

Organic transformation of ERP documentation practices: Moving from archival records to dialogue-based, agile throwaway documents

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ABSTRACT

Implementing enterprise resource planning (ERP) systems remains challenging and requires organizational changes. Given the scale and complexity of ERP projects, documentation plays a crucial role in coordinating operational details. However, the emergence of the agile approach raises the question of how adequate lightweight documentation is in agile ERP implementation. Unfortunately, both academia and industry often overlook the natural evolution of documentation practices. This study examines current documentation practices through interviews with 23 field experts to address this oversight. The findings indicate a shift in documentation practices from retrospective approaches to dialogue-based, agile throwaway documents, including audiovisual recordings and informal emails. Project managers who extensively engage with throwaway documents demonstrate higher situational awareness and greater effectiveness in managing ERP projects than those who do not. The findings show an organic transformation of ERP documentation practices. We redefine documentation to include unstructured, relevant information across different media, emphasizing searchability. Additionally, the study offers two vignettes for diverse organizational contexts to illustrate the best practices of agile ERP projects.

1. Introduction

Enterprise resource planning (ERP) systems are still one of the top five largest IT investments that organizations undertake (Johnson et al., 2023). Implementing an ERP system is a multifaceted endeavor that necessitates organizational and technical changes (Garg & Agarwal, 2014). Deploying ERP systems is frequently accompanied by a diverse range of inherent risks that encompass various factors, including resistance to change, project management challenges, stakeholder involvement, inadequate training, integration difficulties with existing systems, and poor performance (Zendehdel Nobari, Azar, Kazerooni, & Yang, 2022). Consequently, these implementations have a history marked by significant failures and instances of exceeding budgetary estimates (Coşkun, Gezici, Aydos, Tarhan, & Garousi, 2022; Hustad & Olsen, 2014). The process of deploying an ERP system requires the execution of various complex technical tasks, including activities related to data configuration, adaptation, and conversion (Haddara, 2018).

Documentation plays a vital role in ERP project management and communication. ERP documents typically encompass (a) defining the project scope and business requirements, (b) engaging in business process modeling, (c) formulating architectural blueprints and integration

strategies, (d) developing plans for security measures and training, (e) implementing customization strategies, and (f) addressing data management concerns (Carutasu & Carutasu, 2015; Grobler-Debska et al., 2022). However, the proliferation of local initiatives tends to degrade their quality and accessibility, and frequent workarounds often cause ERP documents to be outdated (Maas, van Fenema, & Soeters, 2016).

Agile methods prioritize communication, collaboration, self-organizing teamwork, short development cycles, and faster working software while de-emphasizing formality and heavy documentation (Dingsøyr, Nerur, Balijepally, & Moe, 2012; Heeager & Nielsen, 2020). Transitioning from plan-driven methodologies to agile development approaches has sparked a growing interest in re-evaluating documentation practices within system development projects (Voigt, von Garrel, Müller, & Wirth, 2016). Traditionally, most ERP projects have used a stage-gate implementation approach, analogous to the waterfall model, and have lacked the flexibility for iterative and agile development (Kaushik, Bharadwaj, Awasthi, & Sharma, 2017). Still, there has been a recent increase in adopting agile methodologies within ERP projects, resulting in varying levels of success due to cost overruns, employee resistance to change, steep learning curves, and potential project disruptions (e.g., Gren et al., 2019; Kraljić & Kraljić, 2020; Wijaya &

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Egeten, 2019).

The transition between waterfall and agile can be quite challenging when organizations deal with large information systems (IS) projects, such as ERP implementation (Paasivaara & Lassenius, 2014). They often struggle to fully realize the benefits of the agile method because of the scale and complexity of such projects (Madanian, Subasinghage, & Tachiona, 2021; Wijaya, Prabowo, & Kosala, 2018). Because ERP implementation is unique in nature, some large ERP vendors like SAP have developed their own system methodologies that incorporate agile elements (Kraljić & Kraljić, 2018; Nagpal, Khatri, & Kumar, 2015). Despite this, the body of research regarding the agile ERP documentation approach remains scarce.

Literature reviews on ERP implementation success commonly find studies reporting the importance of project management aspects, such as communication, project team composition, and project management tool use (Ali & Miller, 2017; Kronbichler et al., 2009). Past studies have not emphasized the importance of 'documents' as they are typically considered integral to project artifacts and tools. However, these artifacts and tools do play a significant role in project performance, encompassing a well-documented project charter and strategy, up-to-date progress reports, detailed task schedules, system requirement summaries, and the use of tools like Microsoft Project and JIRA (Besner & Hobbs, 2008; Jitpaiboon et al., 2019). Nowadays, these documents are mostly digital and are incorporated into multimedia platforms for workflow and documentation.

In the engineering context, Hicks, Culley, Gopsill, and Snider (2020) characterize the criticality of "digital footprints" (i.e., email, reports, platform models, and project documentation) for managing complex projects; they note the growth in the variety and volume of digital information on projects and impact of digital information availability on communications, project status, and workflow. For new product development, Blais, St-Pierre, and Bergeron (2023) find that inadequate project documentation results in losing project-related knowledge when employees leave the organization. They also observe that formal/informal communication methods, project documentation, and feedback on completed projects are crucial for avoiding the repetition of mistakes in future projects.

The focal point of the present study is ERP initiatives incorporating the agile approach, here given the complexity of the ERP project and real-time information needs of the agile process. We aim to comprehend how contemporary documentation practices have evolved because of digitalization, standardization, cloud-based solutions, and communication tools. The research is motivated by the necessity for a better understanding of the equilibrium between lightweight and comprehensive documentation while simultaneously identifying pivotal documents for ERP projects without compromising project outcomes. For this inquiry, the following research questions have steered the course of the study:

- (1) *How have the roles and forms of documentation evolved in agile-driven ERP implementation projects?*
- (2) *What are the current emerging best practices for documentation in agile-driven ERP projects?*

The present study uses field interviews to trace changing roles and forms of documentation. It also aims to capture emerging exemplars of documentation in agile ERP projects. This research is further motivated by several bodies of literature.

We revisit documentation theories and practices because of the significant evolution in digitalization, standardization, cloud solutions, and communication tools over the past few decades. Such reflections aim to understand contemporary documentation practices and how they have changed over time. Our research addresses the call to understand the balance between light and heavy documentation better (Heeager & Nielsen, 2018). Accordingly, we intend to determine what documents are still crucial and what can be considered "light" documents without affecting the outcome of an ERP project.

The structure of the present paper is as follows: Section two presents the relevant literature and lenses used in the study. Section three describes the methodology, and section four presents our findings. In section five, our findings are discussed. Sections six and seven highlight our implications for research and practice, followed by study limitations and suggestions for future research. Finally, we make some concluding remarks.

2. Theoretical background

In this section, we briefly survey the documentation and status of ERP research. We then clarify the core principles of the agile approach and compare them to the stage-gate approach, which, until recently, had been predominantly utilized in ERP implementations. Furthermore, we introduce the socio-technical dimension of the agile approach. Special attention is given to the challenges associated with the lightweight documentation that the Agile Manifesto advocates. We also introduce documentation theory as our theoretical framework, which integrates classical and contemporary perspectives on system documentation.

2.1. Documentation and evolution of ERP research

Over the past four decades, numerous studies on ERP implementation have covered a wide array of research topics.¹ Although the summary of those topics is not the goal of the present study, relatively recent research focuses include cloud-based ERP implementation (Shivam Gupta, Misra, Kock, & Roubaud, 2018), ERP consultancies (Jæger, Bruckenberg, & Mishra, 2020), sociocultural context and governance (Bala, Hossain, Bhagwatwar, & Feng, 2021), and analytical approach to ERP vendor selection (Czekster, Webber, Jandrey, & Marcon, 2019).

Previous studies on ERP implementation have predominantly employed a linear life cycle model and a traditional stage-gate approach for implementation. Additionally, except for a few conceptual studies (Wijaya & Egeten, 2019; Wijaya et al., 2018) and an unpublished preprint (Gren et al., 2019), the current research on agile ERP implementation primarily revolves around technological aspects and practical applications (Kraljić & Kraljić, 2018, 2020) that are predominantly found in conference proceedings.

ERP studies have rarely focused on documentation. However, Dutta and Kumar (2022) report that proper documentation ensures transparency, consistency, and effective knowledge transfer. Inadequate documentation methodologies can give rise to insufficient or erroneous documentation, ultimately leading to misinterpretation, miscommunication, and misalignment of expectations among stakeholders. Such adverse outcomes can ultimately result in failures during ERP implementation (Brown, 2004; Shah, Khan, Bokhari, & Raza, 2011; Wong & Davison, 2005). Effective writing skills and communication through written documents and face-to-face/digital interactions are imperative (Keil et al., 2013).

2.2. From stage-gate to agile ERP implementation

Studies on agile ERP projects focusing on documentation are scarce. For instance, Gren et al. (2019) report on 21 ERP implementation projects, of which 10 used the agile approach. The findings indicate that decision makers encountered difficulties distinguishing between the agile and traditional methodologies regarding release time frames, agility requirements, documentation practices, and project intricacies, particularly during the initial stages of the projects. Thus, we draw on previous research conducted on large-scale agile software development projects (Dingsøyr, Moe, Fægri, & Seim, 2018; Edison, Wang, & Conboy,

¹ See the summary of literature reviews by Kronbichler, Ostermann, & Staudinger (2009) as well as Ali and Miller (2017). Mahmood, Khan, and Bokhari (2020) also review the challenges and issues addressed by research.

2022; Heeager & Nielsen, 2018) because they share certain similarities with large-scale agile ERP projects.

Traditional waterfall development necessitates substantial upfront documentation, while agile development favors lightweight and flexible documentation generated on time (Pawar, 2015). The stage-gate approach meticulously formulates and rigorously reviews documents such as requirements, design specifications, and test plans before commencing development (Thummadi & Lyytinen, 2020). Such documentation defines the project scope and ensures that all stakeholders comprehensively comprehend the requirements and development process. In agile development, documentation is produced just in time and is continuously updated throughout the development process (Ambler & Lines, 2012).

The Agile Manifesto prioritizes functional software delivery over comprehensive documentation (Beck et al., 2001). Agile teams focus on rapid and frequent software delivery, relying on face-to-face communication to establish a shared understanding of project objectives and requirements (Schwaber & Sutherland, 2017). Although agile development does not completely eliminate documentation, it emphasizes creating agile and adaptable documentation. A common form of documentation in agile development is user stories, which are succinct and informal descriptions of features or functionalities (Lucassen, Dalpiaz, van der Werf, & Brinkkemper, 2016). These stories function as a means of communication between the development team and customer, effectively capturing the project requirements.

Lightweight documentation, however, may hinder traceability because documentation is the principal means of establishing traceability. For instance, Heeager and Nielsen (2020) highlight traceability issues in safety-critical contexts. They propose addressing safety requirements by incrementally tracking them and ensuring traceability between requirements and other components of the documentation. Agile ERP projects with critical safety requirements (e.g., pharmaceutical and healthcare domains) encounter similar challenges.

2.3. The socio-technical aspect of the agile approach

The agile approach is distinguished by its socio-technical processes and people-centric approach (M. Gupta, George, & Xia, 2019). Previous research has primarily concentrated on two fundamental constructs: technical agile practices, which encompass coding and software testing, and social agile practices, which entail social interaction, collaboration, and direct face-to-face communication (Hummel, Rosenkranz, & Holten, 2015). Scholars argue that comprehending these constructs is imperative for understanding how the agile approach impacts project outcomes (Recker, Holten, Hummel, & Rosenkranz, 2017).

Such a perspective is relevant for investigating documentation practices in agile ERP projects. ERP projects inherently possess socio-technical characteristics because they involve the entire enterprise, necessitating alterations in business functions and structures to become more process-oriented and requiring users to adopt new roles and work methods (Sørheller, Høvik, Hustad, & Vassilakopoulou, 2018). Then, the documentation process in agile ERP projects assumes a crucial role in the socio-technical implementation process, involving both technical tools and social interactions.

Although minimizing extensive documentation, organizations that opt for the agile approach often encounter challenges in establishing guidelines and best practices for effective document management. To illustrate, a case study conducted within a small- and medium-sized enterprise in Canada uncovered miscommunication regarding the implementation approach between the implementing company and its vendor/integrator in the early phases of ERP implementation because of the scarcity of comprehensive documentation to rely upon (Mamoghli & Cassivi, 2019). Another study reported that 70% of practitioners who selectively embraced the agile approach faced difficulty selecting and implementing agile methods, necessitating a wealth of prior experience (Baig, Shah, & Sajjad, 2017).

2.4. Documentation theory

Documentation theory is a theoretical framework that focuses on creating, using, and managing organizational records and documents (Guédon, 2001). It critically analyzes the social, cultural, and historical factors influencing document production, dissemination, and reception (Bowker & Star, 1999). In addition, it emphasizes the importance of documentation as a means of communication, accountability, and memory for organizations and societies (Olsen, Lund, Ellingsen, & Hartvigsen, 2012). Buckland (2018) states, “‘Documentation’ denotes either the process or the outcome of documenting” and “...to document something denotes the creating of didactic or evidentiary records of some thing or some process; the creation of *phenomena* (perceptible things-for-us) representing a possibly imperceptible *noumenon* (thing-in-itself)” (p. 425).

The process of documentation involves selecting, organizing, describing, and preserving documents in various formats, such as paper, electronic, or audiovisual (Case & Given, 2016).

Olsen et al. (2012) propose a comprehensive documentation theory encompassing various disciplines, including archival science, information science, and communication studies. The theory is based on the premise that documentation is essential for managing organizational and societal memory.

According to Lund (2010), “a document can be defined in a very broad sense” (p. 742). Olsen et al. (2012) further predict that “a definition will probably remain elusive” (p. 106). They argue that a broad definition of ‘document’ can encompass more than just written artifacts, including any form of human expression. This suggests that any form of communication or self-expression is a form of documentation. For instance, a musical or rock concert is considered a document, just like a written legal document (p. 110–111). Additionally, the authors use fireworks as an example of a short-lived and ephemeral document. When people watch fireworks, the document vanishes instantly.

Frohmann (2009) even asserts, “There are good reasons for pursuing studies of documentation without the impediments of definitions of ‘document’ or ‘documentation.’” (p. 291). Indeed, the evolution of digital media has expanded the variety of documentation forms (e.g., hyperbooks and online documents), genres (e.g., digital notes and e-Kanban), and content means (e.g., hypertext, graphics, and videos). Contemporary digital platforms can easily add textual comments, hyperlinks, and even audio/visual notes to digital documents.

Documentation theory recognizes the importance of context in the interpretation and use of documents. As Bowker and Star (1999) note, documents are not simply neutral carriers of information but are shaped by the social, cultural, and political context in which they are produced and used. Therefore, documentation practices must consider users’ cultural and linguistic diversity and the changing social and technological contexts in which documents are created and used (Guédon, 2001). From a contemporary theoretical perspective of documentation, Lund and Skare (2010) emphasize that documents have three aspects: technical, social, and mental. The concept of documentation has also been applied to digital contexts, where documents take on new forms and are subject to new challenges related to preservation, access, and authenticity (Buckland, 2018). The use of digital technologies in documentation has brought about new opportunities for collaboration, sharing, and dissemination of information, as well as new challenges related to privacy, security, and control (Case & Given, 2016).

In the past few decades, the digitization of documents has brought about significant changes to documentation and its working. Documentation has certainly been enabled by technological means, such as writing, printing, telecommunications, and document copying (Buckland, 2015). At the same time, documentation has a social aspect— and status as a document (as actual or potential evidence of something) is an individual, personal mental judgment and, therefore, subjective (Buckland, 2016, p. 2). Buckland (2016) further states, “A document must have both physical and mental properties, but since the mental processes

are culturally entangled with the social, the status of being a document necessarily also entails a social dimension indirectly through the mental” (p. 3). Furthermore, the advancement of society makes the division of labor based on more specialized knowledge inevitable, resulting in increasing mutual reliance and coordination through communication using documentation (Buckland, 2015, 2016).

The most tangible aspect is the document as an object. Documents can take the form of printouts or various digital media. As documents become predominantly digital, profound changes emerge, such as the accessibility, interactivity, and searchability of documentation contents. The value of content—data, information, or knowledge—is inherently intangible (Buckland, 1991). The contents generally pertain to facts, subjects, events, and so forth. These contents are exchanged in communication processes. Thus, documents act as the means of the communication process. The same content can be interpreted differently, depending on the context or situation. Table 1 summarizes three fundamental theoretical perspectives of documentation—documents as the means of communication, documents as content (data, information, knowledge), and documents as an object (forms, media).

2.4.1. Classical perspectives on system/project documentation

Halloran et al. (1978) define system documentation as “the descriptive information that explains the system, provides the audit trail of modifications to the system, and serves as a training aid” (p. 3). They suggest that nine criteria determine the quality of documentation: readability, completeness, accuracy, ease of update, change tracking, functionality, identification of responsibility, identification of authority, and adherence to the organization’s documentation standards.

In a classic article on the waterfall approach, Royce (1970) lists six types of system documents: software requirements, preliminary design, interface design, final design, test plan, and operating instructions. Klingler (1987) further elaborates on the different types of documentation, including physical model specification, system requirement specification, system design specification, users’ manual, system test plan and procedures, acceptance test plan and procedures, and functional design specification.

Previous studies have proposed several key purposes of documentation. Written records offer a tangible means of communication between interfacing designers compared with verbal records (Royce, 1970). Documentation clarifies specifications and designs while describing the logic of how systems perform their tasks (Osborne, 1988). Other benefits include improved programmer performance (Benbasat, Dexter, & Mantha, 1980), lower maintenance costs (Dekleva, 1992), and efficient end-user training (Craig & Beck, 1993). In the context of digital documentation, Sprague Jr (1995) summarizes organizational values as those improving the communication of concepts and ideas, reengineering basic business processes, and leveraging organizational memory.

Table 1
Three theoretical perspectives on documents.

Means of the Communication Process	Content (Data, Information, Knowledge)	Object (Forms, Media)
Information as process; what they know is changed; situational circumstances (Buckland, 1991)	Information as knowledge; fact, subject, event; intangible (Buckland, 1991)	Information as object; object (data, forms); tangible (Buckland, 1991)
Documentation as complementary to communication (Lund, 2010); document as social object (Lund & Skare, 2010); document as functional view (Buckland, 2015)	Document as mental object (Lund & Skare, 2010); document represents a semiotic view (Buckland, 2015)	Document as physical object (Lund & Skare, 2010); material view on documents (Buckland, 2015)

2.4.2. Modern perspectives of system documentation

“Working software over comprehensive documentation”² – The Agile Manifesto.

In the past two decades, the agility and speed of system development have received increased attention, with the emergence of agile approaches and other trends such as cloud computing, cloud ERP, software development and operations (DevOps), service-oriented/microservice architecture, and virtualization. One key principle of the agile approach is that working software is the primary measure of progress,³ prioritizing it over comprehensive documentation (Swadha Gupta & Gouttam, 2017; Stettina & Heijstek, 2011). Since the Agile Manifesto was developed in 2001,⁴ studies have discussed documentation needs, challenges/problems, and guidelines/strategies.

Studies have identified two main aspects of documentation needs. First, documentation is critical for project success, including requirements (Verner, Cox, Bleistein, & Cerpa, 2005) and architecture knowledge (Jansen, Avgeriou, & van der Ven, 2009). Documents serve as important boundary objects for teams separated across multiple locations and time zones (Rubin & Rubin, 2011) and are important for governance (Zanzig, Francia III, & Francia, 2015), decision-making, and development aid (Zhi et al., 2015), and maintenance (Selic, 2009). These needs pertain to both the content and communication process perspectives of documentation. Second, documentation is necessary for traceability in terms of compliance with legal requirements, such as the Sarbanes–Oxley Act (Masli et al., 2016) and contractual obligations (Gonzalez, Gasco, & Llopis, 2005). The traceability requisites concern the content perspective of documentation.

Numerous studies have addressed the five main challenges of documentation: knowledge quality, usability, motivations and consequences, resources, and learning and methodology. The first two pertain to the content perspective of documentation and partially to the communication process and object aspects. Research has highlighted that undocumented knowledge results in the loss of valuable knowledge (Massingham, 2018; Rubin & Rubin, 2011; Seleim et al., 2005).

Furthermore, valuable knowledge is often not captured during documentation (Disterer, 2002; Seleim et al., 2005; Stettina & Heijstek, 2011), leading to incomplete or inadequate documentation, which is also known as documentation debt (Mendes et al., 2016). This is because of various factors, such as the complexity of knowledge and the lack of incentives for knowledge-sharing. For example, system architectures are often too complex to be adequately documented, resulting in insufficient documentation in many enterprise architecture (EA) initiatives (Roth, Hauder, Farwick, Breu, & Matthes, 2013). Moreover, software developers may be reluctant to share valuable knowledge to safeguard their job security (Seleim, Ashour, & Khalil, 2005), and companies may not fully appreciate the importance of documentation (Disterer, 2002), which can result in insufficient incentives for project personnel to document their knowledge.

In addition, finding relevant information in extensive paper-based documents can be challenging, while digital searches may take twice as long as paper-based searches (Voigt et al., 2016). Other notable challenges include a lack of organizational resources such as time and budget, scheduling conflicts (Forward & Lethbridge, 2002), inadequate guidelines for documentation, especially in agile approaches (Hoda, Noble, & Marshall, 2012; Kasauli, Liebel, Knauss, Gopakumar, & Kanagwa, 2017), and limitations in organizational learning, especially for documentation (Kasauli et al., 2017).

The proposed solutions for addressing these challenges include shorter content (Hadar, Sherman, Hadar, & Harrison, 2013), high-level architecture models (Selic, 2009), selective tools with straightforward documentation processes (Rüping, 2005), automated documentation

² <https://www.agilealliance.org/agile101/the-agile-manifesto/>

³ <https://www.agilealliance.org/agile101/the-agile-manifesto/>

⁴ <http://agilemanifesto.org/>

(Rong et al., 2019), legitimization of documentation (Stettina, Heijstek, & Fægri, 2012), and job security assurance (Seleim et al., 2005). Some studies also highlight using an approach to lightweight documentation (Salah, Paige, & Cairns, 2014) and cloud and web tools such as Wikis and Google Docs (Farwick, Schweda, Breu, & Hanschke, 2016).

Table 2 summarizes how the three perspectives (content, communication, and object) are related to the needs, challenges, and solutions for documentation addressed in existing studies. It is worth noting that most prior research has focused on the content perspective, with less attention given to the other two perspectives. Furthermore, despite the growing popularity of agile approaches and advancements in media technologies, there have been an insufficient examination of ERP project documentation’s changing roles and impacts.

3. Research method

We conducted an exploratory case study to gain insights into documentation practices in large-scale IS projects, specifically focusing on ERP implementation and supporting operations in firms. Our study aimed to provide a comprehensive overview of documentation practices rather than an in-depth analysis of a single organization. Therefore, we gathered information about documentation practices from various projects and field experts to obtain a broader understanding of the phenomenon under study, following the approach of Eisenhardt and Graebner (2007). The case of “documentation practices in ERP projects” is based on the experiences of different actors representing various industries, vendors, and user organizations. However, current ERP systems interact with various other system entities, and the boundaries of ERP projects may overlap with those of other projects. Through the case study, we aimed to understand the use of documentation and the practical challenges faced during ERP implementation. We investigated the perspectives and documentation procedures of different actors involved in ERP project implementation, intending to reveal the importance of various documents and the content created and used during an ERP project and beyond. Additionally, we explored how and why documentation practices have changed over time.

Our data collection methodology followed the expert interview technique proposed by Meuser and Nagel (2009). Expert interviews gather comprehensive knowledge from individuals who have extensive expertise and knowledge in a specific field. These interviews play a crucial role in exploratory research studies by identifying

Table 2
Key findings from the system documentation literature combined with the three theoretical perspectives of documents.

	Means of the Communication Process	Content (Data, Information, Knowledge)	Object (Forms, Media)	Other
Needs	<i>Project Success Requisites</i> Documenting requirements & architecture, boundary object for separated teams, decision & development aid, maintenance, governance <i>Traceability Requisites</i> Compliance, contractual obligations			
Challenges	<i>Knowledge Quality & Usability Issues</i> Loss of undocumented knowledge, incentives & motivations for knowledge sharing and transfer, incomplete/non-updated contents, too complex to document, extremely time-consuming digital searches			Resource constraints Lack of guidelines Organization having to learn how best to document
Solutions	<i>Guidelines</i> (e.g., readability, usability, and process), <i>shorter contents, focus on architecture & design models</i> <i>Integrated document platform, media, & tools</i> (e.g., Wiki, cloud docs, and Excel) <i>Legitimize documentation, job security, automated approach</i>			

“crystallization points” (Bogner, Littig, & Menz, 2009) and offering unique insights and perspectives based on the interviewees’ experiences. Furthermore, expert interviews provide valuable practical examples derived from real-world business cases. Nonetheless, it is important to acknowledge that this method has limitations, particularly in defining an expert. Consequently, we carefully considered the selection of experts.

The majority of the interviewees possessed a minimum of five years of experience in ERP implementation. The interviewee pool comprised project managers, system integrators (SIs), business managers, system developers, and ERP consultants who exhibited expertise in various ERP and related systems. Eleven of the total interviewees were system consultants involved in the initial planning and management of the project, with their ERP projects typically spanning multiple countries and organizational units. Also, two specialized in system integration. These consultants were selected based on their knowledge of multiple organizations and extensive experience in implementing ERP and related systems. Three interviewees were “internal” consultants who interacted with stakeholders from different organizational units. Among them, one interviewee was an application developer for an off-the-shelf system within a large organization, while another possessed substantial expertise in cloud-based ERP implementations. Finally, one interviewee was a business manager and had previously acted as a project manager in two organizations. The insights provided by these interviewees offered perspectives from internal members of the organizations involved in the study.

We conducted 23 interviews between 2016 and 2020 with expert participants from the US and Norway after obtaining consent from each participant. The interviews were semi-structured and guided by an interview guide (see Appendix A). The data collection process experienced unavoidable delays, particularly because of the COVID-19 pandemic. The interviews were conducted mainly via telephone and Skype/Zoom, with a few performed face-to-face. Table 3 provides information about the interviewees, including their industry experience and roles in ERP projects. During the interviews, the experts shared stories and events from their experiences in both ongoing and previous ERP projects. The interviews were mainly dialogue-based and open-ended, allowing new topics to emerge during the discussions, following Myers and Newman (2007).

Data collection and analysis were performed iteratively. After conducting the initial interviews, the interview guide was slightly adjusted based on the emerging findings. The interviews were recorded and transcribed verbatim. Transcripts and quotes from Norwegian interviews were translated into English. For the data analysis, we partially applied the principles of a grounded theory approach, using first- and second-cycle coding for each transcript (Sarker et al., 2001; Stettina & Heijstek, 2011; Strauss & Corbin, 1994).

The authors undertook a rigorous review of the interview transcripts, carefully examining them on multiple occasions to develop familiarity with the interview data and to gain a comprehensive understanding of its content. Subsequently, an open coding approach was employed to identify and label various concepts and themes from the interview data. Recurring patterns and topics were sought during this analysis process. Once the initial coding was completed, connections were established between the codes, forming broader categories through axial coding. This stage facilitated the identification of significant relationships between these categories.

In the subsequent analysis phase, data from the first cycle were further scrutinized and grouped into recurrent themes based on emerging patterns. Upon the conclusion of the coding process, specific attention was given to selecting key content related to project communication, documentation practices, and documentation forms/media, ensuring that we accurately captured the relevant viewpoints of the interviewees.

Throughout the analytical process, extensive discussions occurred among the authors to ensure a comprehensive understanding of the

Table 3
Profile of interviewees.

ID	Role	Industry	ID	Role	Industry
P1	Consultant	Agrochemical, services	P13	Consultant	Multiple ERP projects in different industries
P2	Consultant	Higher education, materials	P14	ERP Consultant (user organizations)	Engineering & construction
P3	Consultant	Multiple industries	P15	ERP Consultant (user organization)	Engineering & construction
P4	System Developer	Financial services	P16	ERP Consultant (user organization)	Power & Energy
P5	Consultant	Multiple ERP & *CRM projects in different industries	P17	Consultant	Multiple ERP projects in different industries
P6	Manager	Financial services	P18	Consultant	Multiple ERP projects in different industries
P7	Consultant	Multiple ERP projects in different industries	P19	Advisor (vendor)	Multiple ERP projects (distributed systems) in different industries
P8	Consultant	Multiple ERP projects in different industries	P20	Consultant	Multiple ERP projects in different industries
P9	Project Director	Food and beverage industry, services	P21	Project Director	Food and beverage industry, services
P10	Project Director	Pharmaceutical industry	P22	Consultant	Multiple ERP projects in different industries
P11	Consultant	Multiple ERP projects in different industries	P23	Training Manager and Project Manager	Multiple cloud ERP projects in different industries
P12	Project Director	ERP projects in the electronics and office equipment industry			

* CRM: Customer relationship management

empirical material. Analytical memos were collaboratively written, discussed, and combined to reach a consensus on the main content. The coded empirical material was then organized and summarized using the method proposed by Miles and Huberman (1994) for systemizing and reducing data. To clarify the text’s meaning, we used graphical and tabular formats for the themes and categories, aligning with the approach advocated by Kvale and Brinkmann (2009).

When new interviews were conducted, a thorough comparison was made between the new and existing data sets to ensure consistency and coherence. This iterative process enabled us to refine the coding scheme and identify gaps or overlaps in the analysis. For instance, one of the main categories, namely “Current document practice” (see Appendix B), encompassed central themes or subcategories, such as “essential document,” “range of documentation practices,” “documentation volume,” and “shelf life of documentation.” These themes were supported by quotes from the data, which served as illustrative evidence. Table 4 combines the three theoretical perspectives and keywords from the

Table 4
Three theoretical perspectives and keywords.

Means of the Communication Process	Content (Data, Information, Knowledge)	Object (Forms, Media)
Communication, read, reading, write, wrote, writing, create (documents)	Requirements, testing, planning, governance, compliance, memorialize, life, lifespan, record	Media, Word, Excel, spreadsheet, PowerPoint, Wiki, recording, video, platform, portal, SharePoint, Teams, centralized

Table 5
Conceptual classification of documents.

Focus	Structured, Formal, Persistent/Nonvolatile	Unstructured, Informal, Dynamic/Volatile
Project	Charter, scope, timeline, budget, RACI (responsible, accountable, consulted, and informed) with task list and assignments Fit-gap analysis	Email communication Meeting notes Chats
System	Requirements (functional, technical) Process diagram Design (functional, technical) Diagrams (network, information technology (IT) infrastructure) Configuration Test cases Training materials Support matrix	Product backlog Sprint backlog Post-It notes Kanban Whiteboard

findings. Table 5 exemplifies the outcomes of open coding and axial coding, providing a visual representation of the established relationships between recurring themes across different interviewees, particularly regarding the classification of documents.

In addition to utilizing interview data, we supplemented our research by creating two vignettes in narrative form for an improved contextual understanding of complex phenomena (Hughes & Huby, 2004). Thus, we incorporated two vignettes offering detailed descriptions of the social context and influential factors impacting documentation practices in two agile ERP projects (Appendix C). For instance, Günther, Mehrizi, Huysman, and Feldberg (2017) used vignettes to elucidate the potential challenges organizations face in harnessing value from big data. In our study, the vignettes provide concrete illustrations of various narratives of agile ERP implementations within distinct organizational settings. This methodological strategy allows for a more robust and multidimensional examination of the research topic while enhancing the quality of the research findings (Klotz, Kratzer, Westner, & Strahringer, 2022).

Our research focuses on the emerging reality of documentation practice, drawing on three theoretical perspectives of documentation theory and the constructs of social and technical agile practices. As such, we integrated our empirical material with relevant theoretical concepts in sense-making by following Klein and Myers (1999). We utilized documentation theory and agile constructs as analytical lenses and employed reflexive exploration (Blair, 2015) by combining the lenses with the relevant literature on ERP studies and our empirical findings. This approach allowed us to understand documentation practices in ERP projects better over time.

4. Findings

We have identified several themes from our empirical data and categorized them into four main categories: (1) conceptual classification of documents, (2) current documentation practices, (3) innovation in documentation practices, and (4) crucial complements to documents. In this section, we provide an overview of the main content of each

category, along with related themes. Additional details from the empirical findings, including sample quotes from the interviewees, are provided in [Appendix B \(Table B1, B2 and B3\)](#).

4.1. Classification of documents

Before discussing current and emerging documentation practices, we categorized the types of documentation based on their focus (project vs. system) and attributes (structured, formal, persistent vs. unstructured, informal, dynamic/volatile). [Table 5](#) lists the document types referred to by the interviewees.

The interview data indicate that innovation in contemporary documentation practices can be achieved through various media and communication platforms/tools. As a result, documents have become more dynamic, informal, and in real time. Furthermore, unstructured/informal documents complement the structured/formal documents, reducing the overall documentation volume and enabling more efficient sharing and updating of contextual information in real time.

The interviewees highlighted the importance of informal documents, stating, “I haven’t lately seen people do it in more formal documents, but sometimes, it will just be a businessperson who writes a super detailed email ... for lack of a better term, the equivalent of a back of a napkin functional spec” [P9]. “The more effective stuff is, the more informal communication that you have with your stakeholder” [P17]. In addition, they noted the efficiency of the communication process to be increasingly important: “The attention span of folks who are using the documents is reducing a lot. If it is more than one page, I’m not reading it” [P22].

Paradoxically, project managers consume and digest considerable amounts of information, even though most interviewees appreciate the brevity of communication: “I think it’s really important for the project manager ... to spend more time in the process of understanding than just writing on a piece of paper” [P2]. “If you’re reading technical documentation and functional documentation—and I usually read both—there’s no kind of anything that just doesn’t make sense” [P20]. “As a program lead, it’s sickening to watch how much you write and read” [P21].

The evidence shows that documentation appears seamlessly embedded in the communication process of an ERP project. Documents may be formal or informal, and the distinction between informal documents and emails seems blurred. Furthermore, we have found a dichotomy of information processing between project managers and other team members. Project managers rely heavily on reading and writing all kinds of documents to manage a complex ERP project.

4.2. Current documentation practices

Our empirical research has identified several key findings related to documentation practices in agile ERP implementation projects. First, certain documents were considered critical and indispensable for ERP implementation, including business requirements, fit-gap analysis documents, requirement traceability matrices, functional requirements, technical requirements, functional design documents, and technical design documents [GF1, [Table B1](#)]. Second, documentation practices varied significantly by industry (e.g., engineering, pharmaceutical, and financial), organization ownership (private vs. public), organization size, and project scale [GF2, [Table B1](#)]. The interviews revealed a lack of widespread documentation methodology for agile ERP implementation [GF7, [Table B1](#)], which partially explains the varied documentation practices reported by the interviewees [GF2, [Table B1](#)]. One exception was when a vendor required strict adherence to its implementation methodology, including documentation templates.

Third, all interviewees remarked that the volume of documentation has been decreasing compared with the waterfall era [GF3, [Table B1](#)]. However, this remark depended on the interviewees’ industry, organization, and project scale. Fourth, some interviewees mentioned that

documents were not optimally updated, with their usefulness expiring toward the end of the project or shortly after project completion [GF4, [Table B1](#)]. One interviewee stated that the documentation quality declined as the go-live date approached.

Our data also indicated multiple mentions of “throwaway” documentation content, which the agile approach may have influenced. The usefulness of this content does not last beyond the completion of the project. “I think the lifespan of document usefulness depends on whether the component in question is volatile or stable and whether updating documents is part of the team’s workflow and resource allocation” [P11]. “The usefulness of all of these documents after the project ... kind of lose their importance... maybe six months or so afterward” [P12]. “So the lifespan of most documentation ... is usually the life of the project” [P17].

However, the interviewees also pointed out that documentation had value after the go-live, especially when an ERP system was customized: “The value of system documentation is essential to the application manager who is responsible for the maintenance and administration of the system after going live—to see why choices are made, what is the basis for a decision, and how things are configured. Especially when it comes to tailoring, this is important” [P13].

Fifth, documents may be perishable items, but they serve as crucial venues for communication between project managers, stakeholders, and end users [GF5, [Table B1](#)]. Documents enable project managers to increase situational awareness of the project. One interviewee described documentation as a byproduct of ERP implementation, allowing project managers to ensure that each milestone is met. Another called documentation a “necessary evil.”

Sixth, documents are often written by consultants or SIs [GF6, [Table B1](#)]. Large projects tend to have many employees in “junior” positions, and documents were their learning tools for understanding clients’ current systems and business processes. Moreover, the interviewees did not assume content accuracy and completeness. “We’re finding that not everybody writes well; not everybody knows how to organize their thoughts on paper to make it ... useful” [P3]. “It could be super bare-bones, but it should provide context on what was the original task, explaining anything about the context” [P6]. “We just need you to fill out a spreadsheet with what you need and why you need the data. It doesn’t have to be perfect, just good enough for us to get started” [P9].

Many recent ERP vendors, especially those offering cloud-based ERP, have adopted a continuous update approach. “Technology, in general, is moving toward continuous delivery, integration, or deployment methods, so we maintain a changelog throughout the project to track all configurations” [P5]. Many interviewees emphasized the importance of following best practices for documentation: “We still try to follow best practices at least partially to ensure better knowledge retention and ongoing operations” [P3]. Following best practices reduces documentation and centralizes content when the vendor hosts and updates ERP documentation on cloud platforms. “We aim to have centrally available best practice documentation and provide training based on those documents” [P5]. “During the blueprint phase and scope validation, we matched our high-level requirements to the global template and best practice solution proposed by the vendor” [P12]. “We follow the best practices and model companies baked into the ERP tools” [P18]. “We are seeing renewed energy around best practices, model companies, and templates that can accelerate and de-risk projects” [P19].

4.3. Innovation in documentation practices

Documentation practices face a trade-off, while ERP implementation projects have increasingly adopted the agile approach. ERP projects involve tight communication between project teams and stakeholders/end users regarding system details. These projects require the documentation of a complex dataset on the fit-gap analysis between the as-is and to-be systems. The documentation must capture the detailed functionality and related data of various business processes.

Innovation in documentation practices is made possible by document automation tools and the audio-visualization of document contents. These innovations are particularly applicable to (a) end-user training documents and (b) document creation when existing documents for the customized software and connected systems are outdated or missing. End-user training is crucial for the success of ERP implementation. Some ERP systems now have tools to generate audiovisual training materials with screen captures as trainers use the new ERP systems. Such audiovisual tools can also be applied to testing documents. For outdated or missing documents on software artifacts, reverse engineering tools can generate the current information as needed.

Communication media platforms and tools have simplified the process of accessing and searching for documents, thereby increasing the effectiveness of documentation. The expanded variety of documentation media is driven by the pursuit of convenience and efficiency with consolidated multimedia platforms. The interviewees noted that younger generations, in particular, prefer video and multimedia formats over written text for learning and communication. This has led to the use of communication platforms, such as Microsoft Teams, chats, podcasts, video recordings, and so forth, for document management and collaboration. As a result, the concept of documentation has broadened, with any written digital communication considered part of ERP documentation. Furthermore, some communication platforms are owned by vendors or are public, expanding the boundary of ERP documentation from private to hybrid (privately owned but partially supplemented with publicly shared documents).

The effectiveness of multimedia documentation has been recognized, with documents now including text, diagrams, spreadsheets, and PowerPoint, and not being limited to written form. Oral and video forms of communication are increasingly preferred, especially among younger generations who are accustomed to multimedia communications through platforms like YouTube, Facebook, Instagram, TikTok, and so forth. However, the frequent use of multimedia may have shortened the attention span among younger generations of ERP implementers, implying that long, wordy documents are not likely to be read. Nonetheless, individual differences and preferences for documentation mode should be considered because some individuals may still prefer traditional written documents over videos or other multimedia formats. [Table B2](#) provides additional empirical evidence of the documentation innovations identified in the findings.

4.4. Essential complements to documents

ERP implementation success relies on up-to-date and relevant documents and contextual information. For example, project members must understand why certain decisions are made or how to interpret and use documented content. Face-to-face meetings with subject matter experts (SMEs) are valuable and efficient. “We have handover meetings where developers sit with the customer and the team. They need to review the system documentation beforehand. ... These meetings are important supplements to the documentation because they help identify weaknesses in the system documentation or lack of competence” [P13].

Meeting notes can be a good substitute for contextual information when SMEs are unavailable. They can help reduce the “formal” documentation volume or even eliminate their needs. In the past, documents were a primary way to capture system knowledge and minimize the risk of knowledge loss when SMEs left the organization. However, recording SMEs’ presentations could be a practical alternative to documenting specific pieces of their knowledge. Moreover, the short shelf life of ERP documents may not justify the cost of writing all system facts. [Table B3](#) provides additional empirical evidence.

4.5. Vignettes illustrating best practices

We share two vignette stories from our research findings to illustrate how best practices can be applied ([Appendix C](#)). This approach helps

generalize the findings and conveys a rich contextual account beyond the specifics of organizations (Günther et al., 2017; Kotlarsky, Scarborough, & Oshri, 2014). These stories highlight two different approaches to documentation practices.

The vignettes depict two distinct organizational contexts. The first vignette is about an ERP project in a mid-sized company, and the second story is about an ERP project in a larger company. The transition to a more agile ERP documentation approach occurred smoothly in the first vignette, which concerns a mid-sized organization. This can be attributed to several factors. First, the project scope in a mid-sized organization is typically more limited. As a result, the scale of change required for adopting the agile approach was smaller, making the transition easier to manage. Second, the presence of suitable skills among the project manager and team members helped adapt to agile implementation. Additionally, the emphasis on leveraging multimedia technologies and establishing a shared platform for all project participants ensured effective communication and collaboration among them and enhanced the overall project outcomes.

In contrast, the second vignette depicts a project with greater complexity and a broader scope. The challenges faced in this scenario were multifaceted, with two main factors impacting the project. First, there was an issue with policy formulation regarding the selection of tools for implementation. This led to a problem in utilizing the shared platform effectively, impeding seamless coordination and collaboration among project participants. Second, some key stakeholders were unfamiliar with the agile mindset. The project team needed additional effort to manage them.

The vignettes show that the best approach to agile documentation depends on organizational contexts and familiarity with the agile methodology.

4.6. Synthesis—analysis of the findings

[Fig. 1](#) summarizes our findings and depicts the paradigm shift in documentation practices within ERP implementation projects, transitioning from the traditional waterfall methodology to an agile approach. Documentation practices have undergone innovation. Multimedia documents on digital platforms and collaboration and communication channels, such as Teams, Zoom, and others, have replaced extensive, formal written documentation. Additionally, current documents have shorter life cycles and are considered dynamic throwaway artifacts. Our empirical research demonstrates the increased utilization of visual graphics, videos, and podcasts. System developers and project managers prefer concise documents that provide an overview, facilitating easy transfer and comprehension. Conversely, end users prefer videos and podcasts more strongly than lengthy written user manuals.

Large ERP projects with challenges adopting an agile methodology could incorporate agile principles in postimplementation customization projects. These subsequent endeavors of a more confined scope allowed organizations to initiate and familiarize themselves with the agile approach.

Certain ERP implementations used a hybrid approach and faced difficulty in transitioning to an agile methodology, mainly because of a substantial need for documentation and reduced flexibility. This predicament was evident in organizations operating critical infrastructures obligated to adhere to stringent compliance regulations. Our observations reveal that many organizations continue to employ the stage-gate methodology or attempt to incorporate agile components to adopt a hybrid approach.

5. Discussion

Our research findings have shown that contemporary documentation practices are evolving to become more dynamic and informal, as well as in real time. This shift can be attributed to several factors, including the increasing pressure on digitalization and digital transformation in

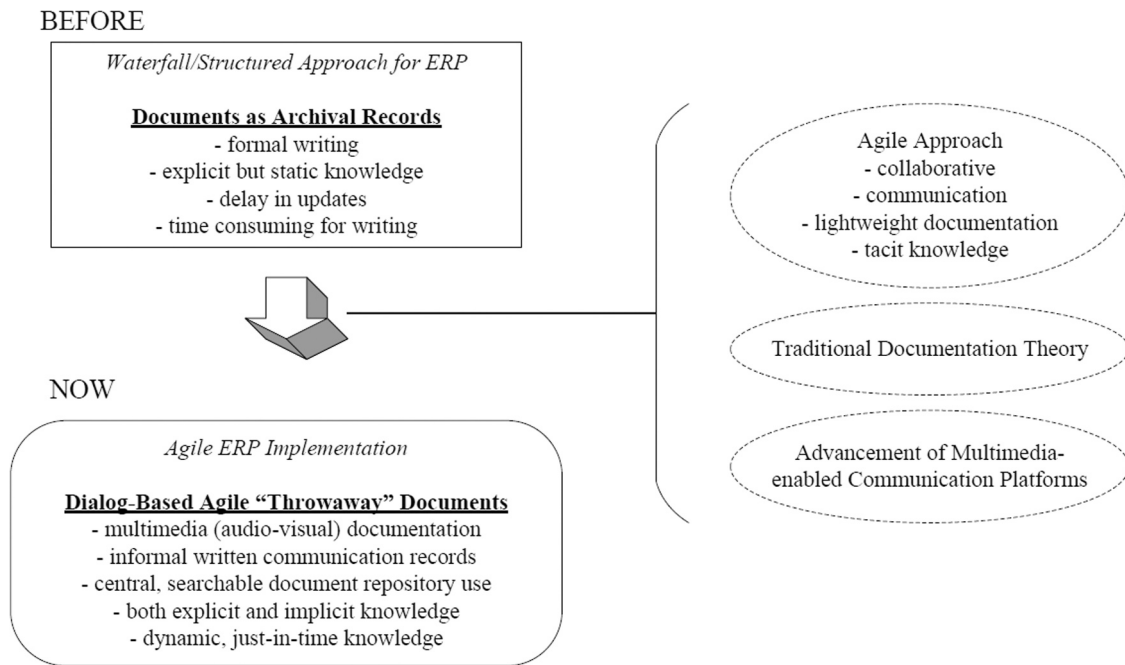


Fig. 1. Transformation of ERP Documentation.

organizations (Rueckel, Muehlburger, & Koch, 2020), the impact of agile approaches that emphasize less documentation, the emergence of ERP cloud solutions, the increased use of communication media, and the creation of more informal and volatile documents.

This shift reflects a new reality in which the paradigm of system documentation has been quietly but steadily changing. The boundary of what we considered “documents” was around relatively well-defined structured information. It has now expanded to include unstructured information on various media as well. Multimedia documentation and communication platforms enable this new reality by automatically documenting activities like planning and face-to-face meetings. As discussed in the theoretical background section above, Buckland (1991, 2016) and Olsen et al. (2012) contend that the traditional conceptualization of ‘documentation’ as paper-based embodies an incomplete perspective.

Documents are now digital, changing how they are organized and stored. How we capture system requirements and project documentation has drastically changed with the decreasing use of paper. Various digital media forms, such as video recordings and instant message chats, are sometimes used instead of formal paper documents, expanding the definition of digital documents in ERP projects.

Any digital file can now be considered a digital document. The project participants used sophisticated search and retrieval mechanisms like hyperlinks and keywords to organize these digital documents. Additionally, the distinction between formal and informal documentation has blurred, with information artifacts such as emails and their attachments now considered de facto documents. Moreover, the socio-technical process embedded in an agile ERP implementation shows that the distinction between documentation (in terms of tangible artifacts) and communication (in terms of intangible artifacts) is becoming outdated. Documentation and the creation of tangible artifacts exemplify technical agile practices, while communication and intangible artifacts relate to social agile practices.

Companies increasingly use cloud solutions and centralized platforms for their organizational digitalization efforts. The focus on increased standardization and decreased customization has also reduced documentation volume. Assembling information in one place is key to facilitating information-seeking behaviors (Huang, Niu, & Pan, 2021). ERP project managers often face information overload and time pressure

during decision-making. Our interview data highlight the value of collecting information on one or a few documentation platforms for information accessibility and reduced search effort.

Leading software vendors post documentation online and maintain digital community networks where developers and end users can report issues and share solutions. Such content sharing is not limited to vendor-managed communities because end users often create and manage communities to share issues and educate each other, as documented in open-source software (OSS) communities (von Krogh, Haefliger, Spaeth, & Wallin, 2012). Most training material is now in videos and e-learning materials, with traditional extensive user manuals becoming increasingly rare.

In cloud-based ERP implementations, vendors take responsibility for creating documents as part of their ERP service. These documents are often created and revised through ongoing dialogues between the cloud vendor and customers. According to our findings, a cloud ERP implementation project leveraged one document in an advanced Excel sheet with the necessary details for configurations of the modules the customer has selected. The same document acted as a project document that tracked the project resources, including to-do lists for upcoming activities and meetings.

The impact of agile methodology is now visible, even though ERP projects are often approached with a waterfall-like methodology. Management expects faster and more frequent project deliveries, with minimal time wasted on formal project artifacts, such as detailed paper-based documents. Project teams are encouraged to find more streamlined, agile ways of capturing, delivering, and consuming critical information in digital forms.

The value of system documentation quickly depreciates after the system goes live because it is not used much in post-implementation. Project managers prefer recording activities and dynamically learning from emerging situations rather than producing copious, static documents. Our analysis of interview data identified key documents that the interviewees considered foundational. However, these documents were viewed as a “necessary evil.” These documents were shorter in content, focusing more on visualizations, graphics, and multimedia forms, and had a shorter lifespan, often not used after going live.

As media technologies change the nature of documentation, informal coordination and control mechanisms in ERP projects embrace

“throwaway” documents to make ERP implementation more adaptive and agile. We see the emerging practice of “throwaway” documents as an approach to completing project tasks in a “good enough” manner, one that is influenced by the agile approach. Our interview data indicate the increasing assimilation of the agile approach at a detailed project execution level, while the high-level structure of ERP projects still resembles the waterfall approach. Our analysis has also revealed documentation as a formal (explicit) and informal (social interactions) means of coordination and control, aligning with coordination theory and control theory as the theoretical foundations of the agile approach.

The project managers emphasized the importance of creating documents as part of the learning process in the project. However, many interviewees used traditional documentation less frequently but regarded electronic communication media (e.g., email, Zoom, SharePoint, and Teams) as more important. Reading was noted as how project managers receive the necessary data, information, and knowledge about the project status, so writing is required to gain an overview of complex ERP projects. The cognitive process theory of writing (Flower & Hayes, 1981) considers writing to be a set of distinctive thinking processes. In an increasingly virtual and remote communication environment, a combination of reading and writing may support developing and revising the project “script.” According to Tierney and colleagues (1989), “Writing appeared to serve as a mode through which the learner allowed ideas to come to fruition and resolved disputes. Reading was a resource for opposing views or further elaborations upon an idea” (Tierney, Soter, O’Flahavan, & McGinley, p. 166). Furthermore, “Writing transforms our cognitive abilities” (p. 623), and the integration of reading and writing combines internal and external cognitive processes (Menary, 2007). In this regard, ERP project managers act as writers.

In summary, we have observed a new reality and a shift in documentation practices in ERP projects. This shift involves three main changes:

1. Changes in infrastructure: The structure of content storage is now centralized on platforms and standardized.
2. Changes in the file types for documentation: There are more digitalization and multimedia files.
3. Changes in content types: The content itself is decreasing, with more of a focus on foundational documents at a higher level, visualizations, graphics, and dialogue-based documents (especially for cloud ERP projects). Additionally, more documents are discarded after systems go live (throwaway documents).

Despite these changes, reading and writing documents remain essential for project managers as a significant learning process. Our empirical evidence suggests that the agile approach is emerging in ERP projects, leading to innovations in documentation practices. We now see distributed throwaway documents on various digital media, platforms, and tools as a significant shift. This realization should guide the future design of an information management infrastructure to capture the evolving “digital footprint” (Hicks et al., 2020) of ERP projects and support the ongoing effective use of ERP systems.

6. Theoretical implications

We started with document/documentation theory (Buckland, 2016; Lund, 2010; Lund & Skare, 2010) and agile constructs (Dingsøyr et al., 2012) as the theoretical baselines. Our research findings have indicated that documentation still serves various crucial functions throughout the life cycle of an ERP project, including communication, collaboration, and facilitating knowledge transfer. The analysis involves classifying documents into system and project categories (see Table 5). The interpretation and significance of a document may differ depending on the organizational, social, and cultural contexts. However, we have seen an organic transformation of documentation. The findings suggest future

trajectories for documentation theory and knowledge management implications beyond ERP implementation.

First, we should recall the definition of “document” as “elusive” (Olsen et al., 2012), and digital media has expanded the variety of documentation forms, genres, and content means (Frohmann, 2009). Given our findings, we propose revising the definition to include unstructured information. For the “unstructured” characteristics, we refer to those offered by Ferrucci and Lally (2004): “information whose intended meaning is only loosely implied by its form and therefore requires interpretation in order to approximate and extract its intended meaning” (p. 455).

Theoretically, such characterization seems risky because the boundary of “documents” can become so broad that any communication artifact (e.g., email, audio, and video recordings) may become ERP documents. However, that is the reality shown in the second column of Table 5. If ERP documents include unstructured information, the theoretical domain of documentation and communication is blurred and overlapping. However, some scholars in the information science field appear to embrace and accept such a reality (Dvoenosa, 2013; Hjørland, 2015; Kebede, 2010). For the domain of information systems and information management, we should add to the definition of ERP documentation as “readily searchable and managerially relevant” ERP information. The “searchable” characteristic is pragmatically important because information would not be shared and used if it is not searchable.

Second, “throwaway” documents aim to enable timely, “good enough” information for agile project management. However, what are “good enough” documents regarding the relevancy and sufficiency of information? Quick access to pertinent information is a priority from an information seeker’s perspective. Woudstra, van den Hooff, and Schouten (2016) note that a time-pressured search may give fast and efficient results but compromise the quality of information and decision-making. For this, there should be “goldilocks ranges” for digital information searches over time, effort, and quality of information obtained (Matysek & Tomaszczyk, 2022). The reserve can be used to create information. Timeliness, writing effort, and information quality are the trade-offs. The timeliness and quality of “throwaway” documents may depend on the purposes and circumstances of how those documents are created and used. Future studies should develop theories on the right balance regarding document details, timeliness, and required effort levels.

Third, if ERP documents aim for searchable structured and unstructured information, the next theoretical implication is what information management approach we should take. One approach suggested is the holistic information asset management (HIAM) model, especially for digital transformation (Evans & Price, 2020). Given that the HIAM model is largely managerial, what would be a more practical and technical approach to storing and querying such information? A possible approach is to establish an ERP document portal similar to corporate portal sites. The portal approach has been around for the past two decades (e.g., Detlor, 2000; Dias, 2001). Nevertheless, the advancement of nontraditional database systems and search technologies used in big data analytics (Jimenez-Marquez, Gonzalez-Carrasco, Lopez-Cuadrado, & Ruiz-Mezcua, 2019) may enable the development of flexible, pragmatic ERP document platforms. Furthermore, future studies should address how to track both internal and external information within a portal. This is essential because there is a scarcity of research on the architectural aspects of portals designed for enterprise-external information sources, including trigger mechanisms for updating and searching for relevant information (Ehrensperger, Sauerwein, & Breu, 2020; Jimenez-Marquez et al., 2019).

The findings of the present study may also relate and contribute to documentation and knowledge management for cloud computing. The reality of recent enterprise cloud computing includes 89% of multicloud approach use (Duarte, 2023), dependencies on vendors (Garrison, Wakefield, & Kim, 2015), and complexity of microservice interdependencies (He, Tu, Wagner, Xu, & Wang, 2022). Contemporary

organizations must embrace the availability and adequacy of documentation for auditing (Chou, 2015) and timely routing of documents (Saratchandra & Shrestha, 2022). These challenges appear to correlate with those of knowledge management for agile ERP implementation.

7. Managerial implications

The emergence of the agile approach has resulted in a paradigm shift in ERP implementation. This can often cause confusion and conflict within an ERP project team, leading to inconsistent and less effective documentation practices. At the same time, the rapid advancement of multimedia communication platforms has enabled the organic transformation of ERP documentation, and the boundary between formal and informal writing has been obscured. Documentation is seamlessly embedded in various communication activities for ERP implementation. These changes take place gradually and continuously over time. As a result, both academia and practitioners overlook this organic transformation. We should update the notion of “documents” as archival records to dialogue-based, agile “throwaway” documents.

By recognizing this transition, we regard documentation as a means of just-in-time knowledge management for ERP go-live and continuous updates. A few major implications exist for the best project management for ERP and any complex systems. First, project teams and stakeholders need to unlearn the notion of “documentation” as formal written compositions and adopt a new definition. Nowadays documentation should be regarded as any readily searchable and managerially relevant structured and unstructured project information in text, audio, image, and video. Second, they need to develop an information management system in which diverse content and documents are tagged and indexed to be accessible and searchable. Third, this is technically and practically not an easy undertaking that can be accomplished in the short term. Instead, project leads must foster cultural and attitudinal change toward documentation management and practice. We should also remember that adopting the agile approach has been a journey over the decades and has involved cultural change and numerous small innovations (Lawrence & Yslas, 2006).

Toward those goals, it should be remembered that project managers who extensively engage with throwaway documents appear to have higher situational awareness and are more effective in managing ERP projects than those who do not. However, throwaway documents do not expel all traditional ERP documents, such as project charters and requirements trace matrices; throwaway documents complement them. Our study’s findings note that these complements include handover meetings, collaboration, and dialogues. They are crucial for successful agile ERP projects and represent agile social practices. Also noted is that the documentation practices in agile ERP projects involve both social and technical agile practices (Hummel et al., 2015).

Because of the wide variation in documentation practices in ERP implementations, team members often have different backgrounds and perceptions of the purpose, scope, depth, and expected life cycle of ERP project documentation. Therefore, ERP program management needs to deliberately define and communicate which documents are required and to what level of detail to prevent confusion and conflict within the team. One best practice is to establish a centralized communication platform, such as Microsoft Teams, to facilitate collaboration and store critical documents.

Despite the diversity in practices, certain documents remain critical. Program managers should clarify that, although a document is required, it needs to be “good enough” instead of perfect. Documentation should be concise and easily digestible. Program managers could consider using a “requirements trace matrix” as a best practice instead of lengthy narratives. Although ERP documentation may be perceived as transient and disposable, program managers should ensure that critical documentation is completed for audit trails and governance purposes. At the same time, managers should develop guidelines regarding “good enough” documents concerning their timeliness, required efforts, and quality.

Project managers should encourage ongoing dialogues and concise documentation as best practices to reduce the risk of misunderstandings. Many of the interviewees mentioned that daily scrums are becoming common and valuable for ERP projects because these meetings can facilitate cross-team communication and effectively promote awareness and collaboration. It is important to emphasize that documentation is a means of communication, not the end goal itself.

Finally, program managers should stay updated on automation trends and leverage emerging technologies to improve the project team’s productivity and accuracy. For example, fully leveraging testing automation (e.g., regression testing) can result in more robust and replicable testing, potentially eliminating errors that may occur with manual testing.

In particular, we recommend that ERP program managers consider adopting the best documentation practices, as shown in Table 6.

8. Limitations and future research agenda

The present study has several limitations and future research opportunities that need to be considered. First, the data were collected in the US and Norway between 2016 and 2020, and the insights obtained from the interviewees are based on industry norms and practices in these countries during the study period. This may limit the generalizability of the findings to other countries or time periods. Second, the empirical data used in the present study was comprised of qualitative information obtained from interviews with 23 field experts. Although these insights provide valuable qualitative data, it would be beneficial to complement them with quantitative data obtained through survey instruments to

Table 6
Best practices of ERP documentation in the Agile era.

Domain Activity	Best Practice
Planning	<ul style="list-style-type: none"> • Clarify what documents are lightweight and what documents remain comprehensive. • Discuss the extent and roles of documents billable by the vendor and consultants/SIs. • Create policies for storing documents centrally using collaboration tools. • Remind project participants that meeting minutes (especially concerning key decisions) are considered part of ERP documents.
Function mapping	<ul style="list-style-type: none"> • Store the requirements trace matrix in a visible and accessible location. • Encourage teams to use modern tools (e.g., AI transcription). • Record the discussions on business processes and required business rules/logic for audit.
Testing and QA	<ul style="list-style-type: none"> • Make full use of the requirements trace matrix. • Adopt automation testing/QA tools.
Training	<ul style="list-style-type: none"> • Incorporate screen captures and short videos in training documents. • Use central documents that capture knowledge and expertise to be shared across the team as a way to enhance knowledge transfer and prevent the loss of project knowledge.
Maintenance	<ul style="list-style-type: none"> • Plan to use reverse engineering tools to generate up-to-date documents on software artifacts. • Consider the long-term costs of generating just-in-time documents using reverse engineering tools or consultants/SIs.
Compliance requirements	<ul style="list-style-type: none"> • Use documents that can easily be traced, supporting compliance requirements. • Identify noncompliance issues.
Complements to documents	<ul style="list-style-type: none"> • Conduct handover meetings. • Leverage communication media technologies. • Encourage collaboration, communication, and ongoing dialogues. • Utilize a shared and common platform to ensure access to crucial documents and facilitate knowledge-sharing.
Change management	<ul style="list-style-type: none"> • Develop documents that record and track all changes in an agile ERP project.

assess the findings objectively. Third, the COVID-19 pandemic and subsequent lockdowns may have influenced how organizations handle knowledge management and digital transformation, which, in turn, may have impacted documentation practices. Conducting a follow-up study to explore the impact of remote work practices on documentation practices during the lockdown period may be worthwhile. Fourth, future studies could focus on the accessibility and usefulness of specific ERP documents after the system goes live because the present study has reported an increase in the number of throwaway documents. Finally, the interview data used in the current study were cross-sectional, and future studies could consider using survey instruments to focus on specific industries or organizations to assess variances in documentation practices.

9. Conclusion

Effective ERP implementation requires efficient management of requirement details across multiple organizational units, and documentation, such as the requirement traceability matrix, plays a critical role in this process. However, when implementing ERP using an agile approach, there may be trade-offs that minimize the number of documents. The present study has highlighted the changing nature of documentation practices in the context of ERP implementation and offers a new conceptualization of documentation. Existing documentation theories have mainly focused on content but not sufficiently on form, media types, and communication process aspects. Given advancements in media technologies and the increasing use of cloud ERP and documentation platforms, it is essential to reevaluate our understanding of documentation.

How well does lightweight documentation work for ERP implementation? Based on the interview data, the present study suggests a new conceptualization of documentation that includes audio, visual, and text artifacts in any media used for ERP implementation. This

reflects the changing reality of IT professionals who extensively use advanced communication technologies to interact with colleagues and stakeholders and record project activities. The previously clear distinction between formal records and informal communication objects is becoming obscure in agile ERP implementation projects. With the new conceptualization, documentation is increasingly embedded in the dynamic and efficient ERP implementation process, with throwaway (transient) documents that may include communication artifacts such as email. We redefine documentation as any readily searchable and managerially relevant structured and unstructured project information in the form of text, audio, image, and video.

The current study makes several contributions. First, the reconceptualization of documentation challenges and improves existing documentation theory. The emerging documentation characteristics are “good enough,” timeliness, and media agnostic. This may also apply to managing enterprise cloud systems architecture because it involves scale and complexity for multiple organizational units. Second, the present study points to the next generation of knowledge management, including distributed, unstructured information on diverse media for ERP implementation and other complex systems life cycle management. Third, the findings contribute to a better understanding of the socio-technical process involved in agile ERP implementation projects. The present study provides best practices and vignettes for managers to consider in handling documentation practices and enhancing the agility of ERP projects in light of the paradigm shift. Finally, the current study sheds light on the crossroads of documentation, media/communications, and knowledge management academic domains. In this context, we aim to acquire timely, convenient information with minimal resources for creating and consuming such information across various media.

Declaration of Competing Interest

None.

Appendix A. : Interview guide

Open-ended, semi-structured interview.
<Background>.

- What is your current job title?
- Tell me about your job title and responsibilities at the time of the IT (ERP) implementation.
<Documentation Practice>
 - What project methodology was used for the IT project—the waterfall, agile, or customized approach?
- Based on your recollection, what documents were used in each phase?
<Documentation Use>
 - How were those documents stored and exchanged (i.e., shared folders, email, or SharePoint/content management systems)?
- How have these documents been used during and after the project? According to you, how does documentation play a role in project outcomes?
- Based on your experience, are documentation practices in ERP projects different from those in systems developed from scratch?
- How are the documents related to the requirement specifications in ERP projects handled?
- How are deviations handled or documented? For example, how are requests about customization of the system, integrations, bolts-on, etc., and customizations that are executed documented?
- What is your view on the necessity and usefulness of system documentation? What are the most useful types of documents? How do you assess the quality of documentation?
<Maintenance & Other>
 - How were the documents maintained? By whom were they maintained?
<Knowledge & Culture>
 - During ERP implementation, what knowledge should be created and maintained and with whom should it be shared?
 - How would you describe the culture of creating and sharing ERP knowledge during the project and after the go-live?
- How was knowledge shared via docs and face-to-face meetings?

- How did knowledge-sharing between the internals and externals in the project team occur (and vice versa)? How was this process executed—and who was responsible?
- For example, when the system goes live, are the specific documents or communication mechanisms that were important maintained (e.g., after the consultants/vendors leave the organization)?
- How would you describe the organizational culture of communication during the project and after the go-live?

<More Details about Documentation Practices> .

- How do new members depend on documentation? Are there any types of documents, such as “informal” documents?
- How are specific documents created depending on the project approach used? What is the lifetime of the documents?
- How do you obtain your critical ERP knowledge—orally from specific individuals or by reading online manuals/documents?
- How do you view written communications?
- How do you keep project members up to date?
- Tell us the state of documentation as of today.
- How much time are project members allocated for creating and maintaining formal/informal documentation?
- How often do you use documents in your work?
- Cloud and Documentation:
 - Are there differences in documentation practices between cloud ERP and on-premise ERP systems?
 - Can you tell us about the formal documentation practices for cloud solutions (when using Software-as-a-Service (SaaS))?

Appendix B. : Categorized findings with interview quotes

Table B1

Current documentation practices—sample quotes.

Finding	Quotations
[GF1] Essential Document	“Consider the requirement traceability matrix as your starting Bible.” [P17] “[The essential documents include] business requirement documentation, fit- gap analysis, functional requirement, technical requirement, functional design document, and technical design document.” [P18] “I believe the foundational documents are of utmost importance. Some of the governance documents are also crucial.” [P19] “The requirements trace matrix is one of the most critical documents.” [P21]
[GF2]Range of Documentation Practices	“The quality of documents can vary significantly depending on the project’s structure and other factors.” [P5] “Larger companies require their customers to provide a substantial number of documents.” [P7] “There was a stark contrast in culture and discipline around documentation processes between the public and private companies.” [P9] “We had more of a scrum approach, but it depended on the size of the project.” [P12] “The importance of documentation is influenced by our culture and the decisions we’ve made to foster teamwork.” [P12] “Our company focuses on developing dynamic documents in collaboration with our customers and doesn’t rely on heavy demand specifications.” [P23] “The level of documentation required depends on the organization’s type and size.” [P17] “The documentation needs are specific to each partner.” [P21]
[GF3] Documentation Volume	“In general, we try not to let documentation become something that will hold us up.” [P3] “We handled it in a meeting rather than creating a formal document.” [P4] “Good documentation is essential at the beginning of a successful project. However, it should be validated and not overly burdensome.” [P7] “For smaller implementations, there is room to cut corners.” [P7] “I haven’t seen many people recently opting for formal documentation.” [P9] “I prefer documentation on a ‘need’ basis rather than creating documents for hypothetical future events. We plan to improve higher-level architecture and API documentation based on client requests. My goal is to create components and patterns that require minimal documentation.” [P11] “We had more flexibility and fewer documentation requirements in our scrum approach, depending on the project’s size.” [P12] “We discuss and don’t have a defined demand specification. A comprehensive demand specification is impractical and useless.” [P13] “I would say we now do about half as much documentation as we used to, especially when it comes to more narrative-type content.” [P17] “The volume of documentation doesn’t always correlate with success.” [P19]
[GF4] Shelf Life of Documentation	“Technical documentation needs to be updated regularly, possibly on a nightly or hourly basis.” [P5] “I often found that final system documentation and requirement specifications became outdated quickly. Changes in module structure or business logic adjustments made them unreliable after a short time. I could never fully trust that they [the documents] were up to date” [P11] “The code was developed with the agile approach in mind, but the accompanying documentation was not updated, leading to confusion on multiple occasions.” [P11] “The lifespan of document usefulness depends on the component’s volatility, the team’s workflow, and resource allocation. Core component documentation from several years ago can still be relevant and up to date.” [P11] “After the project, most of these documents tend to lose their importance.” [P12] “The lifespan of documentation usually aligns with the project’s duration.” [P17] “The shelf life varies depending on the company size. Smaller companies may have a shelf life of 9–12 months, while larger companies may extend to a year and a half to two and a half years.” [P19] “Quality tends to decline as the project progresses due to project or team fatigue.” [P19] “The documents created at the beginning of the project maintain their integrity throughout.” [P20]
[GF5] Documentation as Communication Tools	“Documentation is a byproduct of the services we provide. It naturally emerges and serves the purpose of getting [approval] a sign-off.” [P7] “In a global environment, especially across different timeframes, documentation becomes crucial because our global partners rely on it and actually read it.” [P10] “I consider documentation a necessary evil, but in a positive sense. It’s how I learn and understand things.” [P17] “When reading technical and functional documentation, which I usually do for both, I expect clarity and coherence throughout.” [P20] “As a program lead, it’s disheartening to witness the extensive amount of writing and reading involved.” [P21] “At the beginning of the project, I personally read almost every document. However, now I generate most of the documents for the teams and review and approve them myself.” [P22]

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Table B1 (continued)

Finding	Quotations
[GF6] Who Writes Documents	<p>“Typically, outside consultants focus more on process documentation. Systems documentation, on the other hand, is less frequently contributed by the consultants than one might assume.” [P5]</p> <p>“Regarding document authorship, it is primarily handled by the system integrator. SAP plays a smaller role, and the primary consultant of the project contributes less. The system integrator and/or the business team are usually responsible.” [P19]</p> <p>“I’ve been involved in larger projects where the majority of team members are relatively junior.” [P19]</p>
[GF7] Documentation Methodology	<p>“Since methodologies vary, documentation will naturally differ. It’s problematic to force waterfall documentation practices onto agile methodologies. We should embrace more online interactive tools that align with agile principles rather than sticking to traditional pen-and-paper approaches.” [P2]</p> <p>“The inconsistency of documentation methodologies is the main issue.” [P7]</p> <p>“SAP provides guidance and adheres strictly to their own methodology, [which necessitates various documents].” [P12]</p>

Table B2
Innovations in documentation practices—sample quotes.

Innovations in Documentation	Quotations
Document automation	<p>“We are witnessing the emergence of a new set of documentation tools in agile practices, and I believe that automated testing tools will gain even greater importance.” [P2]</p> <p>“In essence, your documents are not authored by humans, but are automatically generated, with added functionality to expand upon. This reduces the gap and subsequently decreases the need for extensive documentation.” [P18]</p> <p>“Many processes are now automated, making testing much easier. Microsoft offers excellent tools that allow you to record and replicate steps in the testing phase.” [P18]</p> <p>“Training manuals have greatly contributed to simplifying documentation. The system automatically records your clicking and interactions with different screens and captures the changes you make.” [P18]</p> <p>“In terms of e-learning, documentation has been significantly reduced, both from a training and testing standpoint.” [P18]</p>
Intelligence and voice recognition in software	<p>“With the increased intelligence of software and understanding of people’s capabilities, it is now possible to hire less experienced individuals.” [P17]</p> <p>“Documentation has transformed into a speech recognition tool that handles various tasks on your behalf.” [P18]</p>
Reverse engineering	<p>“InfoSys supports systems by conducting their own documentation, often employing reverse engineering methods.” [P9]</p>
Visualization	<p>“Data modeling has become highly visual nowadays, minimizing the need for extensive coding.” [P10]</p>
Centralized/shared document store	<p>“We utilize a shared Google Drive, specifically assigned to each project.” [P5]</p> <p>“We utilize SharePoint as a team resource to store all our documents and files.” [P12]</p> <p>“The size of the projects necessitates a SharePoint repository, although the visibility across the entire project is not as optimal as desired.” [P17]</p> <p>“We have now created dedicated chats or groups within Microsoft Teams.” [P18]</p> <p>“With numerous SharePoint sites, it is easy to miss updated versions if one is not aware of their existence.” [P20]</p> <p>“SharePoint is extensively used by everyone, serving as a common point of reference at any given time.” [P22]</p> <p>“Most commonly, we rely on Microsoft Teams; however, at SAP, we also utilize a solution called Jam.” [P19]</p> <p>“We heavily rely on Microsoft Teams, Microsoft SharePoint, and extensively use OneNote these days.” [P22]</p> <p>“For DevOps, we utilize Microsoft Azure.” [P22]</p> <p>“SharePoint is primarily used for various purposes, but it doesn’t include the knowledge base component, which is handled separately through SAP.” [P20]</p>
Multimedia (podcast, video, electronic communication)	<p>“I wanted to incorporate power iTunes. I have pushed video in my past roles. I have always wanted to incorporate podcasts.” [P20]</p> <p>“I would like to read to learn, but younger folks on my team prefer watching videos.” [P9]</p> <p>“Everything I am doing is through electronic communication. It involves attachments.” [P21]</p> <p>“The media is making us smarter.” [P18]</p> <p>“Instead of reading, they prefer visually experiencing things. For me, it’s more about audio and video.” [P18]</p> <p>“Mixed reality, specifically HoloLens, allows them to have a virtual experience of those things.” [P18]</p> <p>“Our workforce is becoming younger and younger, and people now consume information through multimedia.” [P20]</p> <p>“We had a person leaving the organization, and she has done an incredible job documenting her knowledge about the systems in Word documents. Additionally, she conducted knowledge transfer sessions with the team, and they recorded them. They started saving the recordings on the site so that they can easily revisit and listen to her explanations instead of having to read through everything.” [P10]</p> <p>“We utilize Microsoft Teams as a tool for our meetings, and every meeting I attend is recorded.” [P18]</p>
Recording meetings (e.g., Teams and Zoom)	<p>“There is a noticeable shift towards using markdown documents on GitHub. While there are also Confluence pages with less structured documentation, they suffer from similar issues as formal documentation, such as outdated content and broken links. However, it still serves as a valuable resource. I can see it evolving into a Wiki or FAQ format, but often, such pages are only created when something breaks.” [P4]</p> <p>“The documentation is typically created in spreadsheet format, organized by function rather than being specific to implementing SAP or Oracle. This document should include all business requirements.” [P7]</p> <p>“We develop an Excel sheet based on customer communication, which involves a lot of informal discussions and iterative design. There is extensive back and forth between stages, emphasizing agility throughout the process.” [P23]</p> <p>“We have an Excel template where all the stories, features, and capabilities are created.” [P22]</p> <p>“We present the solution at a descriptive level initially, addressing any ambiguities or questions about the purpose. This process continues across multiple meetings until the customer feels satisfied.” [P13]</p> <p>“Our primary documentation includes a data dictionary, JIRA artifacts (as we heavily use JIRA), and meeting notes.” [P6]</p> <p>“We utilize SAP Solution Manager to track all specification documents and configuration details related to the solution.” [P12]</p> <p>“We use Solution Manager for our documentation needs, and we also utilize certain SharePoint sites to supplement it.” [P21]</p> <p>“Solution Manager is our primary tool.” [P22]</p>
Use of specific tools, Wiki, FAQ, version control (e.g., GitHub), spreadsheet (e.g., Excel), presentation (e.g., PowerPoint), data dictionary (e.g., Jira), solution manager (e.g., SAP)	

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Table B2 (continued)

Innovations in Documentation	Quotations
Others (scanning, e-books, bite-sized knowledge, written communication)	“Currently, there is a significant focus on scanning documents.” [P18] “When it comes to written communication, we don’t limit ourselves to documentation; any form of written communication is acceptable. In fact, we consider it highly important.” [P17] “Nowadays, there is an abundance of online training available, including e-books and shorter videos.” [P19] “People tend to consume information in bite-sized pieces, even when it comes to news.” [P20] “The attention span of document users has significantly decreased. If a document exceeds one page, I usually don’t read it.” [P22]

Table B3

Crucial complements to documents—sample quotes.

Enabler	Quotations
Contextualization and knowledge transfer	“We usually create a knowledge transition deck, a PowerPoint presentation that highlights different areas of the system and references all the documentation we have prepared. We then sit down with the client and conduct face-to-face sessions, going through the documentation together.” [P3]
Document substitutes	“The knowledge transfer process was much more shoulder-to-shoulder [interactive and hands-on.]” [P21] “It’s crucial to ensure that while using agile methodology, the recursive flowing agile documentation doesn’t lose sight of the ultimate objectives. That’s the key to effective documentation in an agile environment. I love agile, but I want to ensure that we don’t forget the value stream we’re delivering to the business.” [P2] “I personally find it helpful when the person leaving the team is still accessible to provide assistance. It’s like having informal documentation.”[P4] “We discussed it in a meeting instead of creating a formal document.”[P4]
Meeting minutes and notes	“The subject matter experts (SMEs) have the docs [extensive knowledge] in their minds.”[P5] “If it’s a quick five-minute meeting, that’s good. But if something requires more detail, I can explain it to them.”[P17] “Many times, the meeting minutes would be included in the stories to explain the decision-making process. Meeting minutes and requirements go hand in hand.”[P6]
Power of informal communication Individual differences	“The meeting minutes are usually considered the authoritative source of truth [information].”[P6] “The most effective communication often happens through informal channels with stakeholders.”[P17] “People have different learning preferences. Some individuals are not satisfied with just conversations; they prefer documentation, while others prefer a hands-on approach.”[P17]

Appendix C. : Vignettes

Vignette 1: Documentation practices in an ERP project of a mid-sized firm

Mendixx Auto Parts (pseudonym) is a mid-sized company that designs and manufactures auto parts in the US, Mexico, and Vietnam. It is headquartered in the US and has sales offices around the world. Mendixx adopted off-the-shelf ERP software in 2005 and has experienced significant growth since then, expanding its operations internationally. Mendixx is now planning to switch to a cloud version of Dynamics 365 with the help of a consulting firm, as they lack experience with Dynamics.

While Mendixx has embraced the agile approach for IT and manufacturing in the last decade, the ERP implementation team is unsure how to apply the agile approach to implementing a new ERP system. The project process described by the consulting firm resembles the waterfall approach, especially from the planning phase to the requirement determination phase. Meera Kumar, the lead consultant, highlighted that the first half of the ERP implementation involves mapping details between the current system functions and databases and the desired future state. Managing these details may require some level of documentation.

However, Meera explained to Mendixx that the implementation process is more streamlined and efficient than a decade ago. A centralized collaboration tool such as Teams can greatly increase transparency among project members and stakeholders with meetings, documents, and other communication artifacts. Meera stated to address concerns about excessive documentation: “Today, industry-specific libraries are available. It is a package of best practices. If you follow such a template, you save tons of time and confusion.” She emphasized that Mendixx should not be overly concerned about strictly following a particular agile method but instead focus on project transparency by streamlining project activities and documentation whenever applicable.

Meera has scheduled a seminar on managing the project with documents and organizing those documents as a virtual information board for the team. She plans to explain to the team that “documents” are not exclusively classical Word documents but include Excel sheets, meeting recordings, memos and emails on key decisions, and multimedia communication artifacts such as bite-sized voice or video recordings. She also recommends that the implementation team use recordings of meetings and screen captures for project coordination and training sessions. Finally, Meera intends to introduce DevOps and ERP regression testing. She feels confident that combining all these tools, practices, and approaches will result in a successful ERP implementation with less voluminous but effective documentation.

Vignette 2: Documentation practices in an ERP project of a larger firm

The following story portrays the challenges of an ongoing ERP project in a large international firm focusing on documentation practices.

AB Foods Inc. (pseudonym) is a leading manufacturer of food products with a global presence. It has an annual revenue exceeding \$20 billion and a headcount of about 100,000. The firm implemented multiple instances of SAP’s ERP system globally in the early 2000 s. The four-year-plus implementation started in Europe, followed by North America and ended in Southeast Asia. A large consulting firm with its own methodology, which resembled the waterfall approach, was brought in for the implementation. Despite the guiding principle of minimizing customization, significant customization, and documentation were required due to business requirements.

In the late 2010 s, AB Foods underwent a major upgrade with SAP S4/HANA Cloud. However, there were challenges due to the acquisition of

ethnic food manufacturers with different ERP systems than AB Foods. AB Foods hired a consulting firm (TPM Consulting) and two SIs to streamline the project process with their new agile approach. At the kick-off meeting, AB's program manager emphasized the agile documentation philosophy of "short and simple, but sufficient," using an example of how air traffic controllers manage radio communication at busy airports.

Another ground rule discussed was using Microsoft Teams (integrated with SharePoint) as a central communication platform and document repository by AB Foods, TPM Consulting, and the two SIs. For managing a large number of documents, communication leads were appointed to enforce best practices for document format and storage location.

Due to the project's scale and complexity, the project team struggled to iron out documentation practices across AB's local units, TPM Consulting, and the two SIs. Halfway through the project, the communication leads observed acceptable documentation practices. However, some stakeholders in AB's local units were unfamiliar with the agile mindset, so the project team made extra efforts to compromise with the rest of the organization. Managing requirements documents also posed challenges, as there was confusion about using Jira and Confluence versus the central SharePoint server.

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