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Exploration of AI-Powered Tools and UX Writing Solutions for Improved Content Design Process in a Robotic Software

Creating UX Writing Guidelines for a Robotic Interface

Master's thesis in Computer science and engineering

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CHALMERS UNIVERSITY OF TECHNOLOGY
UNIVERSITY OF GOTHENBURG
Gothenburg, Sweden 2025

MASTER'S THESIS 2025

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Henrietta Sundberg, Moa Berntsson

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Abstract

While previous research discuss the advantages of combining UX writing and AI, more research is needed regarding integrating AI in the content design process. This project was carried out in collaboration with ABB Robotics in Gothenburg and investigates the possibility of integrating AI-powered tools into the content design process for the robotic software RobotStudio. Further, the research has explored what potential solutions there could be for the project members to create consistent and high-quality content for various UI elements. Previous Heuristic Evaluation identified inconsistency in the text and conducted interviews revealed a process of content design that varied, including the difference in AI usage. The study evaluated AI tools for their ability to generate guideline-compliant text, showing that while some AI tools generated high-qualitative content, none of them fully aligned with the provided guidelines, indicating that human oversight remains essential for context-specific nuances and maintaining consistency. To address the variability in content creation, the study proposes incorporating UX writing guidelines and standardized AI prompts for project members to use. The guidelines were informed by interviews, external and internal company analysis, and user testing. The findings highlight the necessity of balancing automation with human judgment to achieve cohesive and effective UX writing outcomes.

Keywords: UX Writing, Robotic Software, Content Design Process, UX Writing Guidelines, Human-AI Collaboration.

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Acronyms

AI Artificial Intelligence

AIGC AI-generated content

AMRs Autonomous Mobile Robots

HE Heuristic Evaluation

LLMs Large Language Models

UCD User Centered Design

UI User Interface

UX User Experience

1

Introduction

Effective UX writing improves usability by guiding users through the interface, making interactions intuitive by crafting messages that minimize confusion, reduce errors, and improves overall user satisfaction [1]. In the context of UX writing, the term content design focuses primarily on crafting copy and messaging that guide users within the context, helping them navigate interfaces and complete tasks efficiently [2].

In complex software such as robotic applications, clear and precise communication is crucial to support the users. The content design is an important part of the product design process at ABB Robotics, as the words and language users encounter when interacting with a product or software influence their user experience (UX). This project explores the area of UX writing at ABB Robotics, a leading supplier of industrial robots and robot software, equipment, and complete application solutions. This study specifically examines the content design process in the software RobotStudio, a desktop application used for modeling, simulation, and offline programming of ABB robots.

Cross-functional collaboration has become essential rather than optional [3], enabling organizations to improve efficiency and achieve qualitative results. Effective collaboration depends on establishing a mutual understanding that supports seamless coordination among teams. Establishing a mutual understanding can be achieved by employing a design framework. A design framework facilitates communication within the team with minimal effort, especially in remote teams, where it helps developers feel included in the design process and ensures consistency and standards in design communication. A design framework should be created in close collaboration with the engineering leads and architects, to become a crucial reference and cohesive element for all project members [4]. This concept is reinforced by Torrey Podmajersky, who emphasizes that, in situations where there is no dedicated UX writing team, ensuring text consistency across multiple contributors requires adherence to standardized guidelines [2].

The integration of Artificial Intelligence (AI) in UX writing offers significant potential to streamline content creation by enabling rapid generation and deployment of user-centric microcopy [5]. Emerging research highlights the capacity of AI to enhance UX design processes, particularly as the adoption of AI tools in UX writing gains momentum [6], [7]. Thus, investigating the potential of AI-powered tools to improve UX writing practices is of interest.

1.0.1 Research Question

In collaboration with ABB, this project has investigated the content design process for RobotStudio. The project aimed to develop a solution that improves consistency and optimizes the content design process, promoting synchronized cross-functional collaboration. A key focus is evaluating the potential of AI-powered tools to enhance content creation, ensuring efficient, consistent, and brand-aligned microcopy. To guide this exploration, a research question evaluates the proposed solution, formulated as follows:

To what extent can AI tools contribute to improving consistency in the content design process of RobotStudio, and what solutions could support consistency?

1.1 Deliverables and Delimitations

The project deliverables encompass user needs, AI evaluation, guidelines and user testing. The key deliverables are as follows:

1. **Key Challenges:** Identify the main challenges in the current content design process, highlighting existing gaps and areas for improvement.
2. **AI Tool Evaluation:** Assess the performance of AI-powered UX writing tools by systematically evaluating the quality and effectiveness of their generated output.
3. **UX Writing Guidelines:** Develop a set of guidelines for the content design process, allowing project members to create consistent copy.
4. **User Testing:** Investigate the usability of the guidelines.

This project is structured within certain boundaries to ensure a focused and manageable scope. The following delimitations have been established:

- **Product Scope:** The project specifically targets *RobotStudio*. Other products are not considered in this research.
- **Time Frame:** The study is limited to current versions of the software and AI tools available within the time frame of the project's benchmarking period (January to February 2025). It does not explore AI writing solutions or updates released after this period.
- **User Research:** Our user studies are based on a limited number of user data and the findings are applicable to the primary user base identified at the beginning of the project.
- **Language:** RobotStudio comes in different languages, but this project only focus on the English implementation.

1.2 Stakeholders

The project identifies the following primary stakeholders:

- ABB Robotics UX Designers
The team responsible for current UX writing and the content design process of RobotStudio
- ABB Robotics Software Developers
The team developing and maintaining RobotStudio, additionally writing content
- Thesis Authors
Moa Berntsson and Henrietta Sundberg
- Chalmers University of Technology
The university overseeing the project and evaluating the thesis

The project identifies the following secondary stakeholders:

- RobotStudio End Users
Users who rely on the program for simulation, modeling, and programming
- ABB Employees
Other employees at different business areas at ABB

2

Background

The chapter introduces ABB AB, their business area Robotics & Discrete Automation and its software RobotStudio. Then, it outlines the research area and its key challenges. Lastly, this chapter reviews related work relevant to the projects scope.

2.1 ABB AB

ABB, originally known as Asea Brown Boveri, is a leading global technology company specializing in electrification and automation solutions. Headquartered in Zurich, Switzerland, ABB operates in more than 100 countries and employs approximately 110,000 people worldwide. The company focuses on enabling a more sustainable and resource-efficient future by connecting engineering expertise with software to optimize manufacturing, movement, power, and control processes.

Formed in 1988 through the merger of Sweden's ASEA and Switzerland's Brown, Boveri & Cie, ABB has a rich history of innovation spanning more than 30 years. Today, the company is organized into four business areas: Electrification, Process Automation, Motion, and Robotics & Discrete Automation. These divisions work collaboratively to drive performance to new levels and support the transformation of society and industry, enabling a more productive and sustainable future [8].

2.1.1 Robotics & Discrete Automation

Robotics & Discrete Automation, also referred to as ABB Robotics, is a leading global provider of robotics and machine automation solutions. The company offers industrial robots, Autonomous Mobile Robots (AMRs), and machine automation technologies, all orchestrated by ABB's value-creating software. These products and services are designed to help companies across various sectors such as automotive, electronics and logistics to enhance their resilience, flexibility, and efficiency [9]. ABB Robotics is committed to supporting customers in the transition to connected and collaborative factories of the future, thereby contributing to the advancement of flexible manufacturing and smart machines [10].

2.1.2 RobotStudio

Desktop

RobotStudio is an offline robot simulation software program developed by ABB Robotics. The software supports the entire automation process, from the initiation of a new project to deploying and running a verified solution in production and is used as a modeling, simulation and programming tool for robotic applications. RobotStudio enables users to build, test and refine robot installation in a virtual environment before implementing them in real production environments. The software allows users to try various simulations and programming in a virtual environment without disturbing ongoing production, decreasing commissioning time and increasing productivity [11].

Cloud

RobotStudio Cloud is a web-based software application that extends the desktop version by offering cloud storage, version control, and a web application to tune robot programs. It complements the desktop version, enabling users to access robotic projects from any location, make necessary changes, and share updates in real-time. This cloud-based platform facilitates seamless collaboration among project members, regardless of their geographical location. Features such as automatic version control enhance transparency and productivity, allowing teams to track project iterations and identify contributors to specific changes [12].

2.2 Research Area

This study addresses a *wicked problem*, where the design of the UX is complex and the solutions cannot be defined in advance [13]. During a recent heuristic evaluation (HE) of the software, ABB Robotics identified opportunities to improve UX writing in their design process for RobotStudio. The evaluation revealed a need to optimize the content design process to improve the consistency of written text in the software. An HE is a usability inspection method to analyze the usability of an UI [14]. HE is applied with the aim of identifying challenges and evaluating the overall usability of an interface [15].

Wicked problems are inherently difficult to solve due to incomplete or contradictory information, the involvement of multiple stakeholders with differing priorities, and the lack of a clear end point for solutions. In this context, optimizing UX writing for RobotStudio exemplifies a wicked problem, because it requires balancing diverse user needs, accommodating evolving project constraints, and working within iterative design processes. Any solution is provisional at best, aiming to serve the majority while acknowledging that it may not fully suit everyone.

UX writing plays a crucial role in creating clear, engaging user experiences. Well-crafted UX writing improves communication, reduces confusion, and increases user engagement [5]. The evaluation highlighted the need for consistency in written content, including microcopy such as dialogs, tooltips, notifications, and other text

elements. ABB Robotics now seeks to investigate solutions to optimize the content design process, exploring the potential of AI-driven tools to improve efficiency and consistency.

This thesis project aimed to investigate the potential of AI-driven tools in assisting with the creation of microcopy for RobotStudio. Furthermore, the study sought to identify solutions to streamline and enhance the content design process when creating microcopy for RobotStudio, ensuring a more cohesive and effective user experience.

2.3 Related Work

This section reviews related research and developments in UX writing in software, the application of AI in UX design, and the use of AI tools for UX writing.

2.3.1 UX Writing in Software

UX writing plays a critical role in software design that directly influences how users interact with digital products. By crafting microcopy, UX writers guide users through their interactions, providing clarity and encouraging desired actions. This focus on language not only informs users about functionalities, but also shapes their emotional responses and overall engagement with the software [16].

Text is a vital medium for facilitating communication between users and the system. Effective content must be accessible, purposeful, concise, conversational, and clear [2]. As noted by Portmann [16], microcopy plays a key role in constructing users roles and influencing their perceptions. Therefore, the quality and intent of microcopy can significantly affect UX, enhance usability and clarity, and foster a sense of agency among users of the software.

Central to clarity is consistency, requiring uniform terminology and phrasing when referring to specific concepts or functions [17]. According to Podmajersky [2], the primary challenge in achieving consistency arises from multiple contributors independently creating content.

In addition, Podmajersky acknowledges limitations in current approaches, noting that no single tool comprehensively supports the entire content design process. Consequently, project members who contribute to text rely on a variety of tools tailored to different stages, and project members involved in these stages may lack access or familiarity with these tools.

2.3.2 AI in UX Design

Researchers has highlighted the relevance of AI in UX design, emphasizing its potential to shape user interactions with systems [18] and that AI holds significant potential for enhancing UX design processes [7].

Jin et al. [19] highlight that AI can lead to innovative UX solutions when fully

integrated into the design process. However, it is essential for UX designers to understand the capabilities and limitations of AI, ensuring that its integration in the design process is responsible and effective [20].

Abbas et al. [21] provide an overview of the challenges UX designers encounter when incorporating technologies such as machine learning into their design processes and argue that without an understanding of how to effectively work with AI as a design tool, designers risk hindering the design process. Further, Verhulsdonck et al. [5] discuss how AI, design thinking, and content strategy can improve technical communication and collaboration in UX/UI design, ultimately addressing user needs more effectively. Similarly, Choudhury [22] reports that AI can increase productivity in UX design by automating tasks such as research, gathering feedback, and generating alternative design solutions.

Schönberger [23] presents a research framework investigating the influence of AI applications and user skills on UX/UI design quality. This framework explores the interplay between AI technologies and human skills in modern UX/UI design. The study aims to examine how AI impacts design quality and identify the various factors that moderate this influence.

2.3.3 AI Tools for UX Writing

AI-generated content (AIGC) tools are AI-driven programs that automate the content creation process, making it faster and more efficient. The integration of AIGC tools has been shown to enhance collaboration and efficiency within UX design teams [24]. According to Wang et al. [24], AIGC tools not only facilitate content generation, allowing designers to focus on creative aspects, but also foster a culture of exploration and sharing among project members, ultimately improving the overall design process and addressing user needs more effectively. These tools can therefore serve as a solid foundation for implementation in design processes.

Several AI-powered content design tools are available to assist in generating and refining UX writing for various contexts. These tools are becoming more prevalent, especially in advertising and marketing. AI can automate shorter content creation for websites and social media and various AI tools have been increasingly adopted by UX writers to enhance their workflow and streamline the content creation process. These tools can automate lower-value tasks, allowing writers to shift focus towards more strategic and impactful elements of their work. Moreover, AI's capabilities in generating user-centered marketing content illustrate its growing importance in crafting messaging that is not only readable and engaging, but also persuasive in driving user engagement and conversion [25].

3

Theory

This chapter presents the theoretical foundations of the study, covering key concepts and relevant research in the fields of interaction design, content design, and AI.

3.1 Interaction Design

Sharp et al. [26] define interaction design as the process of developing interactive products that facilitate communication and engagement both in personal and professional context. As its core, it focuses on designing the relationship between users and products. Sharp et al. emphasize the importance of considering the context in which an interactive product will be used, advocate for a User-centered Design (UCD) approach. Interaction design involves understanding user activities and requires a multidisciplinary approach that integrates expertise from fields such as engineering, design, psychology, and marketing. Effective interaction design is crucial for the success of a product, ensuring usability, efficiency, and engagement, which are essential for differentiation in competitive markets.

One fundamental dimension of interaction design is user behavior. Gould [27] highlights the significance of user behavior in determining how people interact with a product and the types of interactions the design accommodates. This aspect is closely linked to usability, which refers to the ease and efficiency with which users can interact with a system to achieve their goals. Key considerations include intuitive design, logical navigation, and ensuring that users can easily understand how to use the product or system.

3.1.1 User Research

User research is defined as the systematic research and evaluation of UX to gather meaningful insights that inform decision making during product development. It is a part of UCD process, encompassing activities such as interviews, prototyping, and usability testing. The primary goal of user research is to enhance user proximity and reduce the risk of failure in product development by understanding user needs and motivations [28]. The process of user research involves collecting, analyzing, and interpreting data to support the development of user-centric and data-driven solutions. It employs both qualitative and quantitative methods, including interviews, surveys, usability testing, and observational studies [29].

3.1.2 User-centered Design

User-Centered Design (UCD) is a design that emphasizes continuous interaction between users and designers throughout the development process. UCD relies on three core principles which are user involvement, empirical measurements, and iterative design [26].

The user involvement principle highlights the necessity of incorporating user feedback from the early stages of design, ensuring that solutions align with their goals. It emphasizes the importance of observing users in their natural environment and engaging them throughout the design process. Empirical measurement involves iterative evaluation at various stages of development to validate design choices. Iterative design highlights the necessity of continuous refinement, allowing solutions to evolve collaboratively with users. These principles serve as the foundation of UCD, working together to create products that effectively meet users needs. Adhering to these principles is essential to ensuring that solutions are truly UCD.

UCD is an iterative design process that focuses on users and their needs. It involves users throughout the design and development process to create highly usable and accessible products. The goal is to ensure that the final product meets the users' expectations and requirements, resulting in a better UX. A UCD process should take the target user group and their desires and goals into account in each phase, all the way to the finished product.

By involving users in the design and development process, a well-structured UCD process ensures that the final product aligns with user expectations, improving the overall UX. The process starts with identifying a need and ends with the fulfillment of that need [30].

3.2 Content Design

Content typically refers to information such as textual, visual, and multimedia elements that create digital entities, such as websites and applications. In the context of UX/UI design, content is the text that appears in the UI and involves the crafting of words and sentences, sometimes referred to as UX writing [31]. Effective content in UX and UI, enhances clarity, fosters emotional engagement, and strengthens brand identity. It facilitates navigation, bridges the gap between context and visual design, and guides users toward intended actions. While visual design may get users attention, it is the textual copy that guides them through the interface.

3.2.1 UX Writing

UX writing is the practice of crafting clear, concise, and contextually appropriate textual elements to guide users through digital interactions. It requires similar skills used in visual or interaction design, except that UX writers craft words instead of pixels to guide and communicate with users throughout the experience.

To write a good UX copy, it is essential to define the target audience, their needs,

and the intended user actions [32]. This understanding informs the choice of words, the appropriate presentation formats, and how the information should be structured so that users efficiently obtain the information they require. With increasing focus on UCD, the role of UX writing has expanded, making it a crucial knowledge to ensure linguistic clarity, usability, and brand consistency [17].

Effective UX writing makes it easy for users to understand what they see on their screen and how to interact with it. Using clear language helps users navigate a digital product or service effortlessly, reducing frustration and increasing engagement [17]. Consistency in language and terminology throughout a digital product reinforces users understanding of its functionality and fosters trust. If a term is introduced, it should remain consistent across the experience [17]. For instance, having clear rules for date formats, abbreviations, and the use of lowercase versus uppercase letters is essential.

3.2.2 Microcopy

Microcopy is a specialized area within UX writing, focusing on concise and context-specific textual elements within UIs [17]. These include, among others, link text, button labels, values in drop-down lists, field labels in forms, tooltips, page titles, headings, menus, and dialog boxes. Well-executed microcopy enhances usability by providing clear guidance, reducing cognitive load, and minimizing user errors [33]. Microcopy plays a critical role in guiding user behavior, clarifying intent, and building trust. It demands clarity, brevity, consistency, and precise alignment with tone and brand guidelines [34].

3.2.3 Tone of Voice and Brand Identity

When writing a copy, it is important to consider the type of information and how it is presented. Establishing a recognizable brand voice and adhering to content guidelines enable seamless communication within a team. Without a shared understanding of the brand's voice, the UX writer or the responsible person will frequently need to justify and explain their word choices [33]. A cohesive brand voice strengthens the users connection to the brand [17]. The tone of voice has effects on users impressions of an organization's friendliness, trustworthiness, and desirability [35].

Establishing a consistent brand voice is crucial because it strengthens brand affinity. The biggest challenge to maintaining this consistency is the involvement of multiple project members who create content, often from different departments within a large organization, and unaware of each other's work. A unified description of the brand voice helps diverse teams produce cohesive content. While the voice should remain consistent, the tone can be adjusted depending on the context, such as an error message or a notification [2].

A well-crafted tone and personality in a digital product's language can forge an emotional connection with users. This connection not only builds brand loyalty, but also boosts user engagement. Consequently, UX writing has become an integral part of brand strategy. UX writers now work closely with brand managers and marketers

to ensure that the language used in digital products aligns with the brand’s overall messaging [17].

3.3 Artificial Intelligence

This section introduces generative AI, large language models, and limitations related to their usage in microcopy. It highlights the potential applications of these technologies while addressing the critical ethical issues they present.

3.3.1 Generative Artificial Intelligence

Generative AI is a class of algorithms and models designed to generate content by identifying and learning patterns, structures, and relationships from extensive data sets. Traditional AI systems operate on the basis of predefined rules and deterministic logic, while generative AI has the capability to produce novel, human-like and creative output. The output is generated through prompts provided by the users, and the quality and relevance of the generated content are influenced by techniques such as prompt engineering. Generative AI combines computational intelligence with creativity, expanding the boundaries of machine-generated content [36].

3.3.2 Large Language Models

Large language models (LLMs) are a subset of generative AI designed to process large textual data sets to identify linguistic patterns and contextual relationships [37]. These models operate on the basis of a complex system of rules that govern the relationships between words, phrases, and longer textual structures. The accuracy and reliability of their outputs improve as more contextual data is provided. LLMs are deep learning systems designed to process language by predicting the next word in a sentence. They are trained on massive collections of texts to master the distributional characteristics of words and syntactic structures. LLMs can represent and process virtually any sentence, producing grammatical and meaningful continuations [38].

LLMs can generate impressively fluent and human-like text, but do not possess an understanding of meaning, and instead rely on statistical correlations from their training data. Their effectiveness is also limited by the size of their context window, meaning that they may lose track of important information in longer inputs. LLMs tend to perform better when key information is placed at the beginning or end of long inputs and struggle more to access and retrieve information located in the middle of longer inputs [39]. When providing LLMs with longer input, the content that the model has to reason over increases, which can lead to decreased accuracy.

Despite their strengths, LLMs can produce inaccurate, vague, or biased responses, often referred to as hallucination [40]. These issues arise because models cannot access real-time information or verify facts since they rely solely on patterns learned during training. In addition, they are highly sensitive to how prompts are structured

and phrased, where small variations in wording can lead to very different outputs [41].

3.3.3 Large Language Models for Microcopy

While LLMs are capable of generating fluent and human-like language, their output often lacks nuance, contextual awareness, and precision required for effective microcopy. They may produce verbose or generic suggestions and can introduce inconsistent terminology across an interface, which can undermine usability and user trust. Therefore, although LLMs can support tasks such as writing and ideation, their output must be carefully reviewed and refined by human writers to meet the high standards expected in interface microcopy [41].

Despite their impressive linguistic capabilities, LLMs can face significant limitations when applied to microcopy generation. Effective microcopy requires not only fluency, but also a nuanced understanding of interface context, user expectations, brand voice, and functional constraints such as space, tone, and clarity. However, LLMs do not possess true contextual awareness or intent. They cannot perceive visual layout, interact with interface elements, or understand cross-functional requirements such as localization, accessibility, or legal compliance.

In the context of microcopy, to align with product-specific language and tone, LLMs must be explicitly provided with detailed style guidelines and contextual examples. However, incorporating such information into prompts introduces further challenges. When these instructions are embedded in the middle of long prompts, the models ability to take care of and retrieve the relevant information diminishes significantly. This is due to the way transformer-based models process input sequences, with positional bias favoring the beginning and end of the prompt [39].

3.3.4 Prompt Engineering

Prompt engineering is the iterative process of refining a prompt by adjusting or varying the prompting technique [42]. Through iterative refinement of prompt engineering techniques, AI can better learn from diverse inputs, reduce biases and confusion, and produce more accurate responses. Strategic prompting techniques provide instructions that improve LLMs' ability to produce accurate and efficient responses [43], minimizing the need for manual review and post-generation editing, saving time and effort in attaining desired outcomes [44].

Poorly crafted prompts can result in vague or inaccurate responses, limiting a model's ability to deliver valuable output [45]. As language models evolve, effective prompt engineering has become an essential skill for users aiming to maximize the models potential and achieve optimal outcomes [46]–[48].

Prompt engineering enables the generation of desired responses during the inference phase, eliminating the need for expensive and time-intensive fine-tuning, making it a highly efficient technique for commercial applications [48]. This type of interaction with the model does not change its parameters, it relies on the models

pre-trained knowledge and the context provided in the prompt without additional training, making it a flexible and quick method.

However, relying solely on the models' pre-trained knowledge is highly dependent on the quality and consistency of prompts, necessitating the repeated use of identical prompts to achieve stable outcomes. This approach is further limited by the architectures constrained context length, and research highlights fine-tuning as an effective and scalable solution for optimizing model performance [49].

3.3.5 Fine-tuning

Fine-tuning is a process in which a pre-trained model, a model that has already been trained on a large, general dataset, is further trained on a smaller, specific dataset for a particular task. The fine-tuning process uses data that have been labeled. Fine-tuning involves teaching the model to make predictions or decisions based on the labeled data and the training is tailored to a particular goal, rather than a broad, general purpose. Fine-tuning trains the model once in advance, making it specialized on specific tasks. After fine-tuning, the model has learned the target task, allowing it to execute it efficiently without relying on extended prompts containing examples [50].

The pre-trained LLM already has a general knowledge of understanding language, and the fine-tuning adapts this knowledge to the specific task. Fine-tuning improves how well the model performs on the specific task, making it more accurate or effective. Since the model already has a foundation of knowledge from pre-training, fine-tuning takes less time than training a model from zero. Fine-tuning can achieve good results even if you only have a limited amount of labeled data for the task, because the model builds on its pre-existing knowledge. The challenges of fine-tuning large models include high computational resource demands [51]. In addition, it is important to ensure that the model maintains its broad understanding and ability to perform well on a variety of tasks, while also being adapted effectively to the specific requirements of a particular task, without compromising its overall performance or overfitting to the limited task data [52].

4

Methods

This chapter outlines the methods, design framework, and activities used in this project. They are presented chronologically, starting with the research phase, followed by analysis methods, ideation, evaluation, and prototyping. Finally, ethical considerations for data gathering, consent, and other project-related aspects are discussed.

4.1 Secondary Research

This section introduces secondary research used to analyze existing data collected by others. Literature reviews and benchmarking are methods used in this project to gain background knowledge or support primary research.

4.1.1 Literature Review

A literature review is valuable at the beginning of a project, as it provides an overview of the field and helps the researcher develop expertise in the chosen subject. It should offer insights into the state of the art, key issues, and existing challenges by examining the literature and research conducted by others on the subject. Maintaining a neutral and critical perspective throughout the review is essential [53].

4.1.2 Benchmarking

Benchmarking is a research method implemented to help identify best practices across organizations, enabling efficient improvements [54], [55]. The goal of benchmarking is to learn from similar or related solutions by identifying and studying them, and improve based on findings [56].

4.2 Qualitative Research

This section introduces empirical research methods that can be used to collect qualitative data. Interviews and usability evaluation and inspection, are methods used to collect qualitative data.

4.2.1 Pilot Study

Pilot studies could be implemented in several occasions, where one of them is to evaluate and analyze the materials used in interviews or focus groups, ensuring more reliable results [57]. It can be used to validate the language of the interview questions, assess the duration and timing of the sessions, and identify potential issues.

4.2.2 Interviews

Interviews can be among the most important sources for gaining insight in research [58] and aim to uncover and understand key aspects, such as the perspectives and thoughts of the interviewee on a given phenomenon [59]. Interviews are a qualitative empirical method that can be structured, semi-structured, and unstructured [60]. Semi-structured interviews offer flexibility as they allow for follow-up questions and a deeper exploration. The questions can be open or closed, open questions inviting detailed explanations and encouraging dialog, and closed questions seeking simple confirmations or denials. The purpose of the qualitative method is to identify and discover the users perceptions about a topic, experience, motivations, desires, or mental models [61].

4.2.3 Usability Evaluation and Inspection

Usability evaluation and inspection is a method that assesses how easy and enjoyable it is to interact with a system [62]. The method can take place at various stages in the life cycle of the system [63]. The method evaluates a system based on one or more given values, such as usage problems and usability goals. Usability inspections do not require user participation and can be seen as a self-reflective research method conducted to document experiences with a system. The method focuses on experimental learning and is implemented to analyze learning processes, insights, and usability challenges from a first-person perspective.

4.3 Analysis

The analysis methods described in the section are used to analyze data from secondary and qualitative research and define stakeholder requirements.

4.3.1 KJ-analysis

The method, also known as the Affinity Diagram, is used for analyzing qualitative data obtained from interviews and observations. The method is used to effectively organize, classify and obtain a visual overview of a larger amount of data [64], with the aim of addressing the problem areas, improvements and needs.

It starts by defining a clear theme, a central topic or focus of the analysis. The next step is to gather raw data, for example from qualitative interviews. Then, descriptions of the raw data are written on index cards or sticky notes, which are then

spread out on a surface and grouped based on similarities or shared characteristics. These groups are refined iteratively by correcting any misplacements to ensure logical and cohesive categories. Each group is labeled with a header card that captures its common theme and an affinity diagram is created to visually display the organized data for analysis and communication.

This method effectively explores insights that may otherwise have been overlooked. It is, among others, valuable in project for systematically classifying data, providing clearer insights about users, and support better decision-making of what directions to take in the project [64].

4.4 Ideation

This section focuses on ideation, which is the process of generating and developing new ideas. Using the methods Sketching and Brainwriting, diverse ideas were generated.

4.4.1 Sketching

Sketching aids individuals in reinterpreting their ideas, leading to new insights and creative solutions. There are different types of sketches and two of them are Talking Sketch, which is used to explain ideas and facilitate communication of the participants and Storing Sketch, used to archive ideas for future reference. [65]. Sketching serves as a powerful tool for externalizing and communicating ideas, enabling individuals to articulate complex concepts effectively [66]. A combination of Talking and Storing sketches can facilitate ideation by addressing project uncertainties throughout the design process.

4.4.2 Brainwriting

Brainwriting is a form of brainstorming and can be used to ensure that all participants have equal opportunity to contribute with ideas. Brainwriting is a structured brainstorming technique, originally developed for marketing, where participants silently write ideas in response to prompts. It fosters an inclusive environment, generates numerous high-quality ideas, and requires no expert facilitation or extensive documentation [67]. The method is used for enhancing creativity in conceptual design and follows the process of participants writing down ideas, passing them to others for further development, and then discuss the refined concepts [68]. As the method stimulates creativity at an early stage of the design process and promotes an inclusive environment, it can be used as a first step to discuss the problem area, scope of the project and uncertainties to ensure all participants are on the same page.

4.5 Evaluation

Evaluation methods described in this section are used to evaluate data gathered during secondary research, and ideas generated during ideation.

4.5.1 PMI Table

The PMI (Plus-Minus-Interesting) method is used to provide an overview of various solutions and to highlight key areas for further assessment. The method analyzes a topic through three perspectives: positive (Plus), negative (Minus), and neutral or noteworthy (Interesting) and promotes balanced evaluation and informed decision-making.

The method considers the importance of initially evaluating all sides of an issue or topic by identifying and listing the Plus (advantages), Minus (disadvantages), and Interesting (neutral observations or points of interest) aspects of the topic. Then, there is a vote and discussion based on the identified aspects where a PMI Table is created where scores will be assigned to each aspect. The score range is predefined and could, for example, range from +5 to -5. Based on the total amount each aspect receives, a conclusion are drawn and decision about action could be made [69].

4.5.2 User Testing

User testing, also referred to as usability testing, is a method that can be used to ensure that the final product meets the users' needs and requirements. During user testing, it is important to create a comfortable environment for participants to obtain reliable results. Two aspects that the usability testing can focus on are; effectiveness, determined by whether users can successfully complete the task; and satisfaction, often assessed by observing participants as they interact with the product. For this type of project, usability testing can be performed with five participants, as this is enough to uncover at least 80 percent of design issues [70]. Individuals tend to have difficulty communicating problems, demands and wishes, which may be a result of demands being perceived as self-evident or of language and knowledge being limited [71]. User testing is a method used to observe an individual's actions such as compensatory behavior, alternative use and modifications of a product. They can serve both formative and summative purposes, where formative testing focuses on identifying areas for improvement while summative testing provides evaluation of overall performance.

4.5.3 Think-Aloud

The think-aloud method is a valuable tool for user testing, revealing users motivations and reactions [72]. It is a technique where participants verbalize their thoughts while interacting with a product. This approach helps researchers understand the user's thought process, identify usability issues, and gather insights into user behavior. To use the method effectively the participants should be given a defined task

to complete and be asked to speak their thoughts, feelings, and actions out loud as they perform the tasks [72], [73].

4.6 Prototyping

This section explains the methods of prototyping. This is an important step in the design process, as it allows for exploration, evaluation, and refinement of the concepts before committing to the final product. Prototyping methods bridges the gap between initial ideas and the completed design by enabling iterative testing and feedback.

4.6.1 Rapid Prototyping

Rapid prototyping is a method used to quickly develop simple prototypes of the product to test its functionality and design [74]. Moreover, it is a useful method to visualize and iterate on the UI using tools like wireframes and paper sketches. The method enables valuable feedback early in the process.

4.6.2 Low Fidelity

Low-fidelity prototypes are used to quickly and easily get an overview of the product using simple and inexpensive methods [75]. Low-fidelity prototypes enable fast changes and the possibility of testing new iterations. This refers to the degree of realism or authenticity a prototype exhibits in comparison to the final design or service. These prototypes are often used to explore and refine aspects such as layout and terminology [76].

4.6.3 High Fidelity

High-fidelity prototypes are digital prototypes used to simulate and test the UX of a product [75]. High-fidelity prototypes are used to evaluate and identify potential problems early and are the initial step between the design concept and the final product. It is a useful tool for facilitating collaboration between the design team and stakeholders as it helps to visualize the product and increase the understanding of all involved parties. High-fidelity prototypes typically feature complete functionality and interactivity, making them ideal for exploration and various testing scenarios. These prototypes are designed to behave very similar to the final product, allowing for realistic user interactions. Testing with a fully developed prototype enables users to make informed decisions about improving the design. Involving end-users in the process can be highly beneficial, as they can provide valuable feedback and suggest improvements. This approach allows changes to be implemented quickly and positions end users as active contributors to the design rather than as mere evaluators [76].

4.7 Data Collection Methods

The General Data Protection Regulation (GDPR) is a data protection law enacted by the European Union. It establishes rules for the collection, processing, and storage of personal data of individuals within the EU/EEA, aiming to enhance privacy rights and harmonize data protection laws across member states. In a project involving interviews and personal data collection, the regulation mandates obtaining explicit, informed consent from participants, to ensure they understand how their data will be used, stored, and protected [77].

Informed consent is based on respondents agreeing to participate after being provided with clear information about the study. This process helps prevent harm to participants by ensuring their privacy is protected and that they are not misled about the objectives of the research. As part of the informed consent process, respondents can be assured of confidentiality in the research report, making it difficult for others to identify them. Respondents have the option to provide consent if they agree to participate in the interview and if they agree to be recorded [78].

5

Process

This chapter outlines the project's process and the implementation of the described methods, which constitute a significant portion of the project. The project starts with *Secondary Research*, and the section describes the literature review, analysis of corporate materials, and a RobotStudio inspection, summarizing key findings that inform subsequent steps. After that, the data gathered from interviews are presented in the *Interviews* section. In the following section *Benchmarking of AI Tools* a collection of AI tools is benchmarked to assess their capabilities, followed by *First AI Tool Evaluation* section, to identify tools suitable for UX writing.

Drawing on the findings from the earlier stages of the process, the following *Ideation* section explains the path taken to address the project scope and its potential solutions, resulting in the development of UX writing guidelines. Best practices from other companies and software are then benchmarked in the *Benchmarking of UX Writing Guidelines and Best Practices in Software* section to inform the design of effective UX writing guidelines.

The following section *UX Writing Guideline Development Process* section describes the process of creating the guidelines. The designed guidelines then undergo user testing, with the process and findings of their effectiveness described in the *User Testing* section. As the final step in the project process, the *Second AI Tool Evaluation* section outlines the evaluation process used to evaluate shortlisted AI tools against the finalized UX writing guidelines.

This process, illustrated in Figure 5.1, demonstrates the approach to investigating AI tools potential in content design while developing and refining UX writing guidelines through research, ideation, evaluation, design, and testing.

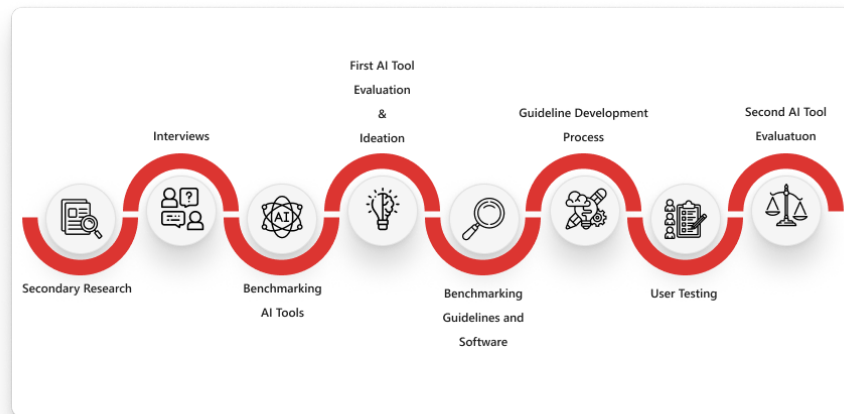


Figure 5.1: A visualization illustrating the process of the project.

5.1 Secondary Research

To get further knowledge within the research area, a literature review was conducted that focuses on interaction design, AI, UX writing, and similar projects. Search engines such as Chalmers Library, Researchgate, and Google Scholar were used to find reliable articles and books. Keywords such as "interaction design", "content design", "ux writing", "artificial intelligence", or "prompt engineering" initiated the literature review. In addition, a review of corporate material such as HE and how to use AI was conducted. An inspection of the RobotStudio desktop and both Cloud's and desktop's files in Figma was assessed.

5.1.1 Corporate Material

The heuristic evaluation provided by the company offered valuable insights and a strong foundation for understanding and improving UX writing in RobotStudio. It highlighted opportunities to enhance consistency in tone of voice, punctuation, terminology, and sentence construction. Additionally, it underscored the value of clearer communication to better guide users and support confident decision-making. The evaluation also revealed areas where revised or additional content could further improve the overall user experience of the software. Figure 5.2 and 5.3 showcase some of the material from the HE.

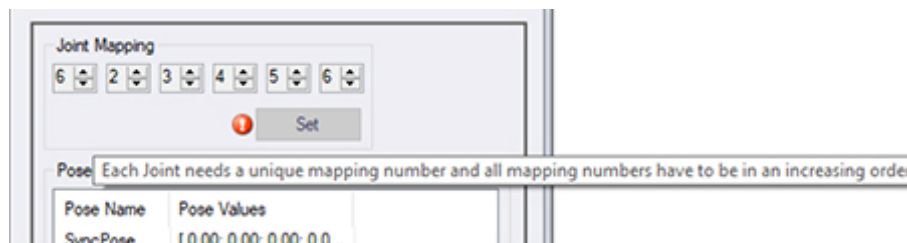


Figure 5.2: A tooltip from RobotStudio, which can be revised for improved clarity and conciseness to enhance user readability. [79] Reprinted with permission.

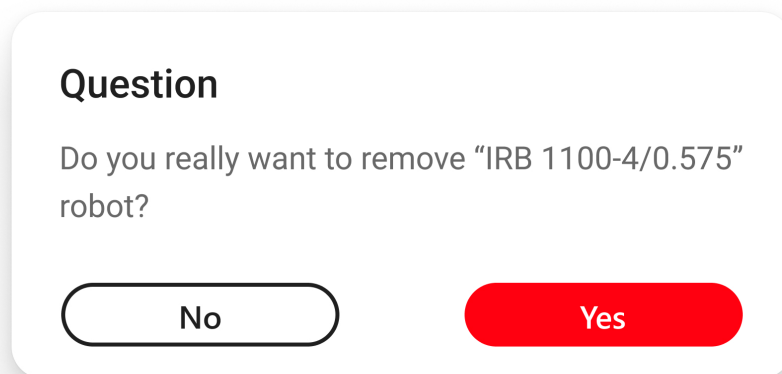


Figure 5.3: A dialog box in RobotStudio requiring revision to improve clarity and usability, empowering users to make confident and informed decisions. [79] Reprinted with permission.

ABB’s AI guidelines on handling AI to ensure company security were reviewed and taken into account during the use of AI. The information provided directives on how it should be used to consider security and data protection and essential requirements.

5.1.2 RobotStudio Inspection

An inspection of the RobotStudio desktop and associated Figma files with the product design was performed from the perspective of first-time users. The inspection was performed to gain a foundational understanding of the RobotStudio desktop software, guided by introductory workflow tutorials on YouTube. The approach provided insights into the usability of the software during interface interaction, navigation, and feature testing. Through the practice-based approach, interesting observations and usability challenges were documented, allowing reflection on the overall UX.

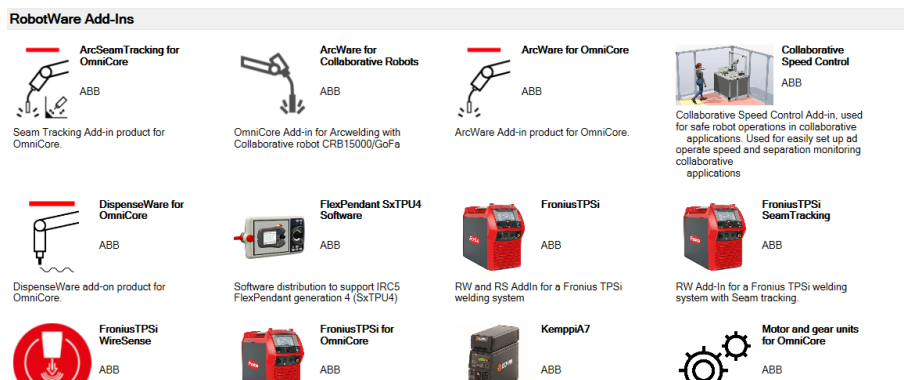


Figure 5.4: Examples of RobotWare Add-In descriptions in RobotStudio, displaying inconsistent use of ending periods. [79] Reprinted with permission.

The novice user perspective offered valuable insights into areas where clarity could be improved, particularly around software-specific terminology. It also highlighted the potential benefits of adding explanatory tooltips to enhance feature comprehension. Additionally, the inspection identified opportunities to improve consistency in punctuation and capitalization for a more polished user experience. Figure 6.2 shows a comparison of the inconsistent usage of ending punctuation and capitalization in a wizard dialog.

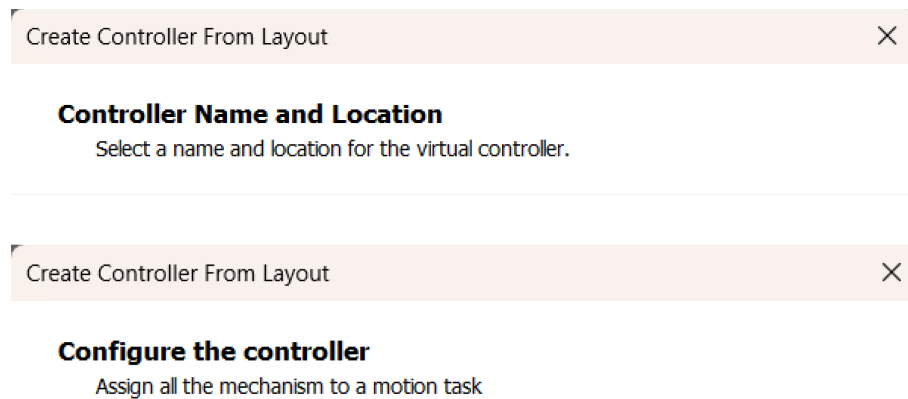


Figure 5.5: Examples of inconsistent writing in a sequence of steps within the same wizard dialog in RobotStudio. From the top down: the first example uses period at the end of the step description and applies title case in the title, the second omits period and uses sentence case in the title. [79] Reprinted with permission.

The inspection of the department’s Figma files provided valuable insights into content patterns and revealed opportunities for greater consistency, reinforcing and clarifying areas previously identified in the software.

5.2 Interviews

The section presents the process and result of the qualitative research and analysis used to understand the end users and their needs, and gain expert knowledge within the research area.

5.2.1 Pilot Studies

Pilot studies were conducted before interviews to assess whether the material aligned with the purpose of the interview, assess the quality of the questions, estimate the time frame and identify potential problems and areas for improvement. Pilot studies should be conducted with a smaller scale of participants representing the real target group. The questions were discussed and refined in consultation with the ABB and Chalmers supervisors. The pilot studies resulted in the elimination of some questions that did not support interview purposes, while others were reformulated to increase clarity.

Table 5.1: Table showing the respondents participation number and their role.

Interview Respondents	
Respondents	Team
R1	Internal Developer Team
R2	Internal Developer Team
R3	Internal Developer Team
R4	Internal Developer Team
R5	Internal Developer Team
R6	Internal Developer Team
R7	Internal Developer Team
R8	Internal UX Team
R9	Internal UX Team
R10	Internal UX Team
R11	External UX Writer
R12	External UX Writer

5.2.2 Respondents

The respondents represented a theoretical selection consisting of both men and women with experience and different perspectives on the subject (Table 5.1).

Respondents 1-7 and 10 were interviewed to gather insights into their current process, behavior, and needs. Respondents 8 and 9 were interviewed to learn about their writing process, best practices, and the results of implementing their guidelines. Respondents 11 and 12 were interviewed to gain expert knowledge in the area of UX writing and learn about best practices.

5.2.3 Procedure

12 interviews were conducted with respondents from both the RobotStudio desktop team and the Cloud team, UX team members from different business areas within ABB, and external UX writers. The purpose of the interviews was to gain insight into the current UX writing and content design process, and expert perspectives on the topic from external UX writers.

Each interview began with an introduction to the project and its purpose, followed by obtaining the respondent's informed consent, explaining that the data collected during the interview will only be used for this project, that the data will be anonymized and aggregated, ensuring that it cannot be traced back to the respondent in both research and product contexts, and that the respondent can withdraw from the interview at any time. Lastly, respondents were asked for permission to record the interview. One respondent did not agree on recording the interview.

The semi-structured interviews started with a predefined introduction, followed by a main part and conclusion. The main part progressed from general to specific

questions, allowing for follow-up questions and probing. The questions were adapted according to the role of the respondent (see Appendices B–E).

One interviewer was responsible for conducting the interview and posing questions, while the other interviewers recorded detailed notes in a OneDrive document, where all project data are securely stored. The interviews lasted between 20-40 minutes and were conducted both in person and online using Microsoft Teams. The interviews were audio-recorded to facilitate subsequent transcript analysis. Access to interview materials is restricted exclusively to interviewers and all data will be securely deleted upon completion of the project.

5.2.4 Analysis

The audio files of the recorded interview were reviewed and the Microsoft transcription tool was used to facilitate the transcription process. The audio files were compared with the output of the transcription tool to ensure that all data were included. The notes of the unrecorded interview were reviewed and, where necessary, the phrasing was refined and contextual information was added to improve clarity and contextual understanding.

The material from the interviews was analyzed using the method KJ-analysis. The analysis was initiated by reading the transcripts and notes from the interviews and simultaneously highlighting interesting quotes and notation. The highlighted text from each interview was placed on a digital board in Figma's FigJam to maintain an overview of the data. Where needed, the data were translated and rephrased to make it easier to understand the context. Whenever it was hard to understand a quote, context was added in parentheses to make it clearer.

The first iteration focused on sorting and categorizing the data into relevant themes based on their topic. During the second iteration, themes and associated data from the first iteration were reviewed. New themes were identified, the number of themes decreased and some quotes changed places, see Figure 5.6-5.8.

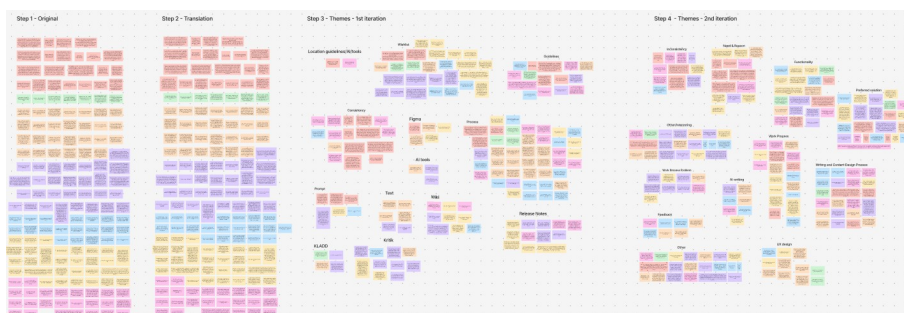


Figure 5.6: Result of the process of analyzing data from interviews with the Developer Team.

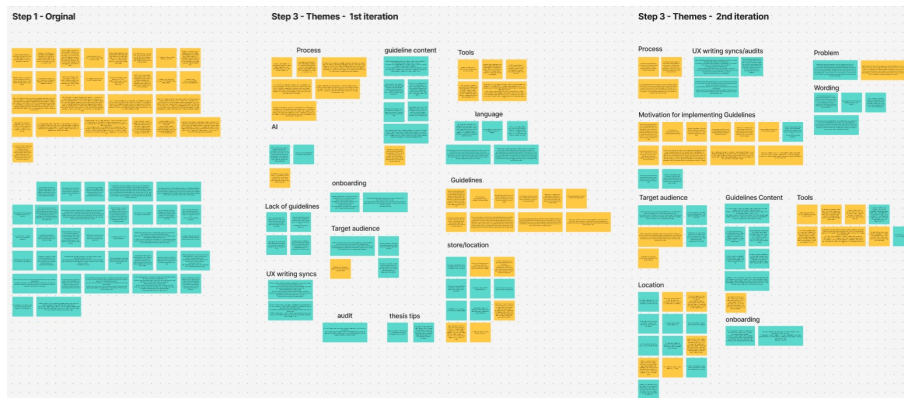


Figure 5.7: Result of the process of analyzing data from interviews with the UX Team.

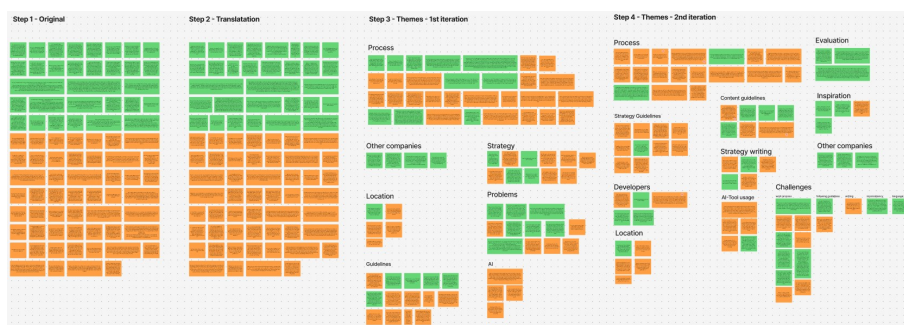


Figure 5.8: Result of the process of analyzing data from interviews with UX Writers.

The identified themes from the KJ-analysis were used in tree diagrams to connect the various indices and collapse the data. The tree diagrams identified branches with associated nodes and visualized a clearer connection between the various themes, see Figure 5.9-5.11.

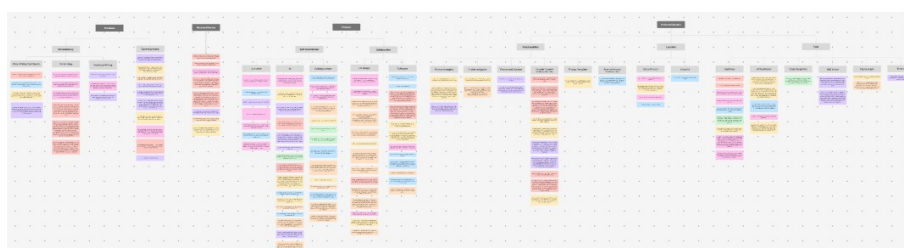


Figure 5.9: Tree diagram illustrating the collapsing of data from Developer Team interviews.

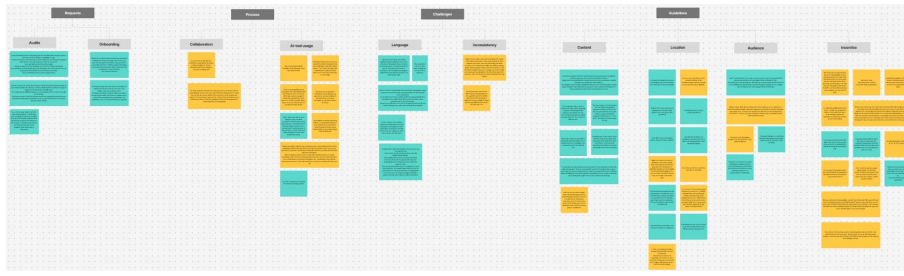


Figure 5.10: Tree diagram illustrating the collapsing of data from UX Team interviews.



Figure 5.11: Tree diagram illustrating the collapsing of data from UX Writer interviews.

5.2.5 Findings from Developer Interviews

The analysis identified main themes such as *Writing Process*, *Preferred Solution*, and *Challenges*.

5.2.5.1 The Developers Writing Process

Writing process explains the approach of developers when creating text for RobotStudio.

Write text based on my previous overview of the product. — Respondent 4

Individual experience and familiarity with the software serve as the primary reference point when initiating text generation. The reliance on personal judgment appears to be particularly prevalent for shorter texts, indicating that the perceived simplicity and brevity of the text lead individuals to bypass established patterns and language standards, trusting their immediate understanding and formulation. The decision-making process regarding the content of the text is often driven by what the individual believes is appropriate or "reasonable", as stated by Respondent 7.

So what to write is up to me, and what I think is reasonable. — Respondent 7

Microsoft's Copilot serve as the company-approved primary AI writing assistant for all employees and allows users to input all types of material without compromising security.

So probably I will do some mistakes when writing the text myself, right? [...] so you have to consult someone like to say like if this is correct or not, and I found that Copilot is a good friend for this task. — Respondent 2

The majority of the non-native English speaking developers recognize the inherent linguistic inaccuracies and difficulties in producing user-friendly text. AI tools such as Copilot are perceived as valuable assistants in text refinement for clarity and tone adjustments.

Trying to use AI to generate release notes based on the description within the work item to see if it could kind of automate the whole process. The release notes should be formatted, so we gave it a bunch of examples of good release notes that we had from the past and then we said 'we would like to, you know, output the release notes in this kind of style and wording and stuff, but this is the content that you'll have from the description of the actual thing that was implemented'. It was able to do it quite well. — Respondent 5

The potential of AI to streamline specific workflows is also being explored by developers. This reflects an interest in using AI to automate traditionally time-consuming writing tasks and make them more efficient. Developers are exploring the potential of leveraging the AI's ability to learn from examples and generate structured output, with the aim of saving significant time and effort.

I will probably just say 'can you improve my text' and then paste the text. — Respondent 6

When asking AI for text refinement, the interaction is often direct and lacks specific guidance. Some of the developers, as indicated by Respondent 6, rely on the AI's general language capabilities without providing specific contextual instructions or stylistic preferences.

So basically for the backend let us say, I am using Copilot to rephrase the statements because once again it depends on the message itself. It is an information, warning or error and the tone of it, so we use this AI to like 'Rephrase it as an information message'. — Respondent 2

Copilot is utilized to rephrase existing statements, particularly to align with specific message types and tones. The approach mentioned by Respondent 2, is used by developers with more AI knowledge and highlights a more targeted application of AI to ensure that the messages adhere to predefined patterns or categories and tone of voice.

[...] I have to mention something, because it is a new field that we can call prompt engineering. How you ask the questions is really important otherwise you would get a wrong response. — Respondent 2

The effective use of AI for text tasks requires more knowledge. To receive the desired and accurate output from AI, how to phrase the questions, also referred to as prompt engineering, is essential. Respondents with greater experience in the field of AI demonstrate a more sophisticated approach as they understand the importance of specificity and including essential parameters for different message types. The quality of the input significantly influences the output and highlights the need for a better understanding of how to interact with these tools to achieve optimal results.

When writing we usually go by feeling or general advice. Generating text with the help of Copilot [...]. — Respondent 3

The respondents' approaches to using AI in their writing process reveal a lack of

standardized prompting techniques and a limited consideration of parameters such as role description, context, and tone of voice. When specifically asked about including parameters in their AI prompts, most of the respondents indicated a general oversight of these essential factors. The majority explicitly mentioned that they "do not consider the tone when asking AI to improve text", risking that the output does not align with the robotics communication style and persona.

If we are going to create a window or dialog, we check other texts in that dialog or other error messages. — Respondent 4

The creation of new textual content is often based on existing UI elements in the interface. Respondents rely on established patterns and language within the organization and write according to a reference they found. As highlighted by Respondent 4, the current approach suggests a strategy to minimize inconsistency and adhere to established patterns and language.

We collaborate more with UX designers now, they work more in Figma, and it may be that they write the texts there and then we take the text straight off. — Respondent 6

The second approach is that developers ask UX designers for guidance during the writing process. Collaboration with UX designers is a common practice, highlighting the importance of the UX perspective in technical communication. The dialog between developers and UX designers is a consistent element, with developers frequently seeking designers' input. When faced with the need to modify existing text, some respondents' first instinct is to seek designers' input rather than independently rewriting, ending up potentially putting more work on UX designers' shoulders.

[...] the key here is collaboration because sometimes you need like to explain some technical issues, which is maybe not clear for the UX designers all the time. They have a good technical background, but it's really specific and we are working in a domain which is really industrial [...] so you have to be specific because people who are working with RobotStudio are engineers and want to know what's going on exactly. Like, OK, why I get this error?. — Respondent 2

5.2.5.2 The Developers Preferred Solution

To assist in the writing process, assistants and tools such as guidelines, AI model, ABB chatbot, code integration and Figma plugin were mentioned by the developers as an ideal solution.

Standardized guidelines and AI-based templates could be beneficial in maintaining consistency. The guidelines should provide examples, terminology, and allow easy navigation. A reference library of common phrases or templates could reduce the dependency on UX designers for minor text updates, allowing developers to write text more independently. Internal portals such as Azure DevOps were mentioned as the primary location where they would like to find information on how to write text.

A context-aware AI chatbot or fine-tuned model that understands company-specific terminology was mentioned as highly beneficial. The AI tool should automate text

generation in a standardized way, have internet access, and adapt the tone based on context.

Preferably AI tools, but more on a higher level, like you could have some rules, maybe some examples. But AI would be more directly 'I want to write this' so you get more direct help. — Respondent 3

5.2.5.3 The Developers Identified Challenges

A key challenge in the current content writing and design process is maintaining consistency. This is largely influenced by the involvement of multiple writers, varying formats, the absence of a unified terminology, and individual writing styles. Writing copy is an individual task that lacks writing rules, leading to a lot of variability in the output. RobotStudio desktop and Cloud each have several writing contributors that consist of project members with various backgrounds.

Respondents' reliance on individual experience in text generation could reinforce positive UX writing patterns, but it also carries the risk of generating inconsistencies or bad phrasing if the content is not following best practices for UX writing.

You can tell that the texts [in RobotStudio desktop] were written a long time ago and it varies depending on who wrote them. — Respondent 6

Terminology, formatting, and sentence construction varies throughout the interface. Words change from place to place and are used differently between internal teams.

Yeah, the word is just like, it keeps changing from places to places. We say 'subscription' and then we say 'license'. — Respondent 4

It is hard to find a balance in technical content. Text with a lot of technical terms and context can be difficult for users and project members to comprehend and requires careful simplification without risking to eliminate the meaning of it.

5.2.6 Findings from UX Team Interviews

The analysis identified three main themes which were *Writing Process*, *Guidelines*, and *Challenges* with associated sub-themes.

5.2.6.1 The UX Teams Writing Process

Two respondents are from one of ABB's other business areas, where they already implemented UX writing guidelines. Prior to the establishment of these guidelines, the absence of a clear and consistent structure for writing resulted in variations in style between the writing contributors. The process of generating text often involved individual designers taking the lead, sometimes seeking input from project members. In particular, ChatGPT emerged as a preferred AI tool for some, perceived as providing better results compared to other AI options. The potential of AI to accelerate the writing process were widely acknowledged.

Respondents 8-9 highlighted that the collaboration varied across teams and that in some teams they had a close-knit review process among designers. In addition,

ensuring consistency across different projects and products was acknowledged as a challenge.

5.2.6.2 The UX Teams Opinions on Guidelines

The introduction of UX writing guidelines has made the writing process more structured and clearer, reducing the ambiguity around tone of voice and terminology. Respondents 8-9 noted qualitative improvements, with the resulting text being shorter, more coherent and user-friendly.

In robotics, it is very important to follow the right terminologies. There are some specific words that everybody knows about, but maybe when you are designing it, you need to use exactly the same and this is always challenging for the new designers and whoever come to the job or join later, because they might not be aware of these terms. — Respondent 10

Respondent 10, particularly, highlighted the importance of consistent terminology, facilitated by a word list, for new designers or external consultants unfamiliar with company-specific language. The need for simple and easily accessible guidelines integrated into the company's UX framework was emphasized. Concrete examples, especially those related to the company's products, were suggested as valuable additions to the guidelines, enhancing their practical application.

The underlined focus was stated to establish a unified writing style across all projects and thereby decrease the writing burden on designers and prevent it from becoming a bottleneck in the development process. Respondent 10 envisioned the design of the guidelines to be concise, user-friendly, and seamlessly integrated into the writing contributor workflows, becoming a fundamental part of the UX strategy for sustained impact.

5.2.6.3 The UX Teams Identified Challenges

It is a challenge to ensure consistent adherence to the guidelines, as adoption is largely left to individual writers. UX writing continues to be a bottleneck for some, particularly non-native English speakers who struggle with nuances in phrasing and terminology. However, even native English speakers face dilemmas regarding tense and the most appropriate way to phrase content, highlighting the inherent complexities of writing effective UX copy.

We didn't have any like guidelines or any support to unite this writing style, like all the writing kind of depended on every design. So what I write will be different from what team members will write. — Respondent 8

The lack of unified guidelines in the past resulted in varying writing styles across writing contributors. Reliance on individual intuition before guidelines often led to uncertainty about the appropriate tense, tone, and terminology.

5.2.7 Findings from UX Writer Interviews

The analysis identified main themes such as *Writing Process* and *Guidelines* with associated subthemes.

5.2.7.1 The Writing Process of UX Writers

To ensure that the content aligns with design and functionality, UX writers collaborate closely with developers, designers, and support teams. However, their late integration into the design process often limits their influence on the final outcome. UX writers use AI tools to accelerate writing, but the output is always carefully reviewed.

The lack of UX writing guidelines in many companies results in reliance on existing text or colleague consultation, leading to inconsistent writing styles and terminology across teams. UX writers are therefore often consulted in the development of guidelines for companies. Despite established guidelines in some organizations, enforcement and behavioral change are difficult, and the guidelines risk becoming shelf warmers, symbolizing resources that exist but are ultimately unused.

The UX writers share a common view that developers generally prefer to avoid handling text. When developers create content without UX input, it tends to be unclear, inconsistent, technically focused, and not user-centric.

5.2.7.2 The UX Writers Best Practices

Clarity and conciseness are essential for effective UX writing. Employing a simple and direct language ensures optimal understanding. Recognizing that users often scan rather than thoroughly read text, the principle of front-loading is recommended, placing the most crucial information at the beginning. This technique also facilitates action-oriented copy, for example "Save changes" instead of "Click here to save changes". Furthermore, maintaining short and scannable sentences through the use of bullet points enhances readability.

Always write the unique or the most important word first, and it is a principle that feels very easy to explain. — Respondent 12

UX writers recommend standardized guidelines to ensure consistent tone and phrasing. These guidelines should include a shared glossary or terminology to maintain uniformity in key terms and avoid unnecessary reinvention of words.

In my project, employees use two terms for the same thing. Those in IT say one thing and those who work with customers say another. [...] because there's a lot of confusion and people search for different terms, it's a bit of a mess so you have to be tough and say "no, we will say this" and then you change all the powerpoints and so on. — Respondent 11

A key principle of UX writing is contextual customization, where the tone and detail are adjusted according to the text's placement and purpose. For example, error messages should be direct and supportive, in contrast to the more conversational nature of onboarding content. Moreover, technical writing demands a balance between accuracy and user-friendliness, particularly for complex software and developer tools.

It's more difficult to create something completely new, but to hook up with a UX designer and the principles there, you just add a little around just text principles it is usually a good start. — Respondent 12

Error messages should be specific and helpful instead of just stating the obvious, e.g. "Invalid password - must be at least 8 characters" instead of "Error". It should offer next steps instead of just stating a problem, moreover, avoid blaming users, and consider user emotions.

Error messages, which I would now call help messages, are a great opportunity to find out about problems and help users further. — Respondent 12

The UX writers emphasized including comprehensive and contextualized examples in the guidelines. The examples should showcase the specific use of terminology that is critical to the organization, clearly distinguishing words to use and not to use. The examples should showcase structural elements such as the appropriate use of headings and subheadings, or guidance on their absence. Establishing the specific English language convention to follow and providing examples of its correct application is also essential for consistency. The UX writers highlighted the importance of showing users tangible examples instead of abstract principles, so that users fully grasp their application.

Instead you can show me what distinguishes one text from another. I also believe in using a lot of examples to make it a bit more concrete. — Respondent 11

For optimal adoption, UX writing guidelines should be easily accessible and integrated into frequently used platforms such as Figma. Avoid storing these resources on intranet is recommended to ensure usage. The guidelines should be structured for quick reference, encompassing best practices, instructions on how to use them, and clear examples of good and bad writing.

5.3 Benchmarking of AI Tools

Benchmarking was performed to identify and explore tools that could support and enhance the content design process. Google and Youtube were used as the main search engines, and keywords such as "generative AI", "LLMs", and "UX writing tools" initiated the search. This resulted in the identification of 60 tools, which were categorized into AI tools, UX writing tools and Figma plugins.

AI tools refers to AI-powered chatbots or assistants, such as ChatGPT or Copilot, that use LLMs to generate human-like text. These tools can create and refine content based on input prompts and are often used to support ideation, rephrasing, and content generation at scale.

UX writing tools are specialized tools designed and fine-tuned to create clear and consistent microcopy in digital interfaces. Many of these tools allow teams to define brand voice and writing guidelines within the system. Based on these pre-set parameters, the tool can generate content tailored to context, target audience, word choice, and tone. The integrated guidelines are shared across project members to ensure a unified voice throughout the interface. Many of these tools also offer collaboration features and in-context editing.

Figma plugins are extensions that work exclusively within the Figma design environment. These plugins are tailored for use by designers and writers, enabling them

to write, edit, and manage UX copy directly in the design files. They often support real-time collaboration and allow teams to maintain consistency between design and content.

From the initial list, tools that appeared particularly promising for supporting consistent content creation were documented for further evaluation. Tools that were non-relevant to the task did not make it to the PMI table.

5.4 First AI Tool Evaluation

The first AI Tool Exploration includes the sections *PMI Table* and *Prompt-Based Evaluation of AI Tools*. PMI Table details the initial assessment of tools identified during the benchmarking phase, with the aim of determining which tools that are more suitable to support UX writing tasks. Prompt-Based Evaluation of AI Tools details the process of evaluating tools that pass the PMI assessment to evaluate how effectively they can support and improve the content design process. The evaluation involves prompt engineering techniques to assess each tool's ability to generate clear, consistent, and contextually appropriate content based on realistic UX writing tasks.

5.4.1 PMI Table

After identifying a set of potentially useful tools, each was thoroughly examined by reading documentation and testing the tool through free trials where available. The evaluation was conducted using a PMI table, where positive (Plus), negative (Minus), and neutral or noteworthy (Interesting) aspects were documented (see Appendix H). The method provided a structured overview of each tool's strengths, weaknesses, and unique characteristics, with a particular focus on their ability to support UX writing, microcopy, and content consistency.

Each aspect was scored on a scale from -5 to +5 based on its relevance and impact on the assignment. Positive aspects were scored from 0 to +5, where highly relevant or impactful aspects received +4 or +5, while useful but less critical aspects received a score from +1 to +3. Negative aspects were scored from -5 to 0, critical flaws were scored from -4 to -5, and more moderate drawbacks were scored between -1 and -3.

Interesting aspects were scored 0. It represents aspects that are potentially promising or noteworthy but cannot be verified or tested at this stage. Because it is difficult to determine if their impact is positive or negative, they were excluded from the score calculation to ensure a transparent and unbiased comparison. For example, a tool might be labeled as *Recommended UX writing tool*. While this may be a compelling reason to include it for consideration, it does not necessarily reflect the tool's actual functionality. It simply suggests that others appreciate it, which may or may not be relevant to the current assignment.

A threshold score of 15 points was set to guide the selection process, as it represents a midpoint between the lowest possible score (-2) and the highest possible score (28). Tools that scored above this threshold were selected for further evaluation, while those that scored below were eliminated. Tools that lacked meaningful features

to support or enhance content creation received the lowest scores. The evaluation focused on whether the tools had the potential to support content creation and not how well they performed in doing so.

17 tools within the categories of AI tools, UX writing assistants, and Figma plugins met or exceeded the threshold and were selected for a deeper evaluation. The AI tools included ChatGPT, Claude, Copilot, Grok, Gemini, Mistral, Perplexity, and Venice. The UX writing assistants included Anyword, ContentShake AI, copy.ai, Frase, Jasper, Wordtune, Writesonic, and Writer. The Figma plugin included QoQo.

5.4.2 Prompt-Based Evaluation of AI Tools

The evaluation focused on assessing the extent to which different AI tools could generate clear, consistent, and contextually appropriate content using prompt engineering techniques, and identifying tools that performed better than others. This was measured by how well each tool aligned with the given prompt in terms of the parameters listed in the prompt. The parameters included role description, task, tone of voice, context, and special phrasing considerations. Both the literature research and the interview findings emphasized prompt engineering as a critical factor that directly affects the quality of AIGC.

To evaluate the tools, predefined prompts were used to simulate realistic UX writing tasks. The goal was to evaluate how well each tool performed in generating content for common UI elements such as tooltips and dialog boxes. Each prompt included a role description, task, tone of voice, context, target audience, and special phrasing considerations, using prompt engineering techniques (see Appendix I). To ensure confidentiality, the prompts were anonymized to ensure that they could not be traced back to the company or specific project.

To ensure relevance and quality, the evaluation used a prompt that had already been developed by the company and internally verified by designers from another business area within the company. The designers had confirmed its effectiveness in generating appropriate UX copy. The prompt leverages several prompting techniques to increase clarity, task relevance, and alignment with tone of voice and context. The main prompting techniques used include:

- **Role prompting** to clearly define the AI's role or expertise
- **Style prompting** to guide the style, tone, and formality
- **Contextual prompting** to give background information to increase relevance and accuracy
- **Task prompting** to define specific tasks and output requirements

Each tool was asked to analyze and revise a tooltip and a dialog message according to a given prompt. The messages had been identified as suboptimal during the company's HE. Each tool were asked to complete three iterations per task to assess consistency, adaptability, and performance. All tools were evaluated using an identical prompt to ensure comparability. The AIGC were then analyzed and compared

with the original suboptimal messages (see Appendix K AI Output).

The output analysis assessed whether the tools succeeded in generating clear, consistent, and relevant content that aligned with the prompt, or if they produced inconsistent or irrelevant results. Tools that did not meet these criteria were excluded for further consideration. 11 tools demonstrated outputs of sufficient quality and were shortlisted for further evaluation. The tools that passed the prompt evaluation were Anyword, ChatGPT, Claude, Copilot, Grok, Gemini, Jasper, Mistral, Perplexity, Venice, and Writer.

5.5 Ideation

As in iterative projects, ideation methods were used both in the early stages of our thesis project and later during the design process. Sketching played an important role in helping the Thesis Authors understand the scope of the project, define the problem area, and structure a clear plan for deliverables. Brainwriting served as a suitable method to ideate on solutions. After ideating on solutions, sketching was used again to ideate on how to align the UX writing guidelines with the company's design system and preferences.

5.5.1 Brainwriting

To explore solutions that could improve consistency in the content design process of RobotStudio, regardless of writing contributor, the ideation session was guided by the needs, wishes, and requirements identified during literature studies, inspections, interviews and AI exploration. A brain-writing session was performed, in which each Thesis Author individually wrote or sketched ideas on paper in a 10-minute time frame. After the session, the ideas were shared, openly discussed, and collaboratively developed further.

Early in the project, the stakeholders raised guidelines as a potential solution to inconsistent content. Through discussions with ABB supervisors, who are also stakeholders, as well as insights gathered from interviews, including with a department that had already implemented writing guidelines, it became clear that guidelines were seen as a desired tool to enable more consistent content creation. This motivated the Thesis Authors to explore solutions for how guidelines could be effectively integrated into the department's content design process.

One concept that emerged was a UX Writing Bot that could increase contextual awareness during writing, compensating for limitations in existing tools which, due to security concerns, could not access sensitive context.

After consulting with an AI-knowledgeable stakeholder, it became clear that implementing and evaluating the UX Writing Bot was not feasible given the company's current operational structure and approach to such proposals. Instead, the concept was re-framed as a potential direction for future development. With this in mind, the focus shifted towards creating a structured framework in the form of visual UX writing guidelines that could support consistency in tone, structure, and phrasing,

regardless of who creates content. These would serve as a consistent reference for both manual and AI-assisted writing, providing support for content creators using existing tools available on the market.

5.5.2 Sketching

At the beginning of the project, Figma was used to sketch and structure a plan to grasp the projects problem area, its scope and to clarify deliverables, to externalize general understanding of the project. Sketching flow diagram of a project plan, served as a starting point of the project to get mutual understanding and clearness in the project outcome. These sketches facilitated real-time dialog between the project members as well as in sessions with the company's supervisors through the sketching type Talking Sketches. This method allowed articulating and refining the assumptions about the projects goals and the companys expectations. Simultaneously, the sketching type Storing sketches was used, by archive the initial ideas and decisions. By saving this sketched flow in a shared Figma project, it gave easy access for future reference, enabling easy revisit and refinement of the project plan if needed.

Later in the project, the sketching method was used to restructure the UX writing guidelines, to align with the companys feedback. This phase involved sketching on a whiteboard to map out how the revised guidelines could address the companys desire for a more concise and actionable format while maintaining alignment with their design system in combination with external guidelines found through our research. These sketches facilitated dynamic discussions, allowing to test ideas of different structure of the guidelines.

The sketching-type Talking sketches were used to verbally discuss uncertainties of the guidelines. Storing sketches complemented these discussions by archiving key decisions and insights. After the whiteboard session, the sketches were photographed to be used as a reference (see Figure 5.12). These Storing sketches made it possible to track the evolution of our guidelines and revisit earlier ideas if addressing new uncertainties.

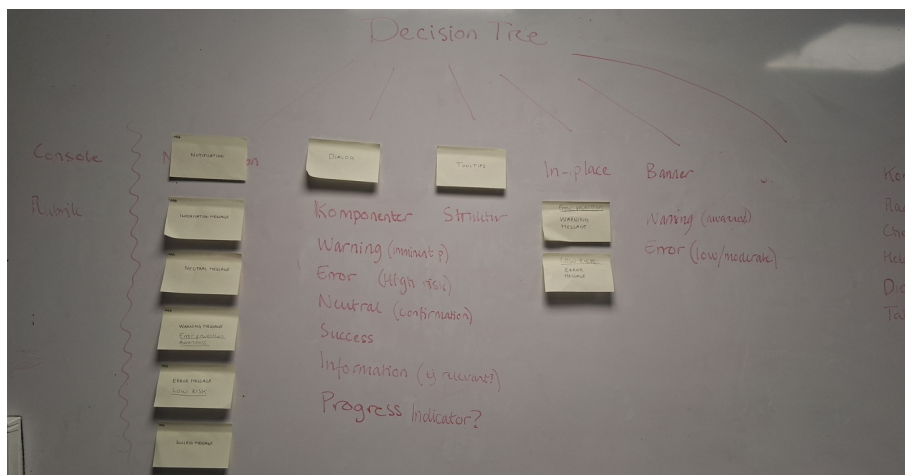


Figure 5.12: An example image of the whiteboard sketching session, illustrating the restructuring of UX writing guidelines.

5.6 Benchmarking of UX Writing Guidelines and Best Practices in Software

Benchmarking was performed to identify best practices and gather insights to inform the development of UX writing guidelines for RobotStudio. The benchmarking included reviewing design systems, style guides, and the UI elements of existing software.

5.6.1 Design Systems and Writing Style Guides at External Companies

13 design systems and writing style guides from companies such as Google, Microsoft and Apple were explored. The focus was on identifying how the guidelines were structured, stored, and what content they covered. Figures 5.13–5.14 present a collage of material from the design systems and writing style guides explored, with a complete list available in Appendix F.

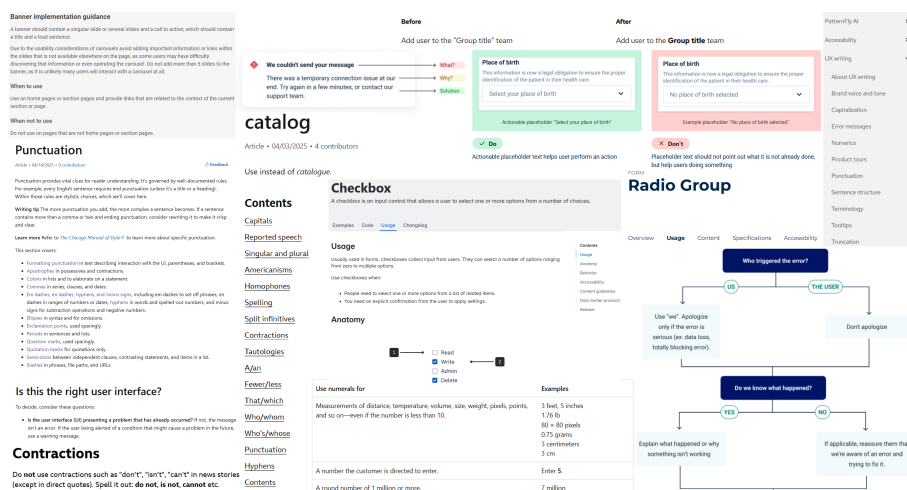


Figure 5.13: Collage of screenshots from benchmarking external software.

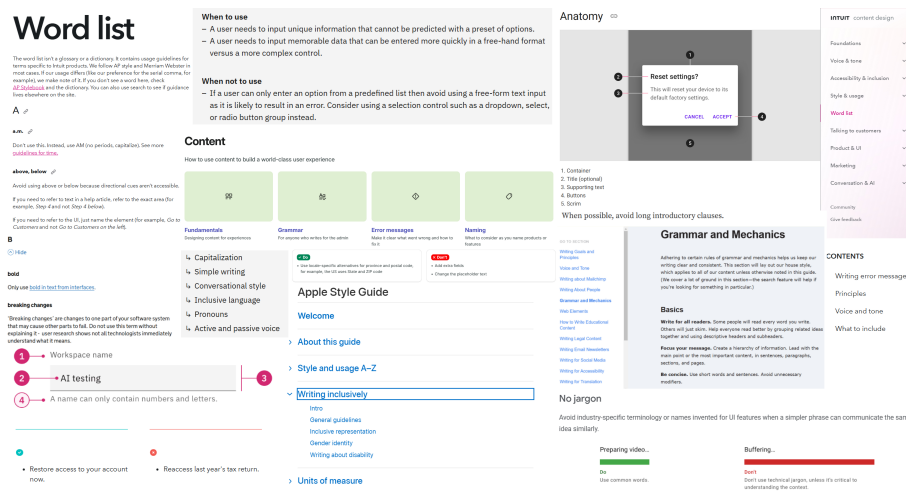


Figure 5.14: Collage of screenshots from benchmarking external software.

A common factor was that UX writing was a subcategory within broader design systems. Most guidelines used a tree structure to organize the content, enabling intuitive navigation and a clear overview. Moreover, many included examples of good and bad writing, which was also emphasized by UX writers during interviews as especially helpful as it shows what the result should and should not look like. Other common sections found in these guidelines included core principles, voice and tone, formatting rules such as punctuation, numbers, abbreviations, and sentence structure. These were typically supported by short explanations and in-context examples. Most guides also explained how and why to use the guidelines, reinforcing consistency and brand identity.

Some companies included detailed guidance on specific UI elements such as dialogs, notifications, and tooltips, explaining when and how to use them and what tone and content to apply. For example, tooltips were recommended to be friendly and supportive, while error messages should adapt tone based on severity. Another notable feature was the inclusion of a word list that outlined preferred terms, words to avoid, and context for their use. Larger companies also incorporated accessibility sections, advising on how to write inclusive and readable content such as using gender-neutral language and avoiding terms such as *disabled*.

5.6.2 Exploration of External Software

To gain a better understanding of interface communication and content structure, various software applications were explored (see Appendix G). The software benchmark included Microsoft Word, Photoshop, Catia V5, Alias Autodesk, Blender, and Google Docs (Figure 5.15). The exploration involved interacting with the UI elements within these applications to trigger tooltips, dialogs, errors, and warnings.

The structural analysis examined the handling of punctuation, capitalization, and formatting, and the communication analysis investigated how the software guides user progression, as well as tone and terminology of the message.

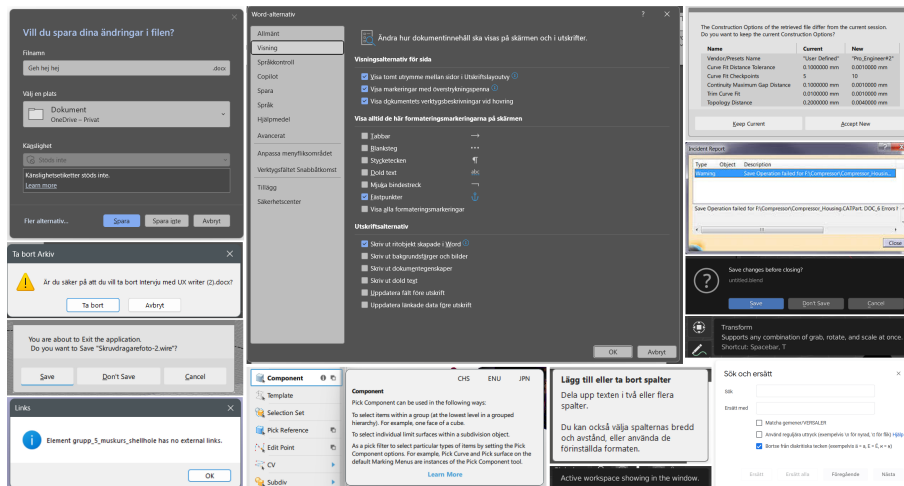


Figure 5.15: Collage of screenshots from benchmarking external software (Appendix G).

5.7 UX Writing Guideline Development Process

The development of the UX writing guidelines documents was informed by insights from interviews, benchmarking, and literature reviews to ensure a solid and relevant foundation. The needs, preferences and requirements identified during this phase directly informed the structure and content of the guidelines. The guidelines include key sections such as:

- Instructions on when and how to use:
 - Guidelines
 - UI Elements
 - Message Types
 - Controls
- Instructions on what to include:
 - UI Elements
 - Message Types
 - Controls
- Core Principles including rules of:
 - Tone of Voice
 - Tense
 - Phrasing
 - Abbreviations
 - Formatting

- Punctuation
- Capitalization
- Glossary and terminology
- Acceptance criteria for each content type
- Good and bad examples to clarify reasoning behind best practices

The initial step involved gathering information on all content areas identified as essential. This was done by benchmarking existing UX writing guidelines, reviewing the companys software and Figma files, and consulting the relevant literature. All findings were documented and structured in Microsoft Word documents, which served as the foundation for crafting the guidelines.

The content of the text documents went through five iterations, with regular feedback sessions involving stakeholders at ABB to ensure that the material was accurate, practical, and aligned with RobotStudios content design process. In addition, Chalmers and ABB supervisors reviewed and evaluated the clarity, usability, and relevance of the guidelines, particularly focusing on how well they support the creation and revision of message types within the product.

5.7.1 Identifying Flow and Structure

To determine an intuitive structure for the guidelines, a visual mapping process was conducted using sticky notes and a whiteboard. Initially, the material were organized by message types such as warnings, errors, and notifications. However, based on feedback from ABB, the structure was revised to focus on UI elements (Figure 5.16).

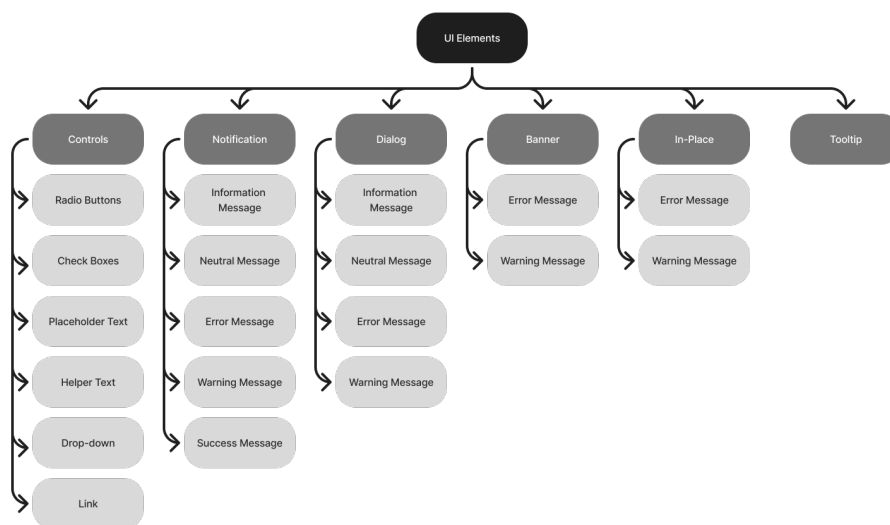


Figure 5.16: Visualization illustrating the flow and structure for navigating UI elements in the guidelines.

For example, instead of grouping all warnings under a single header, warning messages were placed within the **Dialog** section, alongside other message types such as errors or neutral messages. This UI-centric structure better mirrored the stakeholders process when creating new content for the software, making the guidelines more accessible and context-sensitive.

The structure was refined iteratively in collaboration with stakeholders to ensure alignment with existing workflows and internal expectations.

5.7.2 High-fidelity Prototype

To explore a potential integration of the guidelines into existing systems, a clickable high-fidelity prototype was rapidly created in Figma. It served as a testable representation of the structure, content, and potential integration of the guidelines, and was intentionally simplified and temporary, designed solely for use during user testing. Its main objective was to gather feedback on the structure, navigation, and usability of the guidelines during user testing, and inform further iterations and refinements of the final UX writing guidelines documents.

To maintain familiarity and minimize cognitive load, the prototype was embedded within the platform where the company's design system is currently housed. This approach minimized the need for extensive custom design by leveraging an existing framework, helping clarify the purpose of the guidelines for users. It also allowed the prototype to adopt the same hierarchical structure used on the platform, potentially simplifying navigation and improving overall usability.

Although not a final product, the prototype offered an interactive representation of the guidelines that effectively communicated the vision of the guidelines. It included a carefully selected subset of guideline section such as *Introduction*, *Core Principles*, *Dialog*, *UI Element*, and *Wordlist*. These sections were included to simulate realistic use cases that were going to be used in the user testing session (see Figure 5.17-5.18). The prototype represents a redesign of an internal site, and the header has been deliberately blurred out to prevent the unintentional disclosure of sensitive or proprietary information. The content of the selected sections was copied from the comprehensive textual guidelines documents and placed in the prototype to help users explore how the guidelines might function in context.

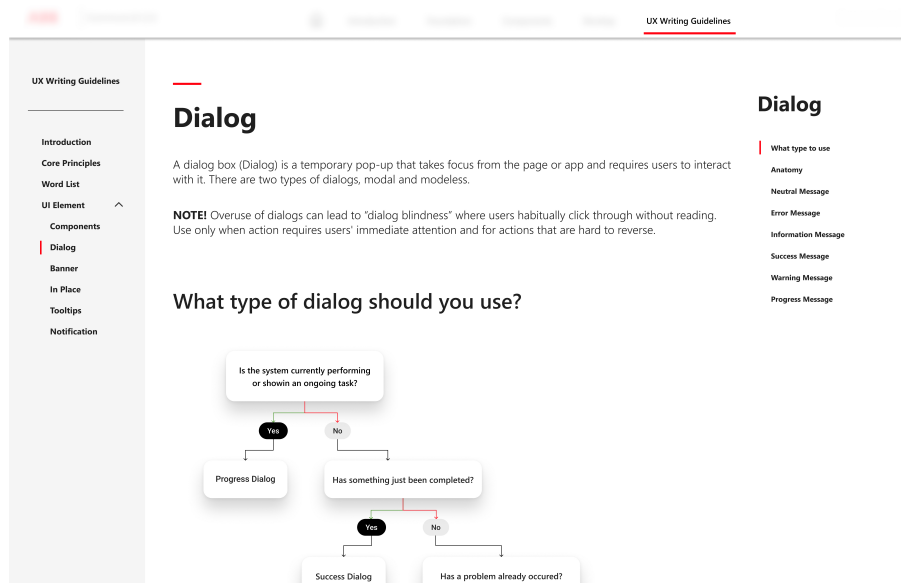


Figure 5.17: Prototype of UX writing guidelines showing the Dialog section in the UI element.

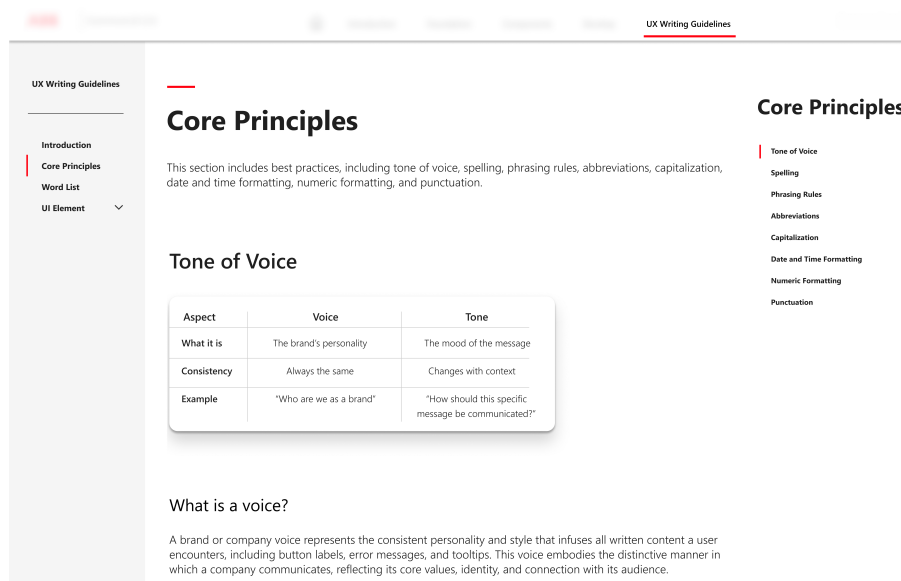


Figure 5.18: Prototype of UX writing guidelines showing Core Principles.

5.8 User Testing

This section details the process, results, and impact of visual guidelines evaluated through user testing.

Table 5.2: Summarization of the participants involved in the user testing sessions conducted to evaluate the UX writing guidelines.

User Testing Participants	
Participant	Team
P1	Internal UX Team
P2	Internal UX Team
P3	Internal UX Team
P4	Internal Developer Team
P5	Internal Developer Team

5.8.1 Pilot Studies

A pilot study was conducted with stakeholders to assess the quality of the test and the material used, estimate the time frame, and identify potential problems and areas for improvement. Before adding the guidelines to the prototype and initiating the pilot, Chalmers supervisor and ABB stakeholders evaluated the content, structure, relevance of the information and usability of the guidelines. The pilot study resulted in the revision of sentence structure to improve clarity and elimination of redundant information.

5.8.2 Participants

The participants represented a theoretical selection consisting of both men and women with experience and different perspectives on the subject (Table 5.2).

5.8.3 Procedure

Five qualitative user tests were conducted to evaluate the UX writing guidelines. The goal was to determine how effectively the guidelines supported users in rewriting poorly written messages and whether they were perceived as helpful in completing the task. The tests were conducted to gather valuable qualitative and quantitative data, and the evaluation focused on two key metrics *Effectiveness* and *Satisfaction*. Another objective was to assess whether the guidelines led to more consistent content among users compared to their current writing approach. Insights from the tests enable iterative refinements, to ensure the guidelines will align with both user needs and project goals.

The guidelines support two primary use cases, reviewing and rewriting existing messages or creating new messages based on a specific context. The user testing session focused specifically on the first approach, reviewing and revising existing messages in the interface.

Each user test began with an introduction outlining the test's purpose, followed by the participant's informed consent and permission to share their screen (see Appendix J for User Testing Protocol). Participants were encouraged to think aloud

throughout the test to provide insights into their decision-making process. Once participants confirmed their understanding of the test, they began screen sharing and were presented with a scenario and the tasks.

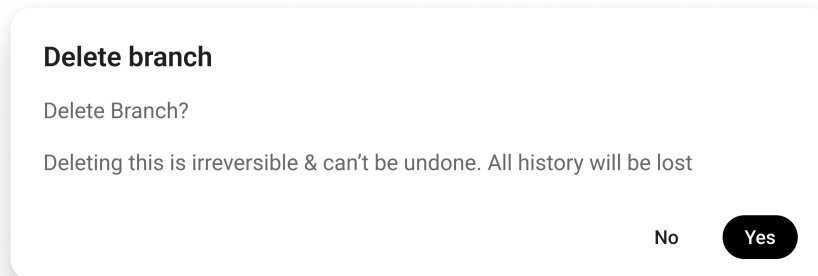


Figure 5.19: The message that should be refined, presented to participants in the test.

The task centered on reviewing and rewriting a message displayed in a dialog, reflecting a scenario where a user clicks on the "Delete Branch" button and must confirm or cancel the action (Figure 5.19). The participants were asked to perform two tasks under two conditions:

1. **Task 1 - Without Guidelines:** Participants rewrote the message using their usual approach and creative judgment, establishing a baseline
2. **Task 2 - With Guidelines:** Participants rewrote the message using the UX writing guidelines provided in the Figma prototype

After performing the tasks, participants were asked follow-up questions regarding the usability and relevance of the guidelines (see Appendix J). The user testing session lasted approximately 60 minutes each and were not recorded. The moderator guided participants through the prototype and test tasks, addressed questions, and fostered open discussions. The non-moderator observed user interactions with the prototype and documented observations and user's thoughts.

5.8.4 Effectiveness

The effectiveness was measured by whether participants could successfully revise the message to align with the UX writing guidelines and a reference that embodied best practices (5.20).

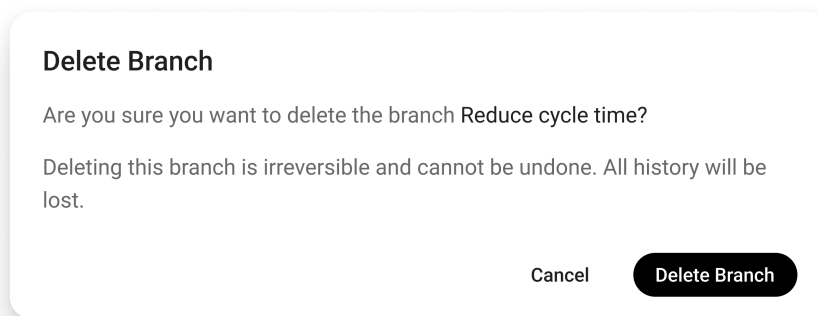


Figure 5.20: Reference message embodying best practices, serving as a target for the participants in the user tests.

The revised message of each participant was compared with the reference and the adherence to the guidelines was evaluated, focusing on the correction of specific issues and the overall quality of improvement within the dialog box. The following issues were used as evaluation criteria:

1. Sentence case in title (Delete branch)
2. Vague and repetitive question in the body that uses title case (Delete Branch?)
3. Usage of ampersands (&)
4. Usage of contractions (can't)
5. No ending punctuation in the last sentence
6. Generic buttons (Yes and No)

5.8.5 Findings

The participants approached *Task 1* in various ways. Participants 1 and 2 leveraged AI to enhance the message, Participant 1 drafted a version manually before asking AI to improve it, while Participant 2 directly requested AI to rewrite the message. In contrast, Participants 3 and 5 chose to rely solely on their own knowledge, making edits without any external tools. Participant 4 took a different approach by opening RobotStudio and triggering a dialog message to use as a reference.

For *Task 2*, all participants began exploring the prototype, clicking through its features. Some skimmed the content quickly, while others took a more detailed approach, reading thoroughly. When they identified a useful principle, they revised their message drafts and adjusted them accordingly. Figure 5.21-5.25 show the participants results for each task, with the *Task 1 - Without guidelines* showcased on the left, and *Task 2 - With guidelines* showcased on the right.

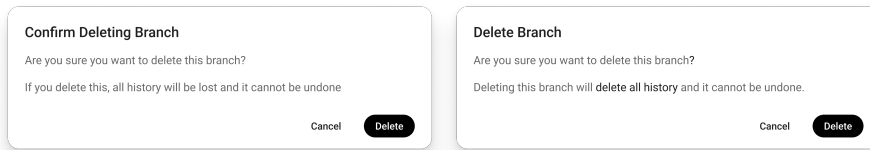


Figure 5.21: Result from user test with Participant 1.

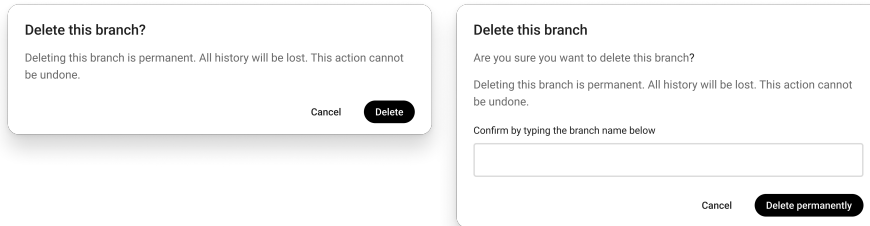


Figure 5.22: Result from user test with Participant 2.

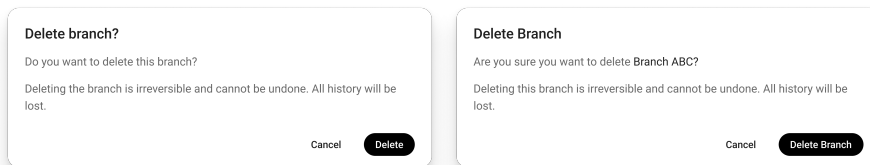


Figure 5.23: Result from user test with Participant 3.

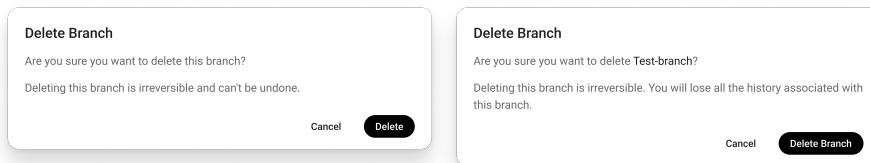


Figure 5.24: Result from user test with Participant 4.

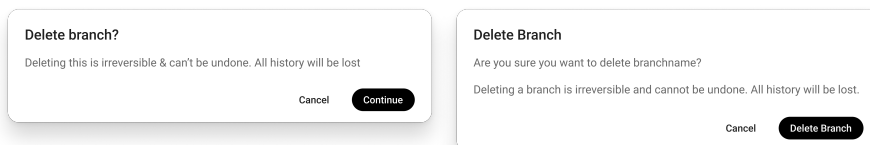


Figure 5.25: Result from user test with Participant 5.

5.8.5.1 Measuring the User Tests Effectiveness

The various approaches when creating text without guidelines resulted in five various results, where some were more correct than others. The issues the participants identified varied, and the result is the following:

Identified Issues Task 1- Without Guidelines:

- Participant 1: [5/6 issues]
- Participant 2: [4/6 issues]
- Participant 3: [5/6 issues]
- Participant 4: [5/6 issues]
- Participant 5: [0/6 issues]

When comparing the results from *Task 1* to the reference of a correct message, significant differences emerged. For example, 3 out of 5 changed the title into a question and only 1 out of 5 used title case instead of sentence case. Similarly, three participants incorporated a confirmation question in the body, while the phrasing of the additional text varied widely between the participants and differed from the reference. Furthermore, 4 out of 5 participants modified the button labels to align more closely with their revised titles.

Identified Issues Task 2 - With Guidelines:

- Participant 1: [6/6 issues]
- Participant 2: [5/6 issues]
- Participant 3: [6/6 issues]
- Participant 4: [6/6 issues]
- Participant 5: [6/6 issues]

When comparing the results from *Task 2* against the reference and among the participants, the semantic and qualitative differences were notably reduced. 4 out of 5 participants used clear, action-oriented titles in title case. All participants included the same confirmation question, "Are you sure you want to delete...?", with three participants adding the object name for greater clarity. The phrasing of the additional information showed much less variation compared to *Task 1*. Moreover, four participants produced messages nearly identical to the reference, differing in the sentence structure or a single word. Additionally, three participants used the button label "Delete Branch" to provide extra emphasis.

5.8.5.2 Measuring the User Tests Satisfaction

Most participants felt that the amount of information was substantial and that more time would be needed to fully absorb it. Others noted that a thorough reading was not necessary to grasp the content, simply reviewing the titles and examples provided an adequate level of information for the task. The participants found the

content relevant and appreciated the clear "do" and "do not" examples, noting that these examples conveyed their meaning effectively even without reading all of the accompanying text. Most of the participants suggested adding more examples to cover a broader range of message types.

Observing the participants as they interacted with the prototype revealed that they navigated the guidelines with ease, indicating a clear logical hierarchy and intuitive titles.

Dialogs are the UI elements where designers have the most problems. — Participant 2

Several participants appreciated the concept of the decision tree as a helpful tool to guide users in selecting the appropriate UI elements, dialog message, and the components of the interface. However, Participant 1 stated that the decision tree for UI elements and components did not explicitly focus on UX writing and suggested that it might be better positioned elsewhere in a design system.

This is not a neutral message right, this is a warning. — Participant 1

An area of shared confusion among the participants was the severity of the message. The participants explicitly stated that more information would be necessary to be able to make a confident decision of what and how to write.

5.9 Second AI Tool Evaluation

The second evaluation stage focused on the 11 AI tools that advanced from the initial prompt evaluation. This phase examined each tool's capabilities and performance in producing high-quality output aligned with the UX writing guidelines.

5.9.1 Evaluating AI Tools through Guideline Alignment

Each tool was asked to analyze and revise two suboptimal messages according to the guidelines and completed one iteration per task (see Appendix L). The messages were intentionally poorly written by the Thesis Authors to assess adherence to the guidelines. The suboptimal messages included parameters that were not handled correctly according to the developed UX writing guidelines, such as punctuation, capitalization variations, and terminology. The goal was to assess whether the tools adhered to the guidelines and could identify the incorrect parameters inserted in the suboptimal messages.

The guidelines inserted in the AI tools together with the suboptimal messages included sections related to the task such as *Core Principles*, *Notifications*, and *Error Dialog*. All tools were evaluated using identical input to ensure comparability. Due to token limitations in some of the tools, the two inputs were inserted separately. The test was initiated by inserting the first messages and related guidelines into the tool and when the first output was retrieved, the second message with related guidelines was inserted. The procedure was the same for all tools to ensure comparability.

When the output was received, the Thesis Authors assessed the adherence to the guidelines based on their knowledge of the content, and assessed whether they were followed or not. When a tool violated the guidelines, the Thesis Authors wanted to check if the tool could retrieve information from the inserted guidelines. To assess their ability to retrieve information from long texts, the tools were asked questions to determine this. For example, if a tool violated the use of contractions, the tool was asked **what does the guidelines say about contractions?**. If the tool confirmed what was stated in the guidelines, it was asked why it violated the guidelines.

6

Result

This chapter presents the results of the study, including the findings of the evaluations of the AI tool and the developed visual UX writing guidelines for project members to use in their content design process. The findings were derived from data gathered through secondary research, interviews, benchmarking, supervision, and evaluation.

6.1 Usage of third-party AI Tools

Evaluation of third-party AI tools revealed their ability to generate text that partially aligns with established UX writing guidelines for various UI elements. However, interviews with project members exposed inconsistent practices, as designers and developers employed various AI tools and writing strategies, resulting in varied AIGC outputs. This lack of uniformity was further evidenced during the tool evaluation phase, where multiple AI tools, provided with identical guidelines and input prompts, produced divergent results, each failing to adhere to different aspects of the guidelines.

6.1.1 Findings from First AI Tool Evaluation

The first evaluation examined how well AI tools could generate clear, consistent and contextually appropriate content based on the same set of instructions. It also assessed how effectively prompt engineering guided AIGC results.

The tools demonstrated strong capabilities to simplify and clarify complex content. Most were able to transform verbose tooltips into concise, readable sentences while preserving core meaning. However, overly compressed output sometimes resulted in ambiguity, revealing a limit to how much content can be condensed without sacrificing clarity. These results reinforce the need for human review to ensure that AIGC aligns with the users intent.

Although many AI tools showed internal coherence and produced stable outputs across repeated prompts, the results revealed significant variation in sentence structure, tone, and terminology across different tools, even when given identical prompts. This inconsistency suggests that users relying on multiple AI tools may encounter divergent outcomes, making cross-tool standardization challenging. Variations may

be the result from how each tool is fine-tuned or how it interprets prompts. Although all tools contributed to improving the clarity of the message, the output varied widely, even within iterations of the same tool. No single tool consistently delivered uniform results, making it difficult to achieve reliable content quality without human oversight.

Some tools demonstrated understanding of the context of the dialog by including standard interface content such as Delete, Cancel, and This action cannot be undone, despite these not being explicitly requested. This implied awareness of interaction design conventions. Others subtly adapted language to reflect hierarchy or urgency. However, terminology was not always consistent. For example, Delete and Remove were used interchangeably, despite their potentially different implications in a product environment. This highlights the importance of precise prompt input and the risk of misinterpretation when contextual cues are missing.

AI tools also tended to generate safe generic phrasing, which, while clear, often lacked specificity. Warnings rarely indicated consequences such as data loss or revoked access. This lack of situational awareness could be misleading in critical scenarios and shows that AI alone cannot guarantee the effectiveness or appropriateness of the message.

Despite these limitations, AI tools showed value in accelerating early content drafts, simplifying technical language, and generating multiple phrasing options. Their outputs often aligned with common UX writing patterns and improved readability compared to the original content. However, results also revealed that many outputs lacked nuance or deviated from brand-specific terminology, especially when instructions were vague.

AI shows strong potential to support the content design process, particularly in the early stages of drafting and ideation. However, without structured guidelines or integrated systems that enforce consistency and brand alignment, its role remains as a helpful assistant rather than a fully reliable solution.

6.1.2 Findings from Second AI Tool Evaluation

The results of Output 1 showed that most AI tools in the second evaluation were able to rewrite poorly written notifications into clearer, more structured formats, moderately aligning with the UX writing guidelines. Common improvements included replacing symbols like "&" with "and" and removing colons by restructuring sentences. Most of the tools respected the principle that error messages placed in notifications should not appear alarming or overly technical. However, key weaknesses were also observed. Several tools introduced grammatical issues, such as using contractions ("couldn't" instead of "could not"), and made changes that disrupted the original intent or tone. Some outputs were ambiguous or misleading. For example, Grok generated "Try signing in again or check the project settings", which deviated from the source meaning, while Venice's "Browser not supported" completely altered the original message. The tools showed potential to enhance clarity and tone, but frequently struggled with preserving meaning, applying terminology consistently, and

maintaining structural accuracy without human oversight.

The results of Output 2 indicate that most tools identified and applied the core structure of a good error message dialog and included a title, explanation, and instruction, aligning fairly well with the guidelines. However, several failed to include either a clear cause or an actionable solution, reducing the usefulness of the message. Violations of specific guidelines were common findings. Many tools used contractions and wrote "doesnt" and "doesn't" instead of "does not", misapplied capitalization (mixing sentence case and title case), and ignored instruction to avoid vague button labels such as "OK" and "Dismiss". Additionally, five out of eleven tools used noninclusive terms such as "disabled", and overly negative terms such as "error" and "wrong", despite being instructed to avoid such terminology. Tools such as ChatGPT and Claude performed more reliably in terms of tone and structure, but no tool achieved full compliance with the guidelines. The varying degree of adherence reveals limitations in consistency and accuracy, elements that are especially critical in complex software applications like RobotStudio.

From the results of Output 1 and 2, it became evident that, while AI tools can assist in drafting and restructuring UX content, their output deviates from established guidelines in subtle but significant ways. The tools demonstrated the ability to access and reference the guidelines when explicitly asked. For example, it could correctly identify rules about contraction, ampersands, or terminology but still failed to consistently apply them in practice. When questioned about these mismatches, the tools often apologized and revised their output. These findings highlight a broader issue, even when AI is provided with guidelines and can retrieve information from them, adherence cannot be guaranteed. This reinforces the importance of human involvement, not only in evaluating the final output, but also in shaping the prompts that guide AI behavior.

The result indicates that AI tools can support content writers by enhancing clarity, tone, and basic structure, but they fall short in areas that require nuanced judgment, contextual understanding, and strict compliance. The Thesis Authors familiarity with the guidelines allowed for rapid identification and correction of these discrepancies. However, external stakeholders, if relying solely on AI outputs, might accept inaccurate content, leading to inconsistencies in the writing process. This underscores the critical role of human review in validating AIGC to maintain adherence to company standards and to achieve compliance with the guidelines. The study shows that fully automating UX writing with existing third-party AI tools is not advisable, as human judgment remains essential to ensure consistency and accuracy. These tools are best positioned as collaborative aids that are useful for first drafts and revision suggestions, but not as autonomous sources of high-quality UX writing.

6.2 UX Writing Guidelines

The solution to inconsistent writing in RobotStudio is a set of visual UX writing guidelines documents. These guidelines were created to ensure consistency, clarity,

and high-quality in all written content across RobotStudio and among all writing contributors. The solution consists of structured user-centered documents designed not only to improve the readability and tone of messages but also to serve as a shared reference point for designers, developers, product owners, and other stakeholders. The guidelines act as a framework where all relevant information is gathered to create content in RobotStudio to ensure that every writer creates content under the same conditions, supporting a consistent and unified tone through the product.

The content of the guidelines is grounded in insights from interviews with the Developer team, UX team, and external UX writers from other companies, combined with a benchmark analysis of existing UX writing guidelines from other companies, and identified best practices. In addition, they reflect current patterns in RobotStudio Desktop and Cloud, as well as principles from ABB Robotics' design system. The guidelines support two primary use cases, reviewing and rewriting existing messages or creating new messages based on a specific context. These use cases reflect real needs expressed during the research phase, ensuring that the guidelines not only promote best practices but are also directly applicable to daily design and development workflows within RobotStudio.

The guidelines are organized into distinct categories such as *Instruction*, *Core Principles*, *Word List* and *UI Elements*. Each category is individually detailed in this section.

6.2.1 Introduction

The *Introduction* is the first section that users encounter when accessing the UX writing guidelines. It explains the purpose of the guidelines and the need to ensure consistent, high-quality written content among all project members. The section specifies that the guidelines are intended for all project members involved in the RobotStudio Desktop or Cloud, including designers, product owners, developers, and product managers as well as external UX writers working as consultants. It highlights that the guidelines support consistent content creation across diverse contributors and examples to aid UX writing decisions. While emphasizing structural consistency, it acknowledges the context-dependent nature of writing and does not provide singular solutions to all writing challenges. It underscores the importance of collaboration between project members and that the guidelines should serve as a complementary tool rather than a replacement for teamwork. In addition, the introduction includes instructions on how to use the guidelines effectively.

6.2.2 Core principles

The *Core Principles* section provides guidelines that apply in general, accompanied by examples, covering essential categories to standardize content creation. The section includes categories such as *Tone of Voice*, *UX Writing Standards*, *Abbreviations*, *Date and Time*, *Numeric Formatting*, *Punctuation*, and *Capitalization*. *Tone of Voice* category defines the concept of voice, describes the voice of ABB's, distinguishes between active and passive voice, and clarifies the role of tone in communi-

cation.

UX Writing Standards explains the use of American English for spelling, addresses company-specific acronyms and jargon, and provides phrasing rules, including the use of contractions, directional language, front-loading, and full object names in UI text, with requirements for darker, bold formatting to ensure distinguishability. It also specifies question phrasing, for the usage of both standard and severe questions. Figure 6.1 shows examples of guidelines in the *UX Writing Standards* category.

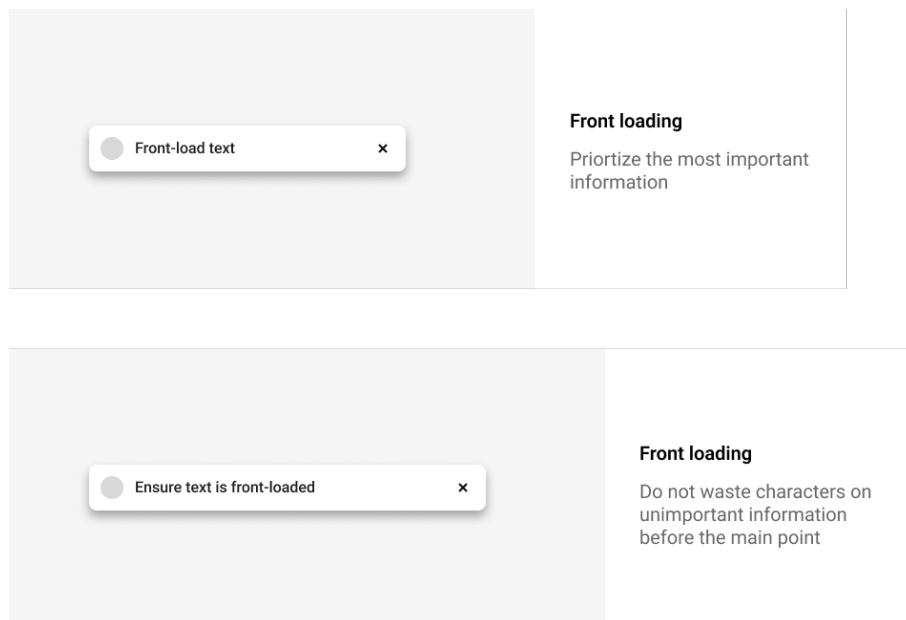


Figure 6.1: Illustrative examples of front-loading, presented as a guideline for phrasing rules within the UX Writing Standards category.

Abbreviations offers structured guidance on the format of abbreviations and units, while *Date and Time* establishes a base format to use. *Numeric Formatting* clarifies when to use spelled numbers versus numerals, and *Punctuation* provides rules for using punctuation marks, including ampersands, commas, colons, and exclamation marks, among others (see Figure 6.2). *Capitalization* details rules and distinctions between sentence case, title case, lowercase, and uppercase.

Ampersands (&)

- Avoid using ampersands in body text; use "and"
- Use ampersands in jargon and specified defined terms

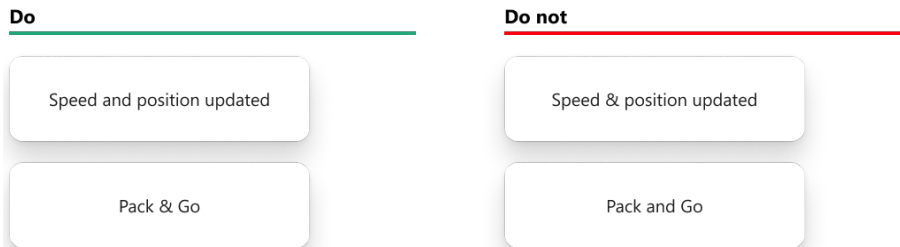


Figure 6.2: Illustrative examples of ampersands guidelines within the Punctuation category.

6.2.3 Word List

The *Word List* section provides a selection of identified words and phrases that should be handled with care when writing UI text. For each term flagged for cautious use, the guidelines explain the rationale for avoidance and alternative terms. *Invalid* and *Please* are words presented in the Word List that should be handled with care 6.3. For example, the guidelines advise avoiding the term *invalid* as it can be overly technical and less inclusive. Instead, clearer alternatives such as "not valid", "incorrect", or "not recognized" should be used to ensure more accessible and user-friendly language. For a more comprehensive list, the guidelines include a link in this section to an excel file, with specialized terminology of company- and product-specific terms.

✘ Invalid

Avoid if possible. "Invalid" can feel judgmental or technical, implying that the user's input or action is wrong without providing clear guidance. Use less technical and more inclusive terms.

Alternative terms:

- ✔ **Not valid:** Use for form inputs or data
- ✔ **Incorrect:** Use for user inputs
- ✔ **Not recognized:** Use for unrecognized data

Do

Selection not valid

Do not

Invalid selection

✘ Please

"Please" can make instructions feel overly polite, wordy, or less authoritative, which may reduce clarity in technical writing. Use it sparingly, only when asking users to perform inconvenient tasks or when the system is at fault. Avoid "please" in all writing.

Do

Connect to controller

Do not

Please connect to controller

Figure 6.3: Examples of words to handle with care in the Word List.

6.2.4 UI Elements

The *UI Element* section contains guidelines for different UI elements used in RobotStudio and the message types used for each UI element. The section includes categories such as *Components*, *Dialog*, *Banner*, *Dialog*, *In Place*, *Tooltip*, and *Notification*. All of the elements have writing guidelines with the the same structure and contain information about each element anatomy, when to use them, and what to include.

6.2.4.1 Components

Components establish guidelines for smaller components such as helper text and checkboxes, beginning with a decision tree to guide users in selecting the appropriate component for specific scenarios (see Figure 6.4).

What type of component should you use?

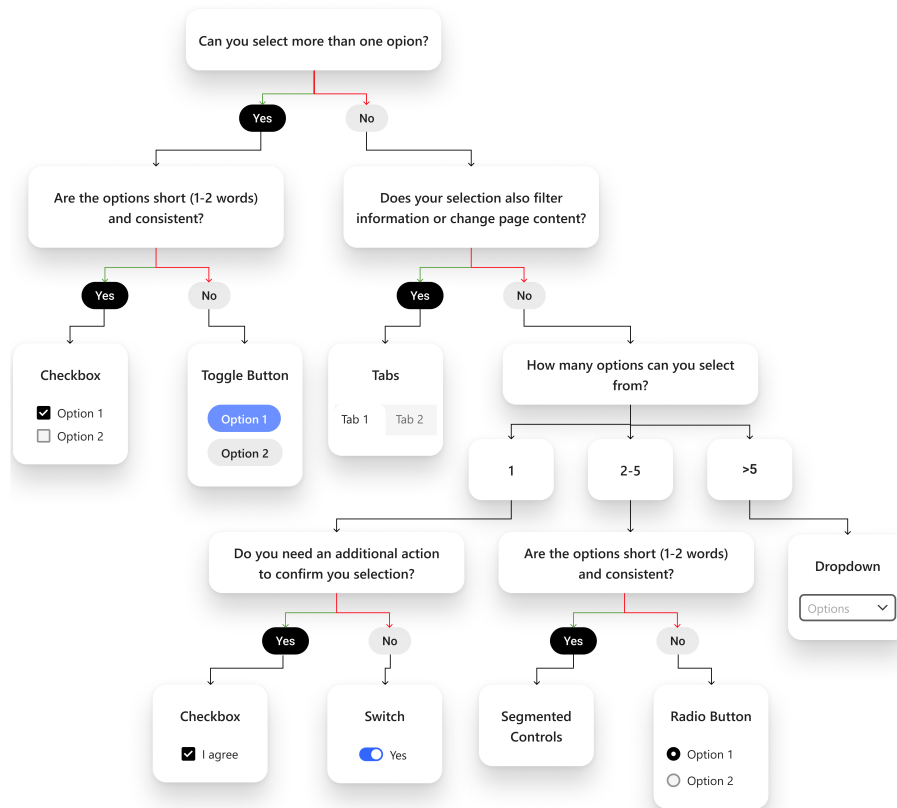


Figure 6.4: Decision tree illustrating the selection of different components, guiding users on which to use.

This section details the anatomy of components, visualized to showcase multiple components with corresponding labels, and provides guidelines on label usage, punctuation, when to use each component, and what to include for each (see Figure 6.5).

Anatomy

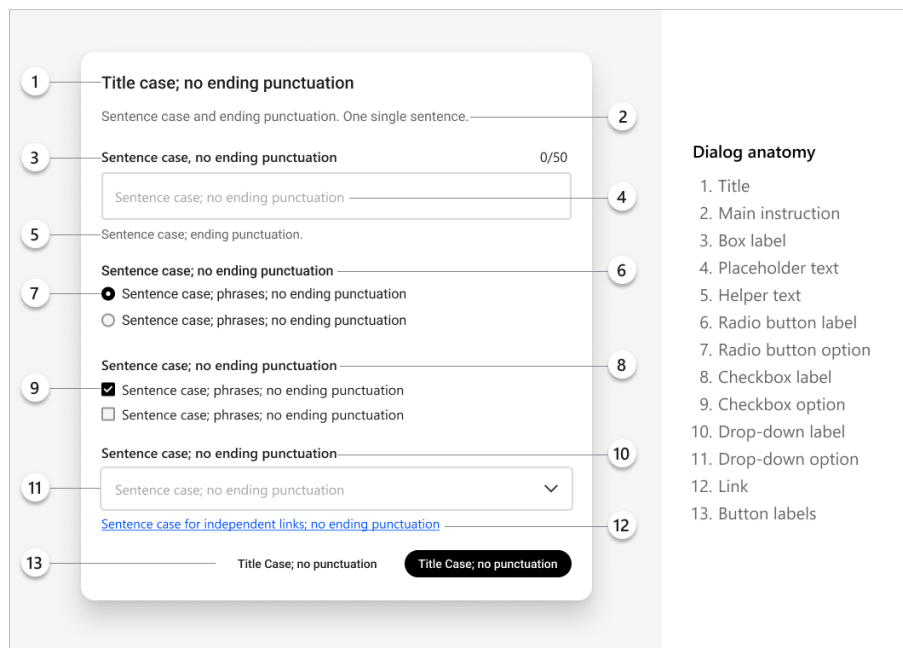


Figure 6.5: Visualization of potential components within a dialog box, illustrating their functions and guidelines for usage.

6.2.4.2 Dialog

Dialog details guidelines for crafting dialog boxes, including various types of messages, such as warning message, error message, and neutral message. Initially, it includes a decision tree to help users determine the appropriate dialog message type when uncertain, ensuring that the correct message is selected according to the context (see Figure 6.6). The guidelines also detail the anatomy of a dialog box, specifying where to apply sentence case, title case, and punctuation in the title, body, and buttons (see Figure 6.7).

What type of dialog should you use?

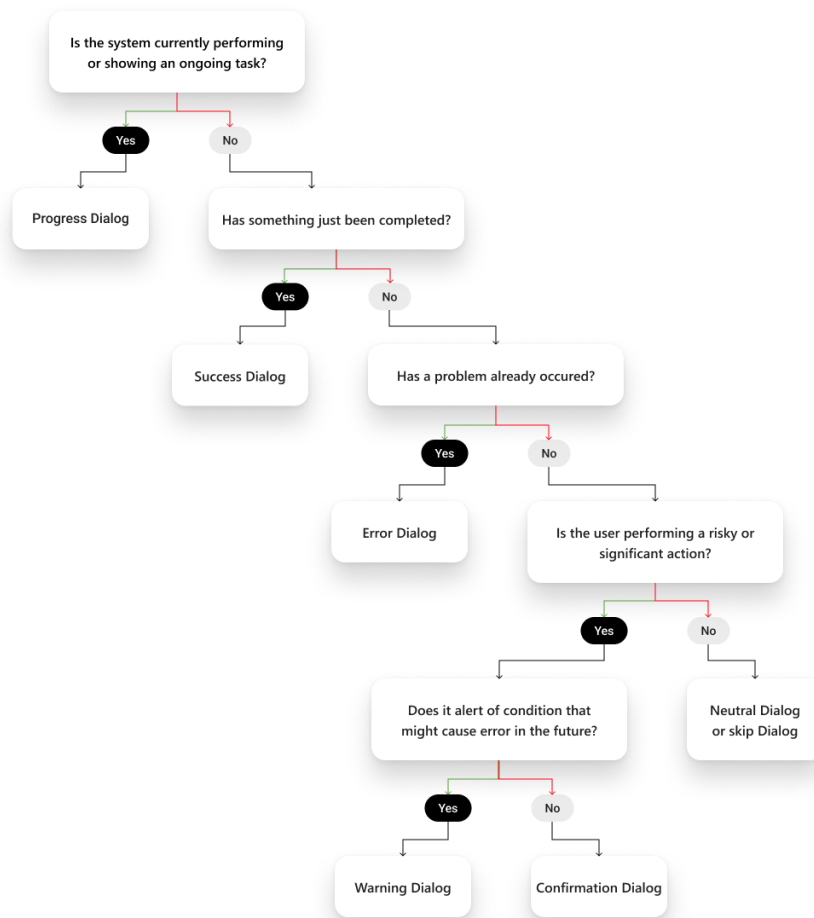


Figure 6.6: Decision tree illustrating the selection of different dialog messages, guiding users on which to use.

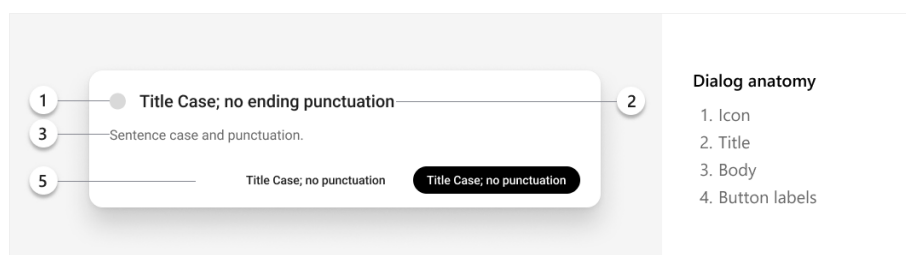


Figure 6.7: Anatomy of a dialog box message.

The guidelines provide a dedicated section for each message type, highlighting when to use the specific message and what to include in the title, body, and button labels (see Figure 6.8). For example, a dialog box for a neutral message, used as a confirmation prompt that requires users immediate interaction, ensures that users are aware of potential consequences of their actions, such as confirming a deletion

that could be intentional or accidental. In contrast, a dialog box as a warning message alerts users to actions that could lead to errors, emphasizing prevention. The same structure applies to all other UI elements, such as tooltips or notifications.

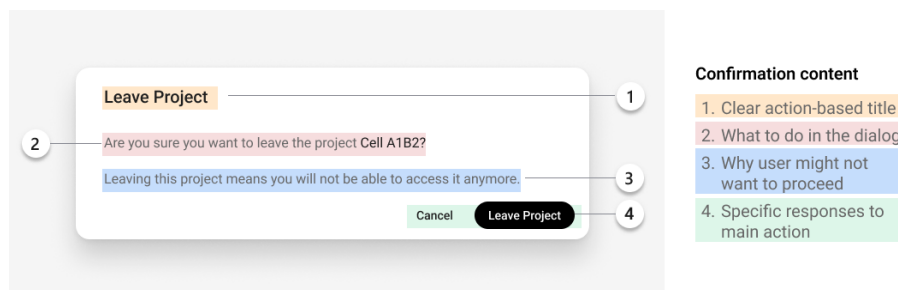


Figure 6.8: Overview of what to include in a neutral dialog message.

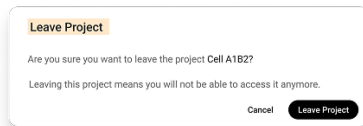
For neutral messages in a dialog box, the guidelines recommend a clear, action-based title, positive language starting with a concise question, including the project name to ensure specificity of what to delete (see Figure 6.9). Buttons must be clear and directly correspond to the action.

6. Result

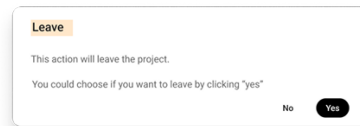
Title

- ✓ Clear action based title describing the action you want to perform
- ✓ Identify the command or feature initiating the action

Do



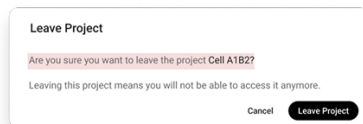
Do not



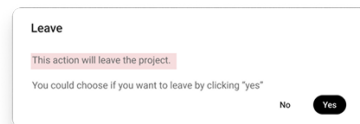
Body

- ✓ Use positive language and start with a clear, concise question such as:
 - "Do you want to [perform an action]?"
 - "Are you sure you want to [perform an action]?"

Do

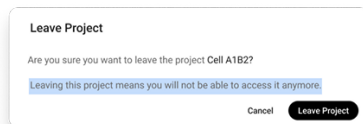


Do not

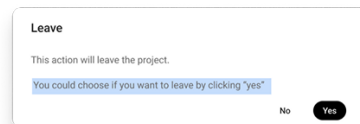


- ✓ Include full object name when it helps clarify the action
- ✓ Explain the key and non-obvious results of completing the action

Do



Do not



- ✓ Use "anyway" to indicate proceeding of the action
 - "Do you want to [perform an action] anyway?"
- ✗ Avoid vague confirmation questions to help users recognize potential mistakes
 - "Are you sure you want to delete this?" instead explain what "this" is

Figure 6.9: Examples of what to include in a neutral dialog message.

The *Neutral Message* guidelines for a dialog box includes a subsection for risky actions, where confirmation messages for potentially high-consequence actions, such as permanent deletion of a project, incorporate a red warning icon, a red button, and specific UX writing guidelines, like using the word "permanently" (e.g., "Delete Permanently"). These messages require additional confirmation, such as typing the projects full name, which is also stated in the title to ensure that users are fully aware of what will be deleted, requiring them to double check their intent and understand the consequences before proceeding. This subsection maintains the same dialog structure and writing content as a standard Neutral Message, with small adjustments

specific to the risky messages.

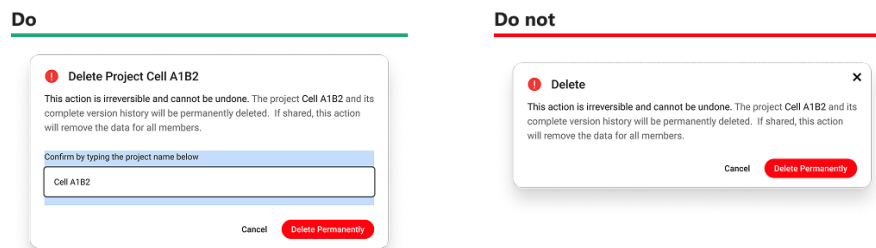


Figure 6.10: Examples of what to include in a neutral dialog message for risky actions.

6.2.4.3 Banner

Banner provides instructions to create banner messages, which typically appear as warning messages in RobotStudio. The purpose of warning banners is to inform users of a condition or potential problem without requiring immediate action, ensuring that users are aware of relevant issues while allowing them to continue their work uninterrupted. The anatomy of a banner is described and consists of an icon followed by a single, concise sentence in sentence case, ending with a period if it is a full sentence. Figure 6.11 shows examples of good (left) and bad (right) warning banners. The "Do" example use sentence case which is the correct capitalization style for this message, while the "Do not" example use title case.

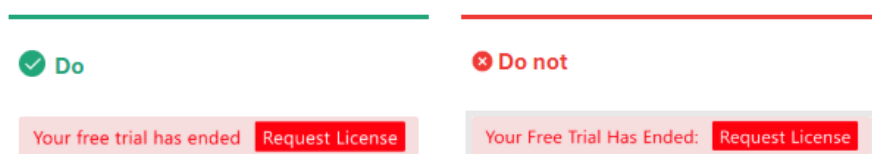


Figure 6.11: Warning banner examples.

6.2.4.4 In-Place

In-Place UI elements are typically used for error messages in RobotStudio. They are designed to address contextual input errors or delayed error detection such as errors identified after a user clicks a confirmation button. These messages should remain visible until the issues is resolved or no further errors are present.

The anatomy of in-place error messages consists of an icon followed by an instructional message. Figure 6.12 shows examples of good (left) and bad (right) in-place error messages. The "Do not" message shown in the figure, shows a message that lacks actionability, as it does not provide clear guidance on how the user can resolve the issue or what steps to take.



Figure 6.12: In-place error actionability examples.

6.2.4.5 Tooltip

Tooltip details that the message should provide concise context to guide users, enhance understanding, and reduce errors without cluttering the interface, but should be used sparingly to avoid overwhelming users and never as a substitute for intuitive UI design. The guidelines on tooltips state that they are ideal for explaining unlabeled elements such as icons or buttons, offering quick hints for confident actions, or clarifying complex features when space is limited. The guidelines explain through examples when tooltips should be used and avoided. For example, they should not be too long, see Figure 6.13.

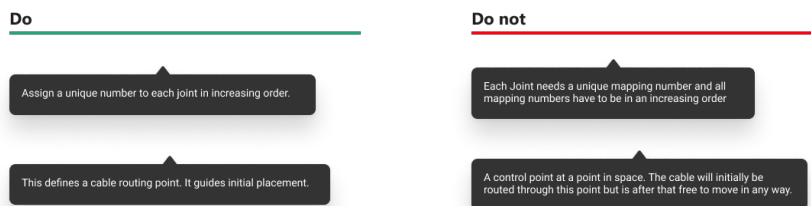


Figure 6.13: Examples of too long tooltips and the shortened versions.

The guidelines explain when to use, what to include, and the anatomy for both a shorter and a longer tooltip (see Figure 6.14-6.15).

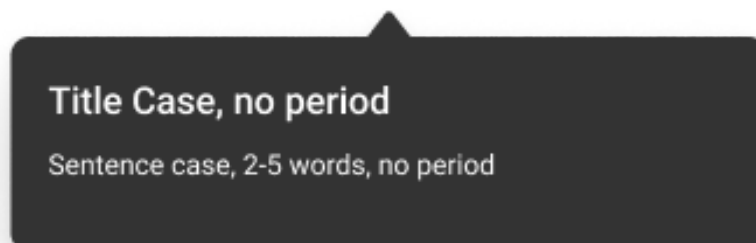


Figure 6.14: The anatomy of a short tooltip.

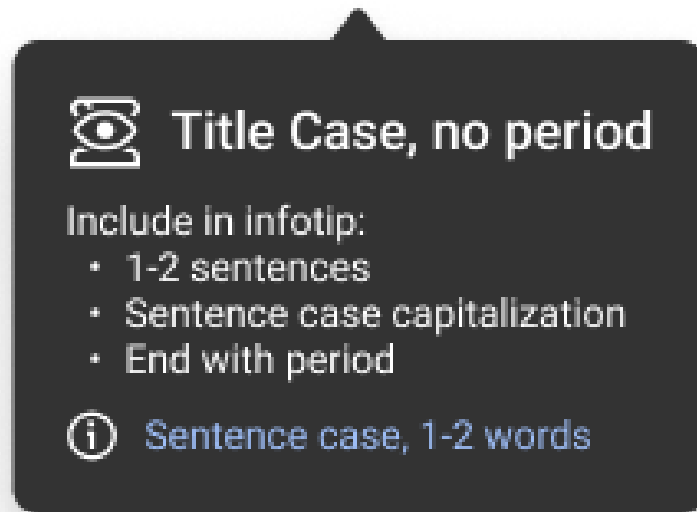


Figure 6.15: The anatomy of a long tooltip.

6.2.4.6 Notification

Notification provides guidance for crafting various notification message types, including information, error, warning, and success notifications. This section begins by outlining the general use of notifications, specifying when they should be used, what content to include, and the distinct anatomies of floating and inline notifications (see Figure 6.16).

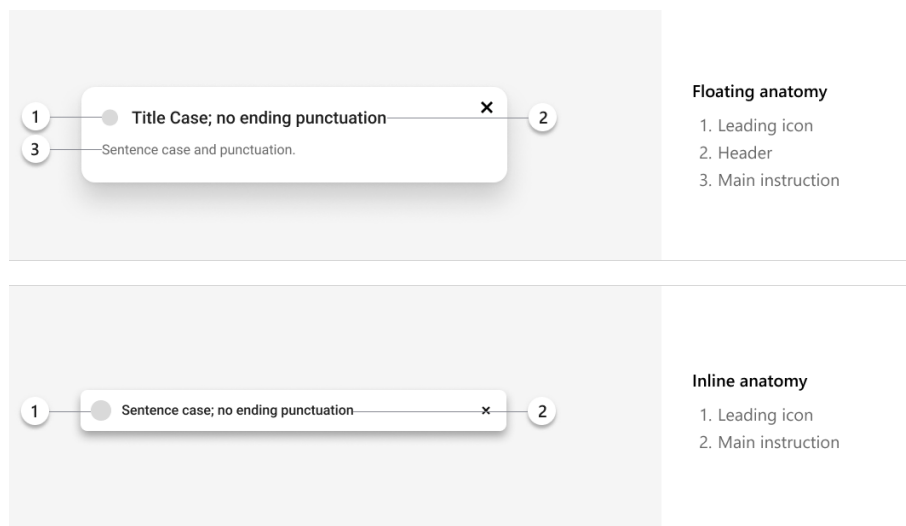


Figure 6.16: Notification anatomy, showing both a floating and an inline notification.

In addition, the guidelines describe different types of notification messages such as

6. Result

information, error, warning, and success, and the guidelines provide instructions for use and content requirements for each one of them. Each message type is accompanied by examples demonstrating proper phrasing and structure.

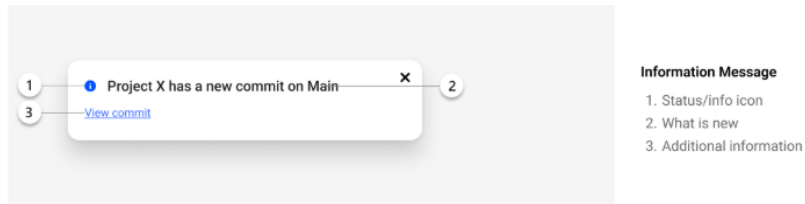


Figure 6.17: Overview of what an Information Notification should include.

7

Discussion

This chapter presents reflections on the final result, the process, and a discussion of future work. The chapter ends with a discussion about ethical consideration and limitations of the project.

7.1 The Project Result

This section discusses the findings of the AI evaluation and the benefits and limitations of using AI tools in the context of content design related to the findings of the projects. This section also discusses the choice of visual UX writing guidelines as a solution, exploring their strengths and limitations.

This study investigated the extent to which AI tools can enhance the content design process for RobotStudio, focusing on improving consistency in UX writing. The AI-evaluation revealed that some AI tools generated high-quality microcopy but produced inconsistent output when compared across different tools. Although this inconsistency is not inherently problematic, it becomes a significant issue if project members use different AI tools, leading to varied terminology and tone that could disrupt the UX if implemented in RobotStudio. Furthermore, AI tools did not fully adhere to the guidelines provided, underscoring the need for visual UX writing guidelines to ensure consistency and brand alignment [2], especially in complex software such as robotic applications where precise communication is of importance.

7.1.1 AI Tools in Content Design

AI tools offer several advantages in generating written text for UIs of software. The AI-evaluation demonstrated that AI tools could generate clear and contextually relevant microcopy, aligning with the findings of Wang et al. [24], which highlight the ability of AIGC tools to facilitate content creation. These tools could efficiently automate routine tasks, such as creating quick drafts of text, enabling project members to focus on strategic aspects like refining tone and ensuring user engagement. For ABB Robotics, where multiple contributors may lack dedicated UX writing expertise, AIs ability to quickly produce good initial drafts reduces the time and effort required to create user-centric microcopy [5]. Therefore, AI could lower the barrier for contributors without UX writing expertise, fostering collaboration within diverse teams at the company while allowing the UX Design team to focus on their work

with fewer interruptions from questions about written content. These mentioned benefits align with Choudhurys [22] findings that AI increases productivity in UX design by automating several tasks and generating alternative solutions.

However, the findings reveal significant limitations in the scenario of integrating AI tools in the content design process to improve consistency in written content. Although research indicates that AIs benefits are that it is fast at creating content [5], the result shows that AI tools produced text that did not align with provided guidelines and that they used inconsistent terms.

Different AI tools used different terminology for the same action, which will result in inconsistent usage if relying solely on AI. Because the AI-evaluation revealed that different AI tools produced varied outputs, this could lead to fragmented microcopy, when there are multiple contributors [2]. For example, Anyword used title case, while ChatGPT used sentence case, among many other differences.

None of the tools from the Second AI-tool Evaluation fully aligned with the provided guidelines. They are not significantly inaccurate, but some include contractions, which violates the guidelines. If the guidelines explicitly prohibit contractions, they should not be used. What is particularly interesting is that, despite being given the exact same prompt and guidelines, the tools fail in different ways. Their outputs not only deviate from the reference message but are also inconsistent with each other. The finding that AI tools did not fully align with the expected output, often deviating from the specified rules, supports Abbas et al.s [21] observation that users must understand how to integrate AI effectively, as these misaligned outputs could otherwise challenge the design process. Lack of alignment requires manual revisions, reducing the efficiency gains that AI promises.

Inconsistency in outputs across different AI tools, such as varying word choices, poses a challenge when project members use different AI tools. This issue is exacerbated in collaborative settings where project members independently write content and inadvertently introduce discrepancies, as noted in the findings from the secondary research and the interviews. These limitations suggest that, while AI is a powerful tool, it cannot fully replace human judgment or structured guidelines to ensure high-quality UX writing in the current content design process at ABB Robotics.

7.1.2 Visual UX Writing Guidelines

The inconsistencies and misalignment of the guidelines observed in the AI output highlight the need for visual UX writing guidelines. By offering a shared standard, visual guidelines mitigate the risks of inconsistency if using AI tools, as project members can confirm outputs against the guidelines. Visual UX writing guidelines, which integrate textual standards with visual representations such as examples of recommended practices and common pitfalls to avoid, could be a suitable solution to improve consistency of the written text in RobotStudio.

A primary strength of this approach lies in its ability to provide a clear, standardized framework that supports multiple contributors to write consistent content, without needing a dedicated UX writing expertise. As Podmajersky [2] emphasizes, stan-

Standardized guidelines are essential to maintain text consistency between various teams, particularly in scenarios that lack a dedicated UX writing team. Visual guidelines foster cross-functional collaboration by establishing a mutual understanding of the written content and its rules [3]. By serving as a shared reference, where project members adhere to the same standards, the issue with the different writing styles could be addressed. If there are uncertainties about how to write in a specific scenario, the guidelines could be used as a reference.

Despite their advantages, visual UX writing guidelines are not without limitations. Visual UX writing guidelines could guide the project members of how the UI should be written and therefore help with consistency, but if there is interest to use AI in the content design process, AI has to be informed of how to adapt to specific situations. The user crafting the text must know how to structure the initial AI prompt to produce an output closely aligned with the desired result, enabling later verification using the provided guidelines.

A focus on prompt engineering could improve AI outputs by refining inputs to better align with guidelines for specific message types. Qualitative prompting techniques improve the quality of the output [43], serving as a vital strategy to complement the visual guidelines, as our interviews confirm the frequent use of AI. However, mastering prompt engineering requires skill, and poorly crafted prompts would not generate the wished output for the project member to use [45].

Additionally, for organizations like ABB Robotics, where multiple contributors may lack UX writing expertise, ensuring that guidelines are accessible and actionable for all project members requires careful design and ongoing training. Without proper implementation, guidelines risk becoming static documents that fail to adapt to evolving user needs or technological advancements, as noted as a fundamental dimension of interaction design [27]. Interviews with UX writers further confirm this, noting that encouraging people to review and adhere to the guidelines is challenging, risking them to become what they referred to as "shelf warmers". To engage guideline users, visual examples are incorporated, which were highlighted by UX writers and project members, and, moreover, identified as best practices through benchmarking. In summary, our results demonstrate that the combined use of AI tools and visual guidelines, complemented by human oversight, offers a balanced approach to improve content creation efficiency while maintaining quality.

7.2 The Project Process

In the following section, the process and its results will be discussed.

7.2.1 Evaluating the AI Tools

In the first AI evaluation, two real examples of messages found in the HE, illustrated in the 5.1.1 Corporate Material section, were used in the prompt to test the tool's ability to produce improved output. This approach helped ground the evaluation in practical and relevant scenarios, allowing for a targeted assessment of how well

AI could transform suboptimal content into clearer, user-friendly messages aligned with UX writing principles.

Using real examples proved beneficial for evaluating weaknesses in UX writing and measuring how closely the output aligned with the prompt and guidelines. However, the evaluation also revealed limitations in both the prompts and the guidelines themselves. For example, some tools produced weak results not necessarily due to their technical limitations but due to prompts that were too vague or ambiguous. In these cases, the tools might have performed better if the input had been more specific or better aligned with the tools' expected structures.

A key observation was that small variations in phrasing significantly affected the outcomes. In one example, asking for more examples resulted in unrelated outputs, whereas using the phrase further iterations should have been requested to receive variations on the prior query to receive better contextual results. This underscores the critical role of effective prompt engineering when interacting with AI tools [45].

This has a direct relation to the lack of contextual awareness that the tools were given. The AI systems were provided only with vague description of the target domain such as "robotic software", which led to many responses being overly generic or based on assumed scenarios. While some degree of invention is expected when little context is given, it became clear that meaningful and accurate content creation heavily dependent on well-defined input. In the absence of this, the tools often fabricated context that did not align with specific needs of RobotStudio users.

This raises an important question about responsibility, and this issue becomes particularly complex in corporate environments, where safety or confidentiality concerns limit the amount of context that can be shared with third-party AI tools. In this project, additional contextual details were not included due to security constraints, which may have affected the quality of the output.

When tools were provided with detailed guidelines, such as avoiding contractions or ampersands, they often failed to follow them consistently. Interestingly, when asked directly about these oversights, the tools were able to refer back to the guidelines and revise their output accordingly. This may point to a limitation in how the guidelines and the used prompt were structured for machine-readability. As observed with LLMs, which process vast textual data to master linguistic patterns and improve with more contextual data [37], they could fail to consistently apply detailed guidelines due to a lack of proactive understanding, which requires explicit and repeated prompts to prioritize rules over their general training data patterns [38], [49].

In the project, it was possible to identify when AIGC deviated from the intended guidelines, as the Thesis Authors had full knowledge of what was and was not included in them. However, if someone unfamiliar with the content in the guidelines were to rely on the same AIGC, they might assume the output adheres to the guidelines, especially if the guidelines themselves had been used as input. This highlights a critical risk, without strong source criticism, users may inadvertently trust incorrect or misleading content simply because it appears well-formulated and

aligned. In fast-paced work environments where AI is used to speed up content creation, this risk increases. When guidelines are supplied to the AI, users tend to assume that the results are accurate. However, this assumption can be problematic, reinforcing the importance of always reviewing and verifying AIGC, even when it appears to follow predefined standards.

7.2.2 Involving The Users

Interviews are essential sources for gaining insight into what the user really thinks about a certain topic and exploring the needs, challenges, and preferences of project members [59], [80]. Several interviews were conducted with different project members to align with what Nudelman [4] suggests, that frameworks should be developed collaboratively with engineering leads, to make sure the project solution was useful across teams and not only for UX designers. By incorporating user research and user testing, the guidelines could address specific user needs, such as providing a lot of visual examples. This approach increases the opportunity for the guidelines to evolve with user expectations. In this study, user testing was conducted with a diverse group of five participants, including designers, front- and back-end developers, as this number is sufficient to identify at least 80% of design issues [70], though additional time would have allowed a larger group of participants to gather more comprehensive feedback.

The study intentionally excluded demographic data such as gender and age in interviews and user test results. This choice was driven by the Thesis Authors commitment to protecting the respondents anonymity, as including gender and age could potentially identify individuals within small teams.

Furthermore, demographic factors were considered less relevant to the research focus, which was centered on professional roles and quality of the output, rather than personal characteristics. Although interesting aspects could be found when looking into gender and age, we also recognized that including gender and age could lead to assumptions about their influence on results, potentially biasing our interpretations.

However, a potential limitation of this approach is that it may reduce the replicability of our study, as some researchers might argue that gender and age could affect team dynamics or performance, necessitating their inclusion for a comprehensive understanding. We contend that larger sample sizes would be required to meaningfully explore demographic influences without compromising anonymity, justifying our decision to prioritize participant privacy and research relevance.

Including gender and age in larger quantitative studies would be relevant to identify statistically significant patterns or correlations in data, such as performance or behavior differences between demographics, while in our study with qualitative studies and smaller samples, these variables are often less relevant due to limited generalizability and the focus on in-depth, context-specific insights.

Testing the guidelines with a larger participant pool beyond the method's minimum recommendation could have provided additional benefits. The results of the study showed that the tests conducted without guidelines were generally of high quality.

However, the backgrounds of the participants may have influenced these findings. Three of the participants are part of the UX team, and one of the participants in the developer team works closely with the UX team and has potentially seen the original reference messages multiple times. This familiarity could have skewed their ability to identify issues.

Especially interesting here is that one developer, who does not work with design at all, scored 0/6, stating the need for guidelines as a reference. More critically, the key finding is not the number of identified issues, but the inconsistency across the messages. Each participant wrote notably different results, highlighting a significant challenge for collaborative teams using different approaches and generating different results, stating the need for guidelines to ensure consistency [2]. Although some inconsistency was also observed when users used the guidelines, this may be attributed to participants having limited time to thoroughly review the guidelines. Encouragingly, nearly all participants correctly identified all issues indicating strong baseline performance despite the inconsistencies. In addition, the messages appeared more similar and consistent with each other when the guidelines were used, compared to the messages created without the use of guidelines.

However, due to limited time, the results of user testing were only collected and documented without performing a detailed analysis or implementation of the feedback. The data collected, mainly the qualitative responses of the participants, provide insight into the strengths and areas for improvement of the guidelines. These results were not acted upon within the scope of this project, and future teams or stakeholders will need to make further refinements of the guidelines. Due to the limited time for the test participants to look through the guidelines, the amount of feedback was limited. These limitations highlight the need for additional time to fully leverage user testing outcomes, ensuring that guidelines align with user needs and project objectives.

7.3 Future Work

This thesis offers a solid starting point for improving the content design process at ABB Robotics, with several opportunities for further development. First, future work should focus on applying and testing the proposed guidelines in a real-world setting at ABB Robotics. Second, we propose expanding the evaluation of AI tools. Lastly, advancing AI integration in the content design process further with a conceptual design for a company-specific fine-tuned model is proposed.

7.3.1 Evaluation of Guidelines

Studies over time with designers and other project members by testing the guidelines in a real-world setting could evaluate the effectiveness of UX writing guidelines, measuring their impact on content consistency, team efficiency, and UX outcomes. Despite conducted user testing, the guidelines are still in a preliminary stage and require further refinement, where additional iterations could improve their clarity, specificity, and applicability to various UI contexts. Such studies would not only

validate the practical utility of integrating guidelines into workflow, but would also identify opportunities to polish them, ensuring that they fully meet the needs of RobotStudios content design process.

Given that the secondary research, interviews, and evaluation of AI tools all underscored the importance of crafting effective and consistent prompts, the guidelines would benefit from a dedicated section on responsible AI usage. This section should outline best practices for using AI thoughtfully, including what types of information are appropriate to include or omit in accordance with ABBs security directives. Additionally, to support the diverse range of contributors using AI tools, the guidelines could feature a curated library of ready-to-use prompts. This would help ensure more accurate and purposeful prompting, aligning with insights from our AI evaluation.

7.3.2 Extended AI-tool Evaluation

Expanding the evaluation of AI tools could explore their application in the content design process specifically for RobotStudio. The evaluation should go beyond assessing the quality of generated content and incorporate critical selection criteria such as security, cost-efficiency, scalability, ease of integration, user-friendliness, and compatibility with tools commonly used at ABB Robotics such as Figma and various code environments. Additionally, support for collaborative team workflows should be a key consideration.

Security is critical to ensure tools comply with data protection regulations and safeguard sensitive company information, to consider what information the user could put into the AI. This investigation could be conducted through the development of a concept screening, comparing current AI solutions used in the company as a reference, and systematically weighting tools against the mentioned criteria. Such an approach would provide a structured framework for selecting AI tools that balance other aspects outside of the project scope.

7.3.3 Fine-tuned and Context-Based Model

To advance the integration of AI in the content design process, a conceptual design for a company-specific model emerged as a potential long-term solution during the ideation phase, for more consistent results. A fine-tuned model could align with ABB Robotics brand voice, tone, and content standards in a more accurate way than more limited third-party tools [49], ensuring high-fidelity to company-specific requirements when generating content. Training the model on targeted datasets for various message types, such as notifications, dialogs, and tooltips, and embedding all UX writing guidelines directly into its knowledge base, improving its context awareness, enabling accurate and contextually relevant content generation [51].

Unlike existing AI tools, which provide generalized outputs and often require extensive prompt engineering to meet specific standards [49], a fine-tuned model would be optimized for RobotStudios specific needs, reducing manual adjustments and improving efficiency [51]. The findings from the AI evaluation, combined with in-

interview insights reflecting strong interest and research emphasizing the efficiency of fine-tuned models [49], suggest that if ABB Robotics aims to adopt AI for UX writing in the future, fine-tuning a model would likely offer greater benefits to the content design process than relying on currently available third-party AI tools. When opting for AI-driven content creation over visual guidelines, a custom model could operate within ABBs secure infrastructure, addressing data privacy concerns. A proprietary model provides improved security by keeping sensitive company data and content processes within a controlled environment, mitigating potential risks associated with external third-party tools.

Beyond being trained on the UX writing guidelines, the model could be integrated in an interface which could enable integrations with code environments, allowing developers to access microcopy directly within their coding workflows, reasoning with findings from the interviews regarding preferred solution. Additionally, creating a Figma plugin for the bot would empower designers to incorporate real-time content suggestions into their prototyping process, fostering seamless collaboration between design and development teams, also reasoning with the preferred solutions discovered in the analysis. However, advancing fine-tuning requires examining diverse fine-tuning strategies, such as those that offer greater cost-effectiveness, to ensure its practicality as the next step [51].

7.4 Ethical Considerations

When exploring AI usage, ethical considerations and data protection challenges must be addressed. It is crucial to investigate and determine which AI model is the most reliable and trustworthy to use while ensuring compliance with privacy standards to protect user data and maintain trust. Another key issue is copyright and ownership, particularly in determining who holds the rights to the data entered into AI systems. Understanding the implications of data input and clarifying intellectual property (IP) rights are essential for ethical and legal usage.

When companies incorporate AI-generated content, such as microcopy produced by large language models, into their products, IP rights present a complex and evolving challenge. Unlike traditional content creation, where ownership and authorship are clear, the legal status of AI-generated content remains uncertain.

A critical discussion point is the concern that AI models can act as plagiarism machines. Since these models are trained on vast datasets comprised of user-generated content, books, articles, and websites, they may inadvertently reproduce or closely mimic existing copyrighted text. This raises ethical and legal questions about originality and authenticity, as AI outputs may sometimes lack clear attribution and effectively recycle others work without permission. Such risks amplify the need for companies to carefully vet AI-generated content to avoid potential plagiarism and uphold intellectual honesty.

However, it is important to note that these concerns are typically less pronounced in the context of microcopy that consists of short, functional text, which often relies on widely accepted conventions and limited linguistic variation. Because of its brevity

and utilitarian nature, microcopy is less likely to mirror protected or unique content in a way that would constitute plagiarism or IP infringement. Nonetheless, companies should remain attentive to tone, brand alignment, and contextual relevance, ensuring that even small pieces of text support a consistent and legally sound user experience.

AIGC risks introducing biases, as language models may reflect biases present in their training data, potentially leading to inappropriate or exclusionary content. This study mitigated this by emphasizing human oversight, but future implementations must ensure review processes to maintain inclusivity. Data privacy is also a critical concern, as AI tools often process sensitive company or user information. Reliance on third-party tool poses potential risk, highlighting the potential future need for a secure, in-house solution, further presented in Future Work.

7.5 Limitations

This research faced several limitations that influenced its scope and outcomes, providing valuable lessons. Defining a clear scope and grasping specific needs initially was challenging, requiring iterative adjustments to align with company and project expectations. During development of the guideline content, despite identifying numerous sources, the study's secondary research uncovered a limited body of existing UX writing guidelines. Sourcing reliable UX writing guidelines was difficult, as available references often provided conflicting advice, complicating the creation of cohesive standards. Aligning the proposed guidelines and workflow with ABB Robotics' existing processes was complex, necessitating careful balance to avoid disrupting established practices. This led to multiple restructurings of the project, such as refining guidelines and iteratively revising the project direction, which consumed time and limited opportunities for deeper refinement.

In addition, our initial research plan involved conducting interviews with a broader sample of UX writers. We contacted numerous professionals and were informed that UX writers would follow up. However, no responses were received. Engaging with additional UX writers would have been beneficial, as their specialized knowledge could have enriched the content of our guidelines, which proved challenging to develop due to limited available resources.

8

Conclusion

This thesis aimed to explore the field of UX writing and the content design process at ABB Robotics, with a focus on evaluating the potential of AI-powered tools to enhance the content design process for RobotStudio while identifying alternative strategies to promote content consistency. This study was driven by the following research question:

- To what extent can AI tools contribute to improving consistency in the content design process of RobotStudio, and what solutions could support consistency?

To address the first part of the research question regarding to what extent AI tools can improve consistency in RobotStudios content design process, an initial assessment of AI and UX writing tools was conducted. This involved a PMI analysis to identify available tools and their capabilities, followed by a deeper evaluation of promising tools using targeted prompts tailored to RobotStudio specific scenarios and requesting refinements to provided inputs.

The initial evaluation revealed that while AI tools could produce high-quality outputs, some failed to meet specific requirements, leading to their exclusion from further analysis. Concurrently, recognizing that AI alone was insufficient, alternative approaches were explored early in the project through interviews and discussions with stakeholders. One promising solution identified was the development of guidelines to address consistency issues.

The guideline development process began with secondary research, gathering insights from existing design guidelines and similar solutions, followed by qualitative data collection via semi-structured interviews with project team members and external UX writing experts. Subsequently, after drafting the UX writing guidelines, a second evaluation of the pre-selected AI tools was conducted to assess their compatibility with the guidelines. This phase confirmed their ability to generate quality outputs but emphasized the critical need for human oversight to ensure context-specific accuracy and guideline adherence.

The findings indicate that AI tools provide valuable assistance, simplifying language, accelerating initial drafts, and enhancing readability, but they fall short in ensuring consistency, contextual precision, and full compliance with UX writing standards. Despite identical prompts and access to style rules, the tools generated variability in terminology and no full alignment with established standards.

This suggests that AI tools have a limited capacity to internalize and consistently apply rules without human intervention. While they can reference guidelines when prompted, their practical application remains inconsistent, posing a risk of introducing new inconsistencies if AIGC are used without expert review. Thus, AI tools should be regarded as supporting aids rather than standalone solutions, excelling in generating drafts, offering rephrasing options, and boosting early-stage efficiency, but requiring human review to align with specific context and UX principles.

Consequently, the development of visual UX writing guidelines emerged as a necessary complement. These guidelines, detailed in the result chapter, are outlined as follows:

- Introduction - Providing an overview of purpose and scope.
- Core Principles - Defining foundational rules for UX writing.
- Word List - Presenting word to handle with care.
- UI Elements - Offering guidance on component-specific writing.

To validate the guidelines, an interactive prototype was developed in Figma, incorporating stakeholder feedback and evaluated through user testing. Participants used the prototype to evaluate the guidelines, with results providing a foundation for future enhancements. This study underscores the importance of integrating automation with human judgment, reinforcing human-centered design principles to foster meaningful and effective user interactions and consistency in a content design process.

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A

Time Plan

The time plan describes the working process that was followed during the thesis work, excluding the final report-writing phase. The time plan is presented using a Gantt chart, see Figure A.1-A.3

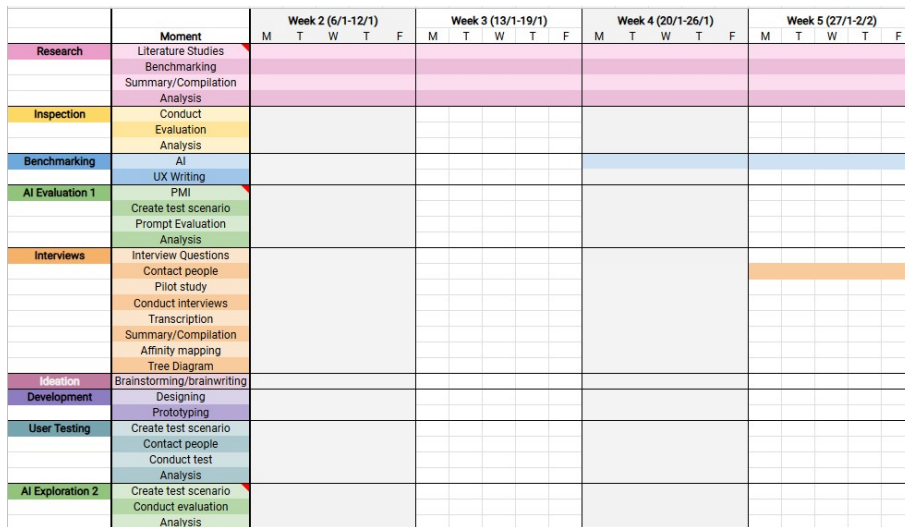


Figure A.1: Gantt chart showing time plan from week 2-5.

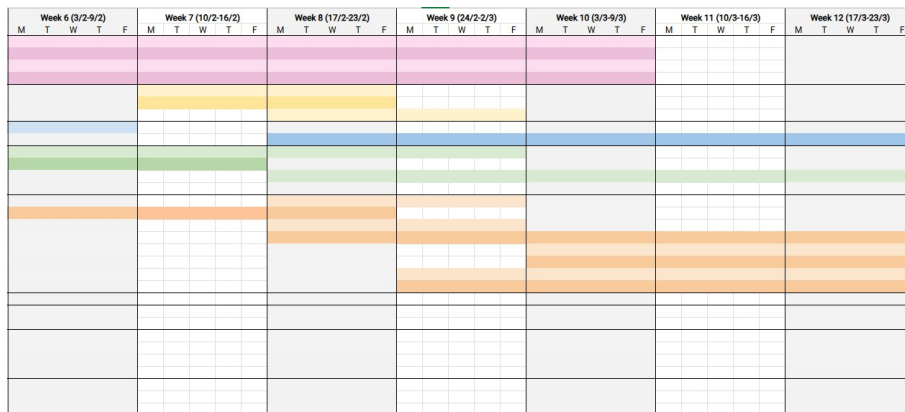


Figure A.2: Gantt chart showing time plan from week 6-12.

B

Interview Guide Developer Team

Introduction

Thank you for agreeing to participate in this interview. Your insights will be invaluable in advancing our project. We are conducting our master's thesis at ABB Robotics, where we are exploring how AI can be utilized to enhance and support the content creation process for RobotStudio.

The aim of this interview is to gather information and opinions about your experience of working in RobotStudio.

Consent Agreement

- I understand that the data collected during this interview will only be used for this project.
- I understand that my data will be anonymized and aggregated, ensuring that it cannot be traced back to me in both research and product contexts.
- I understand that I can withdraw from the interview at any time.
- I agree to be recorded during this interview.
- Would you like to proceed? Do you have any questions before starting?

Background

- Can you tell me about your role?
- Are you involved in developing anything within RobotStudio? If so, could you describe the development process step by step?
- Do you create or generate any text?

Questions to project members who write content

Workflow

- What does the process look like when you create text in RobotStudio?
- Do you currently use any guidelines, tools or templates to create or refine texts you are going to use?
 - How do you experience this process today?
 - If using AI when writing text, which AI-tools do you use?
 - How do you use AI-tools when writing texts? Do you write a draft yourself and let AI enhance it, or do you ask AI to generate a text and then use it as is or rewrite it afterwards?
- What type of text do you write most frequently?
- Do you collaborate with UX-designers?
 - What does this collaboration look like?
 - How do you experience this?

Challenges & Opportunities

- What are the pros and cons of the current process of writing text in RobotStudio?
 - Is there anything that you could use to help to create text in RS?
 - Have you ever felt unsure about how to create a text in robotstudio? If so, can you give us some examples?
 - Are you familiar with writing text that aligns with the company's brand identity and tone of voice?
 - Are there any specific words, concepts or formulations that sometimes lead to misunderstanding or unclearness?
 - Are there any specific functions or modules in RobotStudio where you think the UX-writing could be enhanced?
- What does an optimal process of writing text in RobotStudio look like to you?
 - Do you have any suggestions for improvements to make the process more efficient?

Tools & Guidelines

- To increase the user experience, it's important to have text that is consistent and well-written. If you were to use a tool or guidelines which could enhance text creation for you and your colleagues;

- How would you like it presented to you to be accessible for you?
- What kind of examples would be useful?
- Could you think of anything else that could be important to make these tools or guidelines more usable?
- Do you use the material from the Wiki? How often?
 - How familiar are you with the material, such as the personas for whom you create text for? Do you have knowledge of the UX and Usability guidelines inside the Wiki?
 - Have you ever used the prompt in the Wiki?
 - Do you use these guidelines in your work? Why or why not?
 - Do you know how to use these guidelines in your work?

Questions to project members who do not write content

Collaboration

- Do you collaborate with UX-designers?
 - How does this collaboration look like?
 - How do you experience this?
- In the development process, how do you handle text and content within the software?
 - Do you just copy the content straight from Figma?

Future Directions

- Is there anything that you could use to help to create text in Cloud yourself?
 - Are there any tools and technologies do you use in your development work when implementing text in RS?
- How do you envision the role of AI and machine learning in the future development of UX writing in RobotStudio?
- Do you have any suggestions for how the development process could be made more efficient or effective in terms of integrating UX writing guidelines?

Challenges & Opportunities

- Are there any challenges you face when working with implementation of the already finished text in RobotStudio?

B. Interview Guide Developer Team

- Are there any specific words, concepts or formulations that sometimes lead to misunderstanding or unclearness?
- Are there any specific functions or modules in RobotStudio where you think the UX-writing could be enhanced?
- How do you experience that the text within RobotStudio aligns with the company's brand identity and tone of voice?
- Can you provide examples of when you experienced a challenge related to UX writing?
 - How does the process look like, if you experience above?
- Are there any areas where you see opportunities for improvement in the integration of UX writing guidelines into the development process?

Closing

- Is there anything else you would like to add?
- Do you have any questions for us about the project or the interview?
- If more questions arise, is it okay if we contact you again?

C

Interview Guide UX Team (ABB other business area)

Introduction

Thank you for agreeing to participate in this interview. Your insights will be invaluable in advancing our project. We are conducting our master's thesis at ABB Robotics, where we are exploring how AI can be utilized to enhance and support the content creation process for RobotStudio.

The aim of this interview is to gather information and opinions about your experience with your established guidelines.

Consent Agreement

- I understand that the data collected during this interview will only be used for this project.
- I understand that my data will be anonymized and aggregated, ensuring that it cannot be traced back to me in both research and product contexts.
- I understand that I can withdraw from the interview at any time.
- I agree to be recorded during this interview.
- Would you like to proceed? Do you have any questions before starting?

Background

- Could you both tell me a little bit about your roles at [ABB other business area]?
- What does the current process look like when you write text?
- How does the current process look like when you write text?

Questions

- Please tell us about your work on UX Writing at [ABB other business area].
- How far have you come in the process of developing these UX writing guidelines?
 - Who is the target audience for these guidelines?
- Are you currently following these guidelines on a regular basis?
 - If so, do you notice any difference?
 - Have you measured the result of these guidelines, and in that case how?
- Where do you store or plan to store these guidelines?
- How could you ensure that the guidelines are followed in the best way?
- Do you think that all business areas at ABB can share the same guidelines?

Closing

- Is there anything else you would like to add?
- Do you have any questions for us about the project or the interview?
- If more questions arise, is it okay if we contact you again?

D

Interview Guide UX Team

Introduction

Thank you for agreeing to participate in this interview. Your insights will be invaluable in advancing our project. We are conducting our master's thesis at ABB Robotics, where we are exploring how AI can be utilized to enhance and support the content creation process for RobotStudio.

The aim of this interview is to gather information and opinions about your content design process and your experience of writing text.

Consent Agreement

- I understand that the data collected during this interview will only be used for this project.
- I understand that my data will be anonymized and aggregated, ensuring that it cannot be traced back to me in both research and product contexts.
- I understand that I can withdraw from the interview at any time.
- I agree to be recorded during this interview.
- Would you like to proceed? Do you have any questions before starting?

Background

- Can you tell us about your role?
- What does the current process look like when you write text?
- Do you use any AI tools for writing?
 - If so, which one(s) do you use?
 - How do you use them?
- Do you use any guidelines?

Workflow

- How do you collaborate in your team?
 - Do you have shared platforms?
- How do you ensure that the text is consistent, cohesive and uses the right tone of voice?
 - Do you measure or evaluate the text you have generated before implementing it? How?
- Who is the primary target audience for the UX Writing guidelines?

Challenges & Opportunities

- What would you say are the biggest challenges when creating content?
- How do you think that you could work to ensure that the guidelines developed are followed in the best way?

Tools & Guidelines

- What tool do you prefer to use when creating text?
- Where would you like to store UX writing guidelines?

Closing

- Is there anything else you would like to add?
- Do you have any questions for us about the project or the interview?
- If more questions arise, is it okay if we contact you again?

E

Interview Guide UX Writers

Introduction

Thank you for agreeing to participate in this interview. Your insights will be invaluable in advancing our project. We are conducting our master's thesis at ABB Robotics, where we are exploring how AI can be utilized to enhance and support the content creation process for RobotStudio.

The aim of this interview is to gather information about best practices in UX writing and your experience working as an UX writer.

Consent Agreement

- I understand that the data collected during this interview will only be used for this project.
- I understand that my data will be anonymized and aggregated, ensuring that it cannot be traced back to me in both research and product contexts.
- I understand that I can withdraw from the interview at any time.
- I agree to be recorded during this interview.
- Would you like to proceed? Do you have any questions before starting?

Background

- Can you tell us about your role as a UX Writer?
- What types of texts do you write most often?
- Have you worked with writing text in complex software before?
 - If so, what are the most important principles you follow when writing UX text for complex software?

UX Writing

- How do you work to create clear, simple and user-friendly texts?
- Do you use any tools? Do you use any AI tools? Which one(s)?
 - How do you use it? Where does it come into the writing process?
- If developers themselves need to write text instead of UX writers, what materials or approaches would you say they need?
- Do you collaborate with developers and designers? If so, how do you work to ensure that the content is both user-friendly and technically correct?

Work Process

- How can you ensure that UX Writing is integrated into the entire design process and that guidelines are followed, and not just an afterthought that is brought up when the need arises?
 - How can you best work to follow the guidelines in the best way once they are set?
- We are trying to gain an understanding of how other companies handle UX Writing. Could you share some insights into their working methods? Do they use common documents with guidelines, or how do they usually ensure that UX Writing is done in a consistent manner?
- Are there specific tools or methods you recommend for quality assurance of UX writing in a team where several people contribute to the content?
- When you come to a company, what materials do you want or need from the company to have the conditions to carry out the job as well as possible and understand what needs to be done?

Guidelines

- What do you think is important to include in guidelines for UX Writing?
 - Do you have any tips on presentation and visualization?
- If there are many people involved in writing text, how can you structure the guidelines in a good way for all parties?

Closing

- Is there anything else you would like to add?
- Do you have any questions for us about the project or the interview?
- If more questions arise, is it okay if we contact you again?

F

References of the Benchmarking of Design Systems and Writing Guide at External Companies

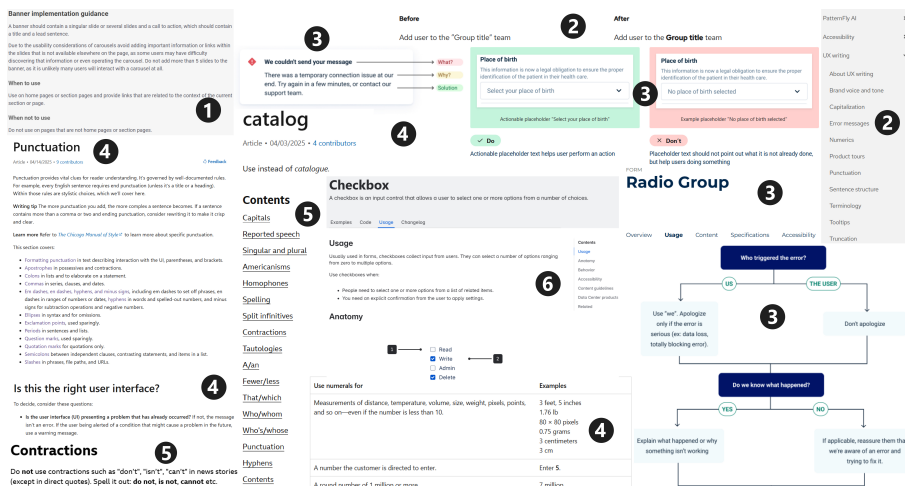


Figure F.1: Collage 1 of screenshots (with numbers) from benchmarking design systems and writing style guides at external companies.

F. References of the Benchmarking of Design Systems and Writing Guide at External Companies

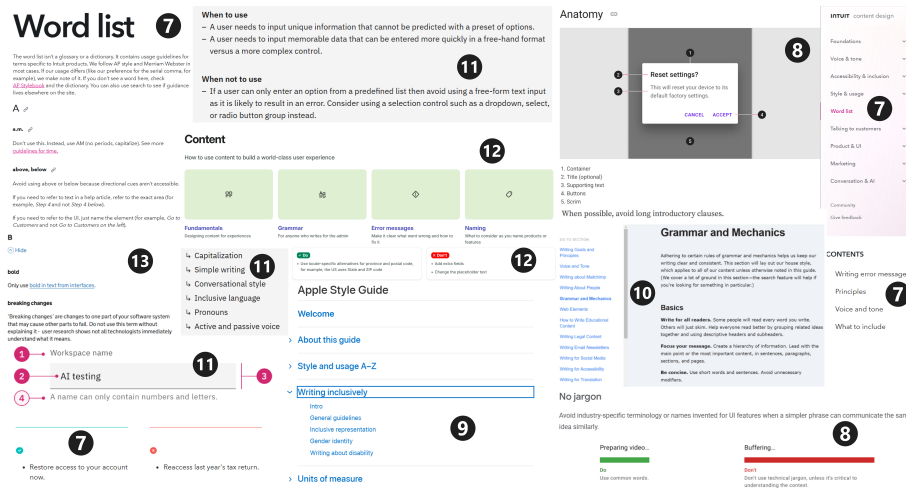


Figure F.2: Collage 2 of screenshots (with numbers) from benchmarking design systems and writing style guides at external companies.

Table F.1: Reference list of external design systems and writing style guides that were assessed during benchmark. Screenshots from the software can be seen the collage in Figure F.1-F.2.

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G

References of the Benchmarking of External Software

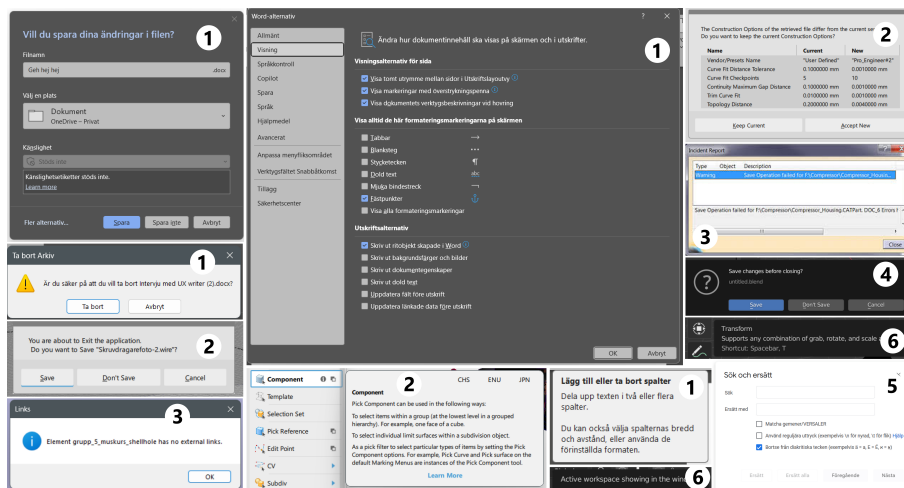


Figure G.1: Collage of screenshots (with numbers) from benchmarking external software.

Table G.1: Reference list of external software that were assessed during benchmark. Screenshots from the software can be seen the collage in Figure G.1.

Reference List	
nr	References
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H

PMI Table AI and UX Writing Tools

PMI Table							
Tool	Plus		Minus		Interesting		Σ
Acrolinx	Secure infrastructure	+5	Untested potential due to no trials	-5	Figma compatible	0	1
	Guidelines compliance	+5	High cost	-4	Trusted by Microsoft	0	
	Styles guides accessible to every writer	+5	No text generation	-4			
Anyword	Text generation	+5	Focuses on marketing and ad copy	-2	AI-powered copywriting	0	25
	Guidelines accessible to every writer	+5	Limited templates	-1	Generates multiples versions of the content	0	
	Tone of voice customization	+5			Offers performance score	0	
	Set persona, context and brand vocabulary	+2			UX writing assistant with a built in AI chat	0	
	Context-based rewrite suggestions	+3					
	Guidelines compliance	+5					
	Easy to use	+3					
ChatGPT	Text generation	+5			AI Chatbot	0	27
	Guidelines compliance	+5			Advanced reasoning	0	

H. PMI Table AI and UX Writing Tools

	Tone of voice customization	+5			Capable of generating diverse text outputs	0	
	Multimodal capabilities	+4					
	Easy to use	+3					
	Real-time data	+5					
Claude	Text generation	+5			AI Chatbot	0	24
	Guidelines compliance	+5			Designed for writing, summarizing, and creative tasks	0	
	Explains output	+1					
	Tone of voice customization	+5					
	Easy to use	+3					
	Real-time data	+5					
Content-Shake AI	Customize brand voice	+4	Focuses on SEO content	-2			25
	Text generation	+5					
	Easy to use	+3					
	Tone of voice customization	+5					
	Guidelines compliance	+5					
	Guidelines accessible to all writers	+5					
Content Reel	Suitable for microcopy	+5	No text generation	-5	Figma Plugin	0	0
	Create component library	+3	Limited capabilities	-3		0	
Copilot AI	Text generation	+5			AI Chatbot	0	28
	Tone of voice customization	+5			Microsoft 365 integration	0	
	Secure infrastructure	+5			Figma compatible	0	

H. PMI Table AI and UX Writing Tools

	Guidelines compliance	+5			Approved by ABB	0	
	Easy to use	+3					
	Real-time data	+5					
Copy.ai	Text generation	+5	Focuses on marketing copy and product descriptions	-2	Generative AI platform	0	28
	Guideline compliance	+5			Premade content categories	0	
	Create templates	+5			UX writing assistant with a built in AI chat	0	
	Tone of voice customization	+5					
	Set persona, context and brand vocabulary	+2					
	Guidelines accessible to every writer	+5					
	Easy to use	+3					
DeepL Write	Improves and rewrites existing text	+3	No text generation	-4	AI powered writing assistant	0	-5
	Easy to use	+3	No tone of voice customization	-4	Similar to Grammarly	0	
			Limited capabilities	-3			
DeepSeek	Text generation	+5	Banned in Several countries	-5	AI Chatbot	0	-5
		-	Security concerns	-5			
Ditto	UI copy management	+2	No text generation	-4	Figma plugin	0	6
	Collaborative writing tool	+3	Limited capabilities	-3	Recommended UX writing tool	0	

H. PMI Table AI and UX Writing Tools

	Component-based workflow	+3			Good tool if the content was correct from the beginning	0	
	UI copy accessible to all writers	+5			Could simplify workflow	0	
Eskritor	Text generation	+5	No customization (premade selections)	-4	Create text based on choices	0	-12
			No tone of voice customization	-4	Generates various content types	0	
			Limited capabilities	-3	UX writing tool with a built in AI chat	0	
			Does not feel secure	-3			
			Non intuitive	-3			
Fabrie AI	Collaborative design tool with AI features for content generation	3	Untested potential	-5	AI integration	0	-2
Frontitude Content Management	Content management tool	+2	No text generation	-4	Figma plugin	0	-2
	Collaborative tool	+3	Limited capabilities	-3		0	
Frontitude UX Writing Assistant	Improves and rewrites existing text	+3	No Tone of Voice Customization	-4	Figma plugin	0	6
	Component library	+2	Limited customization options	-3	Recommended UX writing tool	0	
	Easy to use	+3	No text generation	-4	Product copy writing	0	
	Using reference examples	+3			Content suggestions generated by LLM	0	

H. PMI Table AI and UX Writing Tools

	Styles guides accessible to every team member	+4			UX writing assistant that focuses on content management		
	Set special cases	+2					
frase.io	Content optimization tool	+5	Focuses on SEO content	-2	Figma integration	0	23
	Text generation	+5					
	Tone of Voice Customization	+5					
	Guidelines compliance	+5					
	Real-time data	+5					
Gemini	Text generation	+5			AI Chatbot	0	26
	Tone of Voice Customization	+5			Capable of generating text responses	0	
	Guidelines compliance	+5					
	Feels trustworthy	+3			Cites sources	0	
	Easy to use	+3					
	Real-time data	+5					
Grammarly	Improves and rewrites existing text	+3	No text generation	-4	Recommended UX Writing tool	0	-8
			Limited capabilities	-3	Offers performance score	0	
			No tone of voice customization	-4	AI powered writing assistant	0	
Grok	Text generation	+5			AI Chatbot	0	28
	Tone of voice customization	+5					
	Guidelines compliance	+5					

H. PMI Table AI and UX Writing Tools

	Feels trustworthy	+3			Cites sources	0	
	Easy to use	+3				0	
	Real-time data	+5				0	
Jasper	Text generation	+5	Focuses on marketing content	-2	Recommended UX writing tool	0	21
	Guidelines compliance	+5			UX Writing assistant with a built in AI chat	0	
	Tone of voice customization	+5			Uses models like GPT-3 or GPT-4	0	
	Guidelines accessible to all team members	+5			AI content generation platform for various writing tasks	0	
	Create knowledge base	+3					
Mistral AI	Text generation	+5			AI Chatbot	0	18
	Tone of Voice Customization	+5			Open-weight LM capable of generating text	0	
	Guidelines compliance	+5			Established in France	0	
	Easy to use	+3					
Perplexity	Text generation	+5			Recommended UX writing tool	0	26
	Feels trustworthy	+3			Cites sources	0	
	Tone of voice customization	+5			AI Chatbot	0	
	Guidelines compliance	+5			Fine-tuned GPT models	0	
	Easy to use	+3			Search and answer engine that can generate text-based responses	0	

H. PMI Table AI and UX Writing Tools

	Real-time data	+5					
Picsart AI Content Generator	Text generation	+5	Focuses on SEO	-2	Recommended UX writing tool	0	3
					Generates visual and textual content	0	
Rytr	Text generation	+5	No tone of voice customization	-4	AI writing assistant for generating content across different formats	0	-2
			Limited capabilities	-3	Writing Assistant with a built in AI chat	0	
QoQo	Text generation	+5			UX Writing assistant with a built in AI chat	0	18
	Tone of voice customization	+5			Figma plugin	0	
	Easy to use	+3			Can generate responses and content based on prompt	0	
	Guidelines compliance	+5			Generates personas, journey mapping, affinity mapping, interview and questionnaire material	0	
					Uses models like GPT 4o, DeepSeek R1, and Claude 3.7 Sonnet	0	
Quarkle	Text generation	+5	Does not feel secure	-3	AI writing assistant	0	0

H. PMI Table AI and UX Writing Tools

			Focuses on longer texts/novels	-2	Fine-tuned GPT-4o	0	
Quillbot	Improves and rewrites existing text	+3	Limited capabilities	-3	Recommended UX writing tool	0	-8
			No Tone of Voice Customization	-4	Similar to Grammarly	0	
			No text generation	-4	Paraphrasing and rewriting tool	0	
SudoWrite	Text generation	+5	Focuses on fiction	-2	AI Writing assistant	0	3
Venice	Text generation	+5			AI Chatbot	0	23
	Tone of voice customization	+5			Uses various models	0	
	Easy to use	+3			Create system prompt to command its behavior and voice	0	
	Guidelines compliance	+5			AI platform that assists in content creating and editing	0	
	Real-time data	+5			AI platform that assists in content creating and editing	0	
Wordtune	Text generation	+5			UX writing assistant with a built in AI chat	0	18
	Improves and rewrites existing text	+3			AI powered writing companion	0	
	Tone of voice customization	+5	Limited capabilities	-3	Powered by Jamba	0	
	Easy to use	+3					
	Guidelines compliance	+5					

H. PMI Table AI and UX Writing Tools

Writer	Text generation based on company's guidelines	+5			Recommended UX writing tool	0	26
	Guidelines accessible to all writers	+5			UX Writing assistant with a built in AI chat	0	
	Improves and rewrites existing text	+3			AI writing platform for generating and editing content	0	
	Easy to use	+3			Trained on company's own data set	0	
	Guidelines compliance	+5				0	
	Set brand vocabulary and persona	+2				0	
	Create and share frequently used prompts	+3				0	
WriteSonic	Text generation	+5	Focuses on marketing content and articles	-2	Recommended UX writing tool	0	19
	Tone of voice customization	+5			UX Writing assistant with a built in AI chat	0	
	Improves and rewrites existing text	+3			AI marketing agent and article writer	0	
	Create prompt template	+3			Choose between various models	0	
	Guidelines compliance	+5			SSO and enterprise-grade security	0	

I

Prompts Used in First AI Tool Evaluation

Prompts

Role Description:

You are an experienced UX writer responsible for crafting clear, user-centric content in English (American). Your task is to create copy that helps users easily navigate and understand digital services and products. Ensure the language is accessible, consistent, and aligned with the brand's voice and tone.

Tasks:

Write user-friendly and concise copy for buttons, tooltips, error messages, notifications, menus, and dialog boxes. Create well-structured help texts and instructions that enhance user experience. Ensure the interface communication is consistent. Optimize the copy to reduce cognitive load and maximize clarity. Tailor messages based on the users' needs, considering their various experience levels and contexts. Ensure the content is accessible to all users, including those with different language proficiencies or disabilities. Write in short sentences that are easy to understand.

Tone of voice:

- Our tone is: Considerate, trustworthy, and direct
- Our tone is not: Sarcastic, unprofessional, and formal

Context:

Industrial automation and robotics

Target Audience:

Robotic Technicians, Robotic Engineers and Robotic Operators

Special Cases:

- Use the verb Update, when describing the action to sync/update position data.
- Use the phrasing Do you want to when asking the user a question.
- Use the phrasing Are you sure for more severe questions like warnings and errors.

I. Prompts Used in First AI Tool Evaluation

- Use verb for CTAs, such as buttons, to describe the action users would take by clicking. Do not use Yes and No.

Your Task:

(Enter task for the message type)

Content:

(Enter content to analyze)

Tooltip

Your Task:

You will now analyze the provided content and give me a tooltip. The result should align with the provided guidelines. The tooltip should be shortened to make it clearer and easier to read.

Content:

Each Joint needs a unique number and all mapping numbers have to be in an increasing order.

Dialog

Your Task:

You will now analyze the provided content and give me a title, supportive text, secondary button and primary button. The result should align with the provided guidelines.

Content:

Title: Question

Supporting text: Do you really want to remove Robot 007 robot?

Button: No and Yes

J

User Testing Protocol

[For in-person user tests, participants were asked to bring their computers.]

Introduction

Welcome! Thank you for agreeing to participate in this user test. The user test will focus on evaluating our developed UX writing guidelines.

We will remain quiet during the test and do not interfere, but if you have any questions during the test feel free to ask.

Consent Agreement

- I understand that the data collected during this user test will only be used for this project.
- I understand that my data will be anonymized and aggregated, ensuring that it cannot be traced back to me in both research and product contexts.
- I understand that I can withdraw from the user test at any time.
- Would you like to proceed? Do you have any questions before starting?

Screen Sharing

- Are you okay with screen sharing?
 - If yes, please share your screen during the entire test and think out loud.
 - If no, please think aloud during the entire test and describe your process in detail. Share your additional thoughts during or after the test.

Test

You are going to review a poorly written message. You are going to perform the task, but under two different conditions, one without guidelines and one with guidelines.

Task 1

You will rewrite the poorly written message the same way as you normally do it. You get totally free hands. We want you to think out loud during the entire process, explain your process, and what you changed and why. You have approximately 10-15 minutes to finish the task. We will tell you when your time starts running out.

Task 2

You will rewrite the poorly written message and review it according to the UX writing guidelines. No other tools allowed. We want you to think out loud during the entire process, explain what you changed and why. You have approximately 15-20 minutes to finish the task. We will tell you when your time starts running out.

Scenario

The user clicks on the delete branch button. A neutral message appears in a dialog box that requires the user to confirm or cancel the action. (Send the poorly written message in the Teams chat)

Follow-up Questions

- Were the guidelines easy to understand and use?
- What aspects of the guidelines were clear or unclear?
- Did the guidelines provide sufficient guidance for writing for the assigned UI element?
- Was anything missing from the guidelines? If so, what?
- Did the guidelines feel relevant to the task?
- Were the guidelines efficient to use?
- Were there any aspects of the guidelines that could be improved?

Closing

- Is there anything else you would like to add?
- Do you have any questions for us about the project or the user test?

K

Output from First AI and UX Writing Tool Evaluation

Output			
Tools	nr	Tooltip	Dialog
Reference		Each Joint needs a unique number and all mapping numbers have to be in an increasing order. (17 words)	Title: Question Supporting text: Do you really want to remove Robot 007 robot? Buttons: No and Yes
Anyword	1	Assign a unique number to each joint. Ensure numbers increase sequentially. (11 words)	Title: Confirm Removal Supporting text: Are you sure you want to remove Robot 007? Buttons: Cancel and Remove
	2	Assign a unique number to each joint. Ensure numbers increase sequentially. (11 words)	Title: Remove Robot Confirmation Supporting text: Are you sure you want to remove Robot 007? Buttons: Cancel and Remove
	3	Assign a unique number to each joint, ensuring all numbers increase sequentially. (12 words)	Title: Remove Robot Confirmation Supporting text: Are you sure you want to remove "Robot 007" from the system? Buttons: Cancel and Remove Robot
	1	Assign a unique number to each joint in increasing order. (10 words)	Title: Remove Robot? Supporting text: Do you want to remove "Robot 007"? This action cannot be undone. Buttons: Cancel and Remove Robot

K. Output from First AI and UX Writing Tool Evaluation

ChatGPT	2	Number each joint uniquely in ascending order. (7 words)	Title: Remove Robot 007? Supporting text: Do you want to remove "Robot 007"? This action cannot be undone. Buttons: Keep Robot and Remove Robot
	3	Each joint must have a unique, sequential number. (8 words)	Title: Confirm Removal Supporting text: Are you sure you want to remove "Robot 007"? This action cannot be undone. Keep Robot and Remove Robot
Claude	1	Assign unique, sequential numbers to each joint. (7 words)	Title: Remove Robot Supporting text: Do you want to remove "Robot 007"? Buttons: Cancel and Remove
	2	Number joints uniquely in ascending order. (6 words)	Title: Delete Robot Supporting text: Do you want to delete "Robot 007"? Buttons: Keep and Delete
	3	Assign consecutive, unique numbers to joints. (6 words)	Title: Confirm Removal Supporting text: Do you want to remove "Robot 007" from your system? Buttons: Retain and Remove
ContentShake AI	1	Assign each Joint a unique number in ascending order. (9 words)	Title: Confirm Removal Supporting text: Are you sure you want to remove Robot 007? Buttons: Cancel and Remove
	2	"Each Joint must have a distinct number, arranged in increasing order." (11 words)	Title: Confirm Deletion Supporting text: Do you want to permanently remove Robot 007? Buttons: Cancel and Delete
	3	"Ensure each Joint is numbered uniquely and in ascending sequence." (10 words)	Title: Verify Removal Supporting text: Are you sure you wish to delete Robot 007? Buttons: Proceed and Abort

Copilot	1	Assign a unique number to each joint. Ensure mapping numbers increase sequentially. (12 words)	Title: Are you sure? Supporting text: Do you want to remove "Robot 007"? Buttons: Cancel and Remove
	2	Enter a unique ID for each joint. Ensure IDs follow a sequential order. (13 words)	Title: Are you sure? Supporting text: Do you want to delete 'Robot 007'?" Buttons: Cancel and Delete
	3	Assign distinct numbers to joints. Numbers must increase consecutively. (9 words)	Title: Are you sure? Supporting text: "Do you want to remove 'Robot 007' from the list?" Buttons: Keep and Remove
Copy.ai	1	Assign a unique, increasing number to each joint mapping. (9 words)	Title: Confirm Removal Supporting text: Do you want to remove "Robot 007"? Buttons: Cancel and Remove
	2	Assign a unique, increasing number to each joint. (8 words)	Title: Confirmation Required Supporting text: Do you want to proceed with the removal of the robot named "Robot 007"? Buttons: Cancel and Confirm Removal
	3	Ensure each joint has a unique, increasing number for mapping. (10 words)	Title: Confirm Deletion Supporting text: Are you certain about removing the robot "Robot 007" from the system? Buttons: Cancel and Delete
Gemini	1	Increasing mapping numbers. (3 words)	Title: Remove Robot? Supporting text: Are you sure you want to remove "Robot 007"? Buttons: Cancel and Remove
	2	Unique, sequential numbers. (3 words)	Title: Confirm Robot Removal Supporting text: Are you sure you want to delete "Robot 007"? Buttons: Keep Robot and Delete

K. Output from First AI and UX Writing Tool Evaluation

	3	Unique joint, ordered mapping. (4 words)	Title: Robot Deletion Supporting text: Are you sure you want to proceed with the removal of "Robot 007"? Buttons: Abort and Proceed
Grok	1	Assign each joint a unique number in ascending order. (9 words)	Title: Confirm Removal Supporting text: Do you want to remove "Robot 007" robot? Buttons: Cancel and Remove
	2	Give each joint a unique number, ordered from lowest to highest. (11 words)	Title: Update Confirmation Supporting text: Do you want to update the position data for 'Arm 12'?" Buttons: Discard and Update
	3	Assign each joint a unique number in ascending order. (9 words)	Title: Stop Operation Supporting text: "Are you sure you want to stop the 'Conveyor 5' process?" Buttons: Continue and Stop
Jasper	1	Assign a unique number to each joint. Use increasing numbers for mapping. (12 words)	Title: Are you sure you want to remove Robot 007 Supporting text: Removing this robot will delete its position and configuration data. This action cannot be undone. Buttons: Cancel and Remove Robot
	2	Number each joint uniquely and map them in ascending order. (10 words)	Title: Confirm Removal Supporting text: Do you want to remove "Robot 007"? This action cannot be undone. Buttons: Cancel and Remove Robot
	3	Each joint must have a unique number, ordered sequentially. (9 words)	Title: Delete Robot Supporting text: Do you want to permanently delete "Robot 007"? Please confirm to proceed. Buttons: Keep Robot and Delete Robot

Mistral AI	1	Assign each joint a unique number in ascending order. (9 words)	Title: Confirm Removal Supporting text: Do you want to remove "Robot 007"? Buttons: Cancel and Remove
	2	Number each joint uniquely, in increasing order. (7 words)	Title: Remove Robot Supporting text: Are you sure you want to remove "Robot 007"? Buttons: Cancel and Remove
	3	Assign each joint a unique, sequential number. (7 words)	Title: Confirm Action Supporting text: Do you want to delete "Robot 007"? Buttons: Cancel and Delete
Perplexity	1	Assign a unique number to each joint. Numbers must be in increasing order. (13 words)	Title: Confirm Removal Supporting text: Do you want to remove the "Robot 007" robot? Buttons: Cancel and Remove
	2	Joints need unique numbers in ascending order. (7 words)	Title: Confirm Removal Supporting text: Are you sure you want to remove the 'Robot 007' robot? Buttons: Cancel and Remove
	3	Each joint requires a unique number. Use numbers in increasing order. (11 words)	Title: Remove Removal Supporting text: Do you want to remove the 'Robot 007' robot? This action cannot be undone. Buttons: Cancel and Remove
QoQo	1	Assign a unique, ascending number to each joint. (8 words)	Title: Confirm Removal Supporting text: Are you sure you want to remove 'Robot 007'? Buttons: Cancel Removal and Remove Robot
	2	Number each joint uniquely in ascending order. (7 words)	Title: Delete Confirmation Supporting text: Are you sure you want to delete 'Robot 007'? Buttons: Keep Robot and Delete Robot

K. Output from First AI and UX Writing Tool Evaluation

	3	Ensure each joint has a unique, increasing number. (8 words)	Title: Remove Robot Supporting text: Do you want to permanently remove 'Robot 007'? Buttons: Do Not Remove and Proceed to Remove
Venice AI	1	Assign unique numbers to each joint in increasing order. (9 words)	Title: Remove Robot Confirmation Supporting text: Do you want to remove "Robot 007" robot? This action will permanently delete the robot's configuration and associated data. Buttons: Cancel and Remove Robot
	2	Joints require unique numbers in sequential order. (7 words)	Title: Confirm Robot Removal Supporting text: Are you sure you want to remove "Robot 007" robot? This action will permanently delete the robot's configuration and associated data. Buttons: Cancel and Remove Robot
	3	Use unique, sequential numbers for each joint. (7 words)	Title: Remove Robot Confirmation Supporting text: Do you want to remove "Robot 007" robot? This will update the system to reflect the change and remove all associated data. Buttons: Cancel Update and Update and Remove
	1	Assign a unique number to each joint, ensuring all mapping numbers are in increasing order. (15 words)	Title: Confirm Robot Removal Supporting text: Are you sure you want to remove "Robot 007"? Buttons: Keep Robot and Remove Robot

K. Output from First AI and UX Writing Tool Evaluation

Wordtune	2	Each joint needs a unique number, and mapping numbers must increase sequentially. (12 words)	Title: Confirm Deletion Supporting text: Do you want to remove "Robot 007"? Buttons: Cancel and Delete
	3	Assign unique, increasing numbers to each joint for mapping. (9 words)	Title: Remove Robot Supporting text: Are you sure you want to delete "Robot 007"? Buttons: Keep and Delete
Writer	1	Assign a unique number to each joint in ascending order. (10 words)	Title: Confirm Removal of Robot 007 Supporting text: Are you sure you want to remove Robot 007? This action cannot be undone. Buttons: Cancel and Remove"
	2	Give each joint a unique number, in ascending order. (9 words)	Title: Remove Robot 007? Supporting text: Are you sure you want to remove Robot 007? This action is irreversible. Buttons: Cancel and Remove"
	3	Number each joint uniquely, in ascending order. (7 words)	Title: Delete Robot 007? Supporting text: Are you sure you want to delete Robot 007? This action is irreversible and will remove all associated data. Buttons: Cancel and Delete"
Writesonic	1	Assign unique, ascending numbers to each joint. (7 words)	Title: Confirm Robot Removal Supporting text: Do you want to remove Robot 007? Buttons: Keep Robot and Remove Robot"
	2	Enter joint speeds in degrees per second. (7 words)	Title: Robot Deletion Supporting text: Are you sure you want to delete Robot 007? Buttons: Cancel and Delete"

K. Output from First AI and UX Writing Tool Evaluation

	3	Calibrate robot arm before operation. (5 words)	Title: Remove Robot Supporting text: Do you want to permanently remove Robot 007? from the system Buttons: Retain and Remove"
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L

Prompts Used in Second AI Tool Evaluation

Prompt 1

[Inserted content from the Core Principles and Notification guideline document]

Could you improve this notification based on above guidelines:

Icon + Body:

"An unknown error occurred when the system tried to load the selected project: please close the browser & try to log in again. If the error persists contact your local support department."

Link/button:

"Copy Information".

Prompt 2

[Inserted content from the Error Dialog guideline document]

Could you improve this text according to above guidelines:

Title:

Icon + "Invitation failed."

Body:

"Error: Please, your account doesnt match the one this project invitation was issued for and that means it could get disabled"

Button:

"Ok".

M

Output from Second AI Tool Evaluation

Anyword

Output 1

Notification Body Text:

"An unknown error occurred while loading the selected project. Close the browser and log in again. If the error continues, contact your local support department."

Notification Button Text:

"Copy Details"

Output 2

Error Message Title: "Invitation Failed"

Error message body:

"Your account doesn't match the one associated with this project invitation. To proceed, log in with the correct account or contact the project administrator for further assistance."

Error message button:

"Log In with Correct Account"

ChatGPT

Output 1

Icon + Body:

"Failed to load the selected project. Close the browser and log in again. If the problem persists, contact your local support."

Button:

"Copy info"

Output 2

Title:

"Unable to accept invitation"

Main instruction:

"Your account doesn't match the one this project invitation was sent
→ to.

Supplemental instruction:

To join the project, sign in with the correct account or contact the
→ person who invited you. Using the wrong account may cause the
→ invitation to become unavailable."

Action button:

"Switch account" (if switching is an option)

or

"Close" (if no other action is possible)

Claude

Output 1

Title: "Failed to load selected project"

Body: "An unknown error occurred during project loading. Close your
→ browser and try logging in again. Contact local support if the
→ error persists."

Button: "Copy Error Info"

Output 2

Title: "Invitation failed"

Body: "Your current account doesn't match the account this project
→ invitation was issued for. Sign in with the correct account to
→ accept this invitation."

Button: "Close"

Copilot

Output 1

Icon + Body: "An unknown error occurred while loading the selected
→ project. Please close the browser and log in again. If the error
→ persists, contact your local support department."

Link/button: "Copy Info"

Output 2

Title: Icon + "Invitation failed"

Body: "Your account does not match the one this project invitation
→ was issued for. The invitation may be disabled."

Button: "Dismiss"

Gemini

Output 1

Title: Project load failed

Body: The system encountered an issue while loading the selected
→ project. Please close your browser and log in again. If the
→ problem continues, copy the information below and contact your
→ local support.

Button: Copy Information

Output 2

Title: Invitation Not Accepted

Body: The invitation to this project cannot be accepted with your
→ current account. This invitation was intended for a different
→ account, and continuing may lead to access issues.

Button: OK

Grok

Output 1

Title: "Project load failed"

Body: "The system couldn't load the selected project. Try signing in
→ again or check the project settings for details."

Button: "Close"

Output 2

Title: "Unable to accept invitation"

Body: "This invitation is for a different account. Sign in with the
→ correct account to accept the invitation."

Button: "Close"

Jasper

Output 1

Title: Failed to load project

Body: The system couldn't load the selected project. Close the
→ browser and log in again. If the issue persists, contact support.

Button: Copy details

Output 2

Title: Invitation couldn't be accepted

Body: Your account doesn't match the one linked to this project
→ invitation. Contact the project owner to request a new
→ invitation.

Button: Close

Mistral

Output 1

Icon + Body: "An unknown error occurred when loading the selected
→ project. Close the browser and try logging in again. If the error
→ persists, contact your local support department."

Link/Button: "Copy Info"

Output 2

Title: Icon + "Invitation Problem"

Body: "Your account doesn't match the one this project invitation was
→ issued for. This may result in the invitation being unavailable."

Button: "Dismiss"

Perplexity

Output 1

Icon + Body:

"Loading the selected project failed due to an unknown error. Close
→ the browser and log in again. If the issue continues, contact
→ your local support team."

Link/Button:

"Copy Details"

Output 2

Title (with icon):

Invitation failed

Body:

Your account does not match the one this project invitation was sent
→ to. This may cause your access to be disabled.

If you believe this is an error, contact your local support team.

Button:

Close

Venice

Output 1

Icon + Body:

Error loading project: Browser not supported

"Try another browser or contact support."

Output 2

Title:

Invitation Failed

Body:

Your account doesn't match the one this project invitation was issued
→ for. It may be disabled.

Button:

Try Again

Writer

Output 1

Icon + Body: "Failed to load selected project. Please close browser
→ and log in again. If error persists, contact support."

Link/button: "Copy Information"

Output 2

Title: Icon + "Invitation Failed"

Body: Your account doesn't match the one this project invitation was
→ issued for. This could result in your account being disabled. To
→ resolve, log in with the correct account or contact support.

Button: "Contact Support"