Bridging Communication Gaps

Enhancing Collaboration in
Multinational Capital Projects

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TUDelft

Bridging Communication Gaps

Enhancing Collaboration in Multinational Capital Projects

by

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Preface

Writing this thesis has been one of the most challenging experiences of my academic life. Before starting this program, I had little experience with research at this level, so every step, from defining my topic to conducting interviews and putting everything together felt like new. Looking back, it is not just about finishing a thesis, but about how much I have grown through this process.

First, I want to sincerely thank my supervisors, Erik-Jan Houwing and Paul Chan. Your thoughtful feedback, critical questions, and support helped me stay focused and pushed me to think more clearly and deeply. Our conversations were often eye-opening and always helpful, both academically and personally.

I am thankful to the Henkel Capital Projects department for their openness and cooperation throughout the research process. The insights shared by the interview participants were invaluable to the development of this thesis, and I appreciate their time and trust.

I also want to acknowledge the friends I met during my studies. The mutual support and shared struggles made the challenges of this academic journey easier to face. I am grateful for having crossed paths with people who brought both laughter and motivation along the way.

Iuliia Osipova
Delft, June 2025

Summary

Multinational capital projects are increasingly common in global industries, yet they are often marked by complexity, delay, and cost overruns. A major contributing factor is communication breakdown between geographically dispersed and culturally diverse teams. In response, digital tools such as Microsoft Teams, SharePoint, and collaborative dashboards have been widely adopted. While these tools are intended to streamline collaboration, their effectiveness is far from guaranteed. The success of digital communication depends not only on technology itself, but also on how it is used, interpreted, and embedded within social and organizational contexts.

This thesis investigates the conditions under which digital tools support effective communication in multinational capital projects. The study was guided by one main research question: *What strategies can improve the effective use of digital tools for communication in multinational capital projects?* To address this, three sub-questions were formulated to explore communication challenges, the role of boundary objects and multimodal practices, and the organizational conditions that shape tool effectiveness.

The research combined a theoretical review and an empirical case study. The theoretical framework drew on concepts such as boundary objects, multimodal communication, and socio-technical systems to explain how communication is constructed and negotiated. Empirically, five semi-structured interviews were conducted with professionals from Henkel's Global Capital Project Management team, representing a range of roles, disciplines, and regions.

Problem:
Communication gaps in multinational capital projects

Theory:
Boundary objects, multimodal communication, socio-technical systems

Methodology:
Qualitative case study at Henkel
Semi-structured interviews

Findings:
Interpretation issues, tool fragmentation, cultural working styles

Contributions:
Revised framework,
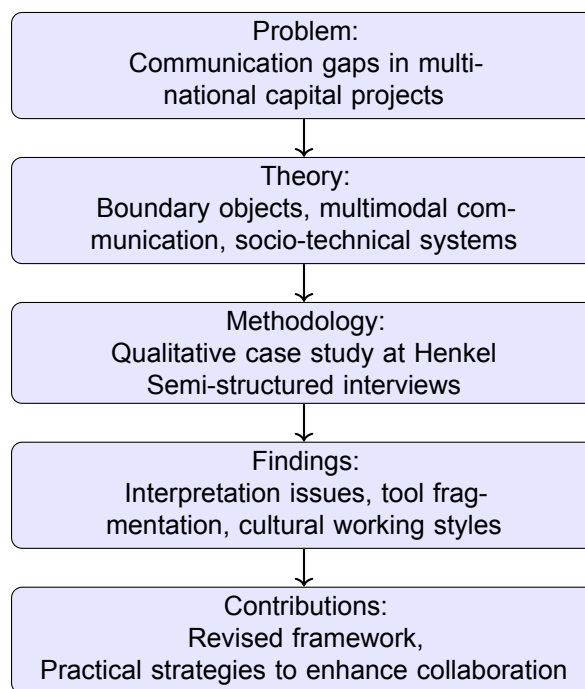Practical strategies to enhance collaboration

Figure: Overview of Research Focus and Contribution

Thematic analysis of the interview data revealed three recurring themes:

1. **Interpreting Boundary Objects in Multimodal Environments**: Shared templates and documents (dashboards, schedules, templates) were often interpreted differently by stakeholders, leading to misalignment in expectations and actions.

2. **Tool Setup and Its Fragmentation**: Although tools like Teams and SharePoint were widely used, their roles were inconsistently defined, creating parallel communication channels and confusion over where to find critical information.

3. **Communication Culture and Working Styles**: Communication effectiveness was strongly influenced by cultural norms, individual behaviors, and regional expectations, which shaped how tools were used and how meaning was constructed.

These themes were compared with literature, revealing both alignment and contradiction. For example, while theory often presents boundary objects as coordination enablers, the data showed that they can also become sources of ambiguity without shared interpretation. Similarly, digital tools are frequently portrayed as neutral enablers of collaboration, but in practice, their impact depends on governance, behavioral norms, and clarity of use.

The study proposes a revised communication model that integrates digital tools, boundary objects, multimodal practices, and human interpretation. This model emphasizes the interplay between technological infrastructure and cultural-contextual variables. In addition, a practical framework was developed to guide organizations in enhancing collaboration by aligning tool usage, interpretation routines, and communication behaviors.

In conclusion, this thesis contributes both theoretically and practically to understanding communication in global project environments. It highlights that improving collaboration is not just about deploying better tools; it is about improving how these tools are used, interpreted, and governed within a culturally diverse team setting. While rooted in the context of Henkel's Capital Projects department, the findings and recommendations are broadly applicable to other multinational organizations facing similar digital communication challenges.

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Nomenclature

Abbreviations

Abbreviation	Definition
CPM	Capital Project Management
ICT	Information and Communication Technology
INT	Interviewee (e.g., INT-01 refers to Interviewee 1)
MS Teams	Microsoft Teams
PM	Project Management
PMI	Project Management Institute
IMEA	India, Middle East, Africa
LA	Latin America

Part I

Part A

1

Introduction

What is this research about?

> Multinational capital projects require collaboration across countries, cultures, and tools. Communication is the glue.

This thesis investigates how digital tools mediate communication in multinational capital projects, with particular attention to how their use is shaped by boundary objects (such as templates and shared documents) and multimodal communication practices (including verbal, visual, and textual forms). Rather than treating digital platforms in isolation, the study explores how these tools operate within broader social and communicative environments, revealing the conditions that enable or constrain their effectiveness.

In globally distributed project environments such as those found in construction, infrastructure, and engineering, teams must navigate challenges including language differences, cultural variability, and inconsistent use of technology. As noted by Davies and Brady (2015), coordination failures in capital projects often come from fragmented communication practices. In this context, digital tools are not just technical enablers, but central actors in mediating how communication unfolds across time zones, cultures, and organizational hierarchies.

To examine these dynamics, this study adopts a case study approach focused on Henkel's Capital Projects department. It aims to uncover communication bottlenecks associated with digital tools and to develop practical strategies that enhance collaboration, align with organizational workflows, and contribute to a more context-aware understanding of digital tool effectiveness in multinational projects.

Why is it important?

Communication within project-based environments presents special challenges. This is especially true within the construction industry, where interaction tends to be characterized by unfamiliar groups of people coming together for short periods before disbanding to work on other projects (Dainty et al., 2007).

Miscommunication in capital projects has a direct effect on project timelines, budgets, and team morale. Studies show that 70% of complex projects fail to meet their objectives due to poor communication and unclear stakeholder expectations (Project Management Institute (PMI), 2013).

Papadonikolaki et al. (2025) argue that while organizations increasingly adopt digital tools, such as Microsoft Teams, SharePoint, and various project management platforms to drive efficiency, these tools alone do not ensure effective multimodal communication. Instead, their success depends on the integration of digital systems with human and cultural elements, as well as on the active development of

data-savvy talent; without such alignment, digital tools may inadvertently introduce further complexity and lead to misinterpretations.

The academic relevance of this topic lies in its socio-technical dimension: communication is not only a technological issue, but also a human one. By linking theories on multimodality (Norris, 2004), boundary objects (Star & Griesemer, 1989), and digital transformation (Papadonikolaki et al., 2025), this thesis provides new insights for both researchers and practitioners.

How is the research conducted?

This research uses a mixed-methods approach combining literature analysis, a case study, and interviews:

- **Literature Review:** the study first reviews academic work on communication challenges, digital tools, and boundary objects in multinational projects. This review identifies patterns and gaps in the current understanding.
- **Case Study:** the Capital Project Management department at Henkel is used as a case to investigate how communication practices are organized and where digital tools succeed or fail.
- **Interviews:** semi-structured interviews are conducted with project stakeholders to explore real-life experiences and perspectives related to communication and collaboration in a multinational context.
- **Synthesis and Recommendations:** findings from the previous steps are integrated to propose practical strategies that enhance communication in complex project environments.

This research aims to contribute to more effective project delivery in global settings, especially by identifying ways digital tools can support not replace human-centered and culturally sensitive communication.

1.1. Background Information

In today's interconnected global economy, multinational capital projects, such as construction, energy, and infrastructure projects play an important role in driving development and economic growth. These projects are marked by their complexity, significant financial investments, and the collaboration of a wide range of stakeholders, including project owners, contractors, consultants, and regulatory bodies, often from different countries and cultural backgrounds.

Studies have shown that costs often increase in capital projects. Flyvbjerg et al. (2004) found that nearly 90% of such projects experience cost escalations. Similarly, Love et al. (2005) demonstrated that poor communication adversely affects time-cost dynamics. Barber et al. (2000), reported that quality failures and delays can increase project costs by up to 23%. More recently, Durdyev and Hosseini (2019) linked ambiguous technical specifications and communication gaps to costly rework in construction projects.

A key factor that contributes to these performance challenges is the difficulty of effective communication. The multinational aspect of these projects brings together a mix of cultural, linguistic, and organizational differences that can hinder clear and efficient information exchange. For example, different cultural norms can lead to varying interpretations of project goals, expectations, and feedback. Language barriers can create misunderstandings or incomplete information transfer. Furthermore, while digital communication tools are designed to bridge geographical gaps, they can sometimes complicate matters if not implemented consistently or if users lack proper training.

Addressing these communication challenges is important, as they significantly impact project performance. Misaligned expectations, technical misunderstandings, and breakdowns in collaboration can result in rework, higher costs, and prolonged timelines. Therefore, it is essential to examine the complexities of communication within the area of multinational capital projects to identify strategies that enhance clarity, promote collaboration, and ultimately improve project outcomes.

This study aims to investigate the various communication barriers present in multinational capital projects, focusing on how cultural, linguistic, and technological factors interact to affect project performance. By highlighting these dynamics, the research seeks to contribute to the creation of more effective communication strategies.

This study focuses on communication dynamics within the Capital Project Management department of Henkel, a global company involved in complex capital projects. While Henkel serves as the primary case, the communication challenges it faces represent broader issues found across multinational capital projects. As such, the research aims to extract insights that are both contextually grounded in Henkel's practices and transferable to other organizations operating in similar project-based, multicultural, and digital environments.

1.2. Problem Statement

Multinational capital projects, such as large-scale infrastructure developments or energy plants, or construction projects, are important drivers of global economic growth (McKinsey & Company, 2020). However, these projects are often prone to systemic failures, particularly cost and time overruns. Research consistently shows that about 60–70% of capital projects exceed their budgets and timelines, with some delays extending beyond a year (Flyvbjerg et al., 2004; Love et al., 2005). For instance, (Barber et al., 2000) found that quality failures and delays in road construction projects increased total costs by up to 23%, while (Durdyev & Hosseini, 2019) linked communication gaps to significant rework and budget escalations. These issues not only strain financial resources but also reduce stakeholder trust and jeopardize long-term project viability.

The causes of these failures are diverse. Capital projects inherently involve complex, temporary organizational structures with multiple stakeholders - owners, contractors, consultants where each pursuing distinct priorities (Cheung et al., 2013). This fragmentation creates competing interests, misaligned objectives, and inefficient workflows. For example, engineers may prioritize technical precision, while managers focus on deadlines, leading to conflicts that delay decision-making (Emmitt & Gorse, 2003). Additionally, the global nature of such projects introduces cultural and geographical barriers. Teams from high-context cultures, where communication relies on implicit understanding, may face challenges when working with teams from low-context cultures, where communication is typically more explicit and direct (Hofstede, 2001). Such differences amplify misunderstandings, particularly in distributed teams working across time zones (Ochieng & Price, 2009).

Communication stands out as a key factor for success among these challenges. Effective communication is closely connected with other critical performance factors, including coordination, trust, and knowledge sharing (Lindhard & Larsen, 2016). Poor communication disrupts coordination by creating uncertainties in task assignments. For instance, misinterpretations of technical specifications due to language barriers can lead to costly rework (Gamil et al., 2019). Similarly, inadequate information flow between stakeholders fosters mistrust, as teams withhold critical updates to avoid blame (Abdul-Rahman et al., 2006). This lack of transparency cascades into delays, as unresolved issues compound over time (Olawale & Sun, 2010).

The impact of poor communication is clearly evident in the "iron triangle" of project success: cost, time, and quality (Atkinson, 1999). Studies reveal that communication breakdowns directly correlate with all three. For instance, ambiguous contracts or unclear drawings in fragmented organizational structures can delay approvals and increase costs (Cheung et al., 2013). Similarly, miscommunication during pipeline installations has led to incorrect welding specifications, resulting in six-month delays and millions in additional costs (Durdyev & Hosseini, 2019). Even minor misunderstandings, such as conflicting interpretations of safety protocols, can compromise quality and safety outcomes (Wang & Yuan, 2016).

As organizations want to address these communication barriers, technology has increasingly been leveraged to facilitate information exchange and collaboration in complex project environments. Digital tools or collaborative software, are increasingly promoted as solutions. These tools promise to streamline information sharing, reduce physical boundaries, and improve real-time collaboration (Hendriks, 1999). However, poorly integrated tools can overwhelm teams with information overload, exacerbating delays as stakeholders struggle to identify critical updates. For example, conflicting data across incompatible software systems can lead to errors in material procurement, further increasing costs (Afshari et al., 2010).

Communication is undeniably central to the success of multinational capital projects. As highlighted throughout this chapter, communication failures have a widespread impact on all aspects of project

performance, including cost, time, quality, and stakeholder satisfaction. Studies such demonstrate that miscommunication directly correlates with rework, delays, and budget overruns. Without clear communication, even the best tools or most well-structured teams can struggle.

However, communication in multinational projects is not just about transmitting information, it is about bridging cultural divides, aligning interpretations, and fostering mutual understanding. The challenges discussed are exacerbated in today's digital era, where tools designed to enhance collaboration often unintentionally depersonalize interactions or overload teams with data.

Given this critical interplay between communication and project outcomes, this research aims to explore how digital tools can be optimized to enhance, rather than obstruct, multimodal communication (e.g., combining text, visuals, and verbal exchanges). By addressing communication barriers, the study aims to provide actionable strategies that enhance collaboration, mitigate risks, and ultimately align multinational projects with their cost, time, and quality goals. In doing so, it seeks to transform communication from a recurring vulnerability into a strategic asset for global project success.

The Figure 1.1 provides a visual representation of the research focus by placing communication at the center and showing its direct influence on both project performance factors and challenges in multinational capital projects. This diagram helps illustrate how communication failures can cascade into larger issues, affecting cost, time, and quality.
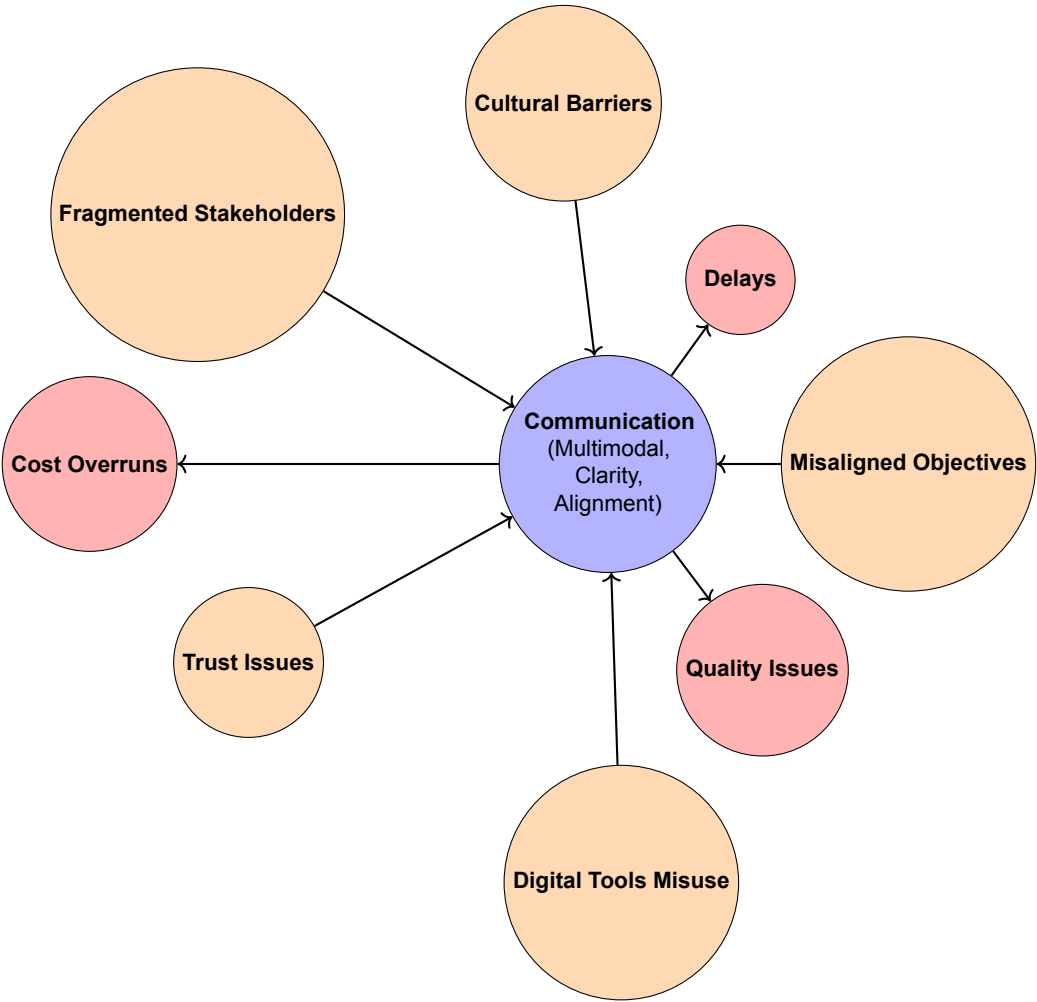
Figure 1.1: The Role of Communication in Multinational Capital Projects

This research aims to solve these interrelated challenges by asking a fundamental question: *What strategies can improve the effective use of digital tools for communication in multinational capital projects?* The study uses Henkel's Capital Project Management department as a case to explore

this question in depth. However, the patterns and strategies identified are relevant beyond Henkel and aim to contribute to the broader discourse on improving communication in complex, distributed project environments.

1.3. Research Objective

The objective of this research is to explore how communication challenges affect collaboration and project performance in multinational capital projects and to identify strategies to improve communication practices in such complex environments. This study aims to examine how cultural, organizational, and digital factors influence communication flows across diverse stakeholders and how these dynamics may lead to misunderstandings, delays, or inefficiencies in large-scale projects.

The research will focus on understanding both the barriers and enablers of effective communication, drawing from real-world insights through interviews and literature. Ultimately, the goal is to provide practical recommendations for improving communication structures and practices that can support better collaboration and outcomes in multinational capital project environments.

This objective aligns with earlier research e.g., (Durdyev & Hosseini, 2019; Ochieng & Price, 2009), which emphasizes the significant role of communication in project success, but adds value by focusing specifically on the interaction between communication practices and multicultural, digitally-mediated project contexts.

1.4. Structure of the Report

This report is structured to guide the reader through the research step-by-step. Part A introduces the context, the problem, and the theoretical foundation. Part B investigates the real-world application of these concepts through a case study and interviews at Henkel. Part C synthesizes these insights to propose practical strategies and directions for future research.

Each part builds upon the previous one, leading the reader from problem identification to conceptual understanding, empirical exploration, and finally, practical resolution. Figure 1.2 illustrates the flow of the research methodology, and the following sections describe the content of each chapter.

Part A: Introduction and Theoretical Foundation

The first part of the report introduces the research topic, establishes its relevance, and provides a theoretical foundation for the study.

Chapter 1: Introduction This chapter provides an overview of the research topic, highlighting the importance of communication in multinational capital projects and the challenges posed by digital tools, multimodal communication, and boundary objects. The problem statement, research objective, and research questions are presented, along with an outline of the report's structure.

Chapter 2: Research Design This chapter explains the research methodology, including the mixed-methods approach combining a literature review, case study, and interviews. The relevance of the research to both academia and industry is discussed, and the scope of the study is defined.

Chapter 3: Literature Review This chapter reviews existing research on communication in multinational capital projects, with a focus on digital tools, multimodal communication, and boundary objects. Key challenges, opportunities, and gaps in the literature are identified, providing a theoretical foundation for the study.

Part B: Empirical Investigation

The second part of the report focuses on the empirical investigation, including a case study of Henkel's Capital Project Management department and interviews with project stakeholders.

Chapter 4: Case Study: Henkel's Capital Project Management Department This chapter presents a detailed analysis of Henkel's communication practices, focusing on the use of digital tools, multimodal communication, and boundary objects. Recurring challenges and opportunities for improvement are identified.

Chapter 5: Qualitative Study: Interviews with Henkel Project Teams This chapter describes the interview process, including the development of the interview guide, recruitment of participants, and sampling strategy. The purpose of the interviews is to gather firsthand insights into the communication challenges faced by Henkel's project teams.

Chapter 6: Analysis and Discussion This chapter presents the findings from the interviews, organized by themes such as challenges, opportunities, and strategies. Thematic analysis is used to identify patterns and insights that address the research questions.

Part C: Findings, Discussion, and Recommendations The final part of the report synthesizes the findings, discusses their implications, and provides actionable recommendations.

Chapter 7: Conclusion and Recommendations This chapter integrates the findings from the literature review, case study, and interviews. The discussion focuses on how these findings address the research questions and contribute to the broader field of communication management. Practical recommendations for improving communication in multinational capital projects are provided, with a focus on digital tools, multimodal communication, and boundary objects. A model for integrating these elements into a cohesive communication strategy is proposed.

Chapter 8: Future Research Directions This chapter acknowledges the limitations of the research and suggests directions for future research. Potential areas for further exploration include the long-term impact of digital tools and multimodal communication on project performance, as well as the role of emerging technologies in enhancing communication in multinational projects.

Chapter 9: Conclusion This chapter summarizes the key findings and recommendations, reiterating their importance for improving communication in multinational capital projects. The report concludes with final remarks on the significance of effective communication for project success and the potential for future research to build on the findings of this study.

Part A

Part B

Part C
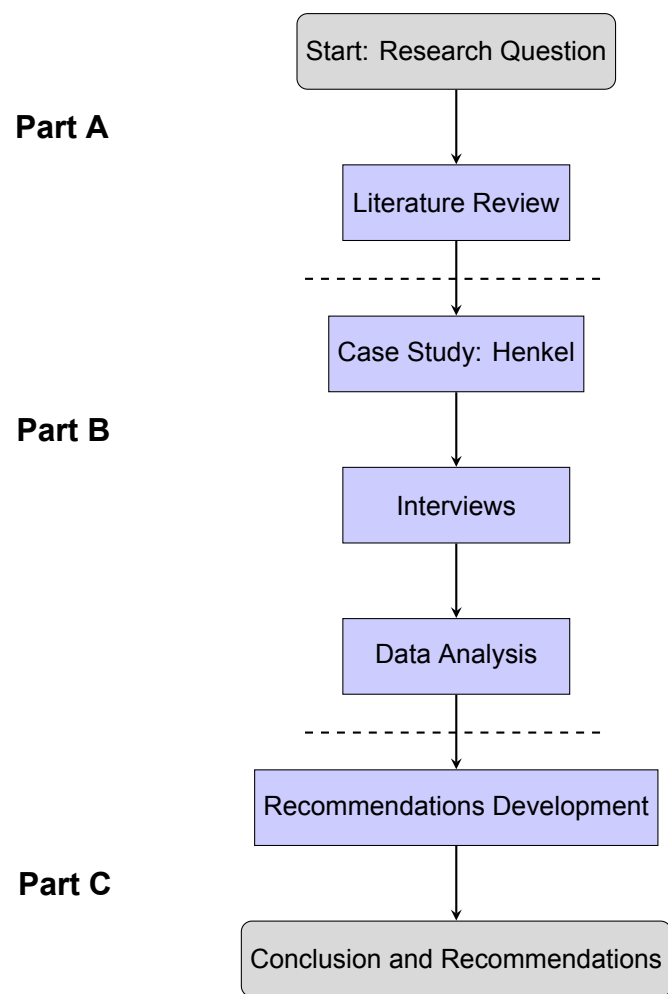
Figure 1.2: Research Methodology Flowchart

2

Research Design

2.1. Scientific and Practical Relevance

This research holds scientific relevance by contributing to the body of knowledge on project communication and collaboration in multinational construction and capital project environments. Although communication has been widely studied in project management, there is a gap in understanding how communication functions in complex, multicultural, and digitally interconnected project settings. By focusing on real project examples and combining concepts such as boundary objects, multimodal communication, and digital tool ecosystems, this research adds a new layer to existing communication theories in project management.

The practical relevance lies in the growing need for organizations involved in capital projects to adapt their communication strategies to increasingly global and technologically diverse environments. The findings of this study can assist project managers, engineers, and consultants in identifying communication bottlenecks and implementing more effective collaboration practices. This includes guidance on selecting and using digital tools more purposefully, aligning communication styles across cultural contexts, and using shared artifacts (e.g., templates, reports) to bridge communication gaps. As the industry continues to face challenges related to cost overruns, delays, and misalignments, the insights from this study can contribute directly to improving project performance.

2.2. Research Questions

Effective communication is a fundamental challenge in multinational capital projects, where collaboration must occur across cultural, linguistic, geographical, and disciplinary boundaries. In such environments, project participants rely increasingly on digital tools not only to exchange information but also to coordinate actions, build trust, and maintain alignment. However, despite the availability of advanced communication platforms, misunderstandings, inefficiencies, and delays still persist.

This research aims to explore the role of digital tools in shaping multimodal communication. To guide this investigation, the following main and sub-questions have been formulated:

Main Research Question:

"What strategies can improve the effective use of digital tools for communication in multinational capital projects?"

Sub-questions:

1. "What communication patterns and challenges are common in multinational capital projects?"

**2. "How do boundary objects and multimodal practices influence the
interpretation and use of digital tools?"**

**3. "What conditions help digital tools support clear, inclusive, and coordinated
communication across project teams?"**

These questions are designed to help uncover both the obstacles and the opportunities involved in communicating across borders and systems. They will guide the literature review, shape the interview design, and inform the analysis and discussion in later chapters. By answering them, this research aims to contribute practical recommendations for improving collaboration and communication in complex project environments.

The research is grounded in a case study of Henkel's Capital Project Management department, but the questions are framed to address broader patterns applicable to multinational capital project environments. Henkel is used as a representative setting in which communication challenges, especially those used by digital tools, can be explored in detail.

2.3. Research Scope

This research focuses on communication in multinational capital projects, with particular attention to the challenges and solutions that emerge in culturally and geographically diverse teams. These projects are often large-scale, complex, and involve a variety of stakeholders from different countries, disciplines, and organizational backgrounds. As such, clear and effective communication becomes a key factor in avoiding misunderstandings, delays, and budget overruns.

The study explores how digital tools (such as project management platforms, communication software, and document-sharing systems) and multimodal communication (including verbal, written, visual, and embodied forms) influence project collaboration and coordination. However, rather than examining communication technologies in isolation, the research takes a socio-technical perspective, acknowledging that communication practices are shaped not only by tools, but also by human elements such as:

• Cultural norms and expectations.

• Professional roles and hierarchies.

• Language differences and implicit meanings.

• Trust, engagement, and interpersonal dynamics.

This study does not aim to evaluate or compare specific software systems, nor does it focus purely on the technical design of communication platforms. Instead, the goal is to understand how tools are used in practice, how communication unfolds across multiple channels, and what kinds of boundary objects help teams build shared understanding in complex environments.

The scope is also limited to the perspectives of professionals who are actively involved in managing or participating in such projects. Their practical insights form the empirical basis of the research, rather than controlled experiments or large-scale quantitative surveys.

The geographic focus is broad, covering international collaboration, but the context remains within the domain of construction related capital projects. Insights may be transferable to other sectors with similar complexity, but the research does not attempt to generalize to all industries or organizational types.

Additionally, this study is based in the Capital Project Management department of Henkel, a global organization with diverse, geographically distributed teams. By focusing on one department within a single company, the research can provide insight into real-world communication dynamics. However, Henkel serves not as an isolated case, but as a model for broader trends affecting multinational capital projects. As such, the scope of the research includes both the internal dynamics at Henkel and the potential applicability of findings to similar departments or organizations operating in globally distributed, capital-intensive environments.

2.4. Methodology

This study adopts a qualitative case study approach, grounded in semi-structured interviews and thematic analysis. The methodology is designed to explore how digital tools influence communication in multinational capital projects, with a focus on the specific practices and dynamics within Henkel's Capital Project Management department.

2.4.1. Research Design

The study is designed as a multi-step qualitative inquiry, consisting of the following key components:

1. Literature Review to establish a theoretical foundation and identify knowledge gaps related to communication in multinational and capital-intensive projects.

2. Semi-Structured Interviews are conducted with industry professionals working in different cultural and organizational contexts to gather empirical insights.

3. Thematic Analysis to code and analyze the interviews systematically, identify patterns, and relate them to the literature.

4. Comparative Interpretation to connect the interview themes with existing research and highlight similarities, contradictions, or emerging trends.

Figure 2.1 below illustrates the step-by-step methodology flow.

Step 1: Literature Review
Identification of key themes and gaps

Step 2: Data Collection
Semi-structured interviews with international professionals

Step 3: Thematic Analysis
Coding and comparison of emerging themes

Step 4: Interpretation
Comparison with literature and synthesis of findings

Step 5: Conclusion & Recommendations
Summary of insights and practical suggestions

Figure 2.1: Methodology Process Flow

2.4.2. Research Approach

Given the exploratory nature of the research question, particularly its emphasis on perception, meaning, and interaction, a qualitative approach was most appropriate. As the goal was not to test a hypothesis but to uncover underlying patterns, tensions, and strategies. The case study method enables deep engagement with a single organizational context, allowing for rich, contextualized insights while still offering transferability to other similar project-based environments.

2.4.3. Case Selection: Henkel Capital Projects

Henkel was selected as the case company due to its global presence, complex capital project portfolio, and diversity in both team composition and tool usage. Within Henkel, the Capital Project Management

(CPM) department provides an ideal setting to explore digital communication practices across cultures, disciplines, and hierarchies.

This department coordinates projects involving various internal and external stakeholders, making it a model of broader multinational project communication dynamics. Furthermore, Henkel's ongoing efforts to digitize project processes made it a relevant and timely context for studying how digital tools mediate communication.

2.4.4. Data Collection: Semi-Structured Interviews

Primary data was collected through five semi-structured interviews conducted between in March 2025. Participants were selected through purposive sampling, based on their involvement in capital projects and their experience with digital collaboration tools. The sample was designed to reflect diverse roles, national backgrounds, and locations within the company.

Table 2.1: Overview of Interview Participants

Interviewee	Role	Region
INT-01	Capital Project Manager	Europe
INT-02	Sr Manager Engineering Design Expertise	IMEA
INT-03	Sr Manager Engineering Standards	Europe
INT-04	Capital Project Manager	IMEA
INT-05	Head of Capital Project Management	LA

Each interview lasted $\approx$ 45 minutes and was conducted via Microsoft Teams. The interviews were recorded (with consent), transcribed, and anonymized to preserve confidentiality. The semi-structured format allowed for flexibility, enabling the researcher to probe deeper into topics of interest while ensuring consistency across key themes.

The interview guide was structured around the theoretical model developed in Chapter 3. Topics included:

- The participant's role in capital projects and use of communication tools;
- Challenges experienced in project communication, particularly across cultural or hierarchical boundaries;
- Perceived effectiveness of digital tools and templates (e.g., Teams, SharePoint, templates);
- Interpretive issues with documents or platforms used in cross-functional teams;
- Views on trust, alignment, and shared understanding within digital communication settings.

2.4.5. Data Analysis: Thematic Coding

Interview transcripts were analyzed using a combined inductive-deductive thematic coding approach. The process began with open coding to surface patterns and categories grounded in participant experience. These early insights were then synthesized and refined in light of relevant theoretical concepts such as boundary objects, multimodality, and digital collaboration practices.

Three core themes emerged from the analysis, each reflecting a key factor influencing the effective use of digital tools can be found in Chapter 5: They also form the foundation of the revised communication model presented in Chapter 6, where findings are translated into practical strategies and visualized through an integrated model.

2.4.6. Limitations

As a single-case qualitative study, the findings are not statistically generalizable, but offer analytic generalizability. The diversity of participant roles and locations within Henkel supports the relevance of insights across similar organizational settings. However, findings should be interpreted within the context of Henkel's specific project workflows, toolsets, and internal dynamics.

2.4.7. Ethical Considerations

All participants were informed about the purpose of the study, their right to withdraw, and the confidentiality of their responses. Personal identifiers were removed to ensure anonymity. The research complies with TU Delft's ethical guidelines for master theses.

2.5. Data Management

To ensure that the research is grounded in reliable and up-to-date academic sources, a structured and systematic approach will be used for data collection and management. The process involves both literature review data and qualitative data from interviews, which are central to the study.

Literature Data Collection

Academic literature will be gathered through trusted databases and repositories, including: Scopus, Google Scholar, ResearchGate, ScienceDirect, TU Delft Library (online catalogue and journals access), TU Delft repository.

To guide the search process, a list of relevant keywords and combinations will be used, such as: *"communication challenges in capital projects", "digital tools in multinational construction projects", "multimodal communication in infrastructure projects", "boundary objects in project collaboration", "cultural barriers in global teams"*.

The search will focus on peer-reviewed journal articles, conference papers, and selected book chapters. Filters will be applied to prioritize: publications from the last 10 years, unless older works are considered foundational; articles with high citation counts or recognized relevance; papers that provide empirical evidence, theoretical insights, or case studies related to communication in complex project environments.

Interview Data Management

For the empirical part, semi-structured interviews will be conducted with professionals working in multinational capital projects. The interview recordings will be

- Transcribed manually.
- Stored securely on a password-protected TU Delft account, following university data privacy guidelines.
- Anonymized during transcription to protect participants' identities and ensure confidentiality.

All data handling will comply with ethical standards set by TU Delft and follow the requirements, ensuring responsible data usage and storage throughout the research process.

Part II

Part B

3

Literature Review

3.1. Introduction to Communication in Multinational Capital Projects

The critical role of communication extends beyond coordination, it directly impacts the "iron triangle" of project success: cost, time, and quality (Atkinson, 1999). Studies consistently link communication failures to budget overruns and delays. For example, Olawale and Sun (2010) found that misinterpretations of project goals due to poor communication led to incorrect executions, while Durdyev and Hosseini (2019) attributed 32% of rework costs to ambiguous technical specifications. Similarly, Wang and Yuan (2016) demonstrated that fragmented communication in safety protocols compromises quality, risking both worker safety and regulatory compliance.

Heubeck et al. (2024) further emphasize that the effectiveness of communication in global virtual teamwork is not solely determined by the number of digital tools used, but rather by how these tools support social capital. They argue that information and communication technologies (ICT) alone is insufficient for effective collaboration, highlighting that strong relational and structural networks within teams significantly enhance communication outcomes. This suggests that multinational project teams should not only focus on the selection of digital tools but also invest in fostering strong social capital to ensure effective collaboration (Heubeck et al., 2024).

Effective communication is a key of successful project management, particularly in multinational capital projects where teams are often distributed across different regions, cultures, and disciplines. The complexity of these projects, coupled with the need for seamless collaboration among diverse stakeholders, makes communication both a critical success factor and a significant challenge. This section explores the importance of communication in multinational capital projects, the challenges posed by cultural diversity and geographical distribution. Additionally, according to Lindhard and Larsen (2016) and illustrated in Figure 3.1, project performance is influenced by various factors, with project communication being one of them.

3.1.1. The Importance of Communication in Multinational Capital Projects

Communication is often described as the foundation of any system of human interaction, as it enables coordination, collaboration, and decision-making in complex environments (Adler, 1986; Hofstede, 1980). Without effective communication, misunderstandings arise, disrupting workflows and reducing efficiency (Ochieng & Price, 2009). In multinational capital projects, effective communication is essential for aligning tasks, sharing information, and ensuring that all stakeholders have a shared understanding of project goals and requirements. According to Axley (1984), communication can be viewed as a metaphorical pipeline through which information is transferred from one individual to another. However, in the context of multinational projects, this pipeline is often disrupted by cultural differences, geographical distance, and technological barriers.

The process of internationalization increases the cultural diversity of project teams, creating new managerial challenges, particularly in the area of intercultural communication (Loosemore & Muslmani, 1999). As Fisher (1988) and Deresky (1993) argue, culture represents shared values, understandings,
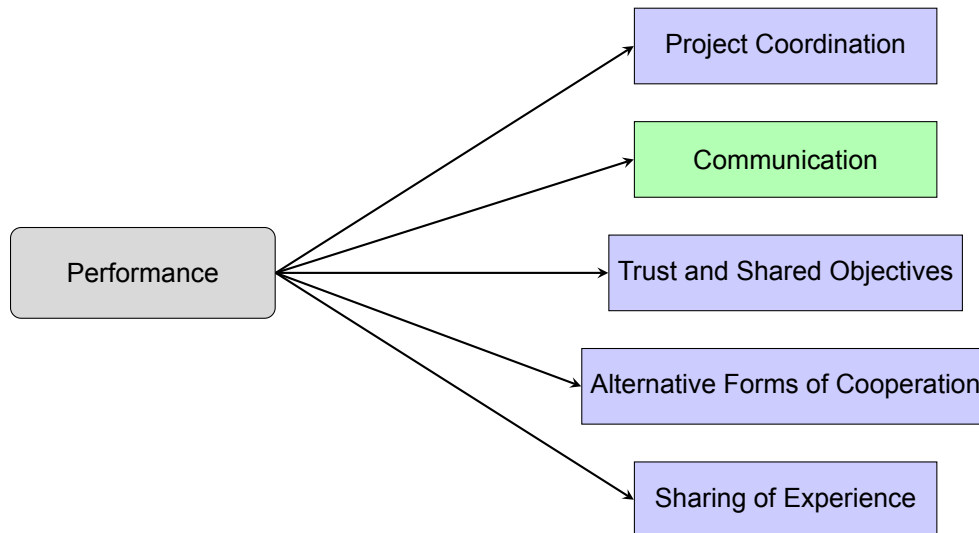
Figure 3.1: Impact of Performance on Key Factors (Lindhard & Larsen, 2016)

and assumptions that shape individuals' perceptions and behaviors. These cultural differences can lead to miscommunication, misunderstandings, and conflicts, which can ultimately jeopardize project success.

3.1.2. Challenges in Communication

Multinational capital projects face a unique set of communication challenges, many of which come from the cultural and geographical diversity of project teams. Ochieng and Price (2009) notes that project success is difficult to achieve even when teams are co-located, and the challenges are magnified in multicultural teams that are widely separated geographically. The loss of face-to-face communication, for example, can lead to misunderstandings and the loss of non-verbal signals such as eye contact and body language, which are critical for building trust and confidence (Emmitt & Gorse, 2006).

Cultural differences further complicate communication by influencing how individuals interpret messages and interact with one another. As Loosemore and Muslmani (1999) explain, the overlap of individuals' "perceptual fields" determines the degree of mutual understanding that can occur. In multicultural teams, these perceptual fields often diverge, leading to misalignment in expectations, goals, and communication styles. This can result in delays, budget overruns, and even project failures.

The findings of communication challenges: cultural, geographical, technological, and procedural are summarized in Table 3.1. Each challenge has specific implications for project coordination and success, highlighting the divirse nature of communication issues in global capital projects.

Challenge	Description	Impact
Cultural Differences	Misunderstandings due to varying cultural norms and communication styles.	Misalignment in expectations, goals, and tasks.
Geographical Distribution	Loss of face-to-face communication and non-verbal signals.	Difficulty in building trust and confidence.
Technological Barriers	Misinterpretation of digital representations and information overload.	Delays, errors, and inefficiencies in communication.
Coordination Issues	Difficulty in aligning tasks and objectives across distributed teams.	Delays, budget overruns, and project failures.

Table 3.1: Challenges in Multinational Capital Project Communication

Before conducting a detailed literature review, my understanding of communication in multinational capital projects was shaped by general professional insights, course discussions, and informal conversations with practitioners. At that stage, I assumed that the primary communication barriers in global projects were cultural, geographical, and linguistic, as often emphasized in project management materials and widely acknowledged industry challenges (Project Management Institute (PMI), 2013).

In this preliminary perspective, digital tools such as email, video conferencing, and project management software were seen as straightforward enablers: neutral instruments that could overcome spatial and cultural barriers, ensure transparency, and streamline collaboration. This interpretation aligns with common organizational narratives around digitalization, which often position technology as a key solution to communication and coordination issues in distributed teams (Lane et al., 2023)."

Based on these assumptions, I visualized an initial conceptual model (see Figure 3.2), which presents a linear and optimistic view of how digital tools enhance communication. In this model, communication challenges are seen as primarily external to tools, which serve as bridging solutions, ultimately leading to improved outcomes.
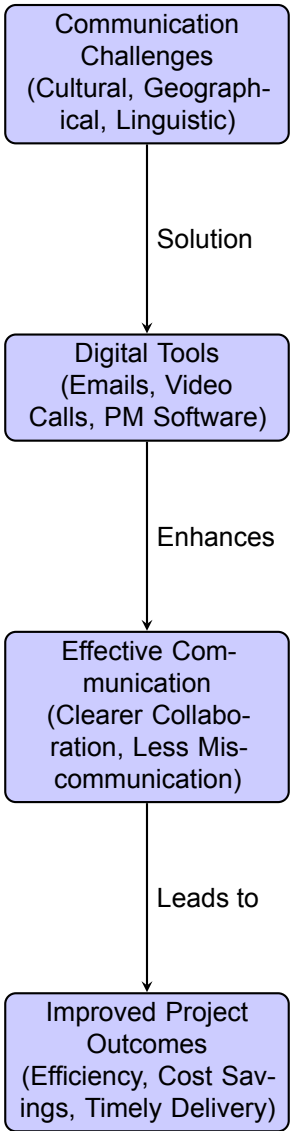
Figure 3.2: Initial Perception of Communication Flow in Multinational Capital Projects

However, as the research progressed and a deeper engagement with the literature developed, it became clear that communication is not a simple linear process, and that digital tools do not act in isolation.

Rather, communication is a socio-technical event influenced by shared meaning, interpretation, power dynamics, and team behavior, factors that are often shaped as much by people as by platforms. These insights are further discussed in Section 6.1 and are incorporated into the refined model presented in Figure 3.3.

3.2. Digital Tools in Communication

The rapid advancement of information and communication technology (ICT) has reshaped the way organizations operate, especially in the context of multinational capital projects. Digital tools have emerged as a crucial component for managing communication across diverse teams and geographical boundaries as organizations update their business strategies to stay competitive. Using digital communication platforms effectively becomes essential to clearly communicate project objectives and continuously refine them throughout the project lifecycle (Bakia et al., 2012; Mavroudi & Hadzilacos, 2013). These tools not only facilitate sharing project information at the project's outset but also enable all project stakeholders to engage in ongoing discussions and idea-sharing.

Digital tools are now indispensable for fostering communication in multinational capital projects, where teams are dispersed across various locations and cultural backgrounds. They offer real-time collaboration, structured information sharing, and improved decision making capabilities, thus mitigating the risks associated with miscommunication and project delays (Daramola et al., 2024). By integrating digital platforms into their workflow, organizations improve communication efficiency and optimize the overall project management process.

Heubeck et al. (2024) mention that the presence of multiple digital communication tools does not automatically translate into improved team performance. Their research highlights a compensatory effect between media richness and communication intensity, suggesting that teams should balance high-frequency, low-richness communication (e.g., email) with lower-frequency, high-richness communication (e.g., video conferencing) to optimize effectiveness. This perspective on digital tool usage is particularly relevant for multinational capital projects, where teams must navigate cultural and linguistic barriers while ensuring efficient project coordination.

Recent research by Papadonikolaki et al. (2025) reinforces the idea that digital transformation in projects is not merely about adopting new technologies, but about understanding that each tool serves a distinct purpose. For example, while collaboration platforms such as Microsoft Teams or SharePoint are effective for real-time communication and document sharing, data analytics tools like Tableau or Power BI provide decision-makers with actionable insights, and AI systems can automate routine tasks. This differentiated functionality means that successful digital transformation requires project managers to align each tool's specific strengths with the communication needs of the project. In other words, it is not enough to simply implement digital tools; organizations must also develop the skills and processes that enable these tools to be used in a way that truly enhances communication and overall project performance.

While digital tools have become essential for enabling communication in multinational capital projects, their success depends not only on their technical capabilities but on how they are used to address underlying challenges. These challenges are often rooted in deeper organizational and interpersonal dynamics, such as misinterpretation of shared documents, varying working styles, and the absence of trust across culturally diverse teams.

This section therefore shifts focus from viewing digital tools as stand-alone solutions to understanding their role as mediators. It explores how digital tools and structured templates can be strategically used to mitigate root causes of communication breakdowns, such as uncertainty or fragmented workflows. By analyzing how digital platforms interact with boundary objects and multimodal practices.

In doing so, the aim is not just to improve communication in a generic sense, but to see how digital tools can be leveraged to overcome systemic challenges that jeopardize communication in globally distributed project teams.

3.2.1. Role and Utilization of Digital Tools

Digital tools like collaborative platforms (e.g., SharePoint, Zoom) are increasingly adopted to address communication challenges. However, their effectiveness is mixed. While Hendriks (1999) argues that such tools reduce physical boundaries and accelerate decision-making, Afshari et al. (2010) highlights how incompatible software systems cause procurement errors, inflating costs. For instance, conflicting data between architects and contractors using different platforms can delay approvals by weeks (Cheung et al., 2013).

In multinational capital projects, digital tools support a broad spectrum of communication activities. They enable project teams to share technical details, progress reports, and strategic updates in formats tailored to different audiences. For example, while detailed technical data might be directly exchanged among specialized team members, summaries and dashboards are created for mid-level managers and executives to ensure alignment on overall project objectives. Siguencia et al. (2016) highlights the importance of adjusting communication content to match the recipient's background, ensuring that technical information is both accessible and meaningful. By providing a unified platform for these diverse forms of communication, digital tools help bridge the gap between teams operating under different cultural and professional frameworks, ultimately fostering a more coherent project environment.

3.2.2. Benefits of Digital Communication Tools

The integration of digital tools in project communication offers significant benefits. For one, these tools support the continuous flow of information, which is essential for maintaining project process from initiation through to completion (Afridi et al., 2023). Studies indicate that organizations employing digital communication practices are more likely to adhere to their schedules and budgets, as clear and consistent information exchange can reduce the likelihood of delays and misinterpretations (Shahriar & Habibul, 2024). In addition, by tailoring the delivery of information, whether through detailed technical updates or high-level summaries, digital platforms help ensure that every stakeholder is informed according to their specific needs (Putro, 2023). This targeted communication approach not only supports decision-making processes but also contributes to the overall quality and success of project outcomes.

3.2.3. Challenges in Using Digital Tools

Despite their benefits, digital tools also present challenges. One significant issue is information overload, where an excess of data can make it difficult to identify and focus on critical messages. Additionally, because digital communication often relies on standardized formats, technical terminology might be understood differently by team members from various cultural and professional backgrounds, which can lead to misinterpretations. Caganova et al. (2015) argue that without clear protocols and adequate training, the potential benefits of digital tools may be undermined by these challenges. Therefore, ensuring that users are well-equipped to manage and interpret the information provided by digital platforms is essential for achieving the desired improvements in communication efficiency.

3.3. Multimodality in Communication

Multimodality refers to the integration of various modes of communication such as verbal, visual, auditory, and embodied elements to create meaning (Kress, 2010). In multinational capital projects, relying only on written or spoken language can be insufficient due to the complexity of the information and the diversity of cultural and professional backgrounds among project participants. Collaborators engage through a variety of "modes", using semiotic resources such as talk, images, objects, notes, and gestures, which together create shared understandings that are not reducible to any single mode (Dameron et al., 2015). This chapter examines the theoretical foundations of multimodality, its application in multinational projects, and both its benefits and challenges.

3.3.1. Theoretical Foundations of Multimodality

The concept of multimodality is based on social semiotics, which looks at meaning-making is a process involving a range of communicative resources beyond language (Kress, 2010). Rather than treating modes as distinct and static categories, recent studies argue that modes are interacting and co-emerging layers of communication. For example, (Boxenbaum et al., 2018) and (Dille & Plotnikof, 2020) call for a "strong" multimodal view that sees modes as closely connected, rather than as isolated

channels. (Zilber, 2017) challenges the traditional divide between the social and material worlds, arguing that materiality itself is a communicative performance. This perspective aligns with (Orlikowski, 2007) sociomateriality and (Ashcraft et al., 2009) communicative constitutive theorizing, which suggest that even the physical form of an artifact (e.g., a diagram or blueprint) becomes a part of the meaning-making process. (Cooren, 2018) further emphasizes that materiality is not a given quality but a process of materialization, highlighting that a visual object may migrate into verbal descriptions or be embodied in gestures during interactions.

3.3.2. Applications in Multinational Capital Projects

In the context of multinational capital projects, multimodal communication is particularly valuable for bridging cultural and linguistic divides. Digital platforms often integrate text, images, and interactive graphics to convey complex project data. For instance, (Barberá-Tomás et al., 2019) demonstrated how the combination of written text and graphical representations could jointly produce emotional meanings, an approach that can be adapted to convey the urgency or status of a project. Similarly, (Höllerer et al., 2018) showed that pictures can extend and enrich what is verbally communicated during critical discussions, such as those about financial challenges. (Paroutis et al., 2015) examined how managers used both visual and verbal channels when interacting with strategic tools during workshops, leading to a collective understanding of complex issues. These examples illustrate that multimodal approaches allow different stakeholders, whether technical staff or project managers to engage with the same information in ways that suit their background and needs.

3.3.3. Benefits and Challenges of Multimodal Communication

The use of multimodal communication offers several benefits. It improves clarity by providing repetitive methods for sharing information; if a message is misunderstood in one mode, another mode (such as an image or gesture) can reinforce or clarify the intended meaning (Streeck et al., 2011). Multimodality also increases engagement by appealing to different sensory and cognitive preferences among team members (Kress, 2010). However, this complexity comes with challenges. Research indicates that many studies have historically treated modes as distinct entities, neglecting the dynamic interplay between them (Knight & Wenzel, 2022). For example, visual and verbal elements are often considered separately, even though a picture can be referenced in talk or even embodied through gestures (Vásquez et al., 2015). Moreover, (Dameron et al., 2015) and (Wenzel & Koch, 2017) note that research on multimodality has frequently overlooked the role of the body the embodied aspect of communication which is essential for creating shared understanding.

3.4. Concept of Boundary Objects

Boundary objects are important artifacts in bridging communication gaps between diverse stakeholders in complex projects. Originating from sociology and education research, they serve as shared references that enable collaboration across organizational, disciplinary, or cultural divides. However, their role is not universally beneficial; when poorly designed or misapplied, boundary objects can exacerbate misunderstandings and fragment collaboration. This chapter explores the theoretical foundations of boundary objects, their types, and their dual role in communication.

3.4.1. Theoretical Foundations of Boundary Objects

The concept of boundary objects was first introduced by (Star & Griesemer, 1989) during their study of collaboration in a natural history museum. They observed that actors from different domains, scientists, funders, and collectors, relied on shared artifacts like species lists and specimen records to coordinate efforts despite divergent goals. These artifacts, termed boundary objects, were defined as:

> "Boundary objects are objects which are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites.." (Star & Griesemer, 1989)

Boundary objects work well at the meeting point of specialization and fragmentation (Akkerman & Bakker, 2011).

Boundary objects are defined by several key characteristics. First, they exist at the interface between

different groups or disciplines and satisfy the informational needs of each group, even if each party only partially understands how the object is used by the other (Star & Griesemer, 1989). For example, in engineering projects, an assembly drawing might provide critical tolerances and specifications for one specialist while offering a three-dimensional perspective on assembly issues for another (Carlile, 2002). Such artifacts can serve as repositories of shared knowledge, facilitating the transfer of technical details across organizational and disciplinary divides.

Beyond just bridging gaps, boundary objects also perform important functions in the creation and negotiation of shared meaning. They help translate complex, context-specific information into formats that are accessible to multiple audiences (Akkerman & Bakker, 2011; Bechky, 2003). However, this process is not always smooth. When boundary objects are poorly designed or inadequately maintained, they risk constraining rather than enabling communication. (Oswick & Robertson, 2009) even describe situations in which boundary objects become "barricades and mazes" that hinder collaborative understanding.

Analyzing boundary objects requires an understanding of the types of boundaries they span. (Carlile, 2002) identifies three types:

- **Syntactic Boundaries:**
  - At this level, communication fails because there is no shared language or common syntax.
  - Effective boundary objects help establish a stable linguistic framework, ensuring that all parties can process information uniformly.
- **Semantic Boundaries:**
  - Even with a shared syntax, differing interpretations of the same terms can lead to miscommunication.
  - Boundary objects at semantic boundaries must enable the creation of mutual understanding by clearly translating and contextualizing information.
- **Pragmatic Boundaries:**
  - These occur when knowledge is context-specific and tailored to particular problem-solving needs.
  - Here, boundary objects are expected to facilitate the transformation of specialized knowledge so that it can be jointly understood and applied by different groups.

Each of these boundaries requires that the boundary object provide distinct functionalities whether by establishing a common language (transfer), enabling explicit discussion of differences (translation), or supporting collaborative adaptation of knowledge (transformation). When effectively managed, these processes support the creation of shared reference bases essential for productive collaboration (Bechky, 2003; Caccamo, 2020).

Dynamic Nature and Dual Role of Boundary Objects
A critical insight from recent literature is that boundary objects are not static; their utility and form can change over time. Some studies have emphasized that boundary objects can "shape-shift" across different contexts (Star & Griesemer, 1989). For instance, an artifact might appear as a stable diagram in one meeting but then be reinterpreted through verbal discussion or even embodied gestures in another (Ewenstein & Whyte, 2009; Knight & Wenzel, 2022). While it allows boundary objects to adapt to local needs and support ongoing communication, it also opens the possibility that, if these shifts are not managed properly, the object may contribute to misunderstandings by presenting different "faces" to different groups (Leonardi et al., 2019). Thus, while boundary objects can bridge communication gaps, they also have the potential to exacerbate them when their dynamic transformations are not aligned with the needs of all collaborating parties.

3.4.2. Implications for Multinational Capital Projects
In multinational capital projects, boundary objects are especially valuable due to the high degree of specialization and the diverse backgrounds of stakeholders. They provide a shared reference that

facilitates coordination, but they require careful management to ensure that their dynamic nature does not lead to misalignment. Optimizing boundary objects involves establishing clear protocols for their creation, use, and continuous adaptation. This might include regular training sessions, standardized documentation practices, and feedback mechanisms that help ensure that the artifact remains a true bridge rather than a barrier. Such measures are essential to leverage the full potential of boundary objects to improve collaboration and achieve better project outcomes.

3.4.3. Conclusion

Boundary objects represent a conceptual tool for understanding and managing the transfer of knowledge across diverse domains in multinational capital projects. Their ability to adapt to local needs while maintaining a common identity makes them indispensable for collaborative work. However, their dynamic nature means they can also exacerbate communication challenges if not properly managed. Recognizing the various boundaries syntactic, semantic, and pragmatic that they must span, and developing strategies to optimize their function, is critical for ensuring that boundary objects serve as effective bridges rather than barriers.

3.5. Communication Barriers in Multinational Projects

3.5.1. Introduction

Effective communication is widely recognized as a key factor in the success of multinational capital projects. As discussed in Chapter 3.1, clear communication facilitates coordination, builds trust, and ultimately influences project performance (Lindhard & Larsen, 2016). However, the very diversity that enriches these projects, spanning cultural, linguistic, geographical, and technological differences, also gives rise to significant communication barriers. This chapter examines these barriers, discusses their impacts on project outcomes, and briefly outlines strategies proposed in the literature to mitigate them.

3.5.2. Cultural and Language Barriers

One of the most critical challenges in multinational projects is the diversity of cultural and linguistic backgrounds. Cultural differences influence communication styles, expectations, and interpretations. For instance, what is considered a direct and efficient communication style in one culture might be perceived as aggressive or rude in another (Deresky, 1993; Fisher, 1988). Loosemore and Muslmani (1999) demonstrate that multicultural teams often struggle to develop shared communication norms, resulting in misinterpretations and misaligned expectations. Furthermore, even when a common language is used, varying degrees of language proficiency and different idiomatic expressions can lead to inaccuracies in the conveyed message. These challenges can create significant obstacles in ensuring that all stakeholders have a shared understanding of project objectives.

3.5.3. Geographical and Technological Challenges

Multinational capital projects typically span large geographical areas, which introduces its own set of barriers. As highlighted by Ochieng and Price (2009), teams separated by considerable distances and time zones face delays in response times and reduced opportunities for face-to-face interactions. The loss of non-verbal cues, such as eye contact, body language, and tone of voice can further make impact on trust and delay effective collaboration (Emmitt & Gorse, 2006). In addition, while digital tools have been introduced to mitigate some of these challenges, their uneven adoption and varying levels of technological proficiency among team members can result in fragmented or inconsistent communication (Daramola et al., 2024).

3.5.4. Impact on Project Performance

The combined effect of cultural, geographical, and technological barriers can be profound. Miscommunication and misunderstanding not only delay project timelines but also contribute to budget overruns and reduced project quality. Studies in the construction industry have shown that communication inefficiencies are directly linked to increased project costs and time delays (Durdyev, 2020; Gamil et al., 2019). When project teams are unable to align on critical issues due to these barriers, decision-making becomes less effective, and the overall coordination of complex tasks is compromised. This, in turn, has a negative impact on the achievement of project milestones and the realization of expected

outcomes.

3.5.5. Strategies for Mitigating Communication Barriers

Although the challenges are significant, the literature also suggests several strategies to overcome these barriers. Enhancing intercultural competence through targeted training programs can help team members develop a better understanding of different communication styles and cultural norms (Loosemore & Muslmani, 1999). Additionally, establishing a shared language or common format is essential; as Axley (1984) noted, conceptualizing communication as a pipeline requires that all parties interpret messages similarly. Digital tools, when used effectively, can provide platforms for multimodal communication, combining text, visuals, and even gestures to reinforce understanding and mitigate the loss of non-verbal cues (Dameron et al., 2015; Kress, 2010).

Finally, the use of boundary objects (see Section 3.4) can serve as common reference points, enabling diverse stakeholders to coordinate despite their differences (Akkerman & Bakker, 2011; Star & Griesemer, 1989). However, if boundary objects themselves are identified as contributing to communication failures due to, for example, poor design or mismanagement; it may be more beneficial to improve and refine these artifacts so that they more effectively bridge gaps between stakeholders. Integrating these strategies into a comprehensive communication model can help multinational projects reduce misunderstandings and improve overall performance.

3.5.6. Conclusion

Communication barriers in multinational capital projects come from the complex interplay of cultural, linguistic, geographical, and technological factors. As evidenced by research from Fisher (1988), Deresky (1993), Loosemore and Muslmani (1999), and others, these barriers can severely impact project performance by causing misalignments and delays. However, by employing targeted training, leveraging digital tools for multimodal communication, and utilizing or improving boundary objects as shared reference points, organizations can mitigate these challenges. A clear understanding and strategic approach to overcoming these barriers are crucial for ensuring that the benefits of effective communication as highlighted in the literature review (see Figure 3.1) are fully realized in multinational capital projects.

3.6. Summary

The literature review explores the role of communication in multinational capital projects, emphasizing its impact on project success and the challenges that arise due to cultural, linguistic, and technological differences. Poor communication often leads to cost overruns, delays, and inefficiencies, making it an important factor in project management. Research highlights that effective communication is not just about information transfer but also about fostering mutual understanding and collaboration among stakeholders.

Digital tools have become essential in managing communication across geographically dispersed teams. While video conferencing, instant messaging, and project management platforms enhance information flow, their effectiveness depends on how they are integrated into project workflows. Studies suggest that using a combination of high-frequency, low-richness communication (such as emails) and low-frequency, high-richness communication (such as video meetings) leads to better collaboration and decision-making. However, an overreliance on digital tools without a structured communication approach can create misunderstandings and depersonalized interactions.

Another key aspect of effective communication is the use of boundary objects, such as shared templates, models, and standardized reports. These objects act as reference points that help align diverse stakeholders and facilitate knowledge transfer. However, their success depends on proper design and implementation. If not well-structured, boundary objects can contribute to further misunderstandings rather than resolving them. Research highlights the importance of embedding these tools within a strong social capital framework, where trust, shared norms, and collaborative networks enhance their effectiveness.

Overall, the literature highlights that improving communication in multinational capital projects requires a strategic combination of digital tools, multimodal communication. Addressing communication barriers

proactively can lead to better collaboration and improved project outcomes.

The Figure 3.3 is a visual representation of the integrated communication flowchart for multinational capital projects. It illustrates how various elements ranging from communication challenges to the eventual improvement of project outcomes are interconnected through the use of digital tools, multimodal communication, and boundary objects.

This section helps answer Sub-question 1 by identifying typical communication patterns in multinational capital projects, including fragmentation, differing expectations, and coordination difficulties. These insights form the foundation for exploring how communication is managed in later chapters.
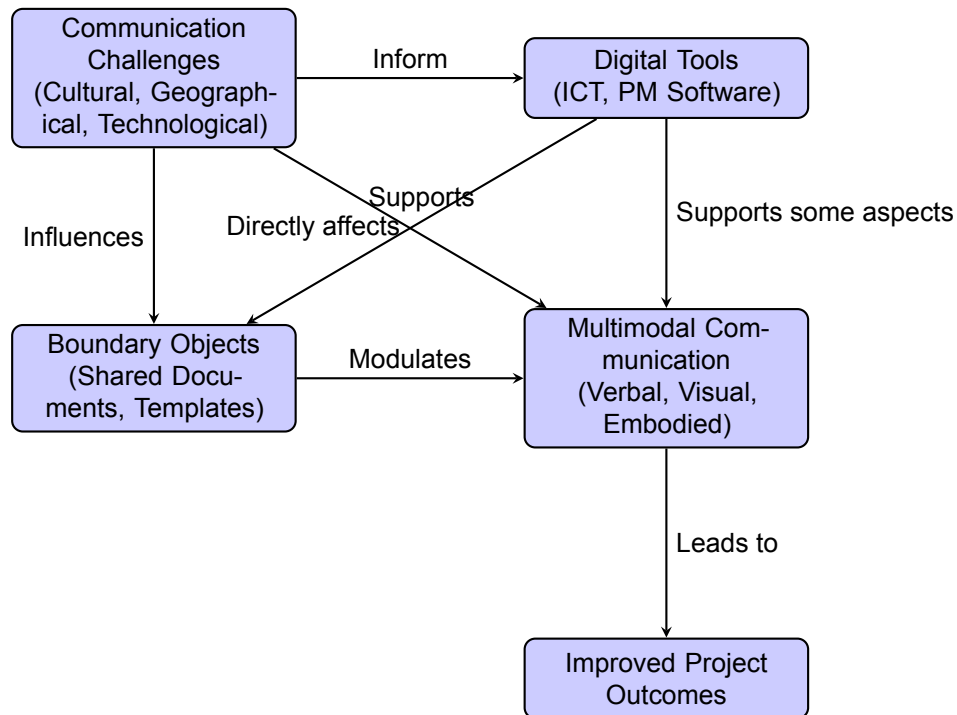
Figure 3.3: Integrated Communication Flowchart

4

Case Study: Henkel's Capital Project Management Department

4.1. Introduction to Henkel

Henkel is a global leader in the adhesives industry, with a rich heritage dating back to its founding in 1876 in Düsseldorf, Germany. Over the decades, Henkel has expanded its portfolio to include not only innovative adhesives, sealants, and functional coatings but also other business units such as Laundry & Home Care and Beauty Care. The Adhesive Technologies division, in particular, has positioned Henkel as a pioneer in the development of advanced bonding solutions that serve a wide range of industries, from automotive and electronics to construction and packaging (Henkel, 2025).

Within the Capital Project Management Department, Henkel integrates digital communication platforms, multimodal interaction methods.

By examining Henkel's operational model through its Capital Project Management Department, this case study aims to see how the company operates in multinational capital projects.

4.2. Role and Responsibilities of Capital Project Management (CPM)

The CPM department is responsible for overseeing and supporting large-scale capital investment projects, typically exceeding one million euros. These projects span across geographies and business units, and often involve upgrades to manufacturing facilities, installation of new technologies, or expansion into new markets.

Key responsibilities include:

- Project Governance: CPM ensures alignment with global standards and methodologies for capital project execution, including stage-gate reviews and investment approval processes.
- Technical Oversight: The department provides subject matter expertise (SMEs) from areas such as Process Engineering, Safety Health & Environment (SHE), and the Global Technology Network (GTN).
- Stakeholder Coordination: CPM coordinates between global and regional teams, ensuring that business, technical, and financial stakeholders are aligned throughout project lifecycles.
- Risk Management and Assurance: Through structured gate reviews, the department evaluates project readiness and highlights areas needing improvement to reduce execution risks.

4.3. The Capital Project Lifecycle

The successful execution of large-scale investment projects requires a well-structured and consistent approach. At Henkel, capital projects are managed using a phased development model that ensures

critical project elements are thoroughly assessed before moving forward (see Figure 4.1). This structured model is commonly referred to as a front-end planning methodology, in which each phase builds on the previous one to reduce uncertainty, align with business objectives, and manage investment risks.

A central component of this lifecycle is the emphasis on early design and scope definition. During the conceptual and basic design stages, teams work collaboratively to develop a clear project scope, define technical requirements, outline cost estimates, and evaluate timeline feasibility. These stages culminate in a formal project evaluation milestone, often referred to as a technical review checkpoint.

At this point, a structured assessment is carried out by a cross-functional review team. The purpose of this evaluation is to examine the maturity of the project's planning documents, identify risks and opportunities, and assess whether the proposed design meets the necessary criteria for investment readiness. Specific areas of focus include the clarity of objectives, consistency of the design package, safety and compliance considerations, and the accuracy of cost and schedule forecasts.

This milestone plays an important role in safeguarding the organization's investments. By enforcing disciplined planning and integrating expert knowledge at key decision points, Henkel ensures that projects entering the execution phase are both technically sound and strategically justified. This forward-looking approach promotes resource efficiency and helps avoid costly rework later in the lifecycle.
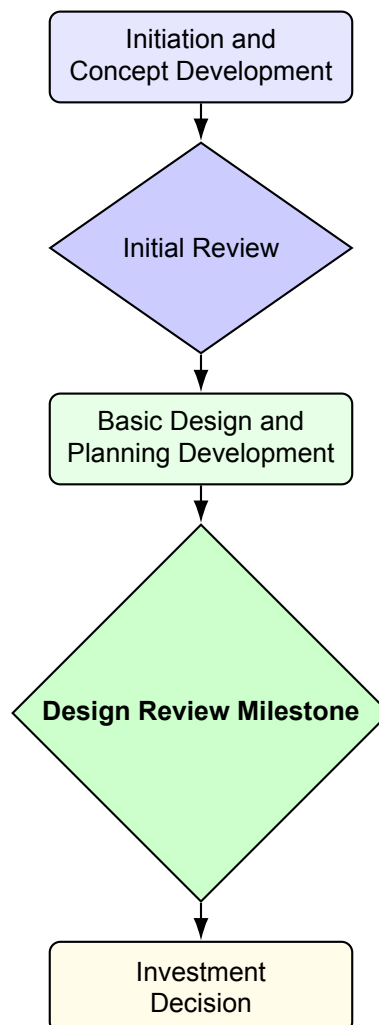
Figure 4.1: Capital Project Development Lifecycle with Key Review Milestones

4.4. Collaborative and Structured Evaluation Process

To ensure the reliability and quality of capital project planning, Henkel employs a highly collaborative and structured project evaluation process. This process is designed not only to validate technical aspects of the project, but also to enhance cross-functional alignment and leverage global expertise.

Prior to the formal review, project teams prepare a comprehensive set of documents that includes technical design specifications, financial models, risk assessments, project timelines, and safety evaluations. These documents are shared in advance with reviewers, allowing for detailed pre-evaluation by experienced professionals from relevant disciplines such as process engineering, safety and environmental management, and financial planning.

The evaluation session itself is conducted in a workshop format. During this meeting, the review team engages with the project team to clarify assumptions, explore uncertainties, and assess the robustness of the proposed plans. Rather than serving as a gatekeeping exercise, the session is framed as a constructive dialogue, where diverse perspectives are invited to strengthen the project proposal.

This process creates a space for learning, improvement, and cross-regional knowledge sharing. Any identified concerns or gaps are translated into actionable recommendations. The project team is then tasked with implementing these improvements and updating the project documentation accordingly.

Following the evaluation, a formal summary report is issued. This report captures the key insights, documents outstanding actions, and provides a general assessment of the project's readiness for advancement.

4.5. Communication Practices at Henkel

Communication within Henkel's Capital Project Management (CPM) team is shaped by the realities of working across multiple time zones, cultural contexts, and professional disciplines. As a globally distributed organization, Henkel's capital projects involve stakeholders located in regions such as Europe, Asia, South America, and the Middle East. To maintain continuity and coherence, team members rely heavily on digital platforms to support collaboration.

Microsoft Teams serves as the primary environment for daily interaction. It supports a range of functions including instant messaging, video conferencing, and collaborative editing of documents. In parallel, **SharePoint** is used as the main repository for documentation, where project files, reports, templates, and review feedback are versioned, archived, and accessed globally. These tools form the backbone of the digital communication ecosystem and enable work to proceed despite geographical dispersion.

In practice, this setup offers clear advantages. Teams allows for rapid coordination and easy scheduling of project meetings, while SharePoint ensures that all collaborators have access to the latest versions of project documents. Both tools promote transparency and support traceability, critical features in capital project environments where decisions must be well-documented and auditable.

However, these tools also introduce new challenges that are central to the themes of this thesis. One of the core issues is that digital tools, while enabling communication, do not automatically ensure understanding. Miscommunication frequently arises not because information is unavailable, but because its meaning is interpreted differently across functions and cultures. For example, project templates or technical drawings stored on SharePoint may be perceived differently by an engineer and a project manager, even if both parties access the same document. This highlights a core limitation in digital collaboration: the absence of shared contextual interpretation.

Moreover, the increased reliance on digital platforms sometimes results in information overload or fragmented communication streams. Multiple concurrent conversations in Teams, combined with overlapping documentation trails in SharePoint, can create confusion about which version of a file or decision thread is current. When decisions are not clearly documented or when follow-up discussions occur outside of official channels, this can lead to discrepancies and misunderstandings, particularly in high-stakes review stages.

The lack of non-verbal cues in written communication further complicates collaboration. In face-to-face settings, much of the nuance in interpretation is guided by body language, tone, and immediate clarification. In virtual environments, especially when messages are brief or ambiguous, these cues
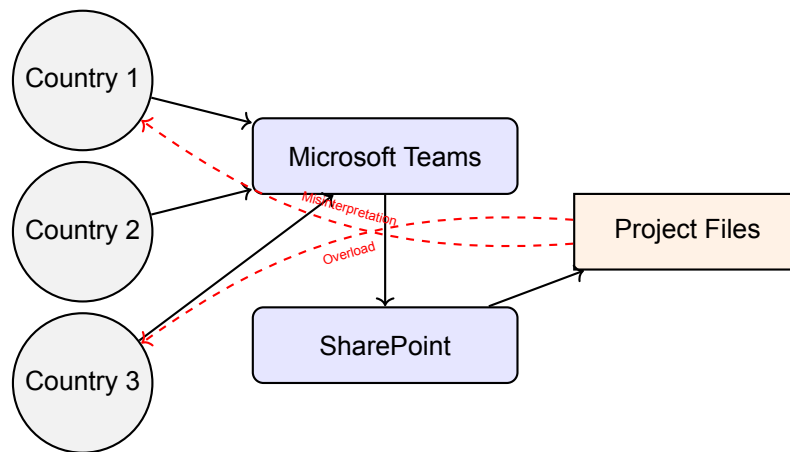
Figure 4.2: Simplified flow of digital communication and documentation within Henkel's project teams

are absent. As a result, trust and alignment, two vital elements in successful project execution, must be built and maintained through written clarity, regular updates, and structured routines.

Despite these challenges, Henkel has taken steps to mitigate potential communication breakdowns. Standardized templates, recurring cross-functional meetings, and clear document protocols are designed to reduce ambiguity. Still, digital tools must be understood not only as enablers of communication but also as potential contributors to misalignment if their use is not actively managed and culturally contextualized.

Figure 4.2 illustrates a simplified representation of how digital communication flows across multinational project teams within Henkel. Team members located in different countries interact primarily through Microsoft Teams and SharePoint, enabling access to shared project documentation and coordination of ongoing tasks. These platforms serve as a central part of the company's digital infrastructure, supporting remote collaboration, document control, and traceability.

However, the figure also visualizes the potential risks embedded in this flow: while digital tools consolidate information, they do not guarantee shared understanding. Issues like misinterpretation and information overload can still emerge when project files functioning as **boundary objects** are interpreted differently by actors from diverse cultural or functional backgrounds. These documents are accessed through technological channels, but their meaning is shaped by **how** people engage with them: verbally, visually, or through written formats, making multimodal communication and social context central to their effectiveness.

Rather than viewing technology as a standalone solution, this figure shows that effective collaboration depends on the interaction between digital tools and human interpretation. As such, the figure serves as a foundation toward more detailed model (e.g., Figure 6.1) that incorporate the influence of boundary objects and multimodal practices as enablers of improved project communication.

In summary, Henkel's communication setup reflects a mature and integrated use of digital platforms, but also highlights the need for continuous attention to social and contextual factors. This reinforces a key insight of the thesis: digital tools are effective only when they are embedded within culturally sensitive communication practices and supported by shared interpretation of boundary objects. Understanding this interplay is essential for achieving alignment and ultimately, successful collaboration in multinational capital projects.

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Empirical Findings and Analysis

5.1. Introduction

This chapter presents the empirical findings of the study, drawn from interviews conducted with members of Henkel's Capital Projects department. While the initial analytical focus was on digital tools, the interviews revealed that communication practices in multinational project environments are shaped by the interaction of several key elements: digital platforms, boundary objects, multimodal representations, and the social conditions under which these are interpreted.

Rather than analyzing each concept in isolation, this chapter adopts an integrated approach. The findings are presented, highlighting how communication is shown through a dynamic relationship between tools, formats, and people. In particular, the analysis explores how meaning is constructed across different roles and cultures, and how misalignments arise due to both technical and non-technical factors.

Building on the theoretical understanding from Chapter 3, this chapter explores how these communication dynamics are experienced in practice, further addressing Sub-question 1.

5.1.1. Interview Participants

To understand communication practices within Henkel's Capital Projects department, five semi-structured interviews were conducted with professionals representing different roles, levels of experience, and geographic regions. The participants were purposefully selected to ensure diverse perspectives from engineering, project management, and capital planning. Table 5.1 summarizes key information about the interviewees.

Code	Role	Date	Region	Key Themes
INT-01	Capital Project Manager	10-03-2025	Europe	Hierarchical influence, formalized communication, language barriers
INT-02	Sr Manager Engineering Design Expertise	11-03-2025	IMEA	Digital tool adaptation, structured reporting, hierarchy challenges
INT-03	Sr Manager Engineering Standards	13-03-2025	Europe	Direct communication, avoiding ambiguity, digital tool efficiency
INT-04	Capital Project Manager	17-03-2025	IMEA	Over-communication, stakeholder alignment, digital vs. face-to-face
INT-05	Capital Project Manager	17-03-2025	LA	Relationship-driven communication, cultural adaptation, behavioral skills

Table 5.1: Overview of Interview Participants and Key Themes

5.1.2. Method of Thematic Analysis

The interview transcripts were reviewed line-by-line to identify recurring patterns (see Table 5.2) related to communication in multinational capital projects. An inductive approach was used, meaning that the themes were derived from the data itself, without applying a predefined coding structure.

As interviews were read and compared, recurring ideas were grouped under three thematic clusters:

- Interpretive diversity around shared project documents;
- Fragmentation and inconsistency in digital tool usage and setup;
- Influence of culture, hierarchy, and interpersonal dynamics on communication flow.

This thematic structure forms the basis for the subsections that follow in this chapter.

Theme	Summary Description
Interpreting Boundary Objects	Shared templates and documents are interpreted differently based on professional background, leading to misalignment.
Tool Fragmentation and Setup	Use of multiple overlapping platforms (Teams, SharePoint, Email) introduces inefficiencies and confusion.
Communication Culture	Communication norms and comfort with tools differ based on cultural and hierarchical contexts.

Table 5.2: Overview of Themes Derived from Thematic Analysis

Summary of Theme Prevalence

To illustrate how the identified themes emerged from the interviews, the chart below (see Figure 5.1) shows the relative emphasis placed on each theme across the five participants. While this is not a formal coding count, it reflects how consistently each topic appeared during the interviews. All participants touched upon each of the three themes, though with varying depth and examples.
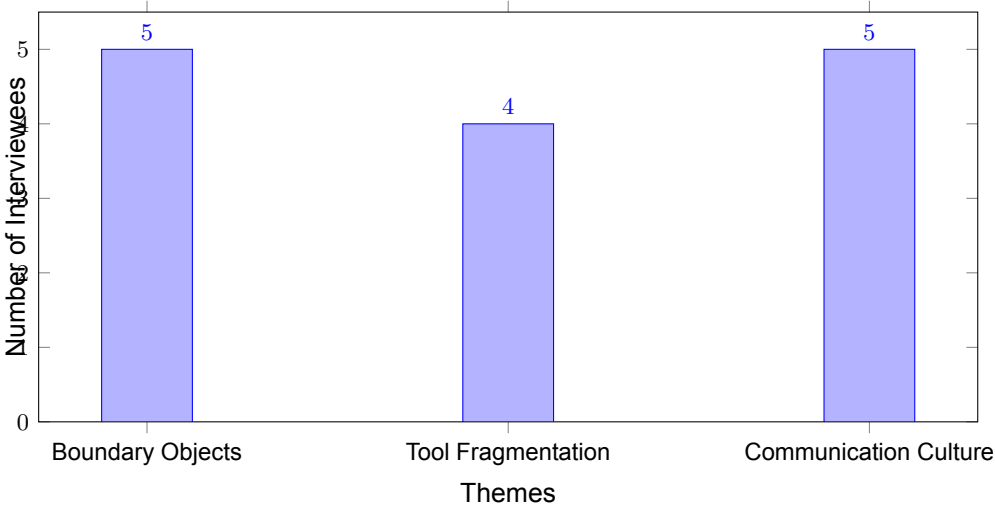
Figure 5.1: Theme Emphasis Across Interview Participants

5.2. The Communication Context at Henkel

Henkel's Capital Projects department operates globally, with teams located across Europe, Asia, South America, and other regions. Projects involve cross-functional collaboration among engineers, planners, contractors, and external stakeholders. Communication takes place largely through digital platforms, such as Microsoft Teams, SharePoint, and email, and is mediated by standardized templates, dashboards, and procedural documents. These serve as boundary objects intended to bridge differences in geography, language, and professional background.

However, interviews revealed that these platforms and artifacts often function differently in practice than intended. Rather than always creating alignment, they sometimes reproduce uncertainty, delay, or disengagement. The following sections explore three relational themes that emerged from the interview data.

Theme 1: Interpreting Boundary Objects in Multimodal Environments

The literature generally presents boundary objects as useful for enabling coordination between diverse groups by providing a "common language" (Star & Griesemer, 1989). However, the interview data from this study complicates this view. Rather than serving as static bridges, boundary objects at Henkel often required active interpretation and negotiation, especially when delivered in multimodal formats (visual, written, verbal) without contextual guidance or synchronous discussion.

Participants described frequent challenges in interpreting shared project documents. Templates, schedules, and dashboards were standardized and accessible, but the way they were understood varied significantly. This variation was not only technical but also multimodal: visual layouts, written instructions, and verbal clarifications were often interpreted differently depending on professional role, language proficiency, and regional expectations. Several interviewees described cases in which assumptions about project status or task ownership were based on incomplete or misunderstood information in dashboards or reports.

One manager explained how assumptions can silently diverge:

> "In one project, the delivery date for critical equipment was understood differently by the supplier and the construction team because the information in the documents was not clear." (INT-02)

This example illustrates the risk inherent in relying on the perceived neutrality of shared documents. What the literature calls the "interpretive flexibility" of boundary objects (Pinch & Bijker, 1984) can become a source of misalignment if teams do not co-construct meaning. At Henkel, this risk was heightened in international teams where language and hierarchy limited open clarification.

Another engineer reflected that what is visible on SharePoint is often treated as final by some colleagues:

> "Some engineers see the report as final just because it's in SharePoint, while others think it's a draft unless it's discussed in a call." (INT-03)

Many participants expressed confusion about this, noting that teams sometimes avoid questioning a document's status out of politeness or hierarchical caution. In meetings, "nodding agreement" was not always a sign of understanding, sometimes it was a gesture to avoid confrontation. Thus, boundary objects became embedded not just in technology but in interpersonal dynamics.

This also challenges the common assumption in literature that standardized artifacts bring alignment. Participants described dashboards that looked visually complete but were missing clarifying context or relied on outdated assumptions. For example, one manager described the weekly status dashboard as "something that's always there, but everyone reads differently." Without reinforcing meetings or explicit framing, the object did not guarantee shared understanding.

Multimodal elements further shaped these misinterpretations. Some stakeholders preferred reviewing documents at their own pace, while others expected live walkthroughs. One interviewee explained that "visuals are fine, but if no one explains what changed, the risk is that people assume nothing changed." (INT-05). This inconsistency in modality led to mismatched follow-up actions, especially when visual indicators (e.g., color coding, charts) lacked explanatory notes or verbal commentary.

Another respondent reinforced the importance of closing this interpretation gap:

> "I often ask my project team 'What did you understand we're supposed to deliver?' and when they verbalize it, I can test if that's aligned with the project objectives." (INT-01)

This quote reflects a recurring strategy: validating understanding not through the tool, but through human conversation. While the dashboard might display the information, the meaning must be checked interactively.

Finally, some interviewees pointed out that even small layout differences or unclear headings in templates can generate confusion across geographies.As one interviewee described needing to "re-explain the same dashboard slide" in every call because "people interpret it their own way first." (INT-02)

This theme shows that boundary objects do not automatically make things clearer. Their effectiveness depends on mutual interpretation, contextual explanation, and clarity about their status and purpose.

*This section contributes directly to answering **Sub-question 2**, by showing how boundary objects and multimodal communication practices influence the interpretation and use of digital tools. While these tools make documents widely accessible, they do not eliminate ambiguity unless meaning is co-constructed across roles and contexts. This challenges simplistic views of digital platforms as neutral conveyors of shared understanding.*

Theme 2: Tool Setup and Its Fragmentation

Digital technologies, including collaboration platforms, are seen as enablers of improved communication, coordination, and information management in increasingly complex project environments. These technologies can support project organizing and help address growing uncertainty and coordination challenges (Papadonikolaki et al., 2025). However, the empirical findings from Henkel suggest a more nuanced picture: rather than simplifying communication, digital tools often fragmented it when they were not implemented with consistent logic, shared norms, or defined governance.

Interviewees highlighted that tools such as Microsoft Teams, SharePoint, and email were all used regularly, but their purposes were not uniformly understood. Teams served for immediate discussions and video calls, SharePoint for document storage, and email for formal updates. However, the boundaries between them were frequently blurred. Some participants used Teams chats for critical updates, while others preferred to send official communication by email, leading to misunderstandings about which channels held authoritative information.

> "There's this ordered style of communication… we call each other on video calls and share documents on another kind of platform, like Teams or SharePoint." (INT-04)

The coexistence of multiple tools without clear integration protocols often resulted in duplicated or contradictory communication. One participant reflected on this challenge in terms of document tracking:

> "Sometimes we end up writing very short emails that don't capture enough detail, or we write long, detailed emails that no one has time to read. It's a balancing act." (INT-03)

Another interviewee described the confusion due to updates happening at different times between platforms:

> "The latest version of a document might be in SharePoint, or it might be attached to an email, or shared in Teams, you have to check all three." (INT-01)

This fragmentation not only complicates traceability, but also consumes time and creates uncertainty about where to find accurate project information. The result is a breakdown in communication flow, where participants spend additional effort validating document status or seeking clarification about updates.

Moreover, several respondents pointed out that tool-related challenges were not due to poor technology but due to inconsistent habits, onboarding differences, or the absence of clear expectations. One respondent noted:

> "Some stakeholders may have difficulty navigating SharePoint or similar systems, which leads to slower response times." (INT-02)

This underscores that effective tool use requires a combination of platform familiarity, social reinforcement, and formalized routines. In practice, project members varied in their digital comfort levels and preferences, further widening the communication gap.

A recurring issue was the lack of ownership over tool governance: Who decides which tool should be used for what and when? Without a "rulebook," as one participant called it, teams relied on personal or regional habits, increasing inconsistency across projects. In one case, the absence of clarity led to

a situation where team members missed critical updates because they were posted in a channel not regularly monitored by others.

The literature frequently assumes that digital platforms, once adopted, naturally streamline communication. This assumption is challenged by Henkel's experience, which shows that tool effectiveness is contingent on disciplined and collective practices not just access. Inconsistent use, uncoordinated workflows, and variation in digital fluency can reduce the potential benefits of even strong platforms.

To summarize, tool fragmentation at Henkel was not primarily a technical limitation, but a socio-organizational one. It came from the absence of shared expectations, uneven use across regions and functions, and insufficient training. While tools like Teams and SharePoint are essential infrastructures for collaboration, their benefits only materialize when their roles are clearly defined, mutually understood, and reinforced across all levels of the organization.

This theme contributes to answering **Sub-question 3** *by revealing the contextual conditions under which digital tools can support inclusive and coordinated communication. These include not only platform capabilities, but user training, shared conventions, and clarity of usage across distributed project teams.*

Theme 3: Communication Culture and Working Styles

While digital tools provide the technical foundation for collaboration, the way communication unfolds in multinational capital projects is deeply shaped by human, regional, and organizational dynamics. The literature emphasizes the role of social norms, trust, and organizational behaviors in enabling or obstructing communication flows (Dainty et al., 2007; Loosemore & Muslmani, 1999). However, what remains underexplored is how specific interactional preferences, such as formality, escalation habits, or response expectations, show themselves in digital environments and influence communication outcomes.

The interviews at Henkel confirm some theoretical assumptions but extend them by showing how communication preferences vary not just across national cultures, but also by professional background, role seniority, and past experiences with international projects. The data reveal that digital communication is not neutral: it is constantly negotiated through behaviors that reflect individuals' comfort levels, confidence, and perceived position in the organizational hierarchy.

Participants described noticeable contrasts in how teams initiate, confirm, and interpret communication. For instance, while some cultures value verbal agreements, others insist on written proof. Some teams respond quickly through informal chats, while others prefer to delay until they can formally document a response.

> "Even in a digital era, regular physical meetings help build trust, clarify ambiguous points, and foster a stronger sense of team cohesion." (INT-05)

This reinforces a key point from the literature: that trust is fundamental to effective communication, especially in dispersed or project-based teams (Emmitt & Gorse, 2006), but adds a practical dimension: Despite the available digital tools, teams still rely on face-to-face contact at critical stages, especially for alignment and building relationships.

Hierarchy also emerged as a strong influence. Junior staff were often hesitant to initiate communication or flag misunderstandings, particularly across departments or when engaging with more senior roles. This aligns with what one respondent noted about the silence or hesitation during meetings:

> "Sometimes you feel people are not asking questions even when something's unclear, maybe because they don't want to challenge others or appear uninformed." (INT-04)

This insight illustrates a missing perspective in much of the literature: while tools are often designed for openness and real-time feedback, human behavior, including perceived authority or fear of escalation, can block their intended use. These subtle interpersonal tensions are rarely acknowledged in studies focused primarily on tool efficiency or formal processes.

Another quote emphasizes the importance of structured follow-up:

> "In our projects, ensuring that every critical decision or piece of information is confirmed, whether by meeting minutes, a follow-up email, or a verbal confirmation, can significantly reduce misunderstandings." (INT-01)

This shows how informal practices, such as "circling back" after a meeting or providing redundant confirmations become essential workarounds to ensure understanding. These practices are rarely discussed in literature, which tends to focus on formal communication structures without accounting for such adaptive behaviors.

Additionally, communication culture also influenced how much people relied on digital tools. Some preferred "quick calls" or "WhatsApp messages," while others avoided informal communication altogether, depending on the company norms or regional work habits. These choices were not necessarily about the effectiveness of the tool, but about social preferences and perceived professionalism.

One participant reflected on the importance of responsiveness and initiative:

> "We have the tools, but if someone doesn't follow up or feels it's not their place to ask, then things slip through the cracks." (INT-02)

This illustrates that even well-structured systems can fail if behavioral norms are not supportive of proactive and inclusive communication. It also underlines the critical role of psychological safety, another underdeveloped concept in the literature on digital tool use in project environments.

*This theme contributes to answering **Sub-question 1** by identifying communication patterns that are shaped not only by local norms and cultural backgrounds but also by individual confidence, hierarchy, and team practices. It challenges the assumption that tool design alone can ensure effective communication, emphasizing instead that inclusive communication depends on behavioral alignment and contextual sensitivity.*

Conclusion

The three themes presented above demonstrate that communication challenges in multinational capital projects emerge not only from technical complexity, but also from social and interpretive factors. Tools such as Microsoft Teams and SharePoint offer opportunities for improved coordination, but their success depends on how boundary objects are interpreted, how tool ecosystems are governed, and how human behaviors adapt across contexts.

Together, these themes support the core argument of this thesis: that digital communication in multinational projects is not merely a technological issue, but a socio-technical and culturally embedded practice. Misalignment and ambiguity arise when digital systems are implemented without shared routines, inclusive practices, and attention to meaning-making processes.

Each theme contributes to different research insights:

- **Theme 1** empirically supports **Sub-question 2** by illustrating how boundary objects and multi-modal documents are interpreted differently in context.
- **Theme 2** addresses **Sub-question 3** by revealing how tool fragmentation and inconsistent usage hinder the enabling role of digital tools.
- **Theme 3** reinforces **Sub-question 1**, previously introduced in the literature review, by showing how communication patterns are shaped by cultural norms, trust, and hierarchy.

These empirical findings complement and, in some areas, challenge the assumptions outlined in Chapter 3. While the literature emphasizes the potential of digital tools to enhance clarity and speed, the data reveals persistent gaps in understanding, confirmation practices, and cultural adaptability.

5.3. Synthesis of Findings

The preceding sections identified three core themes that shape communication within Henkel's Capital Projects department: (1) interpretive differences around boundary objects, (2) fragmentation in digital tool usage, and (3) the influence of communication culture and working styles. This section synthesizes these themes to evaluate how they interact and to what extent they align with or challenge the theoretical assumptions outlined in Chapter 3.

Bridging Theory and Practice

The literature reviewed in Chapter 3 highlights several core assumptions about digital communication in multinational projects. These include:

- That digital tools can reduce ambiguity and enhance clarity across geographically dispersed teams;
- That boundary objects provide a stable means of shared understanding;
- That multimodal communication (verbal, textual, visual) enriches collaboration and mitigates interpretation risks.

The empirical data partially supports these assumptions, but also reveals several tensions:

Contradiction 1. Boundary Objects Require More Than Standardization: The assumption that templates and dashboards naturally facilitate shared understanding is challenged by the finding that such artifacts often generate ambiguity unless supported by shared interpretation practices. As Theme 1 showed, the same document may be seen as finalized by one stakeholder and as a draft by another. This highlights that boundary objects are not inherently effective; their meaning must be co-constructed, a nuance often underexplored in literature that treats them as stable coordination devices (Star & Griesemer, 1989).

Contradiction 2. Digital Tools Alone Do Not Enable Clarity: While the literature talks about digital platforms as enablers of efficiency and coordination, Theme 2 shows that tools like SharePoint and Microsoft Teams often contribute to communication overload and fragmentation. These tools are only effective when accompanied by clearly defined roles, consistent practices, and shared norms, a point underemphasized in more technology-centric literature.

Contradiction 3. Communication Success Depends on Social Factors: As Theme 3 and multiple interviewees pointed out, even well-designed digital systems cannot compensate for a lack of trust, unclear expectations, or diverging cultural assumptions. While the literature recognizes socio-cultural influences, it tends to frame them as background conditions. This research shows that social dynamics, such as fear of challenging hierarchy, or reluctance to seek clarification are primary factors in communication success or failure.

Connecting to Research Questions

These findings contribute to the research questions as follows:

Sub-question 1: What communication patterns and challenges are common in multinational capital projects?

Addressed in both Chapter 3 and Theme 3 (Section 5.2), this question is answered by identifying culturally contingent communication styles, hierarchy-based hesitation, and variable expectations around clarity and documentation. These insights reinforce the idea that communication challenges are not purely technical but social and behavioral.

Sub-question 2: How do boundary objects and multimodal practices influence the interpretation and use of digital tools?

Theme 1 offers a direct answer to this question. Boundary objects (e.g., templates, dashboards) become useful only when their meaning is negotiated among users. Multimodal formats help but can also create confusion when audiences are not aligned in how they interpret visual or textual cues. This expands on the literature, adding nuance to the role of multimodality as both an enabler and a potential risk.

Sub-question 3: What conditions help digital tools support clear, inclusive, and coordinated communication across project teams?

Theme 2 and 3 (Section 5.2) illustrate that digital tools support clarity only when their use is governed by shared behavioral norms, consistent practices, and inclusive routines. For example, confirmation practices (e.g., repeating back instructions) and follow-up communications help bridge interpretive gaps. This suggests that digital infrastructure alone is insufficient; success depends on embedding communication behaviors into the tool ecosystem.

Toward an Integrated Understanding

Taken together, the findings point to an important shift in focus: from asking what tools can do, to how tools are used, interpreted, and embedded in collaborative routines. This aligns with the socio-technical perspective introduced in Chapter 3, but adds depth by showing that:

- Boundary objects do not guarantee shared understanding;
- Multimodality enhances communication only when interpretation norms are aligned;
- Digital platforms require behavioral protocols to function effectively.

Figure 6.1 in Chapter 7 visualizes these findings in an integrated model that connects digital tools, boundary objects, multimodality, and the human factors that modulate communication success.

By synthesizing the empirical insights with theoretical assumptions, this chapter offers a clearer, more nuanced understanding of communication dynamics in multinational capital projects directly contributing to the answer of the main research question:

> *"What strategies can improve the effective use of digital tools for communication in multinational capital projects?"*

The next chapter builds on this synthesis by offering a set of evidence-based recommendations adapted to multinational project environments.

6

Analysis and Discussion

6.1. Findings from Literature

The literature review in Chapter 3 highlighted a range of theoretical insights that frame the communication challenges faced in multinational capital projects. Three key themes emerged from the literature: the centrality of communication for project success, the complex socio-technical nature of digital tools, and the interpretive work required for effective use of multimodal communication and boundary objects. These findings form the theoretical basis for understanding the empirical results that follow in Sections 5 and 6.3.

6.1.1. The Central Role of Communication in Project Success

Communication has long been recognized as a key determinant of project performance, particularly in complex, multicultural environments. The classic "iron triangle" of cost, time, and quality (Atkinson, 1999) is directly influenced by communication practices. Numerous studies have shown that miscommunication, misalignment, and lack of shared understanding are root causes of cost overruns, schedule delays, and reduced project quality (Durdyev & Hosseini, 2019; Flyvbjerg et al., 2004; Wang & Yuan, 2016).

Olawale and Sun (2010) observed that the misinterpretation of project goals due to unclear communication often leads to incorrect executions and time-consuming rework. Similarly, Gamil et al. (2019) demonstrated that language barriers, ambiguous documentation, and incomplete communication loops can severely compromise technical execution. These findings underscore that communication is not a secondary concern in project management - it is foundational.

6.1.2. Digital Tools as Socio-Technical Systems

The literature emphasizes that digital communication tools are not standalone technical solutions, but rather operate within complex socio-technical systems. While tools such as Microsoft Teams, SharePoint, and project dashboards are widely adopted, their impact depends heavily on human factors such as trust, organizational culture, and user competence (Heubeck et al., 2024; Papadonikolaki et al., 2025).

Papadonikolaki et al. (2025) argue that successful digital transformation in capital projects requires not only tool adoption but also the cultivation of data-savvy talent, alignment of cultural practices, and integration of digital systems into everyday workflows. Without these conditions, digital tools can contribute to confusion, overload, and inefficiency.

Heubeck et al. (2024) emphasize the importance of "communication richness" and "social capital" in distributed teams. Their research demonstrates that digital tools are only effective when they support the relational and structural cohesion of the team. High-frequency, low-richness communication (e.g., emails, messaging apps) must be balanced with low-frequency, high-richness modes (e.g., video conferencing, face-to-face interactions) to ensure clarity and trust. This suggests that tools are only as

effective as the social conditions in which they are embedded.

6.1.3. Role of Multimodal Practices and Boundary objects in Digital Tool Use

Multimodal communication and the use of boundary objects, such as templates, dashboards, and visuals are often described as mechanisms that enhance clarity in complex projects. These elements are typically embedded within digital tools, allowing teams to interact through multiple formats and channels.

Studies such as Dameron et al. (2015) and Kress (2010) highlight the importance of combining verbal, visual, and embodied cues to support shared understanding. Similarly, Carlile (2002) and Star and Griesemer (1989) describe boundary objects as flexible artifacts that help translate meaning across functional or cultural boundaries.

However, the effectiveness of these practices within digital tools is contingent upon users' interpretation. Without shared context, even well-designed templates or visual dashboards can become sources of confusion. This insight lays the groundwork for analyzing how digital tools, as used at Henkel, are influenced by these embedded practices, sometimes enhancing, and sometimes hindering, communication.

To explore this further, the next section presents interview-based findings regarding how digital tools operate within real-world communication contexts.

6.1.4. Communication as a Socio-Cultural Process

The literature consistently reinforces the idea that communication is not merely the exchange of information, but a socially constructed and culturally mediated process. It is highlighted that the profound differences in how individuals from high-context and low-context cultures interpret communication cues (Marie C., 2025). For example, what might be considered efficient and direct communication in a low-context culture could be perceived as blunt or disrespectful in a high-context setting.

Loosemore and Muslmani (1999) observed that multicultural teams often lack a shared communication framework, leading to divergent interpretations of the same message. This reinforces the idea that digital tools must be paired with cultural competence initiatives to be effective. Communication strategies must be adapted not only to technological conditions but also to the cultural expectations of participants.

6.1.5. Summary of Theoretical Insights

Taken together, the literature highlights that effective communication in multinational capital projects requires more than the implementation of digital platforms. It requires:

- Alignment of cultural, organizational, and technological factors;
- Purposeful use of multimodal communication to bridge gaps in language and context;
- Design and interpretation of boundary objects that adapt to diverse stakeholder needs;
- Development of social capital and trust to support tool adoption and information flow.

These theoretical insights serve as a benchmark against which the findings from interviews will be evaluated. As the next section will demonstrate, real-world communication practices often deviate from these theoretical ideals, exposing mismatches and opportunities for improvement.

6.2. Findings from Interviews

The interviews revealed that communication practices within Henkel's Capital Projects department are shaped not only by the presence of digital tools, but by how these tools are embedded within broader social contexts. Interpersonal behavior, cultural assumptions, and interpretation habits deeply influence how documents are understood and how tools are used in everyday work.

This section presents three key themes that emerged during the empirical study, complementing Chapter 5 and linking empirical findings to the concepts introduced in Chapter 3.

6.2.1. Boundary Objects as Incomplete Communication

Templates, dashboards, and schedules, designed as boundary objects were intended to support shared understanding across culturally and functionally diverse project teams. However, as seen in the interviews, these artifacts often failed to perform as expected when they lacked contextual explanation or co-interpretation.

> "In one project, the delivery date for critical equipment was understood differently by the supplier and the construction team because the information in the documents was not clear." (INT-04)

This quote illustrates a key contradiction with the literature. While boundary objects are often framed as stabilizing tools in project communication (Star & Griesemer, 1989), the interviews highlight their dependence on active negotiation and clarification, especially in digital environments where non-verbal cues are reduced. Boundary objects function less as neutral conveyors of meaning and more as sites where interpretive differences can surface.

This aligns with literature on sociomateriality and multimodality that challenges the assumption of material artifacts carrying fixed meaning (Orlikowski, 2007).

6.2.2. Multimodal Workflows and Misalignment

Although the theoretical framework sees multimodality as a strength combining visual, verbal, and textual forms to support communication—interviews revealed frequent inconsistencies in how these modes were integrated in practice.

> "I often ask my project team 'What did you understand we're supposed to deliver?' and when they verbalize it, I can test if that's aligned with the project objectives." (INT-05)

This practice of verbal cross-checking shows that even when digital tools provide visual dashboards or written updates, misunderstandings can still occur. The interviews suggest that verbal clarification remains essential, contradicting simplistic views in the literature that emphasize mode richness as sufficient for communication clarity.

Instead, the findings support more recent scholarship that stresses the importance of synchronization between modes and highlights the potential for fragmented meaning when that synchronization is absent (Knight & Wenzel, 2022).

6.2.3. Digital Tool Setup and Use Patterns

Henkel's project teams rely on a combination of Microsoft Teams, SharePoint, and email. While each platform has specific strengths, the absence of clear usage protocols has led to overlap, confusion, and misalignment.

> "There's this ordered style of communication… we call each other on video calls and share documents on another kind of platform, like Teams or SharePoint." (INT-02)

> "Some stakeholders may have difficulty navigating SharePoint or similar systems, which leads to slower response times." (INT-03)

These comments reveal that even when the technical infrastructure is robust, fragmentation emerges due to social factors: inconsistent tool adoption, lack of training, and differing expectations.

This stands in contrast to literature that often presents digital tools as inherently coordinating or efficiency-enhancing. Instead, the findings underscore a socio-technical perspective in which tools must be actively structured and socially embedded to yield their intended benefits.

6.2.4. Working Styles and Behavioral Norms

The most subtle but impactful finding concerns the human behaviors underlying tool use. Interviewees described differences in comfort with formality, escalation, and initiative-taking often tied to regional or cultural norms. For example, junior engineers might avoid challenging documents from senior managers, even if unclear. As one participant explained:

> "There's a big difference in how directly people raise concerns. Some want everything confirmed; others hesitate to speak up without permission." (INT-03)

Such dynamics affect how tools are used not all voices are equally represented in dashboards or meeting notes, and some stakeholders rely more on personal follow-ups than on official channels. This insight extends the socio-cultural framing in the literature by showing how behavioral norms influence not just face-to-face interactions but also digital communication practices.

Summary
Together, these themes reinforce the need to approach communication improvement in multinational projects not as a tool implementation issue, but as a socio-technical challenge. Boundary objects, multimodal workflows, and digital platforms all support communication but only when paired with clear behavioral routines, shared interpretation practices, and a strong awareness of cultural and organizational variation.

6.3. Comparative Analysis: Theory vs. Practice
This section compares the insights from literature with the findings presented in Chapter 5. The goal is to identify where theoretical assumptions about communication in multinational capital projects are confirmed, challenged, or extended by empirical observations at Henkel.

This section addresses Sub-question 3: "What conditions help digital tools support clear, inclusive, and coordinated communication across project teams?" The comparison shows that tool effectiveness is contingent not only on technology but on the social and interpretive environments in which tools are embedded. These insights inform the updated communication framework (Figure 6.1).

6.3.1. Theme 1: Boundary Objects and Multimodal Interpretation
The literature presents boundary objects: templates, reports, dashboards as enablers of coordination across diverse stakeholders, praised for balancing standardization with flexible interpretation (Carlile, 2002; Star & Griesemer, 1989). Similarly, multimodal communication is considered a strength in complex settings, where visual, verbal, and textual channels support redundancy and shared meaning (Kress, 2010).

However, the empirical findings reveal that flexibility, when not paired with shared interpretation routines, can result in ambiguity rather than alignment. Participants reported frequent misunderstandings stemming from assumed shared meanings around documents. This shows that the stabilizing role of boundary objects is not automatic but dependent on contextual framing and co-interpretation.

Contribution. The analysis contributes a more critical view of boundary objects and multimodality by emphasizing the risks of interpretive drift. This nuance is often underexplored in literature that treats these tools as inherently beneficial.

6.3.2. Theme 2: Digital Tool Setup
Much of the literature on digital collaboration tools in projects emphasizes their capacity to support transparency, speed, and coordination assuming that they are used within a coherent digital system.

The Henkel case challenges this assumption. Despite having advanced platforms, teams experienced fragmentation due to unclear tool roles, inconsistent practices, and lack of integration. Even basic questions such as "Where is the latest version of this file?" were raised across interviews.

Contribution. This finding confirms that digital success is not purely technological. The case adds empirical weight to socio-technical arguments by showing how daily routines, platform governance, and user expectations shape communication effectiveness. The finding shifts the focus from "which tool?" to "how are tools aligned and used together?"

6.3.3. Theme 3: Working Styles and Communication Practices
The literature often focuses on formal communication structures, emphasizing defined workflows and governance models. While it acknowledges cultural variation, it rarely addresses how daily communication styles such as preference for escalation, documentation, or face-to-face resolution shape digital

tool usage.

At Henkel, participants described subtle but significant variation in how individuals approached meetings, updates, and reporting. These differences were not merely stylistic but had material impacts on how information flowed and how misunderstandings were addressed (or not).

Contribution. This theme adds a fine-grained behavioral layer to the literature. Rather than treating cultural difference as a background factor, it shows how interpersonal norms and comfort levels actively shape digital interaction.

Updated Model

Figure 6.1 illustrates the revised communication model developed from both empirical and theoretical insights.

It emphasizes that communication outcomes in multinational capital projects are shaped by the dynamic interplay between technology (digital tools), artifacts (boundary objects), modes (multimodal communication), and human practices (such as working styles and interpretation habits).

While digital tools act as enablers, they do not ensure clarity or alignment by themselves. Shared meaning is constructed dynamically, as teams negotiate meaning across artifacts and platforms.

In this model, digital tools act as enablers of communication but do not operate in isolation. They are embedded in socio-cultural contexts, influencing and being influenced by how teams create, interpret, and exchange information. **Boundary objects**, like templates and dashboards, are central to this interaction. They serve as shared reference points but require active interpretation. Likewise, **multimodal communication** (verbal, visual, textual) supports collaboration but can fragment meaning if not aligned with shared expectations.

Importantly, boundary objects and multimodal communication reflect that these two elements are not only outputs of tool use but also influence each other directly. A dashboard (boundary object), for example, may rely on a visual format that requires verbal clarification. Likewise, a written message may only be understood if aligned with a shared template. Their combined effect shapes how digital tools are used and how effective communication develops.

Taking into account these links, the model shows that improving communication in complex projects is not only about better software or training; it is about aligning tools, formats, and interpretation practices between culturally diverse teams.

Unlike traditional linear models, this framework captures the recursive and interpretive nature of communication. Rather than assuming tools or templates directly create alignment, it highlights that effectiveness depends on mutual adaptation between users, artifacts, and social norms.

Conceptual Overlap of Key Themes

Figure 6.2 illustrates that the three core themes boundary object interpretation, tool setup, and communication culture are interdependent. Rather than operating in isolation, they intersect in complex ways to shape how digital communication unfolds.

At the center of this overlap lies the actual effectiveness of digital tools. This framing reinforces that effective communication emerges not from any single intervention but from a systemic alignment of tools, people, and shared practices.
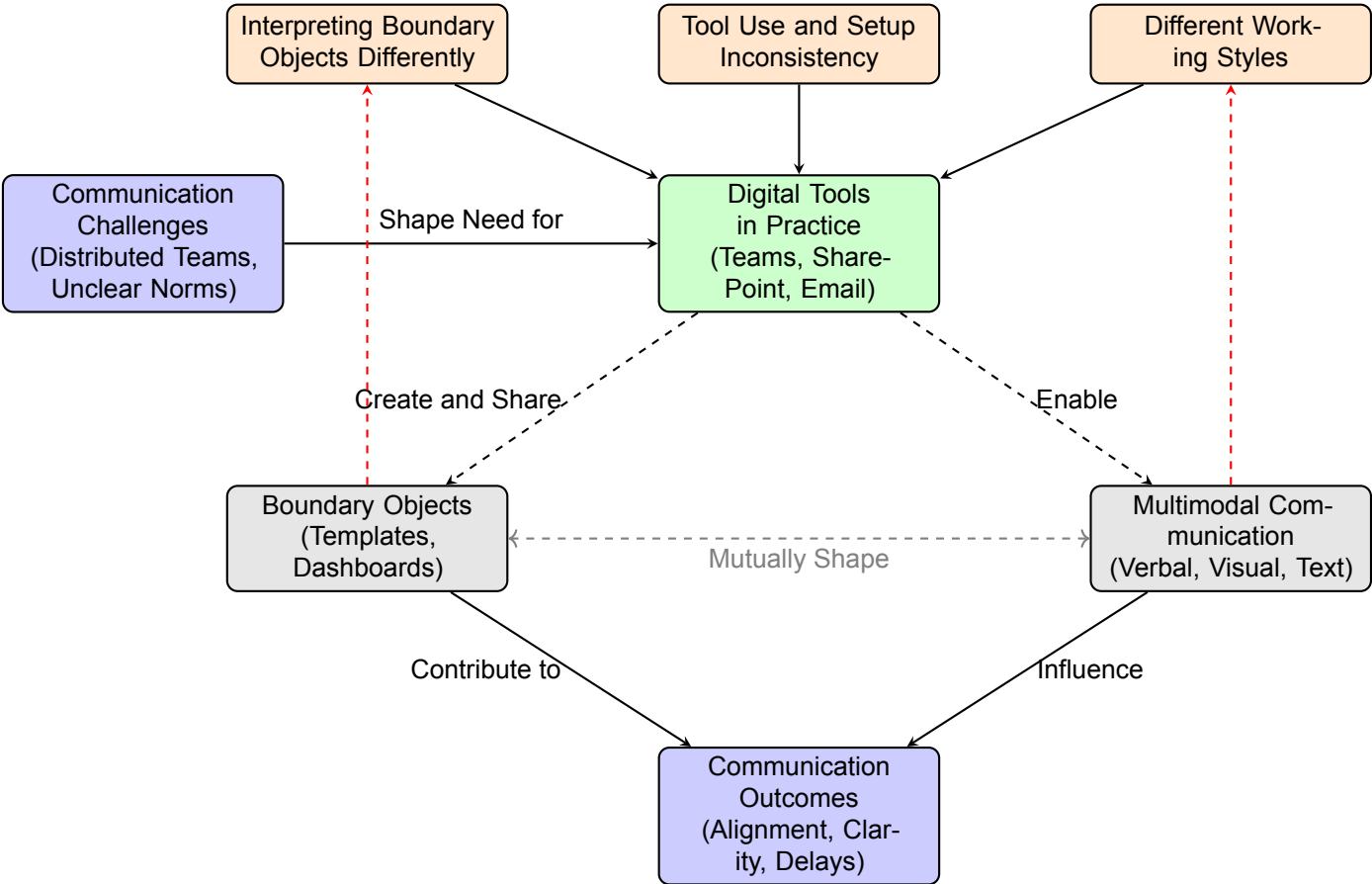
Figure 6.1: Revised Communication Model: Interactions Between Digital Tools, Boundary Objects, Multimodality, and Human Factors

Boundary Object Interpretation   **Tool Setup**

**Digital Tool
Effectiveness**

Communication Culture
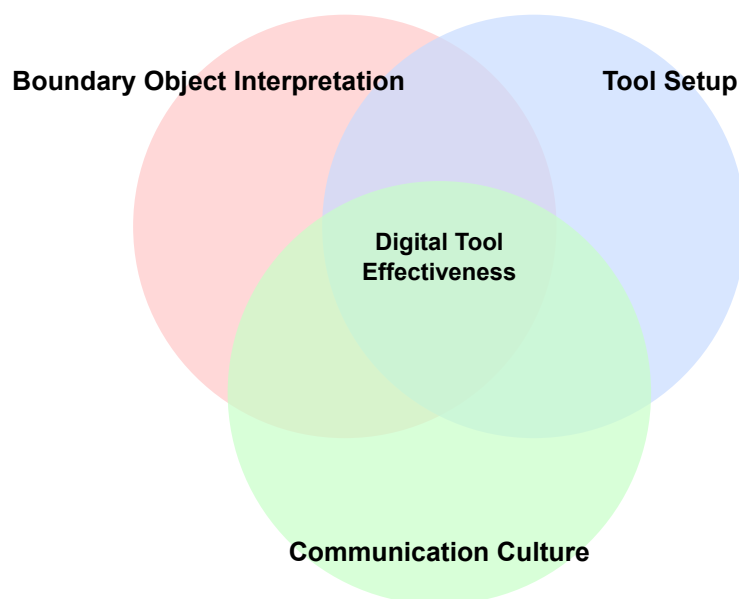
Figure 6.2: Interaction of Thematic Domains Affecting Communication

6.3.4. Contradictions with Existing Literature

While much of the existing literature provides valuable insights into digital communication in multinational project contexts, the empirical data from Henkel reveals several areas where theoretical assumptions fall short or remain underexplored.

First, boundary objects are widely described as helpful tools for bridging gaps across professional and cultural domains (Carlile, 2002; Star & Griesemer, 1989). However, the literature often assumes that these artifacts are stabilizing by default. What is missing is attention to the conditions under which boundary objects fail, particularly when they are deployed without shared interpretation routines. The interviews revealed that dashboards, templates, and shared documents were not inherently clarifying. Without verbal context or cross-role explanation, they became sources of ambiguity. Thus, the literature tends to overstate their coordination function while understating their reliance on active co-construction of meaning.

Second, the assumption that digital tools inherently support integration and clarity is challenged. Academic discussions frequently highlight platforms as means of enhancing traceability, centralization, and speed. What is less emphasized is how inconsistent tool usage and fragmented workflows can actually generate confusion. The Henkel case demonstrates that digital systems, without shared protocols or clearly defined responsibilities, may exacerbate misalignment. These socio-organizational conditions are often acknowledged in principle but rarely explored in detail.

Third, the role of working styles and interpersonal behavior is often treated peripherally in communication studies. While project management literature may note cultural or hierarchical differences, it typically does not analyze how these shape actual communication flows in digital environments. For example, hesitation in challenging senior staff or reliance on informal confirmation channels were key issues observed in interviews, but these soft dynamics are largely absent from dominant models of communication planning and tool integration.

Lastly, much of the literature frames multimodal communication (visuals, text, audio) as a benefit in complex settings. Yet it does not sufficiently address what happens when modes are mismatched or when their sequencing is unclear. Participants described situations where visual dashboards lacked verbal reinforcement, or email summaries failed to capture key discussion points from video calls. This kind of misalignment in mode usage is underrepresented in existing research, which tends to treat modality richness as unconditionally positive.

In summary, the literature provides a strong conceptual foundation, but does not fully capture the nuanced, practice-based realities of communication in multinational capital projects. The Henkel case

demonstrates that tools and templates do not work in isolation, they require aligned interpretation habits, governance mechanisms, and interpersonal awareness to function effectively. These empirical findings highlight the need to move beyond idealized models toward more grounded, situated understandings of digital communication practices.

Part III

Part C

7

Conclusion and Recommendations

This chapter answers the main research question by presenting strategies that improve the use of digital tools in multinational capital projects. These strategies are grounded in both literature and empirical findings, and aim to enhance communication clarity, coordination, and inclusiveness across teams.

7.1. Summary of Findings

This research set out to explore how digital tools influence communication in multinational capital projects, with particular attention to the roles of multimodal communication, boundary objects, and social factors such as interpretation and working styles. Through a combination of literature review and empirical research at Henkel's Capital Projects department, the study uncovered a complex picture of communication dynamics that extends beyond technical tool functionality.

The findings can be summarized along three interconnected themes, reflecting the key challenges and interactions revealed during the study:

7.1.1. Interpreting Boundary Objects in Multimodal Environments

Boundary objects, such as templates, dashboards, and shared documents are often praised in the literature for their ability to bridge differences across professional, geographical, and disciplinary boundaries. However, empirical findings demonstrated that without shared interpretation practices, these objects can become sources of miscommunication rather than solutions.

Documents and visualizations were often understood differently depending on the user's role, experience, and expectations. A dashboard uploaded to SharePoint might be seen as finalized by one group and as a draft requiring discussion by another. This confirms that boundary objects must be supported by active verbal clarification and contextual framing to function as intended.

In addition, multimodal communication, which combines verbal explanations, written texts, and visual representations, was often fragmented in practice. Teams would switch between modes inconsistently, sometimes strengthening clarity, but often reinforcing misalignment when modes were not integrated thoughtfully.

7.1.2. Challenges in Digital Tools Setup

While digital platforms like Microsoft Teams, SharePoint, and email were central to Henkel's project communication, the interviews revealed that their use was fragmented and inconsistent.

There was often no clear agreement on which tool should be used for which purpose. Critical updates might be shared on Teams chats, stored in SharePoint folders, and confirmed via email, creating confusion about where authoritative information was located. Participants described challenges in finding the most up-to-date documents, understanding task assignments, and keeping track of communication threads across multiple platforms.

These challenges were not due to inherent flaws in the tools themselves, but rather to the lack of clear tool governance, training, and coordinated practices. The findings support the view that digital tools operate as socio-technical systems, they require active structuring, not just implementation.

7.1.3. Communication Culture and Working Styles

One of the most important findings was that communication is deeply influenced by personal habits, regional norms, and organizational cultures. Working styles varied significantly across teams and individuals: some preferred verbal confirmation through calls, others relied on documented updates; some teams valued structured formal communication, while others prioritized quick informal check-ins.

These working style differences affected how tools were used, how documents were interpreted, and how multimodal channels were navigated. Even when the same tool was used, expectations around responsiveness, confirmation, and clarification varied, sometimes leading to misunderstandings or delays.

Thus, improving communication effectiveness requires not only technological coordination, but also awareness of behavioral and cultural diversity within project teams.

7.1.4. Integrated Understanding: A Dynamic Communication System

Synthesizing these themes, the study proposes a dynamic model of project communication, as shown in Figure 6.1. In this model, communication outcomes, whether alignment, clarity, or delay are the result of interactions between:

- Digital tools (Teams, SharePoint, email) that enable information sharing,
- Boundary objects (templates, dashboards) that structure communication across modalities,
- Multimodal formats (text, visuals, voice) that carry meaning,
- Human factors (interpretation patterns, working style habits) that influence how tools and documents are created, shared, and understood.

Importantly, this is not a linear process. Boundary objects and multimodal communications not only result from digital tool use, but also feed back into shaping interpretation norms and behavioral patterns. Successful communication thus depends not simply on tool availability, but on ongoing negotiation, clarification, and contextual alignment.

7.1.5. New Insights and Contributions

While the concepts of digital tools, boundary objects, and multimodal communication are established in academic literature, this thesis contributes new empirical insights into how these concepts function together in practice within multinational capital project environments.

Specifically, the research adds the following:

- **Document misinterpretation despite standardization.** While boundary objects like templates and dashboards are intended to standardize communication, this study shows that even well-defined documents can be interpreted differently depending on the reader's role, context, or assumptions. This dynamic is empirically underexplored in existing literature.
- **Overlap between multimodality and misalignment.** Contrary to the idea that multimodal communication (written, visual, verbal) reinforces understanding, this research finds that unless intentionally aligned, these modes can fragment meaning across platforms and tools.
- **Social behavior around digital tools.** The study reveals how communication behavior, such as hesitation to question unclear documents or preference for verbal confirmation can shape how effectively digital tools are used, particularly in hierarchical or cross-cultural teams.
- **Grounded integrative model.** Finally, the research offers a revised communication model (Figure 6.1) that integrates digital tools, communication behaviors, and boundary objects, reflecting how communication actually develops in practice at Henkel.

Though modest in scope, these contributions fill a gap between abstract communication theories and the lived realities of international project teams using digital transformation.

These findings suggest that any strategy for improving communication in multinational projects must address tools, content, and people together, rather than focus narrowly on the deployment of technology or template standardization.

The next sections build on these insights to offer practical recommendations for improving digital communication in complex project settings.

7.2. Recommendations for Practice

The findings of this study reveal that improving communication in multinational capital projects requires a holistic approach, one that addresses not only digital setup but also the social, interpretive, and behavioral dimensions of collaboration. Based on the empirical insights, several strategies are recommended for organizations like Henkel seeking to strengthen project communication across diverse teams.

First, attention must be paid to how boundary objects, such as templates, dashboards, and schedules, are introduced and maintained. While the literature often assumes that standardized documents naturally foster alignment, practice shows that interpretation varies widely. To mitigate this, project leaders should embed explanation practices directly into document circulation routines. When a new project artifact is shared, it should be accompanied by a brief session, whether verbal, visual, or written, that clarifies its purpose, structure, and key assumptions. Such walkthroughs do not need to be elaborate but should be consistent, ensuring that boundary objects function as points of coordination rather than confusion. Moreover, assigning clear document ownership would support this effort by providing a stable reference point for clarifications and updates.

Beyond documents, the way digital tools are organized and used deserves critical reflection. The research showed that confusion and inefficiency often arise not because tools are inadequate, but because their use is inconsistent and fragmented. It is therefore recommended that organizations develop a simple but clear framework that assigns distinct roles to each major platform: for example, distinguishing between tools used for real-time updates, document storage, and formal approvals. Rather than introducing more software, efforts should focus on stabilizing existing platforms into coherent workflows. Regular onboarding and refresher sessions should emphasize these structures, not simply the functional features of the tools, but the communicative practices they are meant to support.

Communication itself must also be managed as a multimodal practice. In the complex, distributed environment of multinational projects, relying on a single mode, whether written reports or verbal meetings is insufficient. Instead, critical updates should be mirrored across complementary modes: a verbal discussion should be followed by a concise written summary, a dashboard should be explained both visually and in text. By integrating multimodal communication systematically, rather than ad hoc, teams can ensure that key messages reach diverse audiences with varying preferences and information processing styles.

A central insight from the research was the importance of adapting to diverse working styles. Communication norms are not universal; what one team perceives as efficient and respectful may be seen by another as abrupt or insufficiently detailed. Rather than enforcing strict uniformity, project managers should create spaces early in project phases for teams to express and negotiate their preferred ways of interacting. Explicitly discussing expectations around responsiveness, confirmation, and format can prevent mismatches that would otherwise surface later as misunderstandings. Encouraging proactive clarification, not treating questions as disruptions but as vital contributions to shared understanding should also be cultivated as a visible norm across teams.

Finally, communication improvement must be embedded into the broader project management process, not treated as a secondary activity. Communication quality should be reviewed at project milestones alongside technical progress and budget status. Assigning communication ambassadors within project teams, individuals who tasked with monitoring communication clarity, updating norms, and supporting colleagues, can help maintain focus on this crucial dimension. Ultimately, organizations must shift the mindset from seeing communication as an individual skill to recognizing it as a shared organizational responsibility.

In conclusion, improving project communication in multinational environments requires moving beyond the implementation of digital tools toward an integrated strategy. Strengthening shared interpretation

of documents, stabilizing tool usage, managing multimodality deliberately, respecting diverse working styles, and institutionalizing communication practices are all necessary, interconnected steps. Only through such a systemic approach can projects hope to foster alignment, prevent miscommunication, and enable collaboration across complex, distributed teams.

Figure 7.1 presents the integrated model for improving communication in multinational capital projects. It reflects the systemic nature of communication practices, showing how behavioral strategies (working styles, interpretation practices) and technical strategies (tool structuring, multimodal integration) must be coordinated under effective project management. Only by addressing all these interconnected elements simultaneously can organizations create resilient and transparent communication environments that support project success.
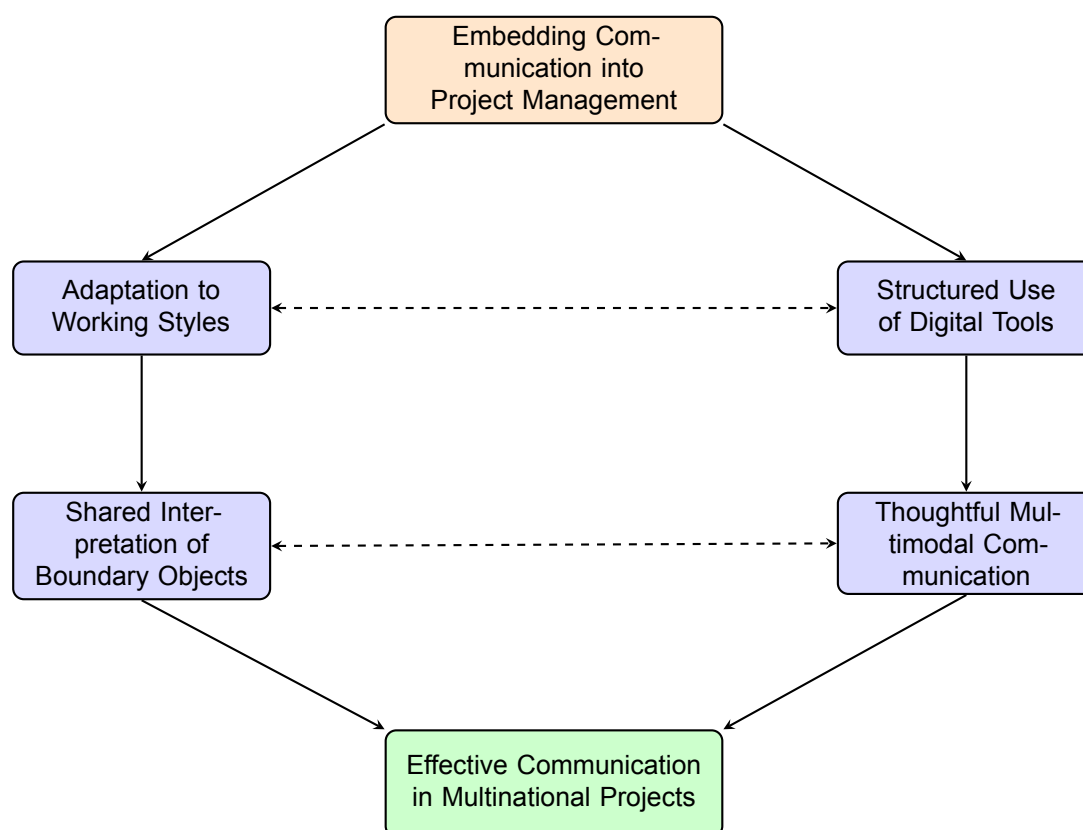
Figure 7.1: Integrated Model for Improving Communication in Multinational Capital Projects

7.3. Implications for Henkel

The findings of this study carry significant implications for Henkel's Capital Projects department and potentially for similar multinational organizations managing distributed project teams. While Henkel already relies heavily on digital tools for coordination across its geographically dispersed workforce, the research suggests that communication effectiveness depends on more than just technical platform availability.

First, the study highlights the need for Henkel to address the interpretive challenges associated with boundary objects such as project templates, schedules, and dashboards. Although these artifacts are widely used across Henkel's projects, they are often interpreted differently by various regional teams, potentially leading to misalignment and project delays. Embedding explicit interpretation practices such as walkthroughs, guidelines, and document overseeing into standard procedures would enhance mutual understanding and reduce uncertainty.

Second, the inconsistency observed in the usage of digital tools in Henkel teams indicates the need for a clearer tool governance. Rather than expanding the range of platforms, Henkel would bene-

fit from clarifying the communicative functions of its existing tools (e.g., differentiating when to use Teams, SharePoint, and email) and reinforcing these practices through onboarding and periodic training. A more coherent use of digital tools would minimize information fragmentation and enhance project transparency.

Third, the study underscores the importance of managing multimodal communication more deliberately. Henkel's reliance on digital platforms presents an opportunity to integrate verbal, visual, and textual communication systematically, ensuring that important updates and project knowledge are reinforced across multiple channels. Standardizing the use of visual aids and linking them explicitly to project documentation would make communication more inclusive and accessible across diverse regional teams.

Moreover, recognizing and adapting to diverse working styles is also important. Henkel operates across cultures where expectations regarding formality, responsiveness, and communication modes vary considerably. Creating early-phase discussions around communication preferences and promoting proactive clarification behaviors would foster stronger interpersonal trust and smoother project execution.

Finally, the research recommends that Henkel integrate communication quality reviews into its formal project management processes. Treating communication effectiveness as a regular audit item, rather than an informal background concern, would institutionalize attention to collaboration practices and promote continuous improvement across projects.

Overall, the results of this study suggest that Henkel has the opportunity to significantly strengthen its communication practices by adopting a coordinated approach that addresses interpretation, tool use, multimodality, and behavioral adaptation as interconnected elements. Implementing the recommended strategies could lead not only to smoother collaboration but also to more timely project delivery, reduced misunderstandings, and improved stakeholder satisfaction.

7.4. Limitations of the Research

While this study provides valuable insights into the role of digital tools in multinational capital project communication, several limitations should be acknowledged to contextualize its findings and guide future work.

First, the research was based on a single case study within Henkel's Capital Projects department. Although Henkel is a large multinational organization and its project settings are diverse, the specific organizational culture, communication infrastructure, and project workflows may not be fully representative of other companies or industries. As a result, the transferability of findings to other contexts should be done with caution, especially where project environments differ significantly in scale, regulatory requirements, or technological maturity.

Second, the number of interviews conducted was limited to five participants, though they were carefully selected to reflect a diversity of roles, regions, and experience levels. This relatively small sample size restricts the generalizability of patterns across the broader organization. Moreover, due to time constraints and scheduling limitations, the study did not include external stakeholders (such as contractors or suppliers), whose perspectives could further enrich understanding of cross-organizational communication challenges.

Third, the data collected through semi-structured interviews provided in-depth qualitative insights but may also be influenced by subjectivity, memory limitations, or social desirability bias. Participants may have emphasized more visible communication challenges or underreported interpersonal dynamics.

Fourth, while the thesis aimed to examine the interplay between digital tools, boundary objects, and multimodal communication, the focus on digital tools became dominant due to the empirical findings. As a result, some aspects of multimodality and boundary object theory were not explored in the same depth as initially envisioned. This decision strengthened thematic coherence but also narrowed the conceptual range of the study.

Finally, the research was conducted at a particular moment in time. Given the ongoing evolution of digital platforms, remote work practices, and organizational change, the relevance of specific tools and processes may shift over time. Future studies could benefit from continuous designs that capture how communication practices evolve across the life cycle of a project or during periods of transformation.

Despite these limitations, the study provides a solid foundation for understanding how human, technological, and structural elements interact in shaping communication outcomes in global project environments. The practical relevance of the findings remains high, particularly within organizations facing similar challenges of distributed collaboration, tool fragmentation, and interpretation diversity.

8

Future Research Directions

This research has investigated how digital tools shape communication in multinational capital projects, with particular focus on how tools interact with boundary objects, multimodal formats, and communication cultures. While the findings provide a grounded and practical model, they also open new opportunities for future academic research and organizational experimentation.

Building on the themes identified in this thesis, future research can develop in three complementary directions:

- **Expanding Scope.** Testing the model in other sectors and organizational contexts.
- **Deepening Methods.** Applying techniques that involve studying subjects over an extended period or ethnographic techniques to uncover communication dynamics over time.
- **Exploring New Technologies.** Investigating the role of emerging tools like AI and immersive platforms in shaping communication practices.

These three dimensions: scope, method, and technology provide a roadmap for future research that goes beyond this single case study. Figure 8.1 visualizes these directions and offers focus areas for further work.
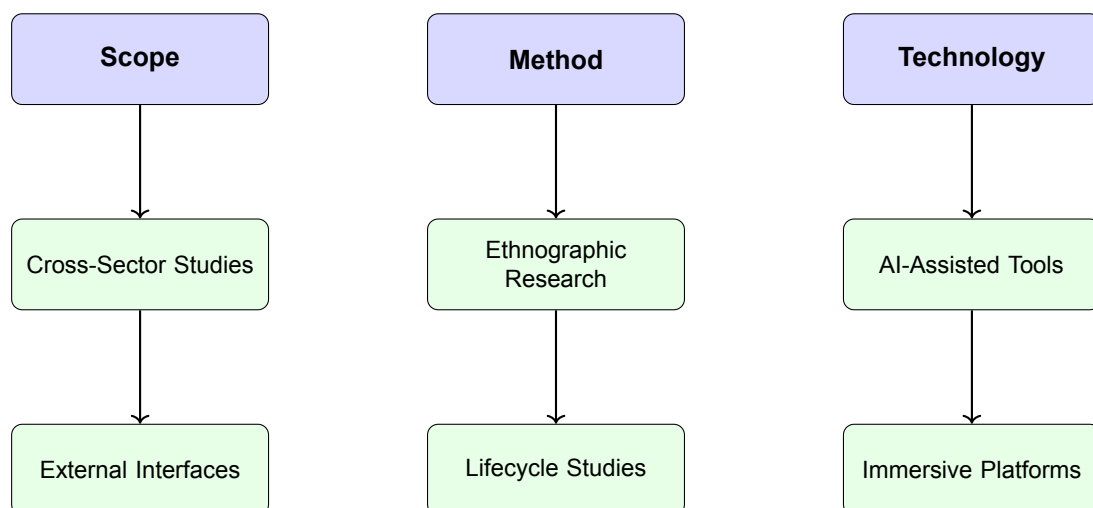
Figure 8.1: Future Research Opportunities across Scope, Method, and Technology

Opportunities for Further Inquiry

1. Expanding Scope The findings of this study are grounded in a single case study within Henkel's Capital Projects department. Future research could test the model in different industries (e.g., energy,

transportation, public infrastructure) or organizational cultures to assess generalizability. Comparing communication dynamics in organizations with flat hierarchies versus those with strong top-down cultures may also reveal how structural factors influence tool interpretation and communication behavior.

Another unexplored direction is to analyze how communication takes place at **external interfaces** particularly between client teams, subcontractors, and regulatory authorities. These interfaces are often where the most critical misalignments occur, and where boundary objects (such as contracts, schedules, and specs) carry high stakes.

2. Deepening Methodological Approaches This thesis relied on semi-structured interviews to capture experiences and perceptions. Future studies could adopt ethnographic or observational methods to investigate how communication unfolds in real-time. For example, tracking how a single document is revised, misunderstood, or escalated across meetings can offer deep insight into the function of boundary objects.

Additionally, **long-term studies** could explore how communication and tool usage evolve throughout a project's lifecycle, from early design through to commissioning. Understanding these dynamics could help identify when communication breakdowns are most likely, or how new tools are embedded (or resisted) over time.

3. Engaging with Emerging Technologies As communication tools continue to evolve, new technologies such as real-time AI translation, automated meeting transcription, and immersive VR environments present exciting possibilities. Future research should investigate whether these tools enable clearer multimodal communication or introduce new risks (e.g., over-reliance, loss of context). Early adoption studies can also examine how new technologies are introduced and accepted by teams with varying digital maturity.

Conclusion

This chapter has outlined a roadmap for building on the findings of this thesis. By pursuing deeper methodological approaches, broader comparative research, and more future-focused explorations, researchers and practitioners alike can continue to develop a richer understanding of how communication tools, practices, and cultures interact in multinational capital project environments.

These future directions reinforce the core insight of the study: communication is not a static function of tools or templates, but an evolving interplay of human behavior, digital infrastructure, and shared meaning-making. Understanding and designing for that interplay remains a critical frontier for both academic research and project delivery innovation.

9

Conclusion

This thesis investigated how digital tools support or hinder communication in multinational capital projects, with a focus on Henkel's Capital Projects department. While digital platforms are widely adopted in global teams, their effectiveness remains uneven: shaped not just by tool features, but by interpretation habits, working cultures, and communication routines.

Main Research Question:

What strategies can improve the effective use of digital tools for communication in multinational capital projects?

To answer this, the study followed three sub-questions that guided the analysis from conceptual foundations to field data:

Research Findings: Answers to Sub-Questions

Sub-question 1: What communication patterns and challenges are common in multinational capital projects?

The literature review (Chapter 3) identified key challenges such as cultural misalignment, unclear tool roles, fragmented communication streams, and hierarchical constraints on voice and interpretation. These challenges were confirmed in interviews, where participants described common confusion around documentation, slow decision-making, and inconsistent expectations across teams and regions.

Sub-question 2: How do boundary objects and multimodal practices influence the interpretation and use of digital tools?

Empirical findings (Chapter 5) revealed that templates and dashboards, while intended to serve as unifying artifacts, often created misinterpretation due to differing expectations. For example, documents were sometimes treated as final by one stakeholder and as provisional by another. Similarly, multimodal communication (e.g., charts, calls, texts) lacked integration, causing gaps in follow-up or clarity. These insights challenge the theoretical view of boundary objects as inherently stabilizing and multimodality as inherently clarifying.

Sub-question 3: What conditions help digital tools support clear, inclusive, and coordinated communication across project teams?

Chapter 6 synthesized both literature and practice, showing that effective tool use depends on four conditions:

- Shared interpretation routines for boundary objects.

- Structured tool protocols to reduce overlap and fragmentation.
- Cultural sensitivity and behavioral norms that support inclusion.
- Aligned use of multimodal formats to reinforce and not dilute messages.

These conditions were integrated into a revised model (Figure 6.1) that emphasizes the interplay between tools, modes, documents, and human factors.

Answer to the Main Research Question

The study concludes that strategies for improving digital tool use in multinational projects must go beyond choosing the "right" platforms. Instead, they should focus on:

1. Developing clear usage protocols and expectations across tools.
2. Aligning communication behaviors through training and shared norms.
3. Facilitating co-interpretation of shared documents (e.g., through meetings or annotations).
4. Integrating multimodal communication intentionally (not arbitrarily).

These strategies shift the focus from technology alone to the sociotechnical system in which tools are embedded. They suggest that digital tools can only enhance communication when paired with cultural awareness, behavioral alignment, and organizational support.

On Enhancing Collaboration

This research not only identifies strategies to improve communication, but also explains how such improvements contribute to enhancing collaboration, as stated in the thesis title. Collaboration in multinational capital projects is often weakened by fragmented tool use, inconsistent interpretation of documents, and cultural misalignment. By addressing these underlying issues through structured tool practices, aligned interpretation routines, and culturally responsive communication norms, this study shows how communication becomes more inclusive, transparent, and coordinated.

In this way, the thesis enhances collaboration by:

- Bridging interpretive gaps across roles and regions;
- Reducing delays caused by tool confusion and misaligned assumptions;
- Supporting more inclusive communication habits that empower all team members to contribute.

The result is not only better communication, but stronger cross-functional and cross-cultural collaboration - an important success factor in multinational capital project environments.

Contributions

This thesis contributes to both academic understanding and project management practice in the following ways:

- **Conceptual Contribution.** It integrates theories of boundary objects, multimodal communication, and digital infrastructure into a unified communication model.
- **Empirical Contribution.** It offers field-based insight into how tools are interpreted and used in a real-world multinational project context.
- **Practical Contribution.** It provides actionable strategies for improving communication across dispersed, cross-functional project teams.

Closing Reflection

Digital tools are not neutral bridges, they are shaped by how people use them, interpret them, and embed them into workflows. While the promise of digitalization is efficiency and transparency, the reality is more complex. This study shows that communication in multinational projects is ultimately a human process, requiring shared meaning, not just shared platforms.

By answering research questions through both theory and practice, this thesis underscores a simple insight with profound implications: better tools alone are not enough; better use of tools, grounded in shared understanding and local context, is what makes communication truly effective.

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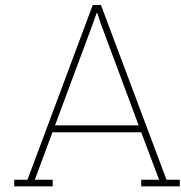
Interview Questions

The following list presents the guiding questions used during the semi-structured interviews conducted for this research. The primary aim of these interviews was to gain in-depth insights into communication practices, challenges, and the role of digital tools in multinational capital projects. As is common in qualitative research, the interviews followed a flexible format: the questions served as a thematic guide rather than a strict script.

Depending on the interviewee's background and responses, not all questions were asked in every interview, and follow-up questions were posed to explore relevant topics in greater detail. Nonetheless, the core focus remained consistent across all interviews, revolving around the themes of communication effectiveness, digital tool usage, cultural and hierarchical influences, and the interpretation of shared project information.

1. ***Can you describe how communication typically works in your multinational capital projects?***
   How do teams stay aligned, and what methods or tools are commonly used?
   Which digital platforms or software have been most effective in keeping your teams connected?
   Can you share an instance where a particular tool helped streamline your communication?

2. ***What are the biggest communication challenges you face in these projects?***
   Can you share an example where communication difficulties impacted the project?
   Are these challenges more related to the technology itself or how it is used by the team?
   How do these challenges affect your project timelines or decision-making processes?

3. ***How do cultural differences or language barriers influence teamwork and collaboration?***
   Have you encountered situations where misunderstandings created issues?
   What strategies or tools have you found useful for overcoming these cultural or language barriers?
   Can you provide an example of a time when bridging these differences improved communication?

4. ***How do you ensure that complex technical information is clearly understood across different teams and decision-makers?***
   What approaches help simplify communication?
   Do you use any visual aids or collaborative platforms to explain technical concepts?
   How do you manage communication between technical staff and non-technical stakeholders using these tools?

5. ***If you could improve communication in your projects, what changes or tools would you recommend?***
   What would make collaboration across teams easier?
   Are there any features or functionalities you wish were available in your current communication tools?
   How do you think leadership or additional training might further enhance digital communication within your teams?