is the most anger-prone overall (65). That indicates that communication failure is emotionally draining and a prime source of discontent in requirement change activities. While 45 respondents were calm, the fact that 23 were sad and 38 were neutral does reflect a lack of team bonding, which can ultimately damage morale as well as performance.

Seventh, the *"Inconsistencies and ambiguities in requirement changes"* challenge leads to a more even but largely negative emotional reaction. Although 42 respondents claimed to be calm,

a significant percentage of them felt angry (43), sad (31), and afraid (30). This indicates that inconsistencies evoke not only frustration but also confusion and anxiety at an emotional level, ranking this as one of the most emotionally destabilizing challenges in the dataset.

The eighth, *"Insufficient required skills, tools, resources, or domain knowledge to manage requirement changes,"* prompted 50 angry and 25 sad and fearful reactions, depicting helplessness or inadequacy. While 54 witnesses were calm, the proportionately low energetic response (24) indicates an overall lack of confidence or preparedness on the part of team members when they are inadequately equipped, which can contribute significantly to change flexibility.

Then, *"No defined roles and responsibilities among team members"* elicited 54 angry and 34 neutral responses, indicating that when responsibility is not defined, tensions are higher and productivity is impaired. Although 48 respondents were at peace, the breakdown in emotions makes sense given a lack of organization in the team, leading to miscommunication and interpersonal conflict, emotionally and operationally detrimental.

The tenth challenge, *"High consequences of requirement changes,"* also provides an interesting emotional trend. Most were calm (67) or energized (30), indicating that even with the severity of the consequences, most team members were not fazed or even energized by the challenge. A total of 32, however, reported fear, indicating that while some are encouraged by pressure, others are intimidated. This reflects the importance of iron leadership and support networks under high-stakes change.

4.3.5 Role-based Emotional Responses toward RCM Challenges

Subsection 4.3.5, presented the role-based emotional responses of agile team towards RCM challenges. The aim was to investigate the role-based emotional reactions of primary Agile team members, Product Owners, Scrum Masters, and the development team to ten typical Requirement Change Management (RCM) challenges. Unlike the frequency of occurrences, this method looked into how each role emotionally responded to particular RCM issues. Emotional reactions were classified into six types: Positive and Energetic, Positive and Calm, Negative and Angry, Negative and Sad, Negative and Fearful, and Neutral or Low Energy emotions. This role-based approach allowed the exploration of the differences in emotional impacts among team members when confronting similar challenges.

By recording emotional expression across these categories, the data delivers insight into which roles suffer more emotional tension or resilience when faced with specific RCM difficulties. For example, *"the Development team"* can demonstrate increased levels of frustration or emotional exhaustion through repeated requirement changes, while *"Scrum Masters"* will presumably demonstrate a more even-handed emotional profile owing to their facilitative function. *"Product Owners"*, on the other hand, will likely demonstrate more aloof or controlled emotional expressions. This analysis makes possible the comparison of emotional profiles, identifying role-specific strengths and vulnerabilities, and finally informing the enhancement of Agile practices to enable improved emotional resilience and team performance in persistent requirement change.Table 4.19 shows Role-based Emotional Responses to RCM Challenges.

Table 4.19: Role-based Emotional Responses to RCM Challenges

CH-ID	**Role**	**Positive and Energetic Emotions**	**Positive and Calm Emotions**	**Negative and Angry Emotions**	**Negative and Sad Emotions**	**Negative and Fearful Emotions**	**Neutral or Low Energy Emotions**
CH-01	Development Team	13	**38**	18	13	15	31
CH-01	Product Owner	6	**8**	5	1	2	1
CH-01	Scrum Master	6	**17**	10	6	5	7
CH-02	Development Team	14	**30**	20	22	19	23
CH-02	Product Owner	1	**7**	4	5	5	1
CH-02	Scrum Master	3	**13**	6	8	8	13
CH-03	Development Team	6	**40**	20	25	7	30
CH-03	Product Owner	4	4	**6**	2	2	5
CH-03	Scrum Master	6	**11**	7	7	9	**11**
CH-04	Development Team	15	**34**	33	7	20	19
CH-04	Product Owner	2	4	**11**	2	2	2
CH-04	Scrum Master	4	**18**	14	5	6	4
CH-05	Development Team	14	29	**39**	13	7	26
CH-05	Product Owner	1	**8**	4	2	2	6

CH-ID	Role	Positive and Energetic Emotions	Positive and Calm Emotions	Negative and Angry Emotions	Negative and Sad Emotions	Negative and Fearful Emotions	Neutral or Low Energy Emotions
CH-05	Scrum Master	4	**17**	15	1	8	6
CH-06	Development Team	14	24	**36**	17	9	28
CH-06	Product Owner	0	7	**11**	3	0	2
CH-06	Scrum Master	4	14	**18**	3	4	8
CH-07	Development Team	17	24	31	20	13	23
CH-07	Product Owner	1	6	5	8	1	2
CH-07	Scrum Master	4	12	7	3	16	9
CH-08	Development Team	14	**39**	34	17	10	14
CH-08	Product Owner	4	6	**7**	1	3	2
CH-08	Scrum Master	6	9	9	7	**12**	8
CH-09	Development Team	18	30	**34**	9	16	21
CH-09	Product Owner	0	7	8	2	0	6
CH-09	Scrum Master	5	11	12	11	5	7
CH-10	Development Team	23	**42**	19	4	21	19
CH-10	Product Owner	2	**10**	4	0	5	2
CH-10	Scrum Master	5	15	**8**	6	6	11

Table 4.19 provides a breakdown of emotional reactions faced by Agile software development team members in various difficult situations, also termed as "Challenge" (CH-01 to CH-10). Each challenges describes a particular hurdle teams have to face in a requirement change management situation. Within each challenges, the emotional reactions are categorized and given weightages within three primary Agile roles: the Development team, Product Owners, and Scrum Masters. The emotional categories are: Positive and Energetic Emotions, Positive and Calm Emotions, Negative and Angry Emotions, Negative and Sad Emotions, Negative and Fearful Emotions, and Neutral or Low Energy Emotions.

The development team always records the maximum number of emotional responses in every

category. For example, in CH-01, developers had 38 positive and calm emotions, 31 neutral or low energy emotions, and 18 negative and angry emotions. This implies that developers, being at the forefront of day-to-day technical issues and requirement updates, are more emotionally invested in or impacted by work-related stressors than their counterparts. Their emotional range spans both positive and negative realms, suggesting they feel both motivation and frustration rather often throughout development iterations.

Product Owners, however, exhibit the lowest rate of emotional expressions. Overall, across all categories, their emotional reactions are low. To illustrate, in CH-02, the Product Owner logged just 1 positive and lively emotion and some gentle negative ones. This trend could be because their more strategic or decision-making nature keeps them detached from the day-to-day emotional burden of implementation and coordination. It may also signify that their emotional experiences are weaker or less freely expressed in the team environment.

Scrum Masters have a moderate degree of emotional engagement. They exhibit a combination of emotions within categories, but not with the same vigor as the development team. For instance, the Scrum Master in CH-06 experienced 14 positive and relaxed emotions, 18 negative and angry emotions, and 8 neutral or low intensity emotions. This trend indicates that Scrum Masters, being facilitators and mediators for Agile teams, are under both the pressures of managing teams and the rewards of allowing collaboration, thereby faced with an even balance of emotional states.

The study shows that emotional experience in Agile settings is not standardized and differs immensely depending on role and context. Developers appear to carry the emotional weight of the development process, often oscillating between high energy and frustration, while Product Owners remain more emotionally detached. Scrum Masters, situated between strategy and execution, reflect a balanced emotional profile. These insights can be valuable for designing emotionally intelligent Agile practices that are sensitive to the emotional burdens specific to each role. Figure 4.13 demonstrates the overall responses of each role towards each challenge that makes RCM challenging.

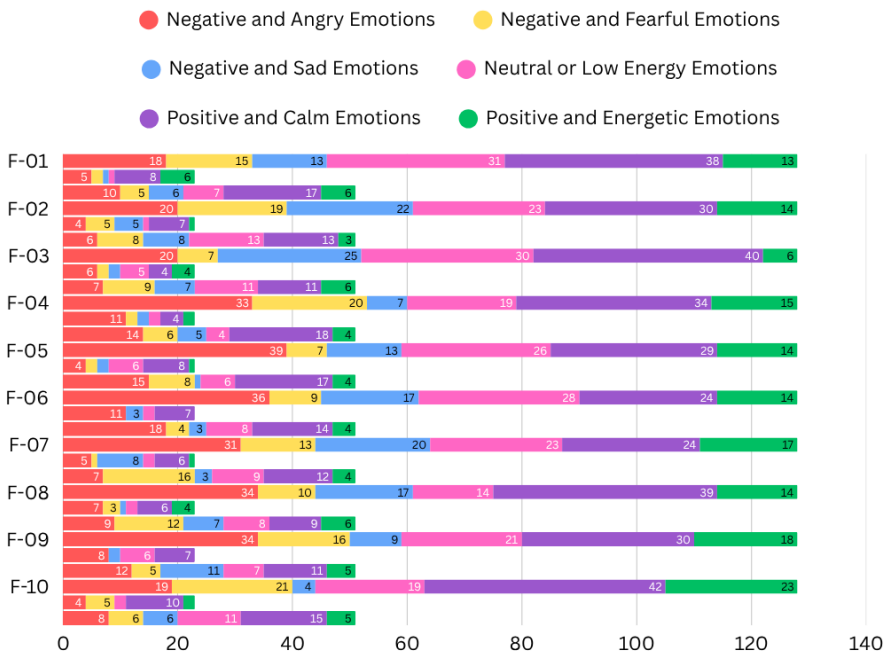

Figure 4.14: Role-based Emotional Responses to RCM Challenges

4.3.6 Avg. EQ level of Agile Team

Daniel Goleman, a researcher and psychologist, popularized the field of *Emotional Intelligence (EI)* with his 1995 bestseller book titled as *"Emotional Intelligence: Why It Can Matter More Than IQ."*.Goleman defined the term Emotional Intelligence as “Emotional Intelligence is the ability to recognize, understand, and manage our own emotions and the emotions of others.” The Emotional Quotient or EQ is the quantitative measure of this capability, just as IQ measures cognitive intelligence[17, 16]. The survey questionnaire consists of a complete section to collect responses to evaluate the EQ level of the respondent. The section is designed to collect the responses for emotional intelligence consists of four subsections. Each section collects the responses for the specific EI competency, i.e, Self-Awareness, Self-Management, social-awareness, and Relationship management. The responses were used to calculate the EQ of each participant. The formula is widely accepted in calculating the composite emotional intelligence (EI) or EQ score using the four-domain model by Daniel Goleman [19], as follows:

$$\text{EQ Score} = \frac{\overline{\text{SA}} + \overline{\text{SM}} + \overline{\text{SoA}} + \overline{\text{RM}}}{4}$$

Where:

$\overline{\text{SA}}$ = Average score of Self-Awareness

$\overline{SM}$ = Average score of Self-Management

$\overline{SoA}$ = Average score of Social Awareness

$\overline{RM}$ = Average score of Relationship Management

The scores are subsequently used to calculate the average role-based Emotional Intelligence (EQ) level of the Agile team. Every participant's EQ score comes with an interpretation on the following scale: a score of 1.0 to 2.4 signifies low emotional intelligence in need of extensive development; 2.5 to 3.4 scores shows moderate or developing EI, representing some understanding with the need for enhancement; 3.5 to 4.4 scores mean good or competent EI, which indicates fairly effective emotional skills with scope for improvement; and 4.5 to 5.0 scores reflect high emotional intelligence and good EI strength [17, 82].

Out of the 202 people who were tested for emotional intelligence (EQ), most had a competent level of emotional intelligence. More specifically, 86 participants (about 42.6%) were categorized under good EQ (scores of 3.5–4.4), which means that they mostly have effective emotional skills but with scope for improvement. 66 participants (32.7%) were classified as being in the developing or moderate EQ range (2.5–3.4), indicating a solid understanding of emotional dynamics but a place to improve. 27 participants (13.4%) scored high on EQ (4.5–5.0), indicating resilient and robust emotional skills. In contrast, 23 participants (11.4%) were designated as low on emotional intelligence (1.0–2.4), indicating a strong need to improve recognizing, regulating, and using emotional sensitivity. As a whole, the findings show that although most Agile team members possess promising emotional abilities, there remains a substantial percentage with potential for focused emotional intelligence growth. Figure 4.14 shows the EQ level of the Agile team.

Figure 4.15 describes the Average Emotional Quotient (EQ) by role within the project team, providing insightful information about the emotional dynamics experienced by different team members. The EQ scores represent the average emotional intelligence of individuals in each role i.e, Development Team, Product Owners, and Scrum Masters, during the project. These scores offer an indication of how emotional awareness, regulation, and empathy manifest in each group, influencing both their individual and collective performances. The upcoming subsections show the EQ level analysis based on agile roles, i.e, Development Team, Scrum Master, and Product Owner.

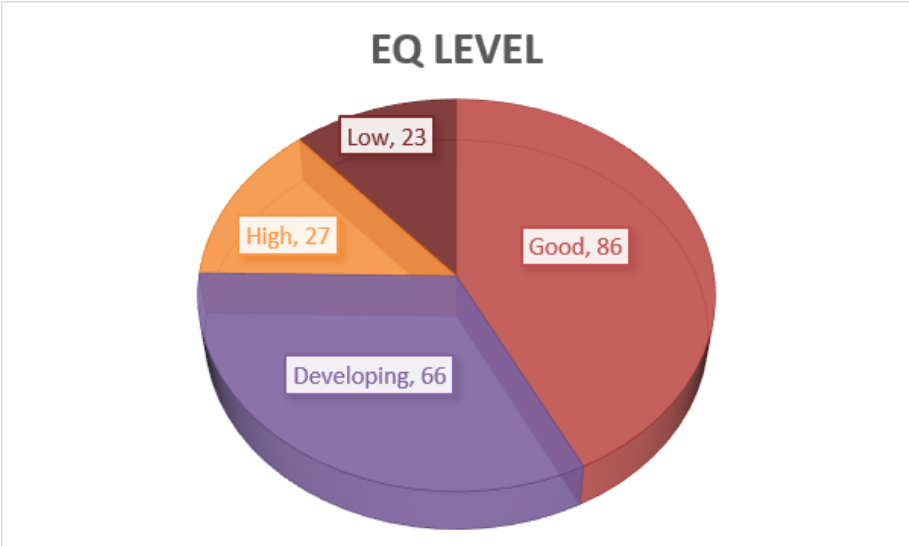

Figure 4.15: EQ level of Agile team

4.3.6.1 Development Team

The Development Team's average EQ score is 3.53, putting them in the good or competent emotional intelligence level (3.5–4.4). These technical roles comprise Requirement Engineers, Business Analysts, Software Architects, Developers, Programmers, and QA Testers. Because they are tasked with executing project tasks, they tend to face emotionally demanding situations such as stringent deadlines, high-tech problems, and inter team communication. Their score implies that they are overall effective at coping with stress, tolerating change, and cooperating with others. Such emotional ability also underpins their ability to empathize with end-users, which plays its part in creating high-quality, user-centric solutions. Emotional intelligence enables this team to deal with ambiguous requirements, conflict resolution, and maintenance of motivation in challenging development cycles.

4.3.6.2 Product Owners

Product Owners score the highest average EQ score of 3.63, which is also in the good or competent range of emotional intelligence. The emotionally demanding and communication-intensive nature of their function is represented by this score. As the primary facilitator between stakeholders and the development team, Product Owners need to reconcile business objectives, technical viability, and customer satisfaction. A high EQ helps them control expectations, deal with feedback, and have good relationships with stakeholders. It helps them manage emotions,

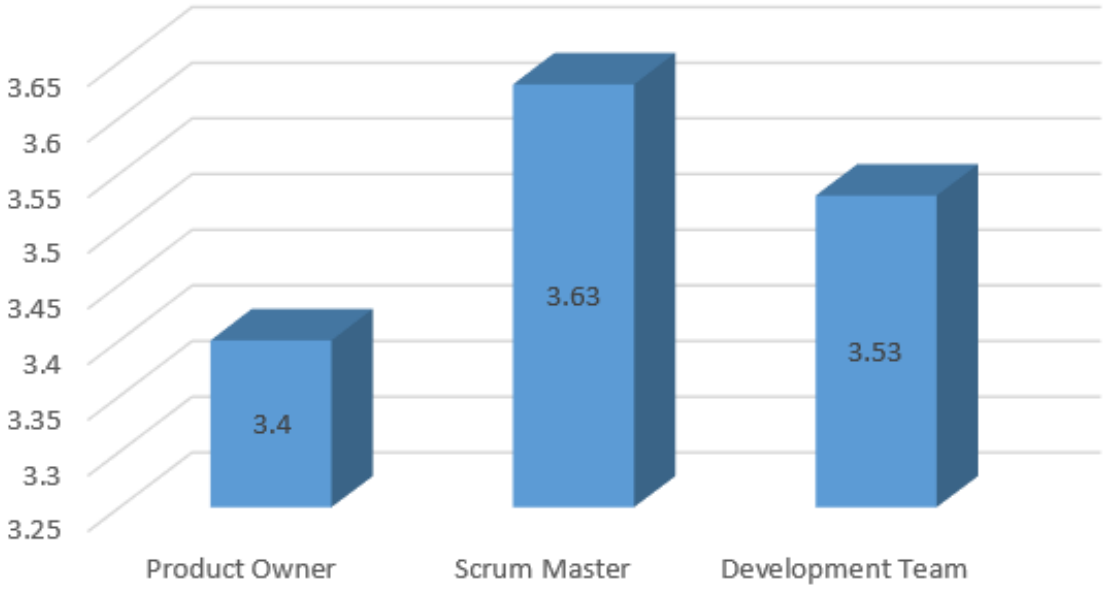

Figure 4.16: Avg. EQ score of each Role

understand team members, and make good decisions that add value to the product. Their emotional intelligence helps drive the product vision and ensure team cohesion.

4.3.6.3 Scrum Masters

Scrum Masters have a mean EQ score of 3.40, which is a moderate or developing emotional intelligence level (2.5–3.4). Although the score is lower than those of the Product Owners and the Development Team, it still reflects a level of emotional competence that can be considered reasonable. Scrum Masters work closely to drive Agile processes, solve conflicts, and facilitate collaboration. Their day-to-day work is dealing with interpersonal relationships and team dynamics. The score indicates that they have the capacity to perform in these functions but can struggle with emotionally charged situations or team stress. With more development in emotional regulation and social awareness, Scrum Masters have the potential to expand on maintaining team motivation and psychological safety.

Figure 4.15 shows the average EQ score of an agile team. The Product Owners, with the highest EQ, are better equipped to navigate stakeholder relationships and manage the broader project vision, while the Development Team's high score allows them to effectively address technical challenges. Scrum Masters, with a slightly lower EQ, still possess the necessary

emotional intelligence to maintain the smooth functioning of the team. These differences underscore the distinct emotional challenges faced by each role within a project setting. High emotional intelligence is crucial for fostering collaboration, maintaining motivation, and ensuring the long-term success of the project, as emotional resilience allows for better decision-making, smoother interactions, and the effective management of conflicts and stressors.

4.3.7 Emotional Response of Participants to each Phase of RCM Lifecycle

This section 4.4 provides a detailed analysis of Agile team emotional response at each phase of the requirement change lifecycle. The aim is to examine and comprehend the role-specific emotional responses and behavioral reactions that Agile team members exhibit as they experience the various phases of requirement change. Agile roles are inherently diverse in responsibility, decision-making scope, and exposure to stakeholders, which influences how people in those roles perceive and cope with change.

Agile software development relies on responsiveness to change; nevertheless, the process of dealing with a high frequency of changes in requirements usually evokes diverse emotional and behavioral reactions based on team roles. Each role has different tasks, expectations, and pressures during change, resulting in individual emotional pathways and coping mechanisms.

This objective focuses on understanding how each role reacts emotionally and behaviorally during each stage of the RCM lifecycle.

1. **Arrival of Change:** How members first see and emotionally respond to new or changed requirements. This involves responses such as fear, excitement, resistance, or uncertainty based on role-specific responsibilities (e.g., POs interpreting stakeholder needs and developers dreading workload increases).

2. **Implementation of Change:** How individuals within the team act and manage themselves through the process of the change. This phase tends to include planning, coordination, task reallocation, and time constraint pressures, which contribute to emotional states like frustration, stress, cooperation, or problem-solving excitement.

3. **Delivery of Change:** Team members' feelings and actions once the change has been

finished and rolled out. Emotional reactions, in this case, can be satisfaction, relief, pride, or dissatisfaction, depending on whether the change went smoothly and on stakeholder feedback.

Through analyzing these role-specific emotional and behavioral reactions, the research aims to discover patterns and contrasts in emotional intelligence deployment by roles. Table 4.20 shows the emotional response of the agile team towards the RCM stages.

Table 4.20: Emotional Responses to Requirement Change Management Lifecycle

Stage	**Positive and Calm**	**Positive and Energetic**	**Negative and Angry**	**Negative and Sad**	**Negative and Fearful**	**Neutral or Low**	**Total**
Feeling when a requirement change request arrives	**88**	**38**	26	21	8	21	202
Feeling when requirement change is implemented	**93**	**69**	16	5	5	14	202
Feeling when a requirement change is delivered	**79**	**93**	9	4	8	9	202

Table 4.20 shows that the emotional reaction to *"What do you feel when a requirement change request comes?"* is generally positive. A high majority of the participants were calm (88) or energetic (38), implying that they are receptive to change and sure of executing it. A minority did react with anger (26), sadness (21), and fear (8), implying that previous negative experiences or workload issues can still have an effect on initial reactions to change.

The next situation, *"What do you feel when the requirement change is implemented?"* indicates a peak in positive feelings. Most participants reported being calm (93) and active (69), while very few reported being negatively angry (16), sad (5), or afraid (5). This indicates that once the changes are in progress and under management, the team members feel reassured and contented, supporting the significance of execution quality and support throughout implementation.

Lastly, *"What do you feel when a requirement change is delivered?"* elicited the most strongly positive emotional reaction in the dataset, with 93 feeling energetic and 79 feeling calm. It is this phase where all efforts come to fruition and progress comes to accomplishment, and it is quite

often accompanied by relief, pride, or motivation. Few of the participants expressed anger (9), sadness (4), or fear (8), which could be due to post-delivery concerns or issues related to quality, but otherwise, the emotional set is very positive at this stage.

This detailed interpretation proves that the initial and middle phases of requirement change management, especially those relating to inadequate communication, vague scope, interdependencies, or insufficient resources, have a tendency to elicit strong negative feelings, particularly anger and fear. On the other hand, subsequent phases like implementation and delivery are related mainly to positive emotions, indicating satisfaction, confidence, and emotional resolution.

These findings underscore the necessity of incorporating emotional intelligence (EI) into change management. Educating teams to control emotional reactions, enhancing communication, defining roles, and establishing trust can adequately mitigate the emotional impact of requirement volatility. Emotional intelligence approaches like these can yield enhanced team morale, enhanced decision-making, and ultimately greater project success rates.

4.3.8 Role-based Emotions Mapping During the RCM Lifecycle

Throughout the life cycle of requirement changes throughout arriving, implementing, and delivering phases, emotional reactions differ widely by role. Table 4.21 shows that during the arriving phase, in which new or changed requirements are presented, the Development Team tends to have more intense negative feelings of anger and fear, mostly provoked by obscure prioritization, vague scope, or undervalued risk. Scrum Masters in this stage most often report fear and apprehension, which is their duty to judge team capacity and uphold workflow harmony, whereas Product Owners might be calmer, reporting calm or neutral feelings because they are detached from strategic considerations.

As the change enters the implementation phase, Developers still exhibit emotional tension, sadness, and frustration caused by interdependencies, resource unavailability, or skill shortages, but mostly reflect resilience through peaceful or high-energy reactions when they perceive a sense of mastery. Scrum Masters at implementation exhibit combinations of positive and negative sentiments, oscillating between conflict resolution and process enforcement.

During the delivery phase, in which results are assessed and effects are achieved, Devel-

opment Teams demonstrate a mix of positive tranquility and fear, realizing the effects of their work, while Product Owners have positive moods, particularly when changes contribute to business objectives. Scrum Masters would mirror the general mood of the team, with balanced feelings associated with project success or lingering challenges. This role-emotional mapping emphasizes the importance of specialist emotional intelligence support on all roles, particularly in high-stakes, emotionally charged phases such as implementation. Table 4.21 shows role-based Emotional Responses during the RCM Lifecycle.

Table 4.21: Role-based Emotional Responses during RCM Lifecycle

Stages	**Role**	**Positive and Energetic Emotions**	**Positive and Calm Emotions**	**Negative and Angry Emotions**	**Negative and Sad Emotions**	**Negative and Fearful Emotions**	**Neutral or Low Energy Emotions**
Arrival	Development Team	22	**60**	15	11	3	17
Arrival	Product Owner	**8**	**8**	4	2	0	1
Arrival	Scrum Master	8	**20**	7	8	5	3
Implement	Development Team	46	**58**	9	3	3	9
Implement	Product owner	6	**13**	4	0	0	0
Implement	Scrum Master	17	**22**	3	2	2	5
Delivery	Development Team	53	**54**	5	2	8	6
Delivery	Product owner	**15**	4	2	0	0	2
Delivery	Scrum Master	**25**	21	2	2	0	1

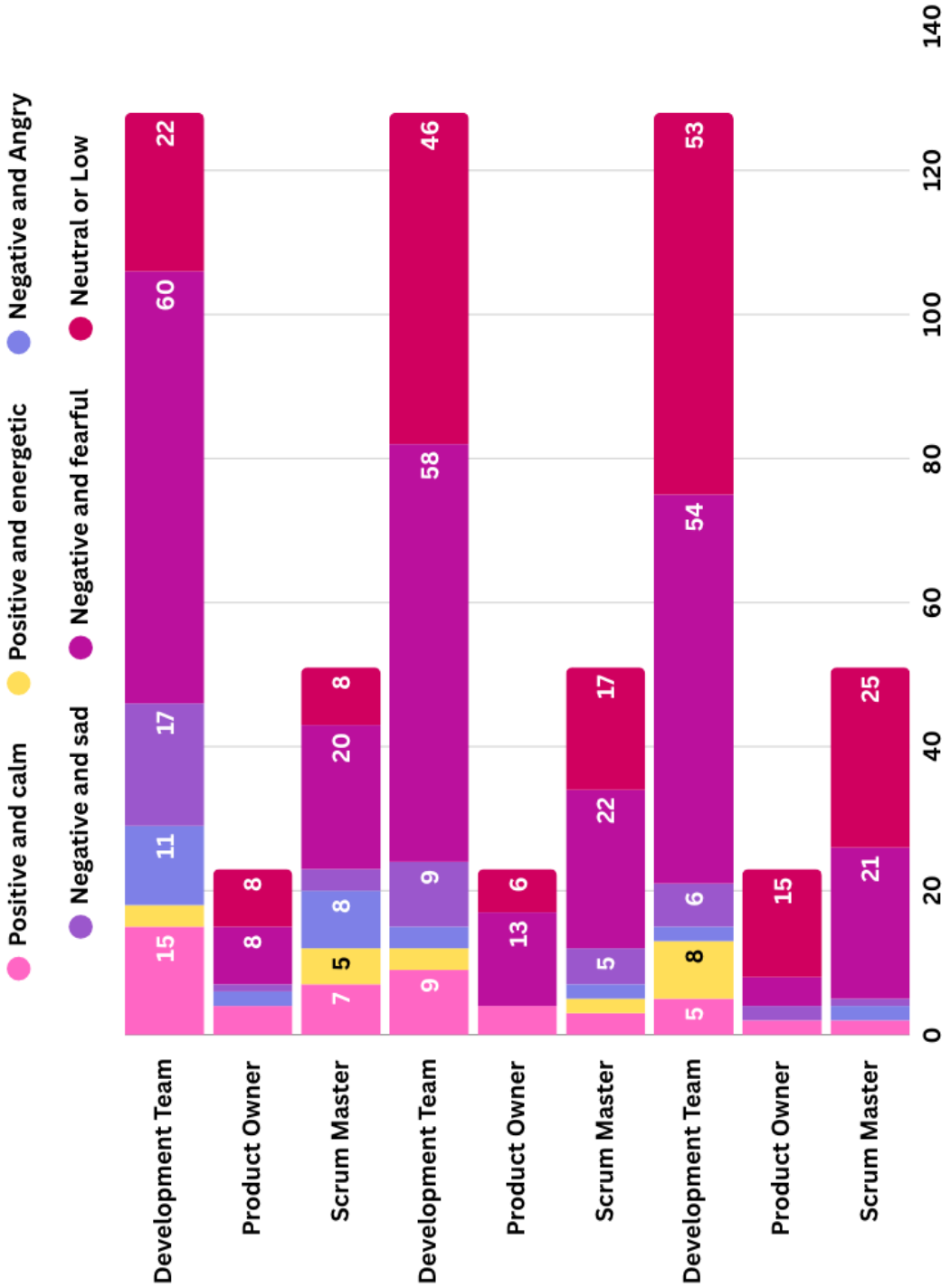

Figure 4.17: Role-Based Emotional Response to RCM Lifecycle

4.4.2.1 Role-based Emotional Response during Requirement Change Arrival

The Development Team has a broad range of emotions, but the most impressive part is their high level of positive calm (60) and energetic (22) reactions, which largely suggest resilience and preparedness to deal with new problems. Nonetheless, anger (15) and sadness (11) also emerge, indicating initial frustration or confusion most likely caused by recurring change, poor clarity, or stakeholder communication breakdown. The team appears to embrace changes while being encouraged to address them. The emotional blend indicates an experienced and skilled team that is both under pressure and motivated at this early point. Whereas, Product Owners exhibit low emotional responses in general, with no fear and few negative emotions. They score equally balanced positivity, particularly in calm and energetic emotions (8 each), which points towards a strategic and calm approach. This can be due to their part in bringing or sanctioning changes, which prepares them more mentally and less emotionally. Possibly because this role is more familiar with or has control over the changes being brought about. While Scrum Masters exhibit moderate negative feelings, especially anger (7) and sadness (8), perhaps reflecting worries about project stability and team reaction. But their fairly high positive calm (20) indicates their capacity to remain calm. These are the kinds of figures indicative of Scrum Master's balancing act of soaking up team tension while still keeping control over operations.

4.4.2.2 Role-based Emotional Response during Requirement Change Implementation

Negative emotions drop at the implementation stage, with anger (9) and sorrow (3) decreased. Positive calmness (58) and energy (46) are still high, indicating a transformation toward focused action and confidence. The Development Team seems to feel more emotionally stable in moving from uncertainty to action, directing their energy toward execution. Whereas, Product Owners have a low emotional profile with higher positive calm (13) scores, which indicate satisfaction with progress and goal congruence. Their absence of negative emotion might indicate distance from hands-on activity, but also trust in the capability of their team. While Scrum Masters display lower negative emotion, combined with increasing positive calm (22) and energetic (17) scores, which indicate enhanced emotional clarity and optimism, as the change is palpable. This implies their function is more relaxed when the team is engaged and less entangled in planning uncertainty.

4.4.2.3 Role-based Emotional Response during Requirement Change Delivered

At delivery, the Development Team achieves peak positivity with close to equal positive calm (54) and positive energetic (53) reactions. Negative feelings are low, affirming a high sense of accomplishment and closure. As some fear (8), potentially attributed to outcomes or feedback from users, there is an overall optimistic emotional situation with evidence of successful emotional migration through the change cycle. Whereas, the Product Owner displays a marked increase in positive energetic emotions (15), the highest in all the stages for this role—suggesting relief and exhilaration upon successful delivery, probably because strategic goals have been achieved. They have a predominantly low emotional range, indicating that they are calm throughout the process. while, Scrum Masters record high positive emotions, particularly positive energetic (25) and calm (21), which suggest that they are pleased with the completed process and team performance. Their emotional pattern verifies that once delivery is completed, their role sets and emotional satisfaction grow.

The Development Team has the greatest emotional range, initial stress (anger, fear, sadness), consistent confidence at implementation, and maximum positivity at delivery, mirroring their strong engagement and emotional resilience requirements. Scrum Masters have moderate emotional fluctuations, beginning in concern and transitioning to satisfaction, emphasizing their alignment and conflict functions. Product Owners exhibit the lowest emotional intensity, maximum positivity at delivery, and a focus on results. Generally, emotions in all roles turn from negative to positive as clarity and progress become better, particularly for those directly engaged in implementation.

4.4 Correlation of Age, Gender, and Professional Experience between the Role-based emotional response

The agile software development environment is very complex and dynamic in the requirement change management process, and there are impacts of change on the roles of the team. This study identifies 10 key challenges of requirement change management with their associated emotional responses categorized into six distinct emotional states: positive and calm, positive and energetic, negative and angry, negative and sad, negative and fearful, and neutral or low.

These emotional categories were used to evaluate how individuals in different agile roles, like Product Owner, Scrum Master, and Development Team, respond to the pressures and dynamics of requirement changes. Each challenge was mapped to one or more emotional states and linked to the roles affected. Moreover, demographic variables such as age, gender, and professional experience were analyzed to uncover patterns and correlations in emotional response and role-based impact. For instance, experienced Scrum Masters often demonstrated more emotionally resilient reactions (e.g., positive and calm) to frequent scope changes, whereas junior developers tended to experience more negative emotional states, such as fear or frustration. This multi-dimensional analysis offers a richer understanding of the human Challenge involved in managing requirement changes and underscores the need for emotional intelligence and role-sensitive support mechanisms within agile teams.

4.4.1 Average Age, Gender, and Professional Experience to the Emotions

A thorough analysis of the relationships between various emotional categories and Age, Gender, and Professional Experience can be found in the table titled "Correlation of Age, Gender, and Professional Experience to the Emotions." These associations provide important information about the relationship between professional and demographic characteristics and emotional reactions.

4.5.1.1 Neutral or Low Energy Emotions

People who typically exhibit more neutral or low-energy emotional states at work fall into this category.

- **Average Role (1.96):** Most people with neutral or low-energy emotions have moderately responsible roles. Usually, members of the Development Team or Scrum Masters fill these positions. These positions frequently deal with teamwork and task management, which may not require a lot of emotional investment.
- **Average Age (1.69):** Most members of this group are in the 20–25 age range, making them comparatively young. This implies that younger people typically report feeling more neutral or low-energy at work, perhaps as a result of their less demanding roles or the types of tasks they are performing.

- **Average Gender (5.14):** A sizable portion of men fall into this emotional category, suggesting that neutral or low-energy feelings may be more common among male professionals in this situation.

- **Average Experience (2.57):** People in this group have between two and five years of work experience. Since they are still in the learning stage of their careers, people in this experience bracket may be less impacted by high-stress emotional reactions, resulting in a more neutral emotional state.

4.5.1.2 Negative and Fearful Emotions:

This group includes people who frequently feel more depressed and afraid, perhaps as a result of stress or uncertainty at work.

- **Average Role (1.8):**Like the preceding group, these people usually hold moderate positions like members of the Development Team or Scrum Masters. Their emotional reactions, however, imply that these positions might entail overcoming obstacles that make people feel afraid, like handling deadlines or modifications to the project's scope.

- **Average Age (1.28):** The majority of these people are in the 20–25 age range, making them primarily younger. This suggests that because they have less experience dealing with obstacles at work, younger professionals may be more prone to feel afraid or have negative emotions.

- **Average Gender (3.92):** Although the gender distribution is less skewed than in the Neutral or Low Energy Emotions group, men still predominate in this category. This could imply that when faced with obstacles at work, younger men may experience higher levels of stress or anxiety.

- **Average Experience (1.96):** The majority of people in this group have less than two years of work experience, which could account for their more sensitive reactions to negativity or fear. The prevalence of negative emotions in this group may be explained by the fact that inexperienced professionals are frequently more prone to stress and anxiety.

4.5.1.3 Positive and Calm Emotions:

This group includes people who feel calm and happy at work, which is frequently associated with higher levels of emotional stability and satisfaction.

- **Average Role (2.0):** People in this group are probably in more responsible positions, like product owners. The greater emotional regulation in this group may be explained by the fact that these positions usually call for emotional stability and decision-making authority.
- **Average Age (3.35):** Most of the people in this group are older, mainly in the 30-35 or 35-40+ age range. This implies that professionals report feeling more at ease and content at work as they get older and tend to improve their emotional regulation.
- **Average Gender (10.18):** Men predominate in this group. This gender dominance may suggest that older, more seasoned men are better able to control their emotions, perhaps as a result of their stable careers or higher emotional intelligence.
- **Average Experience (5.09):** These people have worked in their current positions for five to seven years, which suggests that experience increases one's ability to maintain emotional stability. Experience may improve a person's ability to manage stress at work, which could result in a more relaxed and upbeat attitude.

4.5.1.4 Negative and Angry Emotions:

This group includes people who feel angry and negative emotions, which can be brought on by conflict, frustration, or discontent at work.

- **Average Role (2.0):** Similar to the Positive and Calm category, these individuals tend to be Product Owners or hold high responsibility roles. These roles may involve handling conflicts or dealing with difficult situations, which could lead to anger or negative emotions.
- **Average Age (2.16):** People in this group are typically between the ages of 25 and 30, suggesting that as professionals enter their late 20s, they might encounter more stressful circumstances that make them feel angry or frustrated.
- **The average gender (6.49)** is dominated by men, indicating that male professionals, especially those in high responsibility roles, may be more likely to react angrily to challenges at work.

- **The average experience (3.24)** of these people is three to five years, indicating that as professionals get more experience, they might come across circumstances that make them feel angry or frustrated, especially if they are dealing with problems or conflicts related to a project.

4.5.1.5 Positive and Energetic Emotions:

People in this category exhibit high levels of motivation and engagement as evidenced by their positive and energetic emotions.

- **Average Role (1.92):** The majority of these people are Scrum Masters or Development Team members, which fits with the group's enthusiastic feelings because these positions frequently call for active participation and enthusiasm.
- **Average Age (1.20):** The majority of members in this age group are between the ages of 20 and 25, which indicates that young professionals are more likely to be highly motivated and engaged in their job.
- **Average Gender (2.61):** Although the gender gap is less pronounced than in other emotional categories, men are once more likely to feel depressed
- **Average Experience (1.81):** Those with two years of experience tend to have high degrees of positive emotions, which may be associated with the enthusiasm of beginning their career and adjusting to new environments.

4.5.1.6 Negative and Sad Emotions:

People within this category have feelings of sadness, frustration, and low motivation.

- **Average Role (1.87):** Most individuals in this group would probably be in roles like Scrum Masters or Development Team members, where the stress and emotional issues might be a result of the role's demands.
- **Average Age (1.20):** The majority of people in this group are aged 20-25 years, which implies that younger professionals are likely to have more emotional ups and downs due to the difficulties of early career establishment.
- **Average Gender (3.61):** This category is characterized by a high gender difference, with men more often reporting negative feelings like sadness and frustration.

- **Average Experience (1.81):** Most likely to feel negative emotions are those with fewer than two years of experience. This may be caused by stress involved in learning new skills, uncertainty about their job, or issues at the workplace.

Key trends in emotional experiences across age groups, genders, and levels of professional experience are highlighted in this table. While older professionals with more experience tend to feel calmer and positive emotions, younger professionals, especially those with less experience, are more likely to feel negative emotions like fear, sadness, and anger. Emotional responses are significantly influenced by gender, with men typically reporting more intense emotional reactions overall, especially in categories like calm, energetic, and angry emotions. Table 4.22 shows the Average age, Gender, and Professional Experience to the Emotions.

Table 4.22: Average of Age, Gender, and Professional Experience to the Emotions

Emotions	**Avg.Role**	**Avg.Age**	**Avg.Gender**	**Avg.Experience**
Neutral or Low Energy Emotions	1.96	1.69	5.14	2.57
Negative and Fearful Emotions	1.8	1.28	3.92	1.96
Positive and Calm Emotions	2.0	3.35	10.18	5.09
Negative and Angry Emotions	2.0	2.16	6.49	3.24
Positive and Energetic Emotions	1.92	1.86	5.62	2.81
Negative and Sad Emotions	1.87	1.20	3.61	1.81

4.4.2 Pearson Correlation

Pearson correlation is a statistical index assessing the strength and direction of the linear relationship between two continuous variables. It varies from -1 to +1, with +1 reflecting a perfect positive correlation, -1 a perfect negative correlation, and 0 no correlation. In research, it assists in analyzing whether altering one variable is related to changes in another, aiding data-driven inference and hypothesis testing.[83] To calculate the Pearson correlation following

formula is used.

$$r = \frac{\sum(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum(X_i - \bar{X})^2} \cdot \sqrt{\sum(Y_i - \bar{Y})^2}}$$

where:

X_i, Y_i : individual data points

$\bar{X}, \bar{Y}$: mean of X and Y respectively

$\sum$: summation over all data points

r : Pearson correlation coefficient (range: -1 to 1)

4.5.2.1 Correlation between overall emotions and age, gender, professional experience

A thorough analysis of the relationships between various emotional categories and Age, Gender, and Professional Experience can be found in the table titled "Correlation of Age, Gender, and Professional Experience to the Emotions." These associations provide important information about the relationship between professional and demographic characteristics and emotional reactions. Table 4.23 shows Correlation of Age, Gender, and Professional Experience to the Emotions.

array

Table 4.23: Correlation of Age, Gender, and Professional Experience to the Emotions

Index	Emotions	Role	Age	Gender	Experience
Role	1.0	-0.007945218	-0.211569546	-0.278168503	-0.286341572
Emotion	-0.007945218	1.0	-0.027477114	-0.039799423	-0.033719687
Age	-0.211569546	-0.027477114	1.0	0.410823595	0.518521832
Gender	-0.278168503	-0.03979942	0.410823595	1.0	0.359878887
Experience	-0.286341572	-0.033719687	0.5185218323	0.359878887	1.0

Relationships between the variables of role, emotion, age, gender, and experience are shown in the correlation matrix, which offers important insights into how these elements interact in the workplace.

Role and Gender: There is virtually no correlation between the types of emotions people experience and the roles they play, as evidenced by the extremely weak and negative correlation between role and emotion (-0.0079). Whether a person is a Scrum Master, Product Owner, or member of the Development Team, this weak inverse correlation indicates that the role itself

has little bearing on the emotional reactions they experience. Therefore, the role held within the organization may not have as much of an impact on emotional responses as other Challenge like external influences or personal coping mechanisms.

Role and Age: There is a weak inverse relationship between Role and Age, as indicated by the negative correlation (-0.2116). The people in these positions are typically younger as the number of roles rises, such as from Scrum Master to Product Owner. This may be a reflection of the hierarchical structure of organizations, where younger professionals tend to hold entry-level roles (e.g., Scrum Masters or Development Team members) while older and more experienced individuals tend to hold more senior roles (e.g., Product Owners). The correlation is weak, though, and this trend may also be significantly influenced by other elements like organizational structure or career advancement.

Role and Gender: There appears to be a weak inverse relationship between gender and role, as indicated by the negative correlation between the two (-0.2782). The gender distribution exhibits greater imbalance as the role's numerical value rises (from Scrum Master to Product Owner), with men dominating higher responsibility roles. This suggests that men may be more prevalent in some roles than in others, especially senior roles. However, the correlation is not strong enough to indicate a direct or significant cause-and-effect relationship, suggesting that this gender imbalance may be caused by other Challenge such as organizational culture or societal trends.

Role and Experience: Role and Experience have a negative correlation (-0.2863), indicating that people in lower number roles (such as Scrum Masters) typically have less experience than people in higher number roles (such as Product Owners). This is in line with the normal organizational career progression, which sees people begin in entry-level jobs and progressively advance to more senior positions as they acquire more experience. The correlation is rather weak, though, suggesting that a person's role is not entirely determined by their years of experience. Career advancement may also be significantly influenced by other Challenge, such as performance or leadership abilities.

Emotion and Age: Age appears to have little to no effect on the emotional categories experienced, as evidenced by the extremely weak and negative correlation (-0.0275) between emotion and age. This suggests that people of all ages, from those in their twenties to those in their forties, might feel the same emotions at work. The emotional reactions recorded in this dataset do not appear to be significantly influenced by age, indicating that other Challenge, such

as role, work environment, and personal characteristics, may have a greater impact on emotional reactions than age.

Emotion and Gender: Additionally, there is a very weak correlation (-0.0398) between gender and emotion, indicating that gender has no discernible influence on emotional reactions. According to this, men and women experience a similar range of emotions in their work environments, indicating that emotional reactions in the workplace are essentially gender-neutral. Although more research may be required to determine whether other Challenge, such as societal expectations, influence emotional experiences, this could represent a larger trend of gender equality in emotional expression at work.

Emotion and Experience: Professional experience has little bearing on the emotional reactions that occur in the workplace, according to the negative correlation between emotion and experience (-0.0337). This weak correlation implies that experience alone may not be a significant challenges in determining an individual's emotional reactions to work challenges, regardless of experience level. Professional experience may not have as much of an impact on emotional reactions as other elements like role, workplace culture, or personal characteristics.

Age and Gender: Given that age and gender have a positive correlation (0.4108), older people are more likely to be male. Given that older age groups are frequently more male-dominated in the workplace, this may be a reflection of larger societal trends. Since older professionals in many industries tend to be male, this correlation suggests that gender and age may be related in terms of career trajectories. However, this is not always the case and may differ by industry or region.

Age and Experience: Older people typically have more experience, according to the comparatively stronger positive correlation between age and experience (0.5185). This makes intuitive sense because people tend to gain more years of experience as they get older and advance in their careers. Given that older professionals have probably faced more obstacles and acquired a wider range of skills over their careers, this correlation implies that age is a reliable indicator of experience.

Gender and Experience: Males typically have more professional experience than females, according to the positive correlation between gender and experience (0.3599). Despite being moderate, this correlation suggests that there may be a gender gap in opportunities for experience or career advancement. This could be the result of a number of things, such as historical disparities in career advancement, where men may have had greater opportunities for leadership

positions or career advancement, or gender biases.

All things considered, the correlation matrix shows some significant connections between Role, Emotion, Age, Gender, and Experience. The impact of role on emotion and the comparatively weak correlations between emotion and age, gender, and experience, in contrast to the obvious and stronger correlations between age and experience, indicate that individual characteristics and particular situations have a greater influence on emotional reactions in the workplace than do demographic Challenge alone. The data also shows some gender-related trends, especially in Experience and Role, which might be a reflection of larger organizational and societal trends. Table 4.24 shows the role-based correlation between negative emotions and age, gender, and experience.

4.5.2.2 Role-based correlation between negative emotions and age, gender, and experience

Table 4.24: Role-wise Emotional Analysis

Role	**Negative Emotions Count**	**Age**	**Gender**	**Experience**
Development Team	0.2265625	1.6504065	1.125	2.0703125
Product Owner	0.2173913	2.1052632	1.1304348	3.1739130
Scrum master	0.0980392	1.9	1.2156863	2.7254902

Development Team: With an average score of 0.23, the role in the dataset with the highest average count of negative emotions is the Development Team role, which includes jobs like Requirement Engineers, Business Analysts, and other related roles. This implies that possibly as a result of the nature of their work, people in these roles frequently experience greater emotional difficulties when working on projects. This role's duties frequently include handling shifting requirements, overseeing several stakeholders, and settling disputes—all of which can be emotionally draining. The stress of handling difficult tasks and navigating complicated work environments may be the cause of the higher frequency of negative emotions seen in this group.

With an average age of 1.65, the majority of the Development Team members are probably in the 20–25 age range. This result supports the notion that younger professionals who are still establishing their careers tend to hold entry-level roles, which frequently involve members of the development team. Younger workers may encounter emotional difficulties as they deal with the

demands of entering the workforce, picking up new skills, and adjusting to the dynamics of the workplace.

Although there is some degree of gender diversity within the Development Team, the average gender distribution value of 1.13 indicates that the group is slightly male-dominated. Although diversity is steadily improving, this ratio reflects larger trends in the tech sector, where some technical roles may have a higher male representation.

The Development Team members' average experience is 2.07, indicating that they have two to three years of experience. Because they lack coping mechanisms and experience dealing with problems at work, less experienced professionals are frequently more susceptible to emotional stress. As a result, these people may be more impacted by the emotional dynamics at work, which could explain why this group's negative emotion scores are higher.

Product Owner: Compared to the Development Team, the Product Owner role has fewer emotional challenges, although it still experiences a high degree of negative emotion (average score of 0.22). Product owners may face different kinds of stressors than technical teams because they are usually in charge of overseeing the product backlog and making sure the development team produces value. The emotional challenges appear to be a little less common than in the Development Team role, despite the fact that their role entails strategic oversight, decision-making, and frequent handling of client or stakeholder expectations.

Those in the Product Owner position are slightly older, most likely in the 25–30 age range, as indicated by their average age of 2.11. People in this age range may have some professional experience and are moving into positions requiring greater responsibility and leadership. The comparatively lower emotional stress seen in this role may be due in part to the increased emotional maturity that frequently accompanies aging.

A slight male dominance is indicated by the Product Owner role's average gender score of 1.13, which is comparable to the Development Team's gender distribution. This ratio implies that the gender dynamics in this role are similar to those in other technical roles within the company, but diversity is still possible.

Product owners typically have three to four years of experience, as indicated by their average experience of 3.17. This degree of experience implies that those in this position have probably acquired enough skills and knowledge to manage stakeholders, make decisions, and perform increasingly complicated tasks. Compared to people in less experienced roles, Product Owners may have improved their emotional coping skills as a result of this experience, which would

have decreased the frequency of negative emotional reactions.

Scrum Master: With a score of 0.10, the Scrum Master role has the lowest average count of negative emotions, indicating that professionals in this role are either better at handling emotional stress or have fewer negative emotions overall. Scrum Masters are in charge of assisting the team in maintaining a productive workflow, facilitating Scrum processes, and removing obstacles. Their main responsibilities are to coach the team, facilitate collaboration, and make sure agile principles are adhered to. Given these duties, Scrum Masters might be better able to handle emotional difficulties at work because they frequently act as facilitators and mediators, concentrating on upholding a constructive and upbeat atmosphere.

The majority of people in this role are between the ages of 20 and 25, as evidenced by the Scrum Masters' average age of 1.90, which is comparable to that of the Development Team. Scrum Masters may feel less negative emotions despite being relatively young because of the nature of their work, which calls for them to resolve conflicts and promote positive interactions. Their lower emotional stress scores might be a result of the emotional fortitude needed for their position.

With an average gender score of 1.22, the gender distribution for Scrum Masters is likewise fairly balanced. While there are slightly more men than women in this role, the distribution is still generally fairly balanced.

Scrum Masters have between two and three years of professional experience, according to their average experience of 2.73. This experience should have given you the skills you need to effectively manage team dynamics, settle disputes, and deal with stress at work. It is possible that Scrum Masters' comparatively low emotional challenges stem from their capacity to handle challenging circumstances in a composed and facilitating manner.

It is evident from this analysis that the Development Team feels more negative emotions than Scrum Masters and Product Owners. The nature of the Development Team's work, which frequently entails handling shifting requirements, technical difficulties, and short deadlines, is probably the cause of their greater emotional challenges. These difficulties may cause more emotional reactions, especially in professionals with less experience. Negative feelings are more common among professionals who are younger (ages 20 to 25) and less experienced (ages 1-3). The Development Team position, where members are usually younger and less experienced, is where this trend is most noticeable. Scrum Masters, on the other hand, despite being a little younger, have a tendency to feel less negative emotions. This is probably because they play a role

in facilitating and resolving conflicts, which calls for emotional control and resilience. Because the Scrum Master role is centered on facilitating team dynamics and creating a supportive work environment, it seems to offer the best emotional management overall. Even though they are younger and less seasoned, the Development Team members might encounter more emotionally taxing circumstances, which would raise their negative emotional levels.

4.5 Qualitative Data Analysis

The qualitative data analysis has been performed using semi-structured interviews. In total, 37 interviews were conducted. The interview questionnaire is attached in Appendix E. Through that interview, the Requirement Change Management Process followed by the interviewee was examined. Additionally, emotions and solutions to the identified challenges were analyzed. The upcoming subsections highlight the details regarding qualitative data analysis.

4.5.1 Requirement Change Management Process

The interview data analysis based on Question No 1 *Explain your RCM (Requirement Change Management) process* shows that the interview participant followed the RCM process in an agile environment, shown in Figure 4.17. Using the qualitative responses received from agile team members of the Pakistan IT industry through interviews, the phases of the RCM process are given in the upcoming subsections. The included phases are arrival, implementation, and delivery. The arrival phases include the activities, such as change request submission, initial assessment and feasibility, and impact analysis and documentation of requirement change.

4.6.1.1 Arrival

Change Request Submission: At this stage, clients or stakeholders submit a change request (CR). This frequently entails communicating through unofficial channels like Slack or project management software.

Initial Assessment and Feasibility Check: At this stage the product owner consults with the rest of the team members to determine if the change is feasible. The team examines if the

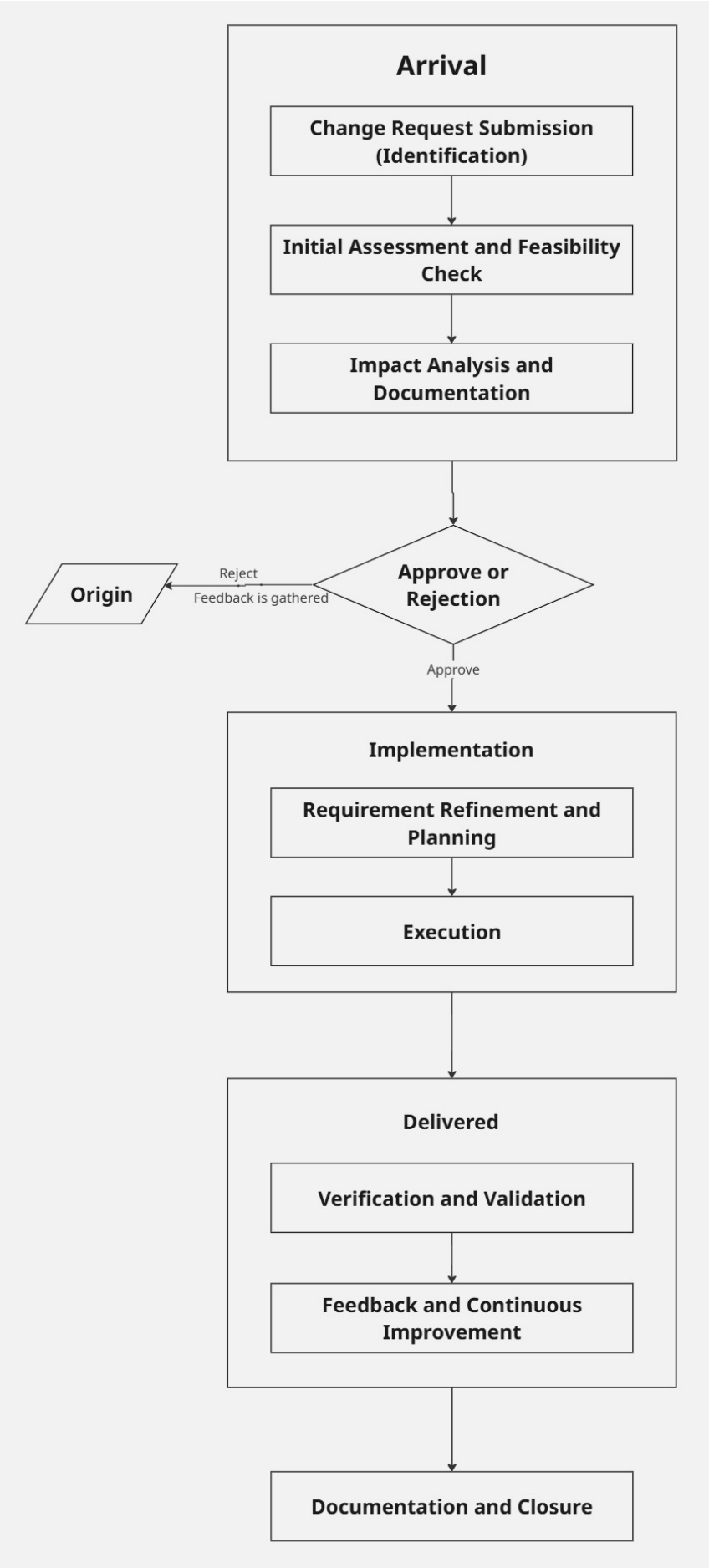

Figure 4.18: Agile RCM Process

change is necessary, suits the project's intention, and would impact the schedule, cost, work plan, and end quality.

Impact Analysis and Documentation: During the impact analysis and documentation phase, the Product Owner and Scrum Master collaborate with the development team to verify how the intended change influences the project's scope, time, cost, and quality and document the findings to aid in informed decision-making.

Approval/Rejection: The stage where, formally, a decision is taken by the agile team to accept or reject the change request.

4.6.1.2 Implementation

The implementation includes activities such as requirement refinement and planning, and execution of the requirement change. **Requirement Refinement and Planning**: This phase includes breaking down the larger tasks into smaller achievable tasks, explaining and documenting the authorized change into concise, actionable work, and scheduling how and when it will be executed in future sprints.

Execution: The implementation stage is where the approved refined requirement change is implemented, tested, and incorporated in the product during the development sprint.

4.6.1.3 Delivered

The delivery includes activities such as verification and validation, feedback and continuous improvement, and documentation and closure of the requirement change. **Verification and Validation**: This phase guarantees the requirement change was implemented properly (verification) and fulfills user expectations and needs (validation), establishing that the change adds value without introducing new problems.

Feedback and Continuous Improvement: This phase is concerned with gathering feedback upon completing a requirement change to learn lessons and enhance future change processes.

Documentation and Closure: This last step entails formally documenting all information of the deployed change and closing the change request to facilitate transparency, traceability, and process closure.

4.5.2 Role-based Emotional Responses towards RCM challenges

The interview data analysis regarding role-based emotional response against RCM challenges shows that the participants felt various emotions towards each RCM challenge. For instance, challenge *"Not properly evaluate the impact and risks of requirement changes"*, the participants P-05, P-09, P-11 felt negative and angry, as for the challenge *"Poor estimation of the cost, time, and effort for requirement changes"*, the participant P-05, felt Frustrated. P-01 felt fearful. The details regarding RCM challenges and emotional responses based on agile team roles, such as product owner, scrum master, and the development team, are shown in Table 4.25, Table 4.26, and Table 4.27.

4.6.2.1 Emotions of the Development Team towards RCM challenges

Table 4.25 shows a variety of emotions the members of the development team experience during requirement change management.

Table 4.25: Emotions of the Development Team towards RCM challenges

Participant ID	**CH-01**	**CH-02**	**CH-03**	**CH-04**	**CH-05**	**CH-06**	**CH-07**	**CH-08**	**CH-09**	**CH-10**
P-01	Frust-ration	Energ-ized	Frust-ration	Accept-ance	Motiv-ation	Calm	Sadness	Over-whelm	Fear	Fear
P-02	Determ-ination	Frust-ration	low	Accept-ance	Motiv-ation	Con-fusion	Sadness	Stress	Bore-dom	Frust-ration
P-03	Frust-ration	Determ-ination	calm	Dis-comfort	Honesty	Uncer-tainty	Stress	Moti-vation	Fear	Frust-ration
P-05	Low	Low	Low	Low	Low	Sad-ness	Sad-ness	Low	Low	Frust-ration
P-06	Stress	Neutral	Low	Low	Low	Frust-ration	Low	Frust-ration	Low	Anger
P-07	Anxi-ety	Frustr-ation	Disa-ppoint-ment	Neut-ral	Frust-ration	Low	Anx-iety	Dis-courag-ement	Ener-gized-	Anx-iety
P-08	Frust-ration	Frust-ration	Un-certai-nty	Frust-ration	Con-fusi-on	Un-certai-nty	Over-whelm	Over-whelm	Stress	Fear

Participant ID	CH-01	CH-02	CH-03	CH-04	CH-05	CH-06	CH-07	CH-08	CH-09	CH-10
P-09	Dep-ressed	frust-ration	Con-fide-nce	Energ-ized	Mot-ivat-ed	Anxiety	Con-fus-ed	Angry	Energ-ized	Fear
P-10	Calm	Energ-ized	Low	Fear	Low	Calm	Low	Energ-etic	Calm	Fear
P-11	Calm	Angry	Calm	Calm	Calm	Calm	Energetic	Energ-etic	Angry	Energ-etic
P-12	Angry	Angry	Low	Fear	Fear	Angry	Angry	Fear	Angry	Calm
P-14	Calm	Calm	Calm	Energ-etic	Sad	Calm	Calm	Angry	Calm	Calm
P-15	Low	Low	Low	Angry	Low	Low	Angry	Angry	Sad	Angry
P-16	Calm	Happy	Angry	calm	Low	Low	Sad	Sad	Calm	Angry
P-17	Energ-etic	Energ-etic	Angry	Angry	Angry	Fear	Angry	Sad	Fear	Fear
P-33	Fear	Angry	Fear	Angry	Angry	Angry	Angry	Angry	Angry	Angry
P-34	Fear	Sad	Low	Angry	Fear	Low	Angry	Low	Calm	Calm
P-35	Low	Low	Low	Low	Low	Calm	Calm	Calm	Calm	Calm
P-36	Fear	Angry	Low	Sad	Sad	Low	Calm	Sad	Calm	Fear
P-37	Calm	Calm	Sad	Calm	Calm	Anx-ious	Calm	Angry	Angry	Calm

Table 4.25 shows a complete set of emotional reactions of the participants, whose role in the project is as a member of the development team from P-01 to P-37, engaged in Requirement Change Management (RCM). Each participant's emotional response is attributed to certain challenges they faced during the RCM process, offering interesting knowledge on how people emotionally cope with sophisticated, evolving, and largely stressful project requirements. The analysis systematically reviews the range of emotional reactions, both positive, such as motivation and satisfaction, to negative, such as frustration, anxiety, and fear. It recognizes the difficulties that evoke these feelings, including poor communication, unclear roles, and the interdependency of making changes. In addition, the study explores the identification of patterns in these emotional reactions so that one can get a better insight into how particular elements in RCM processes contribute to team morale and project success. The table also emphasizes common themes such as communication breakdown, task misalignment, and the stress of coping with

changes without adequate planning. According to these results, the analysis recommends focused solutions to prevent adverse emotional reactions, i.e., enhancing communication techniques, clearly defining responsibilities, embracing agile methodologies, and establishing strong risk management frameworks. These findings hope to improve the RCM process by including actionable action steps to develop an even more structured, effective, and emotionally nurturing work culture.

4.6.2.2 Emotions of the Product Owner towards RCM challenges

Table 4.26 shows a variety of emotions the Product Owners experience during requirement change management.

Table 4.26: Emotions of the Product Owner towards RCM challenges

Participant ID	CH-01	CH-02	CH-03	CH-04	CH-05	CH-06	CH-07	CH-08	CH-09	CH-10
P-04	Angry	Calm	Angry	Fear	Fear	Anxious	Frustration	Angry	Angry	Anxious
P-13	Calm	Fear	Low	Low	Fear	Angry	Angry	Calm	Calm	Calm
P-18	Angry	Angry	Angry	Angry	Angry	Angry	Angry	Angry	Angry	Angry
P-19	Sad	Sad	Low	Fear	Low	Sad	Sad	Low	Low	Fear
P-23	Fear	Fear	Angry	Angry	Angry	Low	Angry	Angry	Angry	Angry
P-25	Energetic	Sad	Angry	Angry	Sad	Sad	Energetic	Angry	Angry	Angry
P-27	Energetic	Energetic	nEergetic	Energetic	Energetic	Energetic	Energetic	Energetic	Energetic	Energetic
P-28	Calm	Angry	Low	Sad	Calm	Angry	Angry	Calm	Low	fear
P-29	Calm	Calm	Calm	Calm	Calm	Calm	Calm	Calm	Calm	Calm
P-31	Energetic	Calm	Calm	Angry	Low	Calm	Sad	Energetic	Low	Calm

This table shows the emotional reactions of different Product Owners (POs), identified by participant IDs (e.g., P-04, P-13), during the RCM challenges. Every cell in the table indicates the particular feeling a PO felt at each challenge, e.g., "Angry," "Calm," "Fear," "Sad," "Energetic," "Anxious," or "Low." The findings indicate different patterns of emotionality. Some participants, e.g., P-18, felt consistently angry at all challenges, which means there was perpetual frustration, whereas others, e.g., P-29, felt calm at all times, showing stability of emotions. Participant P-27

persistently displayed energetic feelings, which would mean a highly motivated and engaged mindset. Conversely, attendants such as P-19 exhibited predominantly sad or low responses, indicating potential disengagement or unhappiness. By and large, the table underscores the variability of emotional experience among Product Owners across different stages of the project, with implications for how changes to requirements may influence emotional states in Agile teams.

4.6.2.3 Emotions of the Scrum Master towards RCM challenges

Table 4.27 shows a variety of emotions the Scrum Masters experience during requirement change management.

Table 4.27: Emotions of the Scrum Master towards RCM challenges

Participant ID	CH-01	CH-02	CH-03	CH-04	CH-05	CH-06	CH-07	CH-08	CH-09	CH-10
P-20	Calm	Calm	Angry	Angry	Angry	Angry	Sad	Fear	Angry	Sad
P-21	Calm	Low	Angry	Angry	Angry	Sad	Low	Sad	Low	Angry
P-22	Calm	Fear	Low	Angry	Angry	Angry	Low	Low	Angry	Fear
P-24	Angry	Sad	Sad	Angry	Angry	Angry	Angry	Low	Fear	Low
P-26	Low	Fear	Sad	Angry	Angry	Calm	Fear	Angry	Sad	Angry
P-30	Angry	Sad	Fear	Sad	Angry	Angry	Fear	Sad	Sad	Low
P-32	Anxiety	Calm	Frustration	Anxiety	Anxious	Frustration	overwhelmed	overwhelmed	Angry	Overwhelmed

This table shows Scrum Masters' (SMs') emotional responses, as indicated by participant IDs (e.g., P-20, P-21), to the Requirement Change Management (RCM) challenges, abbreviated as CH-01 to CH-10. Each emotion noted for every Scrum Master at every challenge indicates how they felt because of those particular RCM challenges. For example, P-20 showed predominantly anger and sadness in reaction to repeated adversity, suggesting repeated frustration, particularly from CH-03 to CH-10. P-21 showed low emotional energy and sadness, indicating emotional fatigue or disconnection. P-24 and P-26 also responded with predominantly anger, sadness, and fear, suggesting emotional tension during difficult periods. P-32, however, exhibited more severe and complex feelings such as anxiety, frustration, and feeling overwhelmed, especially between CH-01 and CH-10, indicating strong emotional sensitivity towards requirement change. Generally, this table captures the way Scrum Masters experience a broad mix of negative feelings,

such as anger, fear, sadness, and overwhelm, when coping with requirement change management issues, emphasizing the emotional demands of their role in Agile settings.

4.5.3 Role-Based Industrial Solutions towards RCM Challenge

The result analysis of interviews shows various role-based solutions towards RCM challenges. For instance, the solution provided by the Product Owners is *"The Product Owner should assess change impact and engage stakeholders, review and discuss risks with the development team, and prioritize and estimate changes by business value and risk."* against the challenge 1, i.e. *"Not properly evaluate the impact and risks of requirement changes"*. The details regarding the role-based solution towards RCM challenges are presented in the table 4.28, Table 4.29, and Table 30.

4.6.3.1 Industrial Solutions for Product Owners towards RCM challenges

Table 4.28. shows the industrial solution towards each identified RCM challenge and the responsibility of the Product Owner.

Table 4.28: Responsibilities and Industrial Solutions of Product Owner towards RCM challenges

CH-ID	**Challenge**	**Responsibility**	**Industrial Solution**
CH-01	Not properly evaluate the impact and risks of requirement changes	The Product Owner is responsible for evaluating and communicating the impact, value, and risks of requirement changes to ensure alignment with business goals [43].	1)-Assess change impact and engage stakeholders. 2)- Review and analyze the risk of RC with the team. 3)- Prioritize and estimate changes by business value and risk.
CH-02	Poor estimation of the cost, time, and effort for requirement changes	The Product Owner ensures requirement changes are well-defined and prioritized to support accurate estimation of cost, time, and effort by the development team [43].	1)-Awareness of Unreliable Estimations. 2)-Collaborative Estimation with Developers 3)-Estimate Using Project History
CH-03	Inefficient management and tracking of requirements and changes	The Product Owner ensures all requirements and changes are clearly documented, prioritized, and tracked through effective backlog management[43].	1)-Requirement Tracking with JIRA 2)-Simplified Change Request Process 3)-Maintain Updated Product Backlog

CH-ID	Challenge	Responsibility	Industrial Solution
CH-04	Unclear prioritization and scope of requirement changes	The Product Owner defines the scope and business value of changes and prioritizes backlog items to ensure clarity and alignment with product goals [43].	1)-Business-Driven Change Prioritization 2)-Clear Scope Communication
CH-05	Instability and conflicts caused by high interdependencies among requirements	The Product Owner manages requirement dependencies by structuring and prioritizing the backlog to reduce instability and conflicts [43].	1)- Early Dependency Identification 2)-Resolve Interdependent Changes Proactively
CH-06	Poor communication and collaboration among team members and stakeholders	The Product Owner facilitates communication and collaboration between stakeholders and the team to ensure shared understanding and alignment [43].	1)-Open Communication Channels 2)-Regular Stakeholder Communication 3)-Scheduled Feedback Sessions
CH-07	Inconsistencies and ambiguities in requirement changes	The Product Owner ensures requirement changes are clearly defined and free from ambiguity through effective refinement and stakeholder collaboration [43].	1)-Requirement Clarity Before Planning 2)-Client Discussion for Clarity 3)-Consistent Change Recordkeeping
CH-08	Lack of necessary skills, tools, resources, or domain knowledge to handle requirement changes	The Product Owner ensures the team has access to required domain knowledge, tools, and resources to manage requirement changes effectively [43].	1)-Skill Gap Identification and Training 2)-Facilitate Targeted Skill Development
CH-09	High cross-functionality across team members	The Product Owner supports cross-functionality by aligning diverse team skills with prioritized goals to maximize product value [43].	1)-Align Teams on Goals 2)-Skill-Based Task Prioritization 3)-Foster Cross-Functional Collaboration
CH-10	High consequences of requirement changes	The Product Owner evaluates the impact and risks of requirement changes to ensure informed, value-driven decisions [43].	1)-Assess Change Impact Early 2)-Communicate Change Implications 3)-Flexible and Supportive Leadership

4.6.3.2 Industrial Solutions for Scrum Masters towards RCM challenges

Table 4.29. shows the industrial solution towards each identified RCM challenge and the responsibility of the Scrum Master.

Table 4.29: Responsibilities and Industrial Solutions of Scrum Masters towards RCM challenges

CH-ID	**Challenge**	**Responsibility**	**Industrial Solution**
CH-01	Not properly evaluate the impact and risks of requirement changes	Facilitates collaborative decision-making by coaching the team and Product Owner on assessing the risks and impact of changes [43].	1)-Facilitate Risk-Aware Planning 2)-Encourage Cross-Team Collaboration 3)-Early QA Involvement
CH-02	Poor estimation of the cost, time, and effort for requirement changes	Ensures that estimation practices are understood and effectively used by facilitating backlog refinement and sprint planning [10, 43].	1)-Monitor Sprint Estimation Accuracy 2)-Adjust Timelines Collaboratively with PO 3)-Maintain Estimation Records
CH-03	Inefficient management and tracking of requirements and changes	Guides the team in adopting tools and practices that enhance transparency and tracking of backlog changes [10, 43].	1)-Track Progress Through Agile Ceremonies 2)-Daily Status Communication 3)-Sprint-Aligned Change Tracking
CH-04	Unclear prioritization and scope of requirement changes	Coaches the Product Owner on backlog prioritization and scope management to ensure clarity during refinement sessions [10, 43].	1)-Align Changes with Sprint Goals 2)-Manage Major Changes Independently 3)-Prioritize Without Sprint Disruption
CH-05	Instability and conflicts caused by high interdependencies among requirements	Facilitates early identification of dependencies and resolves blockers through cross-team collaboration and coordination [10, 43].	1)-Adapt Tasks for Dependencies 2)-Monitor and Manage Dependencies 3)-Facilitate Cross-Team Collaboration
CH-06	Poor communication and collaboration among team members and stakeholders	Promotes open communication and collaboration through facilitation of daily Scrum, retrospectives, and stakeholder engagement [10, 43].	1)-Reinforce Change Communication Protocol 2)-Promote Team Collaboration 3)-Clear blockers on time
CH-07	Inconsistencies and ambiguities in requirement changes	Supports the team in clarifying requirements by enabling effective communication between the Product Owner and developers [10, 43].	1)-Clarify Requirements Early 2)-Facilitate Change Resolution Meetings 3)-Align Team on same page regarding requirements
CH-08	Lack of necessary skills, tools, resources, or domain knowledge to handle requirement changes	Identifies skill gaps and encourages continuous learning by facilitating access to resources and training opportunities [10, 43].	1)-Coordinate Support and Training 2)-Provide Guidance and Mentorship 3)-Assist in Difficult Tasks

CH-ID	Challenge	Responsibility	Industrial Solution
CH-09	High cross-functionality across team members	Fosters team collaboration and helps develop cross-functional capabilities through coaching and facilitation[10, 43].	1)-Promote Cross-Role Collaboration 2)-Resolve Priority-Based Conflicts
CH-10	High consequences of requirement changes	Helps the team and PO mitigate risks by promoting adaptive planning and resilience to changing requirements [10, 43].	1)-Sprint Change Impact Monitoring 2)-Facilitate Risk Ownership Clarity 3)-Ensure Responsibility Awareness

4.6.3.3 Industrial Solutions for the Development Team towards RCM challenges

Table 4.30. shows the industrial solution towards each identified RCM challenge and the responsibility of the Development Team.

Table 4.30: Responsibilities and Industrial Solutions of the Development Team towards RCM challenges

CH-ID	Challenge	Responsibility	Industrial Solution
CH-01	Not properly evaluate the impact and risks of requirement changes	The Development Team evaluates technical feasibility, assesses risks, and communicates the potential impact of changes during backlog refinement and sprint planning [43].	1)-Analyze Technical Change Impact 2)-Communicate Change Consequences 3)-Controlled Environment Testing
CH-02	Poor estimation of the cost, time, and effort for requirement changes	The Development Team participates in collaborative estimation, applying techniques like Planning Poker and story points to ensure realistic cost, time, and effort forecasting [84].	1)-Identify Technical Complexities Early 2)-Reassess Estimates Mid-Sprint 2)-Adjust Timelines for Changes
CH-03	Inefficient management and tracking of requirements and changes	The team keeps their work transparent through task boards and daily Scrum, ensuring changes are visible, manageable, and traceable [10].	1)-Use Tools for Traceability 2)-Maintain Updated Change Logs 3)-Collaborate to Resolve Impact
CH-04	Unclear prioritization and scope of requirement changes	The team provides feedback to the Product Owner during backlog refinement and ensures that any change in scope is clarified before sprint commitment [43].	1)-Proactive Backlog Grooming Participation 2)-Highlight Out-of-Scope Issues 3)-Promote Alignment Through Planning

CH-ID	Challenge	Responsibility	Industrial Solution
CH-05	Instability and conflicts caused by high interdependencies among requirements	The Development Team identifies interdependencies early, communicates blockers, and adjusts work sequences to minimize conflicts [85].	1)-Raise Dependency Concerns Early 2)-Resolve Dependencies Collaboratively 3)-Ensure Coordination Across Teams
CH-06	Poor communication and collaboration among team members and stakeholders	The team actively engages in Scrum ceremonies and maintains transparent, respectful communication with each other and with stakeholders [43].	1)-Transparent Progress Communication 2)-Clarify Unclear Requirements Early 3)-Maintain Open Communication
CH-07	Inconsistencies and ambiguities in requirement changes	The team clarifies ambiguous requirements through direct discussions with the Product Owner and contributes to refining user stories [86].	1)-Request Requirement Clarification 2)-Resolve Ambiguities Collaboratively 3)-Ensure Clear Change Documentation
CH-08	Lack of necessary skills, tools, resources, or domain knowledge to handle requirement changes	The Development Team identifies skill/resource gaps and seeks opportunities for learning or requests support to ensure quality delivery [10].	1)-Initiate Skill Development 2)-Participate in Cross-Training 3)-Leverage Productivity Tools
CH-09	High cross-functionality across team members	The team embraces T-shaped skills, shares responsibilities, and adapts roles to achieve sprint goals collectively [43].	1)-Foster Cross-Functional Collaboration 2)-Resolve Priority-Based Conflicts 3)-Align Teams Toward Goals
CH-10	High consequences of requirement changes	The Development Team ensures quality through continuous integration, testing, and validates that changes meet the Definition of Done to minimize negative outcomes [87].	1)-Test Changes Thoroughly 2)-Prepare Rollback Strategy 3)-Ensure Stable Implementation

4.5.4 Incorporate Emotional Intelligence in Agile Team to address RCM Challenges

To incorporate Emotional Intelligence (EI) in addressing each RCM challenge, training strategies were designed based on Goleman's EI model, focusing on the development of self-awareness, self-management, social awareness, and relationship management. The aim of this

training is to enhance the Emotional Quotient (EQ) of Agile team members, enabling them to more effectively manage and adapt to requirement changes within the development process. The EI components needed to address each requirement change management challenge are provided in Table 4.31, and role-based training to cater to each RCM challenge is presented in Tables 4.32, 4.33, and 4.34

4.6.4.1 EI components to address each RCM Challenge

The following are the components of Emotional Intelligence (EI), utilizing Goleman's EI model[17, 19], utilized to tackle Requirement Change Management (RCM) issues. Each component, i.e., Self-awareness, Self-management, Social awareness, and Relationship management, provides solution-specific strategies to enable Agile teams to effectively recognize, regulate, and respond to the emotional and collaboration demands created by requirement changes. The EI components that are suggested by Goleman's EI model to address each RCM challenge are presented in Table 4.31.

Table 4.31: EI components to address each RCM Challenge

CH-ID	**EI Components**
CH-01	**Self-awareness:** Train team members to identify their emotions (e.g., anxiety, frustration) when they encounter uncertainty in impact analysis. **Self-management:** Train teams to manage emotions at critical times. Learning to stay calm and focused during risk assessment ensures better decision-making. **Social-Awareness:** Encourage POs and SMs to adopt empathy when assessing the risks. Seeing from the team's point of view can assist in prioritizing. **Relationship-management:**Encourage cooperative decision-making and trustworthy communication among stakeholders to ensure that the impact and risks of requirement changes are carefully assessed and consistent with team objectives.
CH-02	**Self-awareness:** Ask team members to recognize overconfidence or self-doubt while estimating time and effort and make more accurate assessments. **Self-management:** Train teams to manage emotions during critical moments. **Social-awareness:** Establish a better understanding among the PO, SM, and Dev teams regarding each other's obstacles to ensure realistic estimates. **Relationship management:** Enhance communication and cooperation between the PO and Development Team to establish an environment in which each feels heard.

CH-ID	EI Components
CH-03	**Self-awareness:**Encouraging team members to look back at their own roles, behaviors, and contributions to inefficiencies in managing and tracking requirements, so they can continually improve and be held accountable throughout the change process. **Self-management:**Train teams on how to remain organized and utilize time well in order to manage numerous change requests, particularly during peak times. This also includes ensuring no emotional burnout by creating achievable expectations. **Social-Awareness:** Create a sense of empathy in the team through understanding of the pressure that comes with the frequent requirement changes and providing support for managing those changes. **Relationship management:** Enhance communication between teams by providing training in active listening.
CH-04	**Self-awareness:** Encourage team members to recognize their confusion or frustration when the changes appear disorganized, enabling them to express and build those feelings constructively during meetings. **Self-management:**Facilitating discipline and flexibility in the team, allowing for its members to remain concentrated, stress-free. **Social-awareness:** Product Owners need to practice empathy to comprehend stakeholders' and team members' concerns regarding prioritization. **Relationship management:**Train Scrum Masters and Product Owners to establish clear, respectful communication channels with the team to handle ambiguous priorities.
CH-05	**Self-awareness:** Inspire the team to be aware enough to recognize their own assumptions and reactions. **Self-management:**Motivate the team to manage their own emotions, enhancing emotional regulation and flexibility to handle team conflicts. **Social-awareness:** Engage POs and SMs in building a habit of empathizing with the team so that they can identify signals of being overwhelmed, stressed out, or out of alignment and provide timely assistance, and appreciate team members' viewpoints and pressures. **Relationship-management:**Encourage open communication and healthy conflict resolution by providing team members with effective collaboration skills like active listening, asking questions for clarity, and aligning frequently with stakeholders, to help manage interdependencies.
CH-06	**Self-awareness:** Inspire SMs to be aware when communication breaches take place and handle them immediately, making sure all understands each other. **Self-management:**Motivate the team to manage their own emotions, remain solution-oriented, and personally own the development of clear, respectful dialogue and active collaboration among team members and stakeholders. **Social-awareness:** Make a habit in POs and SMs to empathise with the team so that they can sense when teams are becoming overwhelmed, stressed, or misaligned, and provide assistance when needed. **Relationship-management:**Empower team members with skills to enhance communication, including active listening.

CH-ID	EI Components
CH-07	**Self-awareness:**Educate teams to be aware of the emotional stress created by ambiguity in terms of requirements and support one another to achieve clarity. **Self-management:**Train teams to remain patient and cope with frustration when dealing with unclear or ambiguous requirements. **Social-awareness:**Train the team to actively acknowledge and value team members' different viewpoints and emotional reactions in discussions of inconsistent or unclear requirement changes. **Relationship-management :** Promote collaborative problem-solving between teams to discuss and clear up ambiguities, ensuring that the entire team is on the same page.
CH-08	**Self-awareness:**Promote self-awareness to recognize knowledge gaps and take proactive measures to enhance through training with experts. **Self-management:**Encourage emotional management and individual responsibility by urging team members to remain self-disciplined under pressure, regulate stress well, and be flexible in cases of knowledge deficits. **Social-awareness:**Create a culture where members of the team empathize with others who might not have knowledge or resources, and provide assistance by sharing thoughts, resources, or tools. **Relationship management:** Enable improved cross-functional collaboration to bridge knowledge gaps expediently. Ensure that knowledge is transferred through peer mentoring and team-based learning sessions.
CH-09	**Self awareness:**Encourage team members to gain insight into their own strengths, weaknesses, and emotional triggers while collaborating across functions. **Self-management:** Train teams to stay composed and focused when alternating between roles or working on tasks that need different sets of skills. **Social-awareness:** Get team members to empathize with and appreciate the challenges of others in other roles. It can minimize clashes and enhance team harmony. **Relationship management:** Train in collaborative communication, emphasizing skills like active listening, clear expression, and constructive criticism to enhance cross-functional team working.
CH-10	**Self-awareness:** Enable team members to become more aware of their stress and anxiety during high-consequence changes so that they are better able to deal with emotions during high-pressure situations. **Self-management:** Educate team members on how to stay calm under pressure and make sound decisions even when there are high risks involved. **Social-awareness:** Ensure the POs and SMs realize the stress that high-consequence changes may induce and provide extra support to enable team members to adjust without emotional burnout. **Relationship management:**Promote team members to establish trust and have solid working relationships by backing one another in times of high-stakes change through open communication, empathy, and cooperation.

4.6.4.2 Role-based EI training to address each RCM Challenge

The following are the trainings to address each Requirement Change Management (RCM) challenge based on Goleman's Emotional Intelligence (EQ) guidelines [17, 19]. With the assistance of the expert psychologists, these trainings are tailored for Product Owners (PO), Scrum Masters (SM), and the Development Team (DT) to address the specific RCM challenges. The details regarding the experts are mentioned in Appendix F. Table 4.32 shows training activities to address each RCM Challenge and to raise emotional quotient (EQ) in POs, and Table 4.33 provides training activities to address each RCM Challenge and to raise emotional quotient (EQ) in SMs, and Table 4.34 shows training activities to address each RCM Challenge and to raise emotional quotient (EQ) in the Development Team.

Role-based EI training for Product Owner (PO) to address each RCM Challenge

Table 4.32 presents the role-based EI training for Product Owner (PO) to address each RCM Challenge.

Table 4.32: Role-based EI training for POs to address each RCM Challenge

CH-ID	**Self-awareness**	**Self-management**	**Social-awareness**	**Relationship-management**
CH-01	1)-Emotional journaling around key decisions 2)- 360° feedback to identify blind spots 3)- Reflective questioning	1)- Practice stress-regulation techniques 2)- Set up decision-simulation exercises 3)- Use "pause and plan" checklists	1)- Conduct empathy-building workshops 2)- Use stakeholder shadowing 3)- Organize "walk-in-their-shoes" sessions 4)- Hold active listening practice rounds	1)- Practice stakeholder dialogue simulations 2)- Use feedback loops 3)- Organize trust-building activities
CH-02	1)-Bias journaling 2)- Cognitive bias identification training 3)- 360° estimation feedback	1)- Impulse control workshops 2)- Calm-under-pressure simulations 3)-Stress management techniques	1)- Developer Shadowing 2)- Empathy interviews 3)-Open-ended team interviews	1)- Backlog refinement facilitation training 2)- Consensus-building exercises 3)- Conflict resolution during estimation 4)- Organize trust-building activities

CH-ID	Self-awareness	Self-management	Social-awareness	Relationship-management
CH-03	1)-Productivity self-assessment 2)- Daily reflection logs on backlog work 3)- Journaling on missed tasks	1)-Time-blocking and task-focused techniques 2)- Distraction management training	1)- Team feedback sessions 2)- Walk in their shoes activity 3)-Empathy interviews	1)- Backlog refinement facilitation training 2)- Collaborative prioritization exercise 3)- Feedback integration loop with stakeholders
CH-04	1)-Reflection prompts 2)- Bias identification 3)- Prioritization journaling	1)-Value-based decision-making exercises 2)- Saying "no" to training with role-play 3)- Time-boxed prioritization simulations	1)- Stakeholder Empathy interviews 2)- Customer value interviews 3)-Emotional response anticipation: “How will others feel about this change?”	1)- Facilitating prioritization workshops 2)- Conflict resolution practice 3)- Boundary-setting role-plays with stakeholders
CH-05	1)-Complexity-awareness journaling: “What assumptions did I make?” 2)- Bias identification 3)- Debrief reflection on past instability cases	1)-Stress regulation exercises before backlog planning, i.e, breathing, grounding techniques 2)- Decision-calming framework (pause $\rightarrow$ analyze $\rightarrow$ consult $\rightarrow$ act) 3)- Pacing and prioritization exercises	1)-Cross-functional Empathy interviews 2)- Team walkthroughs 3)-Dependency interviews: Gather emotional and practical feedback from dev, QA, UX	1)-Collaborative planning workshops with Dev, QA, BA (story mapping, dependency boards) 2)-Conflict resolution practice 3)- Negotiation simulations for scope and sequence alignment
CH-06	1)-Emotional reflection after meetings “What emotions did I feel and why?” 2)- Feedback review logs 3)- Bias identification: Am I listening to respond or understand?	1)-Difficult conversation simulations 2)- Breathing and self-calming techniques 3)- Express needs calmly and clearly	1)- Active listening workshops 2)- Empathy interviews	1)-Feedback loop facilitation training 2)-Team-building exercises 3)-Conflict resolution role-play

CH-ID	Self-awareness	Self-management	Social-awareness	Relationship-management
CH-07	1)-Emotional journaling 2)-Clarity self-check questions	1)-Focus-building exercises 2)- Stress regulation before backlog writing sessions 3)- Time-blocked documentation routines	1)-Walkthroughs from the developer/tester perspective 2)-Empathy interviews 3)-Collect feedback on previous ambiguity cases	1)-Collaborative refinement workshops 2)-Active clarification loops 3)-Ambiguity-spotting team exercises
CH-08	1)-Team capability reflection logs 2)-Bias mapping 3)-360° feedback on supportiveness	1)-Resilience and growth mindset training 2)- Strategic response simulation 3)- Stress management routines	1)-Empathy interviews 2)-Emotional pulse-checks 3)-Team sentiment mapping	1)-Trust-building workshops
CH-09	1)-Cross-functional bias reflection 2)-Decision audit logs 3)-Feedback from functional teams	1)-Cross-functional conflict simulation 2)-Neutral facilitation practice 3)-Emotional regulation exercises	1)-Empathy interviews 2)-Shadowing exercises	1)-Consensus-building exercises
CH-10	1)-Pre-decision reflection logs 2)-Bias identification training 3)- Past decision analysis	1)-Stress-management routines 2)-High-risk scenario simulations	1)-Empathy interviews 2)-Impact walk-throughs with each role	1)-Risk communication training 2)-Team alignment workshops

Role-based EI training for Scrum Master (SM) to address each RCM Challenge

Table 4.33 presents the role-based EI training for Scrum Master (SM) to address each RCM Challenge.

Table 4.33: Role-based EI training for SMs to address each RCM Challenge

CH-ID	**Self-awareness**	**Self-management**	**Social-awareness**	**Relationship-management**
CH-01	1)- Daily reflection log 2)- Feedback from the team 3)- Self-assessment on process integrity	1)- Mindful facilitation exercises 2)- Simulated sprint interruptions	1)- Emotional check-ins 2)- Empathy walk-throughs 3)-Active listening	1)- Facilitation training for change-focused Scrum ceremonies 2)- Conflict resolution role-plays 3)- Team alignment sessions
CH-02	1)- Sprint planning reflection logs 2)- Facilitation feedback 3)- Bias recognition	1)-Emotional regulation training 2)- Time-boxing with flexibility practice 3)-Neutral decision-making role-plays	1)- Group dynamics observation exercises 2)- Team member interviews 3)-Identifying signs of silent disagreement	1)-Facilitation skills training for Planning 2)- Trust-building games before planning
CH-03	1)- Workflow reflection logs 2)- Team feedback on backlog handling 3)- Bias assessment	1)-Routine-building training 2)- Calm-under-pressure exercises	1)- Empathy interviews 2)- Observation exercises	1)- Retrospective facilitation training 2)- Team coaching sessions on shared responsibility 3)- Feedback integration loop with stakeholders
CH-04	1)- Reflection logs 2)- Team feedback surveys 3)- Bias checklists	1)-Boundary-setting practice exercises 2)- Impulse control exercises 3)- Time-boxed planning simulations	1)- Empathy interviews 2)- Active listening training	1)- Conflict resolution role-plays
CH-05	1)- Reflection log 2)- Self-check prompts	1)-breathing exercises	1)- Perspective-exchange exercises between roles 2)- Check-in circles	1)- Dependency mapping workshops 2)- Conflict resolution practice

CH-ID	Self-awareness	Self-management	Social-awareness	Relationship-management
CH-06	1)- Facilitation reflection logs 2)- Bias identification workshops 3)- Self-assessment exercises	1)-Neutral language practice 2)- Emotion regulation exercises 3)- Impartial conflict response exercises	1)- Team observation exercises 2)- Empathy interviews 3)- Role-switching activities	1)- Trust-building workshops 2)- Team-building exercises 3)- Conflict resolution role-play
CH-07	1)- Post-sprint reflection logs 2)- Identify facilitation gaps 3)- Triggers a checklist before refinement	1)-Calm facilitation training 2)- Guided questioning practice	1)- Body language and tone decoding exercises 2)- Empathy mapping 3)- Retrospective story analysis	1)- Trust building workshops 2)- Feedback loops for refining vague requirements
CH-08	1)- Awareness checklists for skill/resource gaps 2)- Feedback review on missed learning opportunities	1)-Growth mindset exercises 2)- Response control simulations when the team expresses confusion 3)- Patience-building practices	1)- Emotional tone decoding 2)- Empathy interviews	1)- Learning culture facilitation training
CH-09	1)- Cross-role reflection logs 2)- Bias identification training	1)-Mindfulness	1)- Role-switching exercises 2)- Active listening practice	1)- Cross-functional collaboration training 2)- Facilitation workshops for integrated sprint ceremonies 3)- Team trust-building activity
CH-10	1)- Self-check questions 2)- Bias identification training 3)- Past decision analysis	1)-Stress-management routines 2)- High-risk scenario simulations	1)- Empathy interviews 2)- Behavioral observation exercises 3)-Perspective-taking practice	1)- Facilitated risk management workshops 2)- Team resilience-building activities 3)- Communication coaching

Role-based EI training for the Development Team (DT) to address each RCM Challenge

Table 4.34 presents the role-based EI training for the Development Team (DT) to address each RCM Challenge.

Table 4.34: Role-based EI training for DTs to address each RCM Challenge

CH-ID	**Self-awareness**	**Self-management**	**Social-awareness**	**Relationship-management**
CH-01	1)- Daily reflection log 2)- Self-assessment	1)- Managing risk under pressure workshop	1)- Empathy walk-throughs 2)- Active listening	1)- Conflict resolution training 2)- Communicate risk exercises
CH-02	1)- Estimation Bias Awareness Training	1)-Emotional regulation training 2)-Stress management exercises	1)- Group dynamics observation exercises 2)- Empathy-building exercises	1)- Communication skills exercises 2)- Trust building workshops
CH-03	1)- self-assessment logs	1)-Accountability & Time management sessions 2)- Calm-under-pressure exercises	1)- Empathy interviews 2)- Observation exercises	1)- Traceability collaboration exercises
CH-04	1)- Reflection logs 2)- Team feedback surveys 3)- Bias checklists	1)-Boundary-setting practice exercises 2)- Impulse control exercises 3)- Time-boxed planning simulations	1)- Empathy interviews 2)- Active listening training	1)- Conflict resolution role-plays
CH-05	1)- Reflection log 2)- Self-check prompts	1)-breathing exercises	1)- Perspective-exchange exercises between roles 2)- Check-in circles	1)- Dependency mapping workshops 2)- Conflict resolution practice

CH-ID	Self-awareness	Self-management	Social-awareness	Relationship-management
CH-06	1)- Self-assessment exercises	1)-Neutral language practice 2)- Emotion regulation exercises 3)- Impartial conflict response exercises	1)- Team observation exercises 2)- Empathy interviews 3)- Role-switching activities	1)- Trust-building workshops 2)- Team-building exercises 3)- Conflict-free communication training
CH-07	1)- Assumption busting workshops	1)-Calm facilitation training 2)- Guided questioning practice	1)- Body language and tone decoding exercises 2)- Empathy mapping 3)- Perspective-taking exercises	1)- Trust building workshops 2)- Documenting for Clarity Practices
CH-08	1)- Awareness checklists for skill/resource gaps 2)- Feedback review on missed learning opportunities	1)-Growth mindset exercises 2)- Patience-building practices	1)- Emotional tone decoding 2)- Empathy interviews	1)- Learning culture-building exercises
CH-09	1)- Cross-role reflection logs 2)- Bias identification training	1)-Mindfulness	1)-Cross-Functional Empathy Training 2)- Active listening practice	1)- Cross-functional collaboration training 2)- Team trust-building activity
CH-10	1)- Self-check questions 2)- Bias identification training 3)- Past decision analysis	1)-Emotional Regulation Under Pressure Training 2)- High-risk scenario simulations	1)- Empathy interviews 2)- Resilience in crisis management workshop 3)-Perspective-taking practice	1)- Change Impact Communication Simulations

4.6 Designing of the ARBEI-Framework

This section presents the details regarding the Agile Role-Based Emotional Intelligence (ARBEI) Framework. The aim is to answer the research question 3, which is *How can the*

Role-based Emotional Intelligence of an agile team improve to manage requirement changes effectively, and improve overall team performance?. The objective of this research question is to create a framework that improves emotional intelligence (EI) in a role-specific way to assist Agile teams in managing more effectively the challenges presented by changing requirements. The Agile environment is dynamic, with the necessity for teams to constantly adjust to new and changing customers' needs. Frequent changes in requirements can cause emotional fatigue, miscommunication, and performance slumps, particularly when emotional awareness and the coping skills for high-pressure, high-speed work are not present in team members.
The Aim of the developed framework is to provide a role-based Customized solution to acknowledge the different emotional requirements based on role. The approach is customized to the specific challenges of Product Owners, Scrum Masters, and the Development Team. For instance, a PO might need high-level empathy and communication techniques to work with stakeholders, whereas Developers might need emotional strength and self-control to cope with technical interruptions due to change.It provides EI Competency Mapping by blending the key emotional intelligence areas, self-awareness, self-management, social awareness, and relationship management, into each Agile role's day-to-day tasks and interactions. And, it provides role-oriented EI training that teams can apply to build and strengthen emotional intelligence over time. Finally, this framework is both a developmental roadmap and an actionable guide for developing emotional maturity among Agile teams, improving their ability to handle requirement change positively, and overall project success.

4.6.1 ARBEI-Framework Inputs

The key inputs to design the ARBEI-Framework include the Requirement change management (RCM) lifecycle, a list of identified requirement change management (RCM) challenges, roles of the agile team, Role-Based industrial solutions towards each identified RCM challenge, and the Role-Based emotional intelligence training to handle each RCM challenge.

4.7.1.1 RCM Lifecycle:

The Requirement Change Management (RCM) stages are also major inputs. The framework's design must be in accordance with these stages so that the process is executed smoothly and effectively. The RCM process begins with the Arrival phase, where stakeholders submit change

requests and the Product Owner, along with the team, conducts an initial feasibility check to assess alignment with project goals, potential impacts, and risks. This is followed by a collaborative Impact Analysis and Documentation phase, where implications for scope, cost, and quality are recorded. The team then formally approves or rejects the request. In the Implementation phase, accepted changes are refined, planned, and executed during development sprints. Once implemented, the Delivered phase ensures thorough Verification and Validation, confirming that the change meets user needs and doesn't introduce new issues. Finally, Feedback and Continuous Improvement is gathered to refine future processes, and the change is formally documented and closed in the Documentation and Closure step. These structured stages provide a logical foundation for integrating emotional intelligence training and role-based responsibilities within the proposed framework.

4.7.1.2 List of RCM Challenges:

The results of the survey provide a clear indication of the core problems encountered by each role within Agile teams in Pakistan's IT sector during the Requirement Change Management (RCM) process. By understanding how frequently these issues arise and how severely they impact the Product Owner, Scrum Master, and Development Team, it becomes possible to create a more focused and effective Role-Based RCM Framework. The survey identified ten key challenges that Agile teams commonly face. These include the failure to properly evaluate the impact and risks of requirement changes, poor estimation of the cost, time, and effort involved, and the inefficient management and tracking of evolving requirements. Teams also struggle with unclear prioritization and scope, instability and conflicts caused by high interdependencies among requirements, and poor communication and collaboration among team members and stakeholders. Additionally, inconsistencies and ambiguities in change requests, the lack of necessary skills, tools, resources, or domain knowledge, and difficulties arising from high cross-functionality across team members further complicate the process. Lastly, the high consequences of mismanaged requirement changes, such as project delays, budget overruns, or reduced product quality, underscore the importance of addressing these issues systematically. These challenges serve as critical focal points that the Role-Based RCM Framework must directly target to ensure efficient, emotionally intelligent, and collaborative change management in Agile teams.

4.7.1.3 Roles of Agile Team:

Agile models, like Scrum, have different roles: Product Owners, Scrum Masters, Development team, and knowing how these roles are involved in RCM is important while designing the framework. Every role has a specific responsibility in handling requirement changes efficiently.

4.7.1.4: Role-Based Industrial Solutions of RCM Challenges:

The solutions to all the identified RCM challenges, as collected from the interviews, are the primary inputs used in designing the framework. These solutions represent a cohesive set of role-based strategies that directly address the core issues faced by Agile teams—namely, the Product Owner (PO), Scrum Master (SM), and Development Team (DT) in managing requirement changes effectively. For each of the ten major challenges, specific and practical remedies were gathered. These include enhanced estimation techniques, structured impact and risk assessments, better backlog management, improved change prioritization, and the adoption of collaborative tools like JIRA and Confluence. Stakeholder communication, clarification of ambiguous requirements, and management of interdependencies are emphasized across all roles to prevent instability and delays. Furthermore, strategies focus on cross-functional collaboration, skill development, and readiness for high-consequence changes by encouraging early engagement, technical analysis, and clear documentation. Collectively, these targeted solutions ensure that Agile teams are not only equipped with the right tools and processes but also with the mindset and communication channels necessary to respond flexibly and efficiently to requirement changes in Pakistan's IT sector.

4.7.1.5 Role-Based Emotional Intelligence Training:

TTeam members may be trained in emotional intelligence to better handle the stress, frustration, and uncertainty that frequently result from requirement changes. This input is aimed at preparing team members with the emotional abilities necessary to deal with the RCM process with empathy, patience, and resilience. Competencies such as self-awareness, self-management, social awareness, and relationship management are incorporated into the Agile team through targeted EI training sessions designed to build these essential skills.

4.6.2 Agile Role-Based Emotional Intelligence (ARBEI) - Framework

The Agile Role-Based Emotional Intelligence (ARBEI) Framework is designed to solve the unique emotional and collaborative challenges faced by Product Owners, Scrum Masters, and Development Teams during the Requirement Change Management (RCM) lifecycle. Through the synthesis of role-specific EI competencies, i.e., self-awareness, social awareness, self-management, and relationship management, the framework improves communication, flexibility, and decision-making among Agile teams. It also offers practical industrial solutions to specific RCM challenges, allowing teams to better respond to changing requirements dynamically.

4.7.2.1 Phase 1: Arrival

The Arrival Phase is initiated when a new change request is created. The Product Owner (PO) is mostly accountable for registering and recording the change request by utilizing project management tools like JIRA, Slack, or Trello. At this stage, the main challenge is ineffective communication (CH-06), usually caused by missing information, assumptions, or poor cooperation by stakeholders. PO faces some other challenges, i.e., poor impact and risk assessment (CH-01), vague prioritization (CH-04), inconsistencies, and ambiguities in RCs (CH-07).

After submission, the team transitions to the initial assessment and feasibility check. Here, the PO conducts a mutual discussion with the Scrum Master (SM) and Development Team (DT) to determine the business and technical feasibility of the change. The PO and DT face challenges at this stage are poor impact assessment (CH-01), unrealistic estimates of time, cost, and effort (CH-02), and instability due to interdependencies (CH-05). SM faces inefficient tracking of RCs (CH-03) to assess the feasibility of RCs. DT faces a lack of skills and domain knowledge (CH-08) to assess the feasibility of RCs. The poor communication and collaboration (CH-06) is the most common and critical challenge faced by the entire agile team.

The third stage in this phase, Impact Analysis and Documentation, is a more detailed assessment of the impact of the change on scope, time, budget, and quality. This stage needs joint input from all roles. The PO needs to record every detail carefully and reflect the change in the product backlog. The SM verifies that the team realizes the change's implications and dependencies, and the DT checks the technical feasibility and determines the needed resources.PO and DT face poor impact and risk assessment (CH-01), and poor estimation of cost, time, and effort (CH-02) at this stage. SM faces inefficient tracking of RCs (CH-03) during

impact analysis and documentation of RCs when a change request arrives. POs face unclear prioritization (CH-04) at this stage, as they are responsible for providing the prioritization. PO and DT face instability due to interdependencies (CH-05), inconsistencies, and ambiguities in handling RCs to analyse and document the impact of RC. DT faces a lack of skills and domain knowledge (CH-08) to analyze the impact of RCs. SM and DT team face high cross-functionality because no role is defined to analyze the impact and document it. Poor communication and collaboration (CH-06) is the most common and critical challenges faced by the entire agile team.

Lastly, Approval or Rejection of the requested change is a team-based decision. The Agile team collectively determines whether to go ahead, considering the feasibility analysis, organizational priorities, and availability of resources. This step addresses CH-10, which concerns the high cost and impact of requirement changes, and CH-06, poor communication and collaboration.

4.7.2.2 Phase 2: Implementation

Once a change request is approved, the team enters the Requirement Refinement and Planning stage. The PO breaks down the requirement into user stories or tasks, defines the scope, and revises the product backlog. The SM leads the planning process to ensure that priorities are well understood and the team stays on track. The DT helps make technical tasks more precise and estimates the workload. Some of the main challenges in this stage are poor estimation of cost, time and effort (CH-02), unclear prioritization (CH-05) a lack of skills and domain knowledge (CH-08), unclear prioritization (CH-04), poor communication and colaboration (CH-06), inconsistand and unclear requirements (CH-07), and high cross-functionality (CH-09).

Under the Execution stagee, the Development Team is responsible for carrying out the work necessary to complete the tasks and achieve the Sprint Goal. The Scrum Master assists with this process by resolving impediments and enforcing Agile discipline, with the PO available for clarification. This stage frequently uncovers deeper issues like poor estimation of cost, time, and effort (CH-02), instability due to interdependencies (CH-05), poor communication and collaboration (CH-06), cross-functional coordination issues (CH-09), lack of skills and domain knowledge (CH-08), and high consequences of requirement changes (CH-10).

4.7.2.3 Phase 3: Delivered

After the change has been implemented, the team enters the Verification and Validation stage. The Quality Assurance team and the Development Team ensure the change by testing, and the

PO ensures the change matches stakeholder expectations and requirements. The most significant challenge in this case is the elevated consequence of missed errors (CH-10), inefficient tracking of requirement changes (CH-03), and poor communication and collaboration (CH-06).

Then, the Feedback and Continuous Improvement stage invites the team to review the change process, note what went well, and point out areas for improvement. Retrospectives, surveys, or stakeholder interviews are used to collect feedback. Poor impact and risk assessment (CH-01), inefficient tracking of requirement changes (CH-03), unclear prioritization (CH-04), poor communication and collaboration (CH-06), and lack of skills and domain knowledge are the challenges usually faced by agile teams to conduct a fruitful retrospective to collect the feedback that helps to improve the overall process.

Finally, within the Documentation and Closure phase, the PO revises the change logs for traceability and completeness. The SM reads team reflections, and the DT closes technical activities. Inefficient tracking of RCs (CH-03), poor communication and collaboration, and lack of skills or domain knowledge challenges are addressed by strict documentation and review procedures. Table 4.34 shows the mapping of RCM challenges to each stage of RCM lifecycle.

Table 4.35: Mapping of RCM Challenges to Lifecycle Stages

		Arrival			**Implementation**		**Delivered**		
CH-ID	**RCM Challenge**	Change Request Submission	Initial Assessment & Feasibility	Impact Analysis & Documentation	Requirement Refinement & Planning	Execution	Verification & Validation	Feedback & Improvement	Documentation & Closure
CH-01	Poor Impact and Risk Assessment	✓	✓	✓				✓	
CH-02	Poor Estimation of Cost, Time, and Effort		✓		✓	✓			
CH-03	Inefficient Tracking of Requirement Changes		✓	✓			✓	✓	✓
CH-04	Unclear Prioritization	✓		✓	✓			✓	
CH-05	Instability Due to Interdependencies		✓	✓		✓			
CH-06	Poor Communication and Collaboration	✓	✓	✓	✓	✓	✓	✓	✓
CH-07	Inconsistencies and Ambiguities in RCs	✓		✓	✓				

		Arrival			Implementation		Delivered		
CH-ID	**RCM Challenge**	Change Request Submission	Initial Assessment & Feasibility	Impact Analysis & Documentation	Requirement Refinement & Planning	Execution	Verification & Validation	Feedback & Improvement	Documentation & Closure
CH-08	Lack of Skills and Domain Knowledge		✓	✓	✓	✓		✓	✓
CH-09	High Cross-functionality			✓	✓	✓			
CH-10	High Consequences					✓	✓		

Table 4.35 presents a detailed mapping of which Agile team roles encounter specific Requirement Change Management (RCM) challenges across different stages of the RCM lifecycle. This table highlights that each role—Product Owner (PO), Scrum Master (SM), and Development Team (DT), faces unique challenges based on their responsibilities and involvement in the change process. For instance, the Product Owner (PO), who is responsible for managing the product backlog and aligning the product vision with stakeholder needs [43], faces challenges such as poor impact and risk assessment (CH-01), inaccurate estimation of cost, time, and effort (CH-02), unclear prioritization of requirements (CH-04), instability due to interdependencies among requirements (CH-05), inconsistencies and ambiguities in requirement change requests (CH-07), and the high consequences of mismanaged changes (CH-10). These challenges occur at various points during the requirement change lifecycle and can significantly affect decision-making and project planning. Similarly, the Scrum Master (SM), who facilitates Agile processes and ensures team collaboration [43], experiences difficulties like inefficient tracking and documentation of requirement changes (CH-03), unclear prioritization (CH-04), poor communication and collaboration among team members (CH-06), and high cross-functionality demands (CH-09), which require team members to work beyond their areas of expertise. The Development Team (DT), being directly responsible for implementing the changes [43], encounters the most extensive set of challenges across nearly all RCM lifecycle stages. These include poor impact and risk analysis (CH-01), inaccurate estimation of development efforts (CH-02), inefficient tracking of change requests (CH-03), instability caused by interdependencies (CH-05), communication and collaboration gaps (CH-06), ambiguous or inconsistent change requests (CH-07), lack of

required skills and domain knowledge (CH-08), pressure from high cross-functional expectations (CH-09), and the potential for serious negative consequences if changes are mishandled (CH-10).

Table 4.36: Role-wise RCM Challenges Across Lifecycle Stages

			Arrival			**Implementation**		**Delivered**		
CH-ID	**RCM Challenge**	**Role**	Change Request Submission	Initial Assessment & Feasibility	Impact Analysis & Documentation	Requirement Refinement & Planning	Execution	Verification & Validation	Feedback & Improvement	Documentation & Closure
CH-01	Poor Impact and Risk Assessment	PO	✓	✓	✓				✓	
		DT		✓	✓				✓	
CH-02	Poor Estimation of Cost, Time, and Effort	PO		✓		✓				
		DT		✓		✓	✓			
CH-03	Inefficient Tracking of Requirement Changes	SM		✓	✓			✓	✓	✓
		DT						✓	✓	✓
CH-04	Unclear Prioritization	PO	✓		✓	✓			✓	
		SM				✓				
CH-05	Instability Due to Interdependencies	PO		✓	✓					
		DT		✓	✓		✓			
CH-06	Poor Communication and Collaboration	AT	✓	✓	✓	✓	✓	✓	✓	✓
CH-07	Inconsistencies and Ambiguities in RCs	PO	✓		✓	✓				
		DT			✓	✓				
CH-08	Lack of Skills and Domain Knowledge	DT		✓	✓	✓	✓		✓	✓
CH-09	High Cross-functionality	SM			✓	✓	✓			
		DT			✓	✓	✓			
CH-10	High Consequences	PO						✓		
		DT					✓	✓		

* Product Owner(PO), Scrum Master(SM), Development Team(DT)

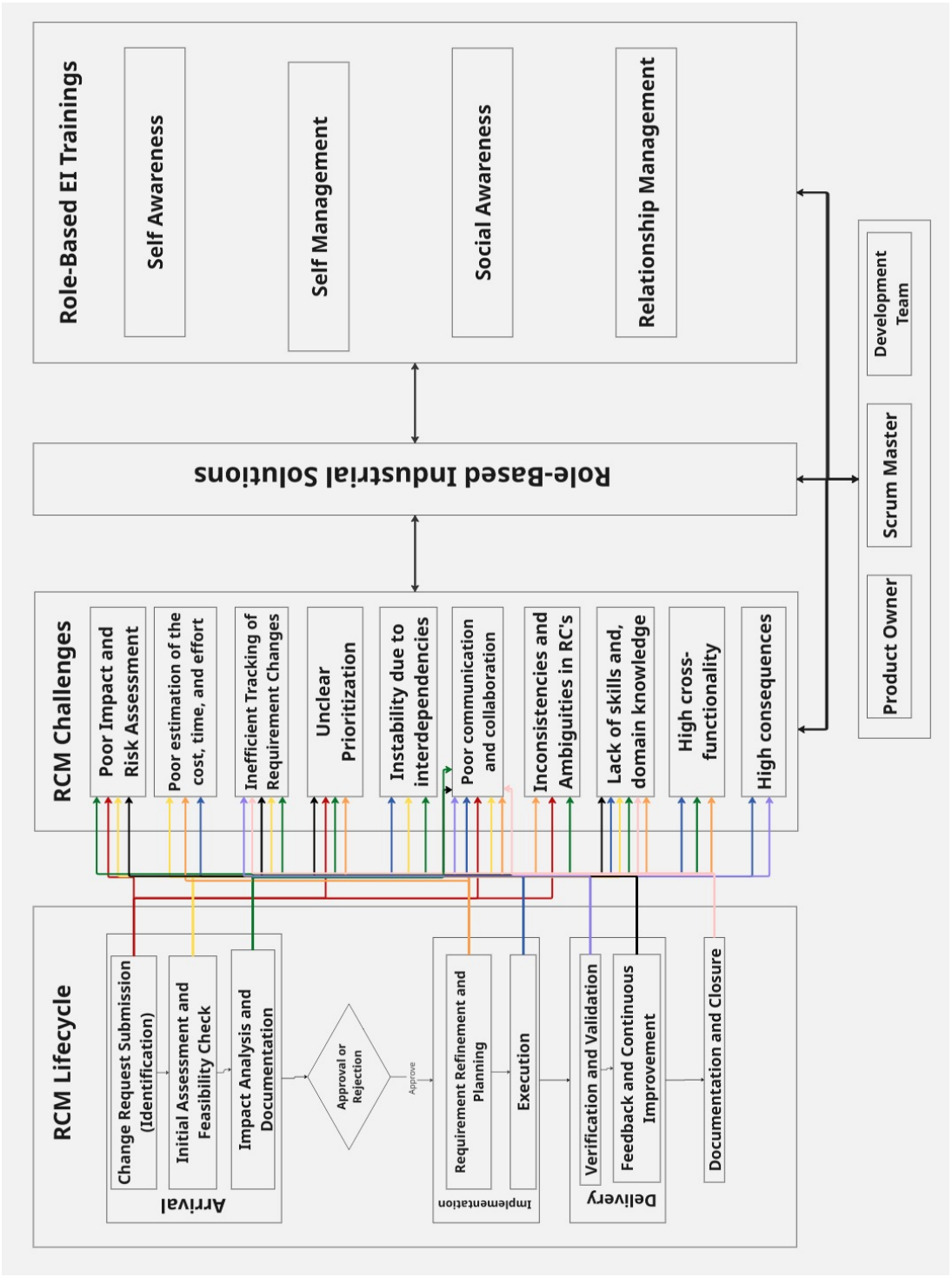

Figure 4.19: Agile Role-Based Emotional Intelligence Framework

Figure 4.18 shows the details of the working of the Agile Role-Based Emotional Intelligence (ARBEI) framework. During the arrival phase at the stage of change request submission, when the change request is identified, various challenges such as poor impact and risk assessment (CH-01), unclear prioritization (CH-04), poor communication and collaboration (CH-06), and inconsistencies and ambiguities in requirement changes (CH-07). At the stage of initial assessment and feasibility check, challenges such as poor impact and risk assessment (CH-01), poor estimation of the cost, time, and effort (CH-02), inefficient tracking of requirement changes (CH-03), instability due to interdependencies (CH-05), poor communication and collaboration (CH-06), and lack of skills and domain knowledge (CH-08). similarly, at the stage of impact analysis and documentation challenges such as poor impact and risk assessment (CH-01), inefficient tracking of requirement changes (CH-03), unclear prioritization (CH-04), instability due to interdependencies (CH-05), poor communication and collaboration (CH-06), inconsistencies and ambiguities in requirement changes (CH-07).lack of skills and domain knowledge (CH-08), high cross-functionality (CH-09) are usually experienced by the agile team.

During the implementation phase, at the stage of requirement refinement and planning, challenges such as poor estimation of the cost, time, and effort (CH-02), unclear prioritization (CH-04), poor communication and collaboration (CH-06), inconsistencies and ambiguities in requirement changes (CH-07), lack of skills and domain knowledge (CH-08), and high cross-functionality (CH-09) are faced by agile teams. Similarly, at the execution stage, challenges such as poor estimation of the cost, time, and effort (CH-02), instability due to inderdependencies (CH-05), poor communication and collaboration (CH-06), lack of skills and domain knowledge (CH-08), high cross-functionality (CH-09), and high consequences (CH-10) are usually faced by the agile teams.

During the delivery phase, at the stage of verification and validation, challenges such as inefficient tracking of requirement changes (CH-03), poor communication and collaboration (CH-06), and high consequences (CH-10) are faced by agile teams. The challenges, such as poor impact and risk assessment (CH-01), inefficient tracking of requirement changes (CH-03), unclear prioritization (CH-04), poor communication and collaboration (CH-06), and lack of skills and domain knowledge (CH-08), are faced by agile teams at the stage of feedback and continuous improvement. Similarly, at the stage of documentation and closure of requirement change

challenges, such as inefficient tracking of requirement changes (CH-03), poor communication and collaboration (CH-06), and lack of skills and domain knowledge (CH-08), are faced by the agile teams. This study provides the Role-Based industrial solutions and the Role-Based emotional intelligence (EI) training for each agile team role, such as product owner, scrum master, and the development team to handle each identified challenge efficiently.

4.7.2.4 Guidelines to use ARBEI Framework for Product Owner

Table 4.36 shows the details of industrial solutions and EI trainings for PO to address identified RCM Challenges at various stages of RCM lifecycle.

Table 4.37: ARBEI Framework for Product Owner

Stage	**Challenge**	**Industrial Solution**	**EI Training**
Change Request Submission	Poor Impact and Risk Assessment (CH-01)	1) Assess Change Impact with Stakeholders 2) Risk Review 3) Prioritize Based on Value & Risk	SA: Emotional journaling, Reflective questioning SM: Stress-regulation, “Pause and plan” SoA: Shadowing, Active listening RM: Dialogue simulations, Feedback loops, Trust-building
Change Request Submission	Unclear Prioritization (CH-04)	1) Business-Driven Change Prioritization 2) Clear Scope Communication	SA: Prioritization journaling SM: Saying "no" training SoA: Stakeholder empathy interviews RM: Conflict resolution role-plays
Change Request Submission	Inconsistencies and Ambiguities in RCs (CH-07)	1)-Requirement Clarity Before Planning 2)-Client Discussion for Clarity 3)-Consistent Change Recordkeeping	SA: Emotional journaling, Clarity self-check questions SM: Focus-building exercises, Stress regulation,Time-blocked documentation routines SoA: Walkthroughs from the developer/tester perspective, Empathy interviews RM: Collaborative refinement workshops, Active clarification, Ambiguity-spotting team exercises

Stage	Challenge	Industrial Solution	EI Training
Change Request Submission	Poor communication and collaboration (CH-06)	1)-Open Communication Channels 2)-Regular Stakeholder Communication 3)-Scheduled Feedback Sessions	SA: Emotional reflection, Feedback review logs Bias identification SM: Difficult conversation simulations, breathing, and self-calming techniques Express needs calmly and clearly SoA: Active listening workshops Empathy interviews RM: Feedback loop facilitation training, Team-building exercises, Conflict resolution role-play
Initial Assessment & Feasibility	Poor Impact and Risk Assessment (CH-01)	1) Assess Change Impact with Stakeholders 2) Risk Review 3) Prioritize Based on Value & Risk	SA: Emotional journaling, Reflective questioning SM: Stress-regulation, "Pause and plan" SoA: Shadowing, Active listening RM: Dialogue simulations, Feedback loops, Trust-building
Initial Assessment & Feasibility	Poor Estimation of Cost, Time, and Effort (CH-02)	1) Acknowledge Unreliable Estimations 2) Collaborate with Developers 3) Use Project History	SA: Bias journaling, Cognitive bias training SM: Calm-under-pressure exercises SoA: Developer shadowing RM: Consensus-building, Conflict resolution
Initial Assessment & Feasibility	Instability Due to Interdependencies (CH-05)	1) Early Dependency Identification 2) Resolve Changes Proactively	SA: Complexity-awareness journaling, Bias reflection SM: Stress regulation, Decision-calming SoA: Team walkthroughs RM: Planning workshops, Conflict negotiation simulations
Initial Assessment & Feasibility	Poor communication and collaboration (CH-06)	Same Industrial Solutions as above for CH-06	Same EI trainings as above for CH-06
Impact Analysis & Documentation	Poor Impact and Risk Assessment (CH-02)	Same Industrial Solutions as above for CH-02	Same EI trainings as above for CH-02

Stage	Challenge	Industrial Solution	EI Training
Impact Analysis & Documentation	Inconsistencies and Ambiguities in RCs (CH-07)	Same Industrial Solutions as above for CH-07	Same EI trainings as above for CH-07
Impact Analysis & Documentation	Instability Due to Interdependencies (CH-05)	Same Industrial Solutions as above for CH-05	Same EI trainings as above for CH-05
Requirement Refinement & Planning	Inconsistencies and Ambiguities in RCs (CH-07)	Same Industrial Solutions as above for CH-07	Same EI training as above for CH-07
Impact Analysis & Documentation	Poor communication and collaboration (CH-06)	Same Industrial Solutions as above for CH-06	Same EI trainings as above for CH-06
Requirement Refinement & Planning	Unclear Prioritization (CH-04)	Same Industrial Solutions as above for (CH-04)	Same EI trainings as above for CH-04
Requirement Refinement & Planning	Poor communication and collaboration	Same Industrial Solutions as above for CH-06	Same EI trainings as above for CH-06
Verification & Validation	High Consequences (CH-09)	1) Assess Change Impact Early 2) Communicate Implications 3) Supportive Leadership	SA: Pre-decision logs, Bias identification SM: Stress management, High-risk scenario simulation SoA: Impact walk-throughs RM: Risk communication training, Team alignment workshops
Verification & Validation	Poor communication and collaboration (CH-06)	Same Industrial Solutions as above for CH-06	Same Industrial Solutions as above for CH-06
Feedback & Improvement	Poor communication and collaboration (CH-06)	Same Industrial Solutions as above for CH-06	Same Industrial Solutions as above for CH-06
Feedback & Improvement	Unclear Prioritization (CH-04)	Same Industrial Solutions as above for CH-04	Same EI trainings as above for CH-04

4.7.2.5 Guidelines to use ARBEI Framework for Scrum Master

Table 4.37 shows the details of industrial solutions and EI trainings for Scrum Master to address identified RCM Challenges at various stages of RCM lifecycle.

Table 4.38: ARBEI Framework for SM

Stage	**Challenge**	**Industrial Solutions**	**EI Training**
Change Request Submission	Poor communication and collaboration (CH-06)	1)- Reinforce Change Communication Protocol 2)- Promote Team Collaboration 3)- Clear blockers on time	SA: Facilitation of reflection logs, Bias identification workshops SM: Emotion regulation exercises, Neutral language practice SoA: Empathy interviews, Role-switching activities RM: Trust-building, Conflict resolution role-play
Change Request Submission	Poor Impact and Risk Assessment (CH-01)	1)- Facilitate Risk-Aware Planning 2)- Encourage Cross-Team Collaboration 3)-Early QA Involvement	SA: Daily reflection log, Feedback from team SM: Mindful facilitation, Simulated sprint interruptions SoA: Emotional check-ins, Active listening RM: Facilitation training, Conflict resolution, Team alignment
Initial Assessment & Feasibility Check	Poor estimation of cost, time, effort (CH-02)	1)- Monitor Sprint Estimation Accuracy 2)- Adjust Timelines Collaboratively 3)-Maintain Estimation Records	SA: Sprint planning reflection logs, Bias recognition SM: Emotional regulation, Timeboxing SA: Team interviews, Group dynamics observation RM: Trust-building games, Facilitation skills training
Initial Assessment & Feasibility Check	Poor communication and collaboration (CH-06)	Same Industrial Solutions as above for (CH-06)	Same EI trainings as above for (CH-06

Stage	Challenge	Industrial Solutions	EI Training
Impact Analysis & Documentation	High Consequences of RC (CH-10)	1)- Sprint Change Impact Monitoring 2)- Facilitate Risk Ownership Clarity 3)-Ensure Responsibility Awareness	SA: Self-check questions, Past decision analysis SM: Stress-management routines, High-risk scenario simulations SoA: Perspective-taking, Empathy interviews RM: Risk management workshops, Team resilience activities
Impact Analysis & Documentation	Poor communication and collaboration (CH-06)	Same Industrial Solutions as above for (CH-06)	Same EI trainings as above for CH-06
Requirement Refinement & Planning	Poor communication and collaboration	Same Industrial Solutions as above for CH-06	Same EI-trainings as above for CH-06
Requirement Refinement & Planning	Unclear Prioritization (CH-04)	1)- Align Changes with Sprint Goals 2)- Manage Major Changes Independently, Prioritize Without Sprint Disruption	SA: Reflection logs, Bias checklists SM: Boundary-setting, Impulse control SoA: Active listening, Empathy interviews RM: Conflict resolution role-plays
Requirement Refinement and Planning	Inconsistencies and Ambiguities (CH-07)	1)- Clarify Requirements Early 2)- Facilitate Change Resolution Meetings 3)-Align Team on Same Page	SA: Post-sprint reflection logs, identify facilitation gaps SM: Calm facilitation, Guided questioning SoA: Empathy mapping, Retrospective story analysis RM: trust building, Feedback loops
Execution	Inefficient Tracking of RC (CH-03)	1)- Track Progress Through Agile Ceremonies 2)- Daily Status Communication 3)- Sprint-Aligned Change Tracking	SA: Workflow reflection logs, Bias assessment SM: Routine-building training, Calm-under-pressure exercises SoA: Empathy interviews, Observation exercises RM: Retrospective facilitation, Shared responsibility coaching

Stage	Challenge	Industrial Solutions	EI Training
Execution	Instability due to interdependencies (CH-05)	1)- Adapt Tasks for Dependencies 2)- Monitor & Manage Dependencies, Facilitate Cross-Team Collaboration	SA: Reflection log, Self-check prompts SM: Breathing exercises SoA: Perspective-exchange, Check-in circles RM: Dependency mapping, Conflict resolution practice
Execution	Poor communication & collaboration	Same Industrial Solutions as above for (CH-06)	Same Industrial Solutions as above for (CH-06)
Verification and Validation	High cross-functionality (CH-09)	1)-Promote Cross-Role Collaboration 2)- Resolve Priority-Based Conflicts	SA: Cross-role reflection logs, Bias identification SM: Mindfulness SoA: Role-switching exercises, Active listening RM: Cross-functional facilitation workshops, Trust-building activities
Verification and Validation	Poor communication & collaboration (CH-06)	Same Industrial Solutions as above for CH-06	Same EI trainings as above for CH-06
Feedback and Continuous Improvement	Lack of skills & domain knowledge (CH-08)	1)- Coordinate Support and Training 2)- Provide Mentorship 3)- Assist in Difficult Tasks	SA: Awareness checklists, Feedback on learning gaps SM: Growth mindset, Patience-building SoA: Emotional tone decoding, Empathy interviews RM: Learning culture facilitation training
Documentation and Closure	Poor communication & collaboration (CH-06)	Same Industrial Solutions as above for CH-06	Same EI trainings as above for CH-06
Documentation and Closure	Inefficient Tracking of RC (CH-03)	Same Industrial Solutions as above for CH-03	Same EI trainings as above for CH-03

4.7.2.6 Guidelines to use ARBEI Framework for the Development Team

Table 4.38 shows the details of industrial solutions and EI trainings for the Development Team to address identified RCM Challenges at various stages of RCM lifecycle.

Table 4.39: ARBEI Framework for the Development Team

Stage	**Challenge**	**Industrial Solutions**	**EI Training**
Initial Assessment & Feasibility Check	Poor Impact & Risk Assessment (CH-01)	1)- Analyze Technical Change Impact 2)-Communicate Change Consequences 3)- Controlled Environment Testing	SA: Daily reflection log, Self-assessment SM: Managing risk under pressure workshop SoA: Empathy walk-throughs, Active listening RM: Conflict resolution trainings, Communicate risk exercises
Initial Assessment & Feasibility Check	Poor Estimation of Cost, Time, and Effort (CH-02)	1)- Identify Technical Complexities Early Reassess 2)- Estimates Mid-Sprint 3)- Adjust Timelines for Changes	SA: Estimation Bias Awareness Training SM: Emotional regulation training, Stress management exercises SoA: Group dynamics observation exercises, Empathy-building exercises RM: Communication skills exercises, Trust building workshops
Initial Assessment & Feasibility	Poor communication & collaboration (CH-06)	1)-Transparent Progress Communication 2)-Clarify Unclear Requirements Early 3)-Maintain Open Communication	SA: Self-assessment exercises SM: Neutral language practice, Emotion regulation exercises, Impartial conflict response exercises SoA: Team observation exercises, Empathy interviews, Role-switching activities RM: Trust-building workshops, Team-building exercises, Conflict-free communication training
Initial Assessment & Feasibility	Instability Due to Interdependencies (CH-05)	1)-Raise Dependency Concerns Early 2)- Resolve Dependencies Collaboratively 3)- Ensure coordination across teams	SA: Reflection log, Self-check prompts SM: Breathing exercises SoA: Perspective-exchange exercises between roles, Check-in circles RM: Dependency mapping workshops, Conflict resolution practice

Stage	Challenge	Industrial Solutions	EI Training
Initial Assessment & Feasibility	Lack of Skills and Domain Knowledge (CH-08)	1)-Initiate Skill Development 2)- Participate in Cross-Training 3)- Leverage Productivity Tools	SA: Awareness checklists for skill/resource gaps, Feedback review on missed learning opportunities SM: Growth mindset exercises, Patience-building practices SoA: Emotional tone decoding, Empathy interviews RM: Learning culture-building exercises
Impact Analysis & Documentation	Poor communication & collaboration (CH-06)	Same Industrial Solutions as above for CH-06	Same EI training as above for CH-06
Impact Analysis & Documentation	Poor Impact and Risk Assessment (CH-01)	Same Industrial Solutions as above for CH-01	Same EI training as above for CH-01
Impact Analysis & Documentation	Instability Due to Inter-dependencies (CH-05)	Same Industrial Solutions as above for CH-05	Same EI training as above for CH-05
Impact Analysis & Documentation	Inconsistencies and Ambiguities in RCs (Ch-07)	1)- Request Requirement Clarification 2)- Resolve Ambiguities Collaboratively 3)-Ensure Clear Change Documentation	SA: Assumption busting workshops SM: Calm facilitation training, Guided questioning practice SoA: Body language and tone decoding exercises, Empathy mapping, Perspective-taking exercises RM: Trust-building workshops, Documenting for Clarity Practices
Impact Analysis & Documentation	High Cross-functionality (CH-09)	1)- Foster Cross-Functional Collaboration 2)- Resolve Priority-Based Conflicts 3)- Align Teams Toward Goals	SA: Cross-role reflection logs, Bias identification training SM: Mindfulness SoA: Cross-Functional Empathy Training, Active listening practice RM: Cross-functional collaboration training, Team trust-building activity
Requirement Refinement & Planning	Poor communication & collaboration (CH-06)	Same Industrial Solutions as above for CH-06	Same EI training as above for CH-06

Stage	Challenge	Industrial Solutions	EI Training
Requirement Refinement & Planning	Poor Estimation of Cost, Time, and Effort (CH-02)	Same Industrial Solutions as above for CH-02	Same EI training as above for CH-02
Requirement Refinement & Planning	Lack of Skills and Domain Knowledge (CH-08)	Same Industrial Solutions as above for CH-08	Same EI training as above for CH-08
Requirement Refinement & Planning	Inconsistencies and Ambiguities in RCs (CH-07)	Same Industrial Solutions as above for CH-07	Same EI training as above for CH-07
Requirement Refinement & Planning	High Cross-functionality (CH-09)	Same Industrial Solutions as above for CH-09	Same EI training as above for CH-09
Execution	Poor Estimation of Cost, Time, and Effort (CH-02)	Same Industrial Solutions as above for CH-02	Same EI training as above for CH-02
Execution	Instability Due to Inter-dependencies (CH-05)	Same Industrial Solutions as above for CH-05	Same EI training as above for CH-05
Execution	Poor communication & collaboration (CH-06)	Same Industrial Solutions as above for CH-06	Same EI training as above for CH-06
Execution	Lack of Skills and Domain Knowledge (CH-08)	Same Industrial Solutions as above for CH-08	Same EI training as above for CH-08
Execution	High Cross-functionality (CH-09)	Same Industrial Solutions as above for CH-09	Same EI training as above for CH-09
Execution	High Consequences (CH-10)	1)- Test Changes Thoroughly 2)- Prepare Rollback Strategy 3)-Ensure Stable Implementation	SA: Self-check questions, Bias identification training, Past decision analysis SM: Emotional Regulation Under Pressure Training, High-risk scenario simulations SoA: Empathy interviews, Resilience in crisis management workshop, Perspective-taking practice RM: Change Impact Communication Simulations

Stage	Challenge	Industrial Solutions	EI Training
Verification & Validation	High Consequences(CH-10)	Same Industrial Solutions as above for CH-10	Same EI training as above for CH-10
Verification & Validation	Inefficient Tracking of RCs(CH-03)	1)- Use Tools for Traceability 2)- Maintain Updated Change Logs 3)- Collaborate to Resolve Impact	SA: self-assessment logs SM:Accountability & Time management sessions, Calm-under-pressure exercises SoA: Empathy interviews, Observation exercises RM: Traceability collaboration exercises
Verification & Validation	Poor communication & collaboration (CH-06)	Same Industrial Solutions as above for CH-06	Same EI training as above for CH-06
Feedback & Improvement	Poor Impact and Risk Assessment (CH-01)	Same Industrial Solutions as above for CH-01	Same EI training as above for CH-01
Feedback & Improvement	Lack of Skills and Domain Knowledge (CH-08)	Same Industrial Solutions as above for Ch-08	Same EI training as above for CH-08
Feedback & Improvement	Inefficient Tracking of RCs (CH-03)	Same Industrial Solutions as above for CH-03	Same EI training as above for CH-03
Verification & Validation	Poor communication & collaboration (CH-06)	Same Industrial Solutions as above for CH-06	Same EI training as above for CH-06
Documentation & Closure	Lack of Skills and Domain Knowledge (CH-08)	Same Industrial Solutions as above for CH-08	Same EI training as above for CH-08
Documentation & Closure	Inefficient Tracking of RCs (CH-03)	Same Industrial Solutions as above for CH-03	Same EI training as above for CH-03
Documentation & Closure	Poor communication & collaboration (CH-06)	Same Industrial Solutions as above for CH-06	Same EI training as above for CH-06

4.6.3 Validation of the Agile Role-Based Emotional Intelligence (ARBEI)-Framework

To ensure that the developed framework was credible, relevant, and practical, it was reviewed by six experts, including experienced Agile professionals, Product Owners, Scrum Masters, software engineering researchers, and psychologists with strong knowledge of emotional intelligence. These experts were given a detailed presentation covering the framework's structure, purpose, and role-specific elements. Feedback was collected through interviews and questionnaires, focusing on clarity, completeness, role relevance, and practical use. The experts agreed that the framework effectively linked emotional intelligence to Agile roles and could be applied in real Agile environments. They suggested minor improvements for visuals and terminology, which were made without changing the core structure. Overall, the review confirmed that the framework is valid and useful for training, team development, and managing change.

Table 4.40 describes the responses of the experts and details of the actions taken to improve the framework.

Table 4.40: Expert Validation of the Role-Based Emotional Intelligence Framework

Expert ID	**Role**	**Feedback Summary**	**Suggested Improvements**	**Action Taken**
E1	Agile Coach / Scrum Trainer	Framework is well-aligned with Agile values and clearly differentiates roles.	Use more Agile-aligned terminology in role descriptions.	Terminology revised for alignment.
E2	Product Owner	Emotional dimensions are accurate and relevant to real PO challenges.	Add examples of EI behaviors in typical change scenarios.	Examples added to framework notes.
E3	Software Engineering Academic Expert	Theoretical grounding is strong; the structure is logical.	Consider referencing more EI models (e.g., Goleman).	Added supporting citations.

Expert ID	Role	Feedback Summary	Suggested Improvements	Action Taken
E4	Developer Lead	Developer role emotions are well captured; coping mechanisms are realistic.	Expand on "self-regulation" in high-pressure contexts.	Clarified and expanded the coping section.
E5	Clinical Psychologist	Reviewed the framework to ensure psychological soundness and practical relevance in team retrospectives and coaching sessions.	Recommended the addition of a visual summary for better comprehension and usability.	Visual diagram integrated as per suggestion.
E6	EI Researcher in Organizational Behavior	Role-specific mapping of EI is innovative and timely.	Clarify the difference between "empathy" and "social skills."	Definitions refined and differentiated.

4.7 Comparison with Existing Frameworks

This section compares the proposed Role-Based Framework for Integrating Emotional Intelligence in Agile Teams during requirement changes with the existing approaches considered from various academic and industrial literature, focusing on establishing its significance and novelty based on structure, scope, and applicability within Agile environments.

Table 4.41: Comparison with Existing Approaches

Dimension	**Emotion-Oriented RC Handling (Madampe 2023)[29]**	**EI Six-Cs Framework (2022) [29]**	**Pre-Development RC Techniques (Alpha/Beta) [76]**	**Agile Emotional Trajectory Framework [15]**	**Challenge Emotion Influence Model [31]**	**Other RCM/EI Studies [77, 40]**	**ARBEI Framework**
Primary Focus	Emotional reactions, influences, coping practices during RCs	EI mechanisms influencing RC handling	Practical RC techniques used before development	Emotional journey across RC phases	Relationship between RC complexity → emotional outcome → stakeholder influence	RC challenges, EI impact, communication, team dynamics	Actionable role-based guidance for agile teams to manage RCs and integrate EI into agile teams
Methodology	Mixed-methods + STGT	Six-Cs EI reasoning + qualitative evidence	Industry surveys	Longitudinal qualitative	Mixed-methods + emotion-frequency	Case studies + surveys	Surveys + interviews + lifecycle modelling + role mapping

Dimension	Emotion-Oriented RC Handling (Madampe 2023)[29]	EI Six-Cs Framework (2022) [40]	Pre-Development RC Techniques (Alpha/Beta) [76]	Agile Emotional Trajectory Framework [15]	Challenge Emotion Influence Model [31]	Other RCM/EI Studies [77, 40]	ARBEI Framework
Core Components	Challenges → Emotions → Influences → Practices	Six-Cs (Context, Conditions, Causes, Consequences, Contingencies, Covariances)	Clarification meetings, POC, reprioritization, re-estimation	Emotional stages towards each RC stage: receiving → implementing → delivering	Factor → Emotion → Influence chains	RC factors, communication barriers	7-stage lifecycle + roles-based RC challenges + industrial solutions + emotional intelligence trainings
Lifecycle Coverage	No lifecycle	No lifecycle	No lifecycle	Emotional stages only	No lifecycle	Mostly none	Full 7-stage lifecycle
Role-Based Responsibilities	Not defined	Not defined	Informal, not mapped	Not defined	Not defined	Minimal or none	Formal roles: PO, SM, Dev

Dimension	Emotion-Oriented RC Handling (Madampe 2023)[29]	EI Six-Cs Framework (2022) [40]	Pre-Development RC Techniques (Alpha/Beta) [76]	Agile Emotional Trajectory Framework [15]	Challenge Emotion Influence Model [31]	Other RCM/EI Studies [77, 40]	ARBEI Framework
EI Integration	Limited (focus on emotional reactions, not EI skill application)	Full EI model with regulation strategies	None	Limited to emotional transitions	Limited to coping	Partial EI (stress, empathy)	EI mapped to each stage + agile role + challenge
Techniques / Practices	Stress-reduction, influence-aware communication	EI self-regulation strategies	POC, reprioritization, backlog grooming, clarification	Emotion-sensitive communication	Coping driven by stakeholders	Challenge-level suggestions	Industrial solutions + role duties + EI training
Agile Integration	Background only	Minimal	Some agile practices	Agile context (iterations)	Indirect	Scattered references	Deep Scrum + Kanban integration

Dimension	Emotion-Oriented RC Handling (Madampe 2023)[29]	EI Six-Cs Framework (2022) [40]	Pre-Development RC Techniques (Alpha/Beta) [76]	Agile Emotional Trajectory Framework [15]	Challenge Emotion Influence Model [31]	Other RCM/EI Studies [77, 40]	ARBEI Framework
Context	Australia, NZ, NA	Multi-country	Global	Global	Global	Generalized	Pakistan IT industry focus
Strengths	Deep insight into emotional burden & stakeholder influence	Strong EI logic	Highly practical early-stage RC approaches	Captures emotional peaks across RC flow	Clear causal chain from complexity → emotion	Good diagnosis of RC challenges and team tensions	Most comprehensive + operational
Limitations	No lifecycle; not operational	No role mapping; not lifecycle-oriented	Fragmented; no structured workflow	Not a management/RCM model	No stage-wise RC structure	No unified solution or lifecycle	Addresses all gaps

Dimension	Emotion-Oriented RC Handling (Madampe 2023)[29]	EI Six-Cs Framework (2022) [40]	Pre-Development RC Techniques (Alpha/Beta) [76]	Agile Emotional Trajectory Framework [15]	Challenge Emotion Influence Model [31]	Other RCM/EI Studies [77, 40]	ARBEI Framework
Outcome Type	Explains what practitioners feel	Explains why EI matters	Shows how teams act tactically	Reveals when emotions shift	Shows how RC factors trigger emotions	Identifies where teams struggle	Provides how to manage RC end-to-end using roles, EI, workflow, agile, solutions
Uniqueness	Emotional understanding	EI conceptual model	Practical tactical practices	Emotional timeline	Emotional causal mapping	Contextual observations	First unified operational framework combining lifecycle + roles + EI + Agile

4.8 Threats to Validity

In any empirical study, counteracting threats to validity is important in order to ascertain the credibility and generalizability of findings. The following were the identified threats to validity in this research:

4.8.1 Internal Validity

Internal validity is the extent to which the results observed are due to the variables of interest and not some other extraneous variable. In this research, self-reported feelings and feelings towards requirement change management by participants may be influenced by mood, personal biases, or recent experiences not related to the focus of the study. Secondly, having the researcher present or how interview questions and surveys were worded may have inadvertently affected answers (observer-expectancy bias).

4.8.2 External Validity

External validity relates to the generalizability of the results of this study to the larger population beyond the sample. Since this study targeted a group of agile teams with distinct sets of roles (Product Owners, Scrum Masters, and the Development Team) and organizational setups (e.g., fintech and Edutech sectors), the findings might be transferable only to these types of agile settings or sectors. The patterns of emotional intelligence impact may differ in cultures, team sizes, or levels of organizational maturity, which were not fully controlled.

4.8.3 Construct Validity

Construct validity determines if the measures and methods employed reflect the concepts targeted in this instance, emotional intelligence, categories of emotional response, and change management issues. Although available EI models (e.g., the Goleman model) were applied to inform coding, there is a danger of mislabeling or oversimplification of emotional status. Furthermore, associating emotions with requirement change issues necessarily entails subjective

interpretation, which can influence consistency.

4.8.4 Conclusion Validity

Conclusion validity is the degree to which conclusions from the analysis are reasonable and statistically valid. By the qualitative nature of axial coding and with a small sample size, the potential for over-interpreting some emotional patterns or age, gender, and experience correlations exists. The systematic nature of the coding process means that it can still include the interpretations of the researcher, thus introducing the potential bias in the themes being developed.

4.8.5 Reliability

While MAXQDA facilitated consistency in qualitative coding, the subjective nature of the coding process may still affect reliability. Intercoder agreement was ensured through multiple checks, but replication by another researcher is liable to result in some variations in axial themes or emotional mappings.

4.9 Summary

Chapter 4 provides a detailed discussion and result analysis of the survey to give valuable insights about the emotional dynamics involved in Requirement Change Management (RCM) in Agile settings. It starts with the findings of the pilot test and survey administration, then delves into a thorough discussion of emotional reactions felt in each phase of the RCM life cycle: Arrival, Implementation, and Delivery. The study identifies role-specific emotional patterns in Product Owners, Scrum Masters, and the Development Team and examines how age, gender, and work experience affect these emotional reactions. Quantitative data comprises average emotional tendencies by demographics and Pearson correlation analysis, while qualitative data delves deeper into how teams interpret and emotionally respond to the challenges of RCM.

Drawing on these observations, the chapter offers role-based solutions and incorporates

Emotional Intelligence (EI) as a central facilitator for dealing with the emotional and collaborative challenges that are embedded in RCM. Certain EI components and tailored role-based training programs are described to enhance emotional resilience in Agile teams. These concepts are integrated into the Agile Role-Based EI Framework (ARBEI-Framework), which is coherently structured and verified within the three lifecycle phases of the RCM. The chapter finishes with a verification of the validity and reliability of the framework based on the scientific method, laying a sound platform for further studies and real-world application in Agile project management.

CHAPTER 5

CONTRIBUTION AND FUTURE WORK

5.1 Introduction

The research overview, research contribution, limitations, and future work direction are all covered in detail in Chapter 5.

5.2 Research Summary

The emotional dynamics of requirement change management (RCM) in agile software development are examined in this study, with a focus on how emotional intelligence (EI) helps address requirements change difficulties. It looks at how an agile team feels throughout the requirement change management process. The study documents the emotional responses of Agile roles, Product Owners, Scrum Masters, and the Development Team throughout the RCM lifecycle, as well as the problems they encountered when managing RCs and their solutions, using a variety of approaches, including surveys and interviews. The study introduces the Agile Role-Based Emotional Intelligence (ARBEI) Framework, which offers industrial solutions and role-based EI training to address the issues of requirement change management. The professional reviews validate the framework.

5.3 Research Contribution

Through the integration of Emotional Intelligence (EI) into the process, this study contributes to the improvement of Requirement Change Management (RCM) in Agile teams. It illustrates that in addition to posing technical hurdles, RCM also has emotional repercussions; therefore, resolving these issues is crucial to the success of requirement changes. The research aids in the provision of role-based solutions for the efficient handling of demand changes by identifying the emotional difficulties faced by specific agile roles, Product Owners, Scrum Masters, and the Development Team. In addition to offering practical guidance for the effective use of EI, it offers a role-based framework for EI competency that is based on self-awareness, self-management, social awareness, and relationship management connected to RCM phases. Additionally, the study explores the ways in which demographic traits influence emotional reactions, enabling tailored Emotional Intelligence training. A major contribution is the identification of significant RCM challenges in Pakistan's IT sector and providing relevant EI skills and industrial solutions, to handle those challenges. The Agile Role-Based RCM Framework combines EI training with industrial solutions, preparing Agile roles to handle RCM challenges and improve overall project outcomes.

5.4 Limitations

The research is limited to Agile environments only, reducing its scope of application to other models such as Waterfall or Hybrid, and is based primarily on qualitative, self-reported evidence, and therefore potentially biased. The sample size, while large, is not diverse enough to fully represent the wider Agile practice. The research takes a short-term perspective of EI training without looking at its long-term effects on team performance or emotional resilience, and the research doesn't explain EI in conflict resolution deeply. The developed framework does not consider its iterative nature, and the lack of cross-industry analysis restricts the framework's generalizability. Finally, while demographic characteristics are recognized, their more profound impact on emotional reactions and training requirements is under-researched, indicating the importance of more comprehensive and longitudinal studies.

5.5 Key Findings

Section 5.5 introduces the major findings of the study, noting the emotional issues that Agile teams encounter throughout Requirement Change Management (RCM) and the role Emotional Intelligence (EQ) plays in mitigating them. Each finding provides insight into how certain roles are affected emotionally, the necessity of incorporating EI skills into the RCM lifecycle, and the impact of demographic factors.These findings cumulatively informed the development of a Role-Based RCM Framework comprising targeted EI training and industrial solutions to each RCM challenge to enhance collaboration, emotional resilience, and change management efficacy in Agile environments. The following subsections present the key findings of this study.

5.5.1 RCM Process Impact on Emotional Dynamics

The Requirement Change Management (RCM) process has a strong impact on emotional reactions within Agile teams. Feelings of stress, frustration, and anxiety are frequently faced because of various challenges in handling requirements.

5.5.2 Emotional Challenges by Role

At different stages of the RCM process, different roles, including Product Owners, Scrum Masters, and Development Teams, must deal with distinct emotional issues. The responsibilities associated with the tasks for various positions during RCM elicit distinct emotional responses.

5.5.3 Importance of Emotional Intelligence EI in RCM

Handling RCM challenges requires the application of EI competencies such as self-awareness, self-management, social awareness, and relationship management.

5.5.4 EI Competency Mapping for RCM Lifecycle

EI skills must be incorporated into every step of the RCM process to enable effective emotional management for example Self-awareness may be needed at the requirement change arrival phase, Self-management is required in implementation and execution, Social-awareness during verification and validation, and Relationship management may be required at delivery and closure.

5.5.5 Role-Based Emotional Intelligence (EI) Competency Mapping

A refined mapping of roles across emotions in the RCM process shows how emotional responses evolve at each stage of RCM lifecycle, for instance:

- **Requirement Refinement and Planning:** Product Owners feel under pressure, Scrum Masters emphasize communication, and the Development Team manage uncertainty.
- **Implementation and Execution:** Product Owners need to stay calm under pressure, Scrum Masters focus on solutions, and Development Team faces frustration over estimations.
- **Verification and Validation:** Product Owners need to manage stakeholder emotions, Scrum Masters ensure team support, and Development Team face difficult testing results.
- **Feedback and Continuous Improvement:** Product Owners remain open to feedback, Scrum Masters lead retrospectives, and the Development Team reflect on their emotional impact on work. **Documentation and Closure:**Product Owners handle closure emotions, Scrum Masters ensure proper documentation, and the Development Team manage closure feedback.

5.5.6 RCM Challenges Addressed by Emotional Intelligence (EI)

The integration of EI training helps to address the identified RCM challenges:

- Not properly evaluating the impact and risks of requirement changes.
- Poor estimation of the cost, time, and effort for requirement changes

- Inefficient management and tracking of requirements and changes
- Unclear prioritization and scope of requirement changes
- Instability and conflicts caused by high interdependencies among requirements
- Poor communication and collaboration among team members and stakeholders
- Inconsistencies and ambiguities in requirement changes
- Agile teams have to face the lack of skills or domain knowledge to handle requirement changes
- Agile teams have to face high cross-functionality among team members
- High consequences of requirement changes

5.5.7 EI Training Enhances Collaboration and Resilience

EI training makes Agile teams capable enough to enhance collaboration, cope with stress, and remain emotionally resilient during RCM. Teams that apply EI to their processes are more likely to deal with requirement change challenges.

5.5.8 Framework Development for Role-Based RCM

The study introduces the Agile Role-Based RCM Framework, which incorporates Emotional Intelligence (EI) training and industrial solutions to manage RCM challenges effectively.

5.6 Future Direction

Future work can further explore the Agile Role-Based EI Framework by utilizing it for other software development methods, such as Waterfall, Hybrid, and Lean etc. Studies can investigate the long-term effects of EI training on team collaboration, conflict management, and project success, while industry-specific studies can specialize the framework for healthcare,

finance, and the tech-education sectors. Exploring EI in virtual and blended work environments, particularly using digital media, is also critical. Furthermore, research needs to explore in detail the influences of demographic variables such as age, gender, and culture on EI training outcomes and create tailored methods. Practical applications can be supported through case studies of real-world usage, and a study of its flexibility across Agile flavors such as Kanban, Lean, and XP will establish its flexibility.

5.7 Conclusion

This study emphasizes the emotional effect of Requirement Change Management (RCM) in Agile teams and proposes a practical, role-based Emotional Intelligence (EI) framework to promote collaboration and resilience. It may have several limitations, but along with that, it is insightful and opens the door for wider use across methodologies, industries, and contexts over time.

Appendices

APPENDIX A

SEARCH STRINGS

The Boolean search term used was:

- ("Emotional Intelligence") AND ("Agile Teams" OR "Scrum Teams" OR "Agile Development")
- ("Emotional Intelligence" OR "Soft Skills") AND ("Software Engineering" OR "Software Teams")
- ("Agile Methodology" OR "Agile Software Development") AND ("Requirement Change Management" OR "Requirement Engineering")
- ("Agile Roles" OR "Product Owner" OR "Scrum Master" OR "Development Team") AND ("Emotional Challenges" OR "Team Performance")
- ("Agile Software Development") AND ("Team Dynamics" OR "Team Behavior") AND ("Emotional Intelligence")
- ("Emotional Intelligence") AND ("Requirement Volatility" OR "Requirement Change") AND ("Agile Environment")
- ("Scrum" OR "Kanban") AND ("Team Collaboration") AND ("Emotional Intelligence" OR "Interpersonal Skills")
- ("Emotional Intelligence") AND ("Change Management") AND ("Software Projects" OR "Agile Projects")

- ("Framework Design") AND ("Agile Development") AND ("Role-based Emotional Intelligence")
- ("Emotional Intelligence Training") AND ("Agile Teams") AND ("Software Project Management")
- ("Conflict Resolution") AND ("Agile Teams" OR "Software Development Teams") AND ("Emotional Intelligence")
- ("EI Challenges" OR "Emotional Barriers") AND ("Agile Roles" OR "Scrum Teams")
- ("Team Performance") AND ("Agile Methodology") AND ("Emotional Factors" OR "EI")
- ("Leadership in Agile") AND ("Emotional Intelligence" OR "Empathy" OR "Self-Awareness")
- ("Agile Practices") AND ("Soft Skills" OR "EI") AND ("Project Success Factors")

This search term was used across titles, abstracts, and keywords in the chosen databases to provide exhaustive coverage of the subject matter.

APPENDIX B

EXISTING STUDY

Table B.1: Existing Study

Study ID	Title	Reference
S-01	"Exploring Emotional Intelligence in Agile Software Testing"	[62]
S-02	"Supporting Emotional Intelligence, Productivity, and Team Goals while handling Software Requirements Changes"	[31]
S-03	"Product Owners' Observed Emotional Intelligence Throughout The Planning, Refinement, and Retrospective Agile Team Meetings: An Exploratory Study"	[71]
S-04	Identification of Agile Requirements Change Management Success Factors in Global Software Development Based on the Best-Worst Method	[72]
S-05	"Agile Software Requirements Engineering Challenges, Solutions: A Conceptual Framework from Systematic Literature" Review	[49]
S-06	"Agile Methodologies and Emotional Intelligence: An Innovative Approach to Team Management"	[27]
S-07	"Product Owner Emotional Intelligence Related to Agile Team Processes and Effectiveness: A Qualitative Case Study"	[70]

Study ID	Title	Reference
S-08	"The Impact of Stressors on the Relationship Between Personality Traits, Knowledge Collection Behavior, and Programmer Creativity Intention in Software Engineering"	[30]
S-09	"The Emotional Roller Coaster of Responding to Requirements Changes in Software Engineering"	[15]
S-10	"A Framework for Emotion-Oriented Requirements Change Handling in Agile Software Engineering"	[29]
S-11	"The Role of Emotional Intelligence in Handling Requirements Changes in Software Engineering"	[14]
S-12	"The Role of Emotional Intelligence in Agile Project Management"	[73]
S-13	"Emotion Centric Requirements Change Handling in Software Engineering"	[40]
S-14	"An Empirical Study on the Role of Work Ethics and Emotional Intelligence on Software Engineers' Work Performance and Job Satisfaction"	[13]
S-15	"Improving Conflict Management and Team Effectiveness through Emotional Intelligence: An Exploratory Study in Agile Teams"	[28]
S-16	"Quality Requirement Change Management's Challenges: An Exploratory Study Using SLR"	[74]
S-17	"Requirement Engineering Challenges in Agile Software Development"	[48]
S-18	"Emotions and Perceived Productivity of Software Developers at the Workplace"	[42]
S-19	"Happier and Further by Going Together: The Importance of Software Team Behaviour during the COVID-19 Pandemic"	[68]
S-20	"The Impact of Emotional Intelligence on Software Development Team Performance"	[11]

Study ID	Title	Reference
S-21	"Can Trait Emotional Intelligence Variables of Well-Being, Self-Control, Emotionality, and Sociability Predict a Software Development Engineer's Creativity?"	[67]
S-22	"A Study on the Impact of Emotional Intelligence on Employees' Work Attitude in the Software Industry"	[9]
S-23	"Emotional Intelligence and Job Performance in Agile Teams"	[69]
S-24	"How (Un)Happiness Impacts Software Engineers in Agile Teams?"	[75]
S-25	"The Role of Emotional Intelligence in Agile Team Composition as Mediator in Software Project Success with Transformational Leadership as Moderator"	[76]
S-26	"Comparative Analysis of Requirement Change Management Challenges Between In-House and Global Software Development: Findings of Literature and Industry Survey"	[57]
S-27	"A Proposed Framework for Requirement Change Management in Global Software Development"	[77]

APPENDIX C

SURVEY QUESTIONNAIRE

INTRODUCTION:

This survey is conducted as a part of a Masters thesis research carried out at the Faculty of Computing and Software Engineering, NUML University, Islamabad Pakistan. The research is approved by the Computing and Software Engineering department at NUML University, Islamabad Pakistan on Jan, 2025. Investigators: Supervisor: Dr. Sumaira Nazir (HOD), Co-Supervisor: Dr. Nargis Fatima (Prof) Rubab Mushtaq Ali (Student)

PURPOSE:

Requirement engineering is a foundational yet challenging aspect of the Software Development Life Cycle (SDLC), especially in traditional models like Waterfall, where rigid processes hinder effective change management. Agile methodologies welcome change but often evoke complex emotional responses, affecting emotional well-being, performance, and team dynamics. Existing studies emphasize the role of EI in developers during requirement change handling. However, there is a gap in understanding role-specific EI needs and their application during requirement changes at each stage of requirement change. This research aims to address these gaps by identifying the emotional challenges faced by other roles in Agile teams i.e Product Owner (PO), SCRUM master (SM), and Development Team examining the influence of those challenges on each role of Agile team, and proposing a structured, role-specific EI framework.

PROCEDURE:

Participation is voluntary. This survey will take approximately 15-20 minutes of your time.

PERSONAL INFORMATION AND CONFIDENTIALITY:

Your contact details, should you choose to share them, will be kept confidential, and the responses

will be reported anonymously.

C.1 Personal Information

This section is intended to gather basic information on the participant, team, and projects. **NOTE:** We assure details of the participants, their companies, and all other confidential information shared will be kept confidential. The names and details of the participants will not be specified in any of the publications or reports.

1. How old are you?

a) 20-25

b) 25-30

c) 30-35

d) 35-40+

2. Your Gender group?

a) Male

b) Female

3. Professional Experience?

a) Less than 1 year - 2 years

b) 2 year - 5 year

c) 5 year - 7 year

d) 7 year - 10+ year

4. The domain of the project?

a) IT

b) Finance and Banking

c) Transport

d) Medical

e) Telecom

f) Healthcare

g) Manufacturing

h) Other

5. Your working mode during the project?

a) Remote (from home)

b) In-office

c) Hybrid

6. Your role in the project?

a) Agile Coach/Scrum Master

b) Product Owner

c) Development Team (Requirement Engineer, Business Analyst, Software Architecture, Programmer, Developer, QA, Tester)

d) Other

7. Project contract type?

a) Time and Material (Client pays for any development work irrespective of a fixed schedule)

b) Fixed Price (Client pays only for the predefined work)

c) I don't know

d) Other

8. Iteration length?

a) 1-3 weeks

b) 3-5 weeks

c) 5-7 weeks

d) 7-10 weeks

9. Project Category?

a) Maintenance

b) Migration

c) New development

d) Software as a Service (SaaS)

e) Other

10. Team size?

a) 5-20

b) 20-40

c) 40-60

d) Other

C.2 Requirement Change Management

Requirements change: can be an **addition/modification/deletion/bug-fix of a functional/non-functional requirement** presented in any form such as a user story and a use case.
E.g. of a functional requirement: Display the name of the user on the home page
E.g. of a non-functional requirement: Portability
Does your organization follow any Requirement change management process?

a) Yes

b) No

Factors that make RCM a challenge:

Please select one option from the five provided:

1. Never
2. Rare
3. About Half time
4. Often
5. Always

Table C.1: Factors that make RCM a challenge

Factor	**Never**	**Rare**	**About Half time**	**Often**	**Always**
Not properly evaluate the impact and risks of requirement changes.	1	2	3	4	5
Poor estimation of the cost, time, and effort for requirement changes.	1	2	3	4	5
Inefficient management and tracking of requirements and changes.	1	2	3	4	5
Unclear prioritization and scope of requirement changes.	1	2	3	4	5
Instability and conflicts are caused by high interdependencies among requirements.	1	2	3	4	5

Factor	**Never**	**Rare**	**About Half time**	**Often**	**Always**
Poor communication and collaboration among team members and stakeholders.	1	2	3	4	5
Inconsistencies and ambiguities in requirement changes.	1	2	3	4	5
Lack of necessary skills, tools, resources, or domain knowledge to handle requirement changes.	1	2	3	4	5
High cross-functionality across team members.	1	2	3	4	5
High consequences of requirement changes.	1	2	3	4	5

C.3 Emotions

Thinking of a recent project, how did you feel when handling requirements changes?

What did you feel when you could not properly evaluate the impact and risks of requirement changes?

a) Positive and Energetic Emotions

b) Positive and Calm Emotions

c) Negative and Angry Emotions

d) Negative and Fearful Emotions

e) Negative and Sad Emotions

Category	Emotion 1	Emotion 2	Emotion 3	Emotion 4	Emotion 5
Positive and Energetic Emotions	Ecstatic	Enthusiastic	Excited	Energetic	Inspired
Positive and Calm Emotions	At ease	Calm	Content	Relaxed	Satisfied
Negative and Angry Emotions	Angry	Furious	Disgusted		
Negative and Fearful Emotions	Anxious	Frightened			
Negative and Sad Emotions	Depressed	Discouraged	Gloomy		
Neutral or Low Energy Emotions	Bored	Fatigued			

Table C.2: Emotion Categories and Associated Emotions

f) Neutral or low-energy emotions

What did you feel when you poorly estimated the cost, time, and effort for requirement changes?

a) Positive and Energetic Emotions

b) Positive and Calm Emotions

c) Negative and Angry Emotions

d) Negative and Fearful Emotions

e) Negative and Sad Emotions

f) Neutral or low-energy emotions

What did you feel when you couldn't manage and track requirements and changes?

a) Positive and Energetic Emotions

b) Positive and Calm Emotions

c) Negative and Angry Emotions

d) Negative and Fearful Emotions

e) Negative and Sad Emotions

f) Neutral or low-energy emotions

What did you feel when there is unclear prioritization and scope of requirement changes?

a) Positive and Energetic Emotions

b) Positive and Calm Emotions

c) Negative and Angry Emotions

d) Negative and Fearful Emotions

e) Negative and Sad Emotions

f) Neutral or low-energy emotions

What did you feel when there is Instability and conflicts caused by high interdependencies among requirements?

a) Positive and Energetic Emotions

b) Positive and Calm Emotions

c) Negative and Angry Emotions

d) Negative and Fearful Emotions

e) Negative and Sad Emotions

f) Neutral or low-energy emotions

What did you feel when there is Inconsistencies and ambiguities in requirement changes?

a) Positive and Energetic Emotions

b) Positive and Calm Emotions

c) Negative and Angry Emotions

d) Negative and Fearful Emotions

e) Negative and Sad Emotions

f) Neutral or low-energy emotions

What did you feel when there is lack of necessary skills, tools, resources, or domain knowledge to handle requirement changes?

a) Positive and Energetic Emotions

b) Positive and Calm Emotions

c) Negative and Angry Emotions

d) Negative and Fearful Emotions

e) Negative and Sad Emotions

f) Neutral or low-energy emotions

What did you feel when there is poor communication and collaboration among team members and stakeholders?

a) Positive and Energetic Emotions

b) Positive and Calm Emotions

c) Negative and Angry Emotions

d) Negative and Fearful Emotions

e) Negative and Sad Emotions

f) Neutral or low-energy emotions

What did you feel when there is no defined roles and responsibilities among team members?

a) Positive and Energetic Emotions

b) Positive and Calm Emotions

c) Negative and Angry Emotions

d) Negative and Fearful Emotions

e) Negative and Sad Emotions

f) Neutral or low-energy emotions

What did you feel when there is high consequences of requirement changes?

a) Positive and Energetic Emotions

b) Positive and Calm Emotions

c) Negative and Angry Emotions

d) Negative and Fearful Emotions

e) Negative and Sad Emotions

f) Neutral or low-energy emotions

What do you feel at the time of requirement change request arrive?

a) Positive and Energetic Emotions

b) Positive and Calm Emotions

c) Negative and Angry Emotions

d) Negative and Fearful Emotions

e) Negative and Sad Emotions

f) Neutral or low-energy emotions

What do you feel when requirement change is implementing?

a) Positive and Energetic Emotions

b) Positive and Calm Emotions

c) Negative and Angry Emotions

d) Negative and Fearful Emotions

e) Negative and Sad Emotions

f) Neutral or low-energy emotions

What do you feel when requirement change is delivered?

a) Positive and Energetic Emotions

b) Positive and Calm Emotions

c) Negative and Angry Emotions

d) Negative and Fearful Emotions

e) Negative and Sad Emotions

f) Neutral or low-energy emotions

C.4 Measuring of Emotional Intelligence

Please select one option from the five provided:

1. Never
2. Rare
3. About Half time
4. Often
5. Always

Self-awareness:

Table C.3: Self-awareness

Factor	**Never**	**Rare**	**About Half time**	**Often**	**Always**
My understanding of the impact of requirement changes is clear at any given moment.	1	2	3	4	5

Factor	**Never**	**Rare**	**About Half time**	**Often**	**Always**
Requirement changes play an important part in the success of my projects.	1	2	3	4	5
My responses to requirement changes impact the team and stakeholders around me.	1	2	3	4	5
I find it easy to express the impact of requirement changes on others.	1	2	3	4	5
My decisions regarding requirement changes are easily influenced by external factors, such as stakeholder requests or market shifts.	1	2	3	4	5
I can easily sense when a requirement change may lead to conflict or frustration.	1	2	3	4	5
openly communicate the impact of requirement changes to my team and stakeholders.	1	2	3	4	5
I find it easy to describe the implications of requirement changes.	1	2	3	4	5
Even when I'm concerned about a requirement change, I remain aware of its potential impact on the project.	1	2	3	4	5
I am able to step back and critically analyze the implications of requirement changes, separating them from my emotional reactions.	1	2	3	4	5

Self-Management:

Table C.4: Self-Management

Factor	**Never**	**Rare**	**About Half time**	**Often**	**Always**
I accept responsibility for my reactions to requirement changes and their impact on the project.	1	2	3	4	5
I find it easy to set goals for managing requirement changes and stay committed to them.	1	2	3	4	5
I maintain emotional balance when handling requirement changes, even under pressure.	1	2	3	4	5
I am patient when dealing with delays or challenges related to requirement changes.	1	2	3	4	5
I can accept critical feedback about requirement changes without becoming defensive or upset.	1	2	3	4	5
I remain composed and focused, even during stressful periods caused by requirement changes.	1	2	3	4	5
If a requirement change does not directly affect my work, I do not let it distract or concern me.	1	2	3	4	5
I can restrain myself from reacting impulsively when I disagree with a requirement change or decision.	1	2	3	4	5

Factor	**Never**	**Rare**	**About Half time**	**Often**	**Always**
I control urges to resist necessary requirement changes that could benefit the project's success or well-being.	1	2	3	4	5
I channel my energy into problem-solving and creatively addressing challenges brought by requirement changes.	1	2	3	4	5

Social-Awareness:

Table C.5: Social-Awareness

Factor	**Never**	**Rare**	**About Half time**	**Often**	**Always**
I consider the impact of my decisions regarding requirement changes on the project team and stakeholders.	1	2	3	4	5
I can easily tell if team members or stakeholders are becoming frustrated or dissatisfied with a requirement change.	1	2	3	4	5
I sense when there's a shift in a stakeholder's attitude or mood regarding requirement changes.	1	2	3	4	5

Factor	Never	Rare	About Half time	Often	Always
I am able to provide support and clear communication when delivering difficult news about requirement changes to the team.	1	2	3	4	5
I can generally understand how my team members and stakeholders feel about proposed requirement changes.	1	2	3	4	5
Team members feel comfortable sharing their concerns or thoughts about requirement changes with me.	1	2	3	4	5
It genuinely bothers me when requirement changes negatively affect others or cause unnecessary difficulties.	1	2	3	4	5
I usually know when to offer my input on requirement changes and when to listen or remain silent.	1	2	3	4	5
I care about how requirement changes impact the team and stakeholders involved.	1	2	3	4	5
I understand when stakeholders' priorities or plans need to change in response to evolving requirements.	1	2	3	4	5

Relationship Management:

Table C.6: Relationship Management

Factor	**Never**	**Rare**	**About Half time**	**Often**	**Always**
I am able to show support and empathy when handling concerns about requirement changes.	1	2	3	4	5
My relationships with stakeholders are built on trust and provide a safe space for open discussions about requirement changes.	1	2	3	4	5
I find it easy to share my thoughts and insights about requirement changes with others.	1	2	3	4	5
I am good at motivating team members and stakeholders to embrace necessary requirement changes.	1	2	3	4	5
I maintain a positive attitude when dealing with requirement changes, even during challenging times.	1	2	3	4	5
It's easy for me to build strong relationships with team members and stakeholders while managing requirement changes.	1	2	3	4	5
People describe me as approachable and engaging when discussing or managing requirement changes.	1	2	3	4	5

Factor	**Never**	**Rare**	**About Half time**	**Often**	**Always**
I enjoy helping others navigate through the challenges and concerns related to requirement changes.	1	2	3	4	5
Others can depend on me to follow through with decisions and actions regarding requirement changes.	1	2	3	4	5
I can help calm team members or stakeholders if they are upset or frustrated by requirement changes.	1	2	3	4	5

APPENDIX D

CONTENT VALIDATION FORM

Dear Expert,

Our survey questionnaire attached has a total of 63 items aimed at measuring the role played by emotional intelligence in effectively dealing with requirement changes in Agile teams. It comprises 10 questions that uncover the difficulties faced by teams when handling changes in requirements, 13 questions that reveal emotions felt by various Agile roles in facing such challenges, and 40 questions spread across four main dimensions of Emotional Intelligence (EI): Self-awareness, Self-management, Social-awareness, and Relationship Management, with each having 10 items. We request your professional assessment of every item in terms of relevance, clarity, and conciseness to ascertain the questionnaire's validity and quality.

Research Title:

A Role-Based Framework for integrating Emotional Intelligence in Agile Teams during Requirement Changes

Research Framework:

The main goal of this survey is to assess how emotional intelligence helps in effectively handling requirement changes in Agile teams, with special emphasis on key members like Product Owners, Scrum Masters, and Developers. The questionnaire has 63 items, of which 10 questions probe the difficulties encountered during changes in requirements, 13 questions tap into the emotions that Agile team members feel due to these difficulties, and 40 items assess four basic dimensions of Emotional Intelligence (EI). These EI factors are: Self-awareness, awareness of one's own emotional state and its impact on others; self-management, managing emotional reactions in shifting project environments; social awareness, awareness of others' feelings and

team dynamics; and relationship management, positive management of communication, conflict, and collaboration. This questionnaire is meant to confirm the instrument before data collection. Your critical and honest feedback will be used to determine content validity.

Instructions:

Consider each question on the questionnaire and rate it based on the following three criteria:

Relevance: Does the question measure an appropriate dimension of emotional intelligence in terms of requirement change management in Agile?

Clarity: Is the question well-worded and clear?

Conciseness: Is the question concise and to the point without losing its meaning?

You may also provide suggestions for any vague or irrelevant item.

Marking Guide:

Criteria	**Response Options**	**Response Options**
Relevance	Yes	No
Clarity	Yes	No
Conciseness	Yes	No

Table D.1: Marking Guide

Construct Definitions

1. Not Properly Evaluating the Impact and Risks of Requirement Changes

Refers to the inability to properly assess how a requirement change can impact the project according to cost, quality, schedule, and team dynamics. This results in unexpected adverse outcomes that could have been prevented through effective risk analysis.

2. Poor Estimation of the Cost, Time, and Effort for Requirement Changes

Includes miscalculation of the resources required to effect changes, thereby leading to cost overruns, delayed deadlines, and team overload as a result of unrealistic planning.

3. Inefficient Management and Tracking of Requirements and Changes

Defines the absence of formalized processes or tools for documenting, tracking, and refreshing changes in requirements. This can lead to confusion, rework, and alignment issues between team members and stakeholders.

4. Unclear Prioritization and Scope of Requirement Changes

Happens when requirement changes are not clearly prioritized according to business value or urgency, or their edges and effects are badly defined. This causes scope creep and team effort misallocation.

5. Instability and Conflicts Caused by High Interdependencies Among Requirements

Occurs when modifications to one requirement have far reaching impacts on several others owing to technical or functional interdependencies, resulting in system instability and team conflict or technical failure.

6. Poor Communication and Collaboration Among Team Members and Stakeholders

Refers to the deterioration of successful information sharing and collaboration within change requirements processes. Miscommunication causes confusion, implementation errors, and dissatisfaction among stakeholders.

7. Inconsistencies and Ambiguities in Requirement Changes

Happens when requirement changes are ambiguous, contradictory, or subject to different interpretations. It results in confusion between developers and stakeholders, ultimately leading to improper or mediocre implementation.

8. Lack of Necessary Skills, Tools, Resources, or Domain Knowledge to Handle Requirement Changes

Captures cases when team members are inadequately prepared or under-skilled to properly handle requirement changes. This encompasses inadequate technical competence, absence of decision-supporting tools, or poor knowledge of the business domain.

9. High Cross-Functionality Across Team Members

Although cross-functionality is one of the important Agile principles, too much overlap with roles having no boundaries may result in role confusion, duplication of tasks, and emotional stress during high-change situations.

10. High Consequences of Requirement Changes

Explain situations under which even slight modifications can cause extensive business or technical impacts like security loopholes, compliance, or key feature breakdowns raising the emotional stakes of Agile teams.

11. Positive and Energetic Emotions

This category includes ecstatic, enthusiastic, energetic excited, and inspired emotions.

12. Positive and Calm Emotions

This category includes at-ease, calm, content, relaxed, and satisfied emotions.

13. Negative and Angry Emotions

This category includes angry, furious, and disgusted emotions.

14. Negative and Fearful Emotions

This category includes anxious and frightened emotions.

15. Negative and Sad Emotions

This category includes depressed, discouraged, and gloomy emotions.

16. Neutral or Low-Energy Emotions

This category includes bored and fatigued emotions.

17. Self-Awareness

Having the capability to identify one's feelings, triggers, and effects on team dynamics and direction of the project.

18. Self-Management

Having the ability to control emotional reactions, particularly in stressful Agile settings with

constant requirement changes.

19. Social-Awareness

Being able to understand team members' and stakeholders' emotional requirements and responses when handling change.

20. Relationship Management

Relationship management: Managing interactions effectively, showing empathy, conflict resolution, and encouraging motivation within the team when facing changing requirements.

Table D.2: Questionnaire Evaluation Sheet for Research Instrument Validation

SR.	Section / Construct	Question	Relevance	Clarity	Conciseness
01.	RCM challenges:	Not properly evaluate the impact and risks of requirement changes.	Yes	Yes	Yes
02.	RCM challenges:	Poor estimation of the cost, time, and effort for requirement changes.	Yes	Yes	Yes
03.	RCM challenges:	Inefficient management and tracking of requirements and changes	Yes	Yes	Yes
04.	RCM challenges:	Unclear prioritization and scope of requirement changes	Yes	Yes	Yes
05.	RCM challenges:	Instability and conflicts caused by high interdependencies among requirements	Yes	Yes	Yes

SR.	Section / Construct	Question	Relevance	Clarity	Conciseness
06.	RCM challenges:	Poor communication and collaboration among team members and stakeholders	Yes	Yes	Yes
07.	RCM challenges:	Inconsistencies and ambiguities in requirement changes	Yes	Yes	Yes
08.	RCM challenges:	Lack of necessary skills, tools, resources, or domain knowledge to handle requirement changes	Yes	Yes	Yes
09.	RCM challenges:	High cross-functionality across team members	Yes	Yes	Yes
10.	RCM challenges:	High consequences of requirement changes	Yes	Yes	Yes
11.	Emotions During RCM Challenges:	What did you feel when you could Not properly evaluate the impact and risks of requirement changes?	Yes	Yes	Yes
12.	Emotions During RCM Challenges:	What did you feel when you poorly estimated the cost, time, and effort for requirement changes?	Yes	Yes	Yes

SR.	Section / Construct	Question	Relevance	Clarity	Conciseness
13.	Emotions During RCM Challenges:	What did you feel when you couldn't manage and track requirements and changes?	Yes	Yes	Yes
14.	Emotions During RCM Challenges:	What did you feel when there is unclear prioritization and scope of requirement changes?	Yes	Yes	Yes
15.	Emotions During RCM Challenges:	What did you feel when there is Instability and conflicts caused by high interdependencies among requirements?	Yes	Yes	Yes
16.	Emotions During RCM Challenges:	What did you feel when there is poor communication and collaboration among team members and stakeholders?	Yes	Yes	Yes
17.	Emotions During RCM Challenges:	What did you feel when there is Inconsistencies and ambiguities in requirement changes?	Yes	Yes	Yes
18.	Emotions During RCM Challenges:	What did you feel when there is lack of necessary skills, tools, resources, or domain knowledge to handle requirement changes?	Yes	Yes	Yes

SR.	Section / Construct	Question	Relevance	Clarity	Conciseness
19.	Emotions During RCM Challenges:	What did you feel when there is no defined roles and responsibilities among team members?	Yes	Yes	Yes
20.	Emotions During RCM Challenges:	What did you feel when there is high consequences of requirement changes?	Yes	Yes	Yes
21.	Emotions During RCM Challenges:	What do you feel at the time of requirement change request arrives?	Yes	Yes	Yes
22.	Emotions During RCM Challenges:	What do you feel during requirement change implementation?	Yes	Yes	Yes
23.	Emotions During RCM Challenges:	What do you feel when requirement change is delivered?	Yes	Yes	Yes
24.	Self-Awareness:	My understanding of the impact of requirement changes is clear at any given moment.	Yes	Yes	Yes
25.	Self-Awareness:	Requirement changes play an important part in the success of my projects.	Yes	Yes	Yes

SR.	Section / Construct	Question	Relevance	Clarity	Conciseness
26.	Self-Awareness:	My responses to requirement changes impact the team and stakeholders around me.	Yes	Yes	Yes
27.	Self-Awareness:	I find it easy to express the impact of requirement changes on others.	Yes	Yes	Yes
28.	Self-Awareness:	My decisions regarding requirement changes are easily influenced by external factors, such as stakeholder requests or market shifts.	Yes	Yes	Yes
29.	Self-Awareness:	I can easily sense when a requirement change may lead to conflict or frustration.	Yes	Yes	Yes
30.	Self-Awareness:	I openly communicate the impact of requirement changes to my team and stakeholders.	Yes	Yes	Yes
31.	Self-Awareness:	I find it easy to describe the implications of requirement changes.	Yes	Yes	Yes

SR.	Section / Construct	Question	Relevance	Clarity	Conciseness
32.	Self-Awareness:	Even when I'm concerned about a requirement change, I remain aware of its potential impact on the project.	Yes	Yes	Yes
33.	Self-Awareness:	I am able to step back and critically analyze the implications of requirement changes, separating them from my emotional reactions.	Yes	Yes	Yes
34.	Self-Management:	I accept responsibility for my reactions to requirement changes and their impact on the project.	Yes	Yes	Yes
35.	Self-Management:	I find it easy to set goals for managing requirement changes and stay committed to them.	Yes	Yes	Yes
36.	Self-Management:	I maintain emotional balance when handling requirement changes, even under pressure.	Yes	Yes	Yes
37.	Self-Management:	I am patient when dealing with delays or challenges related to requirement changes.	Yes	Yes	Yes

SR.	Section / Construct	Question	Relevance	Clarity	Conciseness
38.	Self-Management:	I can accept critical feedback about requirement changes without becoming defensive or upset.	Yes	Yes	Yes
39.	Self-Management:	I remain composed and focused, even during stressful periods caused by requirement changes.	Yes	Yes	Yes
40.	Self-Management:	If a requirement change does not directly affect my work, I do not let it distract or concern me.	Yes	Yes	Yes
41.	Self-Management:	I can restrain myself from reacting impulsively when I disagree with a requirement change or decision.	Yes	Yes	Yes
42.	Self-Management:	I control urges to resist necessary requirement changes that could benefit the project's success or well-being.	Yes	Yes	Yes

SR.	Section / Construct	Question	Relevance	Clarity	Conciseness
43.	Self-Management:	I channel my energy into problem-solving and creatively addressing challenges brought by requirement changes.	Yes	Yes	Yes
44.	Social-Awareness:	I consider the impact of my decisions regarding requirement changes on the project team and stakeholders.	Yes	Yes	Yes
45.	Social-Awareness:	I can easily tell if team members or stakeholders are becoming frustrated or dissatisfied with a requirement change.	Yes	Yes	Yes
46.	Social-Awareness:	I sense when there's a shift in a stakeholder's attitude or mood regarding requirement changes.	Yes	Yes	Yes
47.	Social-Awareness:	I am able to provide support and clear communication when delivering difficult news about requirement changes to the team.	Yes	Yes	Yes

SR.	Section / Construct	Question	Relevance	Clarity	Conciseness
48.	Social-Awareness:	I can generally understand how my team members and stakeholders feel about proposed requirement changes.	Yes	Yes	Yes
49.	Social-Awareness:	Team members feel comfortable sharing their concerns or thoughts about requirement changes with me.	Yes	Yes	Yes
50.	Social-Awareness:	It genuinely bothers me when requirement changes negatively affect others or cause unnecessary difficulties.	Yes	Yes	Yes
51.	Social-Awareness:	I usually know when to offer my input on requirement changes and when to listen or remain silent.	Yes	Yes	Yes
52.	Social-Awareness:	I care about how requirement changes impact the team and stakeholders involved.	Yes	Yes	Yes

SR.	Section / Construct	Question	Relevance	Clarity	Conciseness
53.	Social-Awareness:	I understand when stakeholders' priorities or plans need to change in response to evolving requirements.	Yes	Yes	Yes
54.	Relationship Management:	I am able to show support and empathy when handling concerns about requirement changes.	Yes	Yes	Yes
55.	Relationship Management:	My relationships with stakeholders are built on trust and provide a safe space for open discussions about requirement changes.	Yes	Yes	Yes
56.	Relationship Management:	I find it easy to share my thoughts and insights about requirement changes with others.	Yes	Yes	Yes
57.	Relationship Management:	I am good at motivating team members and stakeholders to embrace necessary requirement changes.	Yes	Yes	Yes

SR.	Section / Construct	Question	Relevance	Clarity	Conciseness
58.	Relationship Management:	I maintain a positive attitude when dealing with requirement changes, even during challenging times.	Yes	Yes	Yes
59.	Relationship Management:	It's easy for me to build strong relationships with team members and stakeholders while managing requirement changes.	Yes	Yes	Yes
60.	Relationship Management:	People describe me as approachable and engaging when discussing or managing requirement changes.	Yes	Yes	Yes
61.	Relationship Management:	I enjoy helping others navigate through the challenges and concerns related to requirement changes.	Yes	Yes	Yes
62.	Relationship Management:	Others can depend on me to follow through with decisions and actions regarding requirement changes.	Yes	Yes	Yes

SR.	Section / Construct	Question	Relevance	Clarity	Conciseness
63.	Relationship Management:	I can help calm team members or stakeholders if they are upset or frustrated by requirement changes.	Yes	Yes	Yes

APPENDIX E

INTERVIEW QUESTIONS

1. Explain your RCM (Requirement Change Management) process?
2. What did you feel when you could not properly evaluate the impact and risks of requirement changes, and how did you address that?
3. What did you feel when you poorly estimated the cost, time, and effort for requirement changes, and how did you address that?
4. What did you feel when you couldn't manage and track requirements and changes, and how did you address that?
5. What did you feel when there is unclear prioritization and scope of requirement changes, and how you address that?
6. What did you feel when there is Instability and conflicts caused by high interdependencies among requirements, and how did you address that?
7. What did you feel when there is poor communication and collaboration among team members and stakeholders, and how did you address that?
8. What did you feel when there is a lack of necessary skills, tools, resources, or domain knowledge to handle requirement changes, and how did you address that?
9. What did you feel when there were no defined roles and responsibilities among team members, and how did you address that?

10. What did you feel when there were high consequences of requirement changes, and how did you address that?
11. What do you feel at the time the requirement change request arrives, and how do you address that?
12. What do you feel when a requirement change is implemented?
13. What do you feel when a requirement change is delivered?
14. Explain at what stage of your RCM process you face each challenge mentioned above?

Please briefly share an example or instance when you felt the following emotions when handling requirements changes. Consider the types of requirements change (addition, deletion, modification, combinations of additions, deletions, and modifications, of functional requirements and non-functional requirements) and your emotions felt, and why?

You may also mention,

The requirements change management process you have in place, the Techniques and tools you used to handle the requirements changes

Energetic/ excited/ ecstatic/ enthusiastic/ inspired: _____

_____

_____

At-ease/ calm/ content/ satisfied/ relaxed: _____

_____

_____

Angry/ anxious/ disgusted/ frightened/ furious: _____

_____

_____

Bored/ depressed/ discouraged/ gloomy/ fatigued: _____

_____

_____

APPENDIX F

PSYCHOLOGIST DETAIL

Table F.1: Details of Interview Participants (Psychologists) for EI Training Recommendations

ID	**Name**	**Expertise/Designation**	**Relevant Contribution**
Ex-01	Dr. Muattar Shafiq Khan	Clinical Psychologist	Recommended EI strategies for handling stress and decision-making in development teams
Ex-02	Raja Haseeb ur Rehman	Senior Psychologist	Provided training alignment for empathy, self-regulation, and team collaboration
Ex-03	Ms. Muqaddas	Clinical Psychologist	Suggested practical exercises for improving social awareness in product teams

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