

## **WRITING FOR SAFETY: HOW DO TECHNICAL WRITERS ENSURE USER SAFETY?**

Oumaima Ferdaous Kaab & Coralie Avodagbe

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### **Abstract**

Although user safety is a key part of product design, it depends not only on thoughtful product design, but also on the ability of technical writers to clearly communicate how to use the product safely and correctly. However, the role of technical writers in this area is often ignored. This study looks at how technical writers help keep users safe through their documentation. We focused on three high-risk sectors: transportation, enterprise software, and financial technology. This research is positioned as an exploratory inquiry and does not aim to deliver definitive conclusions. Instead, it sheds light on practices, challenges, and emerging patterns that reveal the often invisible role of technical writers in safety.

To explore this, we conducted semi-structured interviews with six professionals: three technical writers and three product owners. They all work in fields where safety matters. Their answers gave us a clear view of how different industries deal with safety. We also explored research papers and industry reports to support our findings.

We identified two main types of safety:

- Physical safety which is about avoiding harm by using products correctly.
- Operational safety which ensures that systems work safely so that users can trust them.

We also observed that accountability is handled in different ways. Some companies follow strict rules, others use more flexible team-based methods. A key result is that technical writers use a special set of tools to improve safety. This includes:

## WRITING FOR SAFETY: HOW DO TECHNICAL WRITERS ENSURE USER SAFETY?

- Using clear and simple language.
- Organizing information well.
- Choosing the right formats such as web contents and instructional videos.

However, technical writers still face challenges such as limited time and resources, and a gap between how products are built and how users actually use them. This research shows that technical writers play an important but often invisible role in user safety. To build safer documentations, they need a seat at the table right from the start.

*Keywords: User Safety, Technical Writing, Technical Communication, Risk Management, Documentation and Compliance*

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## 1. Introduction

Although we rely on complex products throughout our daily routines for comfort and convenience, they also raise a critical concern: user safety. Occasionally, products including cars, phones, and various consumer goods are recalled due to safety or performance issues. These recalls remind us that unsafe products can cause serious problems. These issues can carry serious consequences on both users and companies' integrity. Moreover, they can also involve significant financial costs. Some of these issues stem from errors, sometimes caused by poor or missing instructions.

This prompted our investigation into the relationship between safety and technical communication. Engineers design safety features while quality assurance (QA) teams test them, but it is the documentation that connects these features to the user. Manuals, labels, and warnings show people how to stay safe.

Technical writers turn complex safety information into simple, clear instructions. Their role is key, but often ignored in companies and in research. In this study, we explore how technical writers help improve product safety. We focus on real experiences, not just theory. We interviewed professionals from three key sectors: transport, software, and financial technology (fintech).

Our goal is to answer simple questions such as: How do teams include safety in their documents? What methods work best? What problems do they face?

This work showcases the daily work of documentation teams and reminds us why their role is vital to user safety.

## 2. Literature review

Our research is based on ideas from technical writing, risk management, and safety rules. The key idea is simple: clear communication helps keep people safe. Good safety writing uses plain language. That means short, simple sentences and no jargon (Redish, 2012). This helps make the content more accessible, especially for those who are not fluent in the language or who have difficulty reading. Studies show that plain language helps users make fewer mistakes.

## WRITING FOR SAFETY: HOW DO TECHNICAL WRITERS ENSURE USER SAFETY?

Standards are also important. For example, the ANSI Z535 standard gives rules on how to show danger. It explains how to use words like *danger*, *warning*, or *caution* and how to use colors and layouts to show how serious a risk is. This helps people quickly see how dangerous a situation might be. Some fields go even further. In the car industry, ISO 26262 requires that every risk be identified and addressed throughout the entire development process, even extending to the user manual. Rail systems follow a similar rule called EN 50128, which deals with software safety.

Another key point is Information Architecture (IA). This means organizing the content so that users can find what they need fast; this is really important in stressful moments. Good IA includes clear titles, easy navigation, and a working search tool. It also helps people who use screen readers, which rely on a clear structure to read the page.

Finally, user testing is essential. It shows if people understand safety instructions, especially in real situations. Adapting this information to different languages and cultures is another challenge for technical writers. The way documentation is delivered today is changing. The industry is clearly moving away from old formats like PDFs, with growing demand for web-based help and embedded guides. New formats like clickable instructions and searchable FAQs make it easier to find safety information. They help users understand what to do, faster. However, it is important to note that new documentation formats, such as video, pose a major safety concern. They can be difficult and costly to update when information changes. Good safety documentation also helps companies stay legal and follow regulations. To ensure good documentation, technical writers frequently collaborate with engineers, designers, and safety experts. Together, they make sure the content is both correct and easy to use.

### 3. Methodology

To explore our research question, we used a qualitative approach. This method helps us understand complex topics by looking at real situations and personal experiences. Unlike quantitative studies, qualitative research focuses on details and context. It gives us a better view of what people do and why they do it. Through discussions with industry experts, we learned about their decision-making processes, the challenges they face, and their methods for handling safety documentation. This helped us see not just what is done, but also the reasons behind it, especially in fields where safety is paramount.

### 4. Research

To collect our data, we conducted semi-structured interviews. This method gave us a clear plan to follow, while still letting us explore new ideas that came up during the conversations. We used a detailed questionnaire to guide the interviews. It helped us look at different parts of user safety in documentation. We asked about people's roles, who is responsible for what, and how risks are found. We also talked about how safety information is checked, how teams work together, and what changes they expect in the future. This approach helped us understand the many things that shape how technical writers support user safety.

#### 4.1 Participant selection

We interviewed six (06) professionals, including technical writers and product owners. They represented various industries, providing us with a wide range of insights on safety documentation.

| Participants     | Fields                    | Years of experience |
|------------------|---------------------------|---------------------|
| Technical writer | Car safety systems (ADAS) | 12                  |
| Technical writer | Cloud software            | 8                   |
| Technical writer | APIs and databases        | 5                   |
| Product owner    | Shared urban transport    | 4                   |
| Product owner    | Railway control systems   | 5                   |
| Product owner    | Fintech                   | 9                   |

The participants included:

- A technical writer working on car safety systems (ADAS).
- A technical writer in cloud software.
- A technical writer focused on APIs and databases.
- A product owner in shared urban transport.
- A product owner in railway control systems.
- A product owner in fintech.

This diverse group provided valuable insights from various fields where safety is crucial, strengthening and enriching our study.

# WRITING FOR SAFETY: HOW DO TECHNICAL WRITERS ENSURE USER SAFETY?

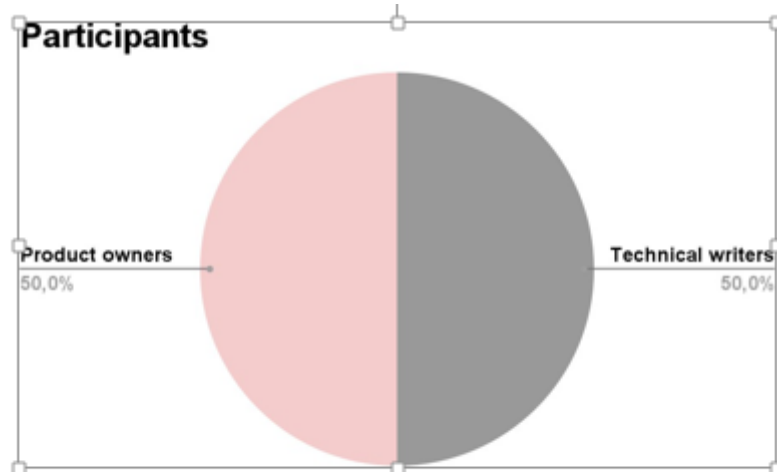


Figure 1: Participants

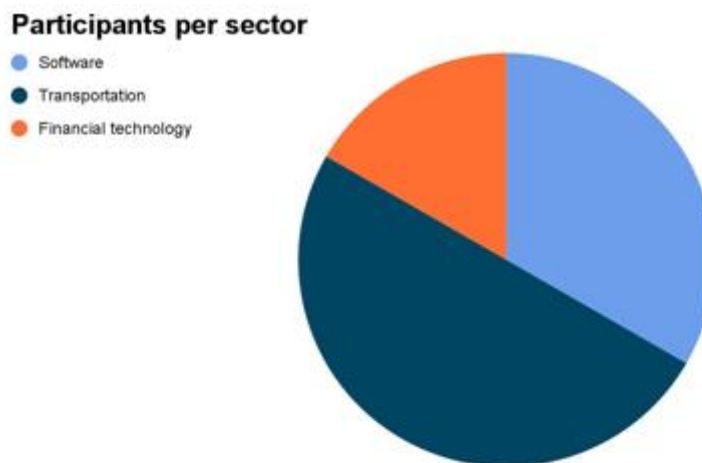


Figure 2: Participants per sector

## 4.2 Data analysis

We transcribed the interview recordings verbatim to preserve the authenticity of participants' responses. This helped keep each person's answers true to what they meant. Next, we used a method called thematic analysis to find patterns in what people say during interviews. Then, we read all the transcripts several times to really understand the content. Later on, we highlighted important parts and gave them short labels called codes. After that, we grouped these codes into bigger themes that showed common ideas across all interviews. We double-checked each theme by going back to the transcripts. This ensured that all the information was accurate and practical. Finally, we used these themes to tell a clear story about what we

learned, adding quotes from participants to support our findings.

### 5. Results

Our analysis of the interviews revealed several important themes that offer insight into how organizations handle safety in their documentation. These themes show a clear difference in how safety is understood, highlighting both physical and operational aspects. They also point to different ways companies assign responsibility and put safety practices into action.

#### 5.1 The two worlds of safety: physical vs operational harm

Our findings indicate that user safety is interpreted differently depending on the industry, which in turn shapes their respective handling methods. A recent survey revealed that about 15% of product liability claims were linked to bad or unclear documentation. That shows how important good writing really is. In the transportation sector, including cars, trains, and shared mobility, safety is paramount. The objective is to prevent accidents, injuries, and fatalities. Accurate documentation is therefore a critical matter of life and death. This aligns with ISO 26262 for automotive functional safety and EN 50128 for railway systems. Similarly, ISO/IEC 26514 emphasizes that user documentation must clearly communicate operational and physical safety requirements. The technical writer working in the car sector said that her role was the ultimate failsafe. She explained: *“If a driver thinks their car is fully autonomous when it is not, the consequences can be dramatic.”* Her job is thus to make the system limits very clear.

The railway product owner said: *“An error in the documentation of an emergency procedure can be as serious as a bug in the code.”* For him, documentation is a vital safety tool. In the railway industry, teams employ formal methods such as Hazard Analyses and FMEA (Failure Mode and Effects Analysis) to identify risks. Everything follows strict rules, like ISO 26262 for cars and EN 50128 for trains.

In software and fintech, safety means something different. It is not about physical harm, but about protecting systems, data, and money. Here, the biggest risks are things like data loss, security breaches, or wrong financial operations. These problems can cost companies millions. The technical writer in cloud services stated: *“An accident for us means deleting a production database by mistake.”* The API technical writer talked about security issues like Common Vulnerabilities and Exposures CVEs, which can expose sensitive information.

The product owner in fintech said: *“The danger is fraud, account hacking, or transfer errors.”* In this field, documentation is the main way to guide users safely. Risks are identified through quality assurance tests and user feedback in an ongoing process. The aim is to prevent errors

## WRITING FOR SAFETY: HOW DO TECHNICAL WRITERS ENSURE USER SAFETY?

that could damage trust or result in financial losses. In short, safety here means doing things correctly, not just avoiding danger, but protecting data, money, and users through clear, accurate processes.

### 5.2 Frameworks of responsibility: formal process vs. agile collaboration

Different definitions of safety lead to different approaches to responsibility. Some systems are strict and legally driven, while others rely more on flexibility and collaboration. In regulated industries like cars and trains, everything follows formal rules inside a Quality Management System (QMS). This is consistent with ISO/IEC 26514, which requires traceability of safety-critical content. It also aligns with tekom's Technical Communication Book of Knowledge (TCBok), which highlights accountability and review processes as key to safe documentation. The car technical writer explained: *"Every document is reviewed, approved, and signed by several people."* She added: *"I am part of the traceability chain; my name is on the record."* In railways, it is similar. The railway product owner said their documentation is seen as a safety artifact. It must be tested with simulators before approval. This process is highly structured. While it helps prevent mistakes, it can also slow things down. However, studies show that it significantly reduces user errors.

In software companies, things operate differently, and teams move quickly. One of the technical writers highlighted: *"Accountability is shared across the team."* She stated that tools like Jira and Slack help support this process. As for product owners, they often serve as the final checkpoint, but identifying safety issues is a shared responsibility across the team. One of the technical writers said: *"My job is to ask questions. Sometimes that reveals there is a problem the product owner had not noticed."* This agile model works well if people stay alert and communicate often. It depends on a strong safety-first mindset across the team including technical writers, product owners, testers, and support. Good teamwork helps reduce mistakes after release.

### 5.3 The technical writer's toolkit for safety

Our interviews showed that technical writers use a set of tools to ensure user safety. This toolkit includes clear writing, awareness of risks, and modern ways to share content. It also relies on good teamwork and strong review processes to make sure the information is correct and easy to use.

Clear writing is the foundation of good safety documentation. Technical writers use plain language, short sentences, and familiar words while avoiding jargon. This approach is recommended by ISO/IEC 26514, which emphasizes clarity, consistency, and accessibility. It also aligns with tekom's TCBok, which underlines usability and comprehension as essential to safety. This helps everyone understand, including people who do not master the

## WRITING FOR SAFETY: HOW DO TECHNICAL WRITERS ENSURE USER SAFETY?

language. Consistency is also important, using different words for the same concept can confuse users. One of the technical writers said: “Sometimes nodes are servers, sometimes they’re disks... this can be very difficult and confusing for users.” Moreover, good structure is just as important as word choice. Technical writers use Information Architecture (IA) to organize content in a clear way, they use headings and subheadings to create a logical flow. This is especially helpful for people using screen readers, who depend on well-coded headers to move through the content.

Technical writers also play a key role in communicating risks. In hardware sectors, they follow standards like ANSI Z535, which define how to use words like *danger*, *warning*, and *caution*, with specific colors and formats. In software contexts, technical writers use visual boxes, callouts, or short microcopy to highlight risks. The fintech product owner gave an example of this. He mentioned that the wording on confirmation buttons is critical safety content and added that it must be clear, because one wrong click can have serious effects.

Collaboration was a recurring theme in all interviews. The technical writer in the car sector shared a story about visiting an engineering lab. She saw a possible pinch point that was not mentioned in the documentation. Her feedback helped improve the product's safety. The railway product owner told a similar story. He explained that a technical writer asked how to cancel a speed limit override, and this made the engineers realize they needed a new safety lock, which they then added to the software. In software teams, collaboration happens in real time. The cloud technical writer said he often reads developers’ pull requests and that helps him understand changes and how they might affect users.

Each of the participants said that checking safety content is essential, and added that it is more than just proofreading. In safety-critical fields, teams do usability testing, testers watch real users try to follow the documentation. The technical writer in the car sector highlighted: “*Their feedback is invaluable.*” Sometimes whole sections are rewritten based on what users do or say. The railway product owner said that they use high-tech simulators to test instructions in real situations. In software, validation happens throughout. Teams look at support tickets and user forums to spot problems. The fintech product owner explained: “*We run A/B tests on buttons or text.*” Another technical writer stated: “*Our user community is our best source of validation.*” Usability testing helps reduce mistakes, it ensures users feel safe and confident when using the product.

# WRITING FOR SAFETY: HOW DO TECHNICAL WRITERS ENSURE USER SAFETY?

ENSURING USER SAFETY IS A TEAMWORK

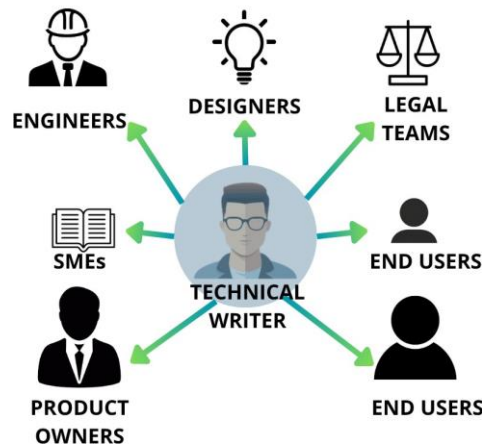


Figure 3: Collaboration around the technical writer

## 5.4 Implications for training

The findings of this study highlight the critical role technical writers play in ensuring user safety across different industries. Training programs for new writers should therefore emphasize not only clarity and structure in documentation, but also risk awareness and collaboration with cross-functional teams. Incorporating standards such as ISO/IEC 26514 and TCBoK into coursework or onboarding materials can provide concrete guidelines for producing safety-critical content. Practical exercises, such as reviewing simulated safety incidents or creating user instructions under regulatory constraints, can help new writers develop the skills needed to identify hazards, communicate risks effectively, and support safe product use from day one.

| Themes                       | Quotations from participants  |
|------------------------------|---|
| Physical safety              | "If a driver thinks their car is fully autonomous when it is not, the consequences can be dramatic."            |
| Operational safety           | "An accident for us means deleting a production database by mistake."   |
| Responsibility               | "Every document is reviewed, approved, and signed by several people."   |
| Agile collaboration          | "My job is to ask questions. Sometimes that reveals there is a problem the product owner had not noticed."      |
| Clear writing & structure    | "Using plain language and clear headings helps users understand risks."   |
| Risk communication           | "The wording on confirmation buttons is critical safety content and must be clear."                             |
| Usability testing            | "Our user community is our best source of validation."  |
| Collaboration with engineers | "A technical writer asked how to cancel a speed limit override, and this made engineers add a new safety lock." |

### 6. Discussion

Our interviews gave us helpful insights into a complex and important field. Technical communication happens in a space full of risks, rules, and fast changes. We noticed one major idea, there are two types of safety: physical safety and operational safety. This is not just theory, it affects how teams work, how money and time are spent, and how decisions are made. In sectors like the car and train sector, the risk is physical harm. Therefore safety is treated rigorously. Teams follow formal standards, use precise tests, and document every step. Sometimes they move slowly, but the idea is to make sure everything is traceable and safe.

In software, companies face different risks such as data or financial loss as well as reputation damage. Teams move faster, they use agile methods and work together. Speed and flexibility matter more. These differences show that a company's definition of safety has a big impact on how it writes and manages documentation. Our interviews also showed that technical writers now play a more active role. They do not just write instructions after everything is done, they really take part in the safety process from the beginning. For example, one technical writer saw a safety risk during a lab visit. Her feedback helped improve the product. Another one questioned a procedure, this led to a new safety feature in the software.

These stories show how technical writers are becoming key collaborators and safety advocates, not just people who record information. Teamwork was a strong theme in all interviews. When things go well, it is because different experts collaborate effectively: engineers understand the system, technical writers focus on the users, product owners oversee the big picture, and legal teams ensure compliance. When these roles work together, safety is strengthened. When they do not, mistakes occur. Many participants said that documentation failures often come from poor communication.

Another common challenge we highlighted is the gap between how a product should be used and how users actually use it. This gap often causes risks. One of the technical writers said that in their company, they write a procedure that works for both perfect and real situations. By doing so, they act as a bridge between the design and the user. This shows that safety is not only about product design; it is also about how well the information is written and understood.

#### 6.1 Enduring challenges and the path forward

Even though we observed many good practices, technical writers still face challenges. In our interviews, several common obstacles came up and these issues affect both the safety and

## WRITING FOR SAFETY: HOW DO TECHNICAL WRITERS ENSURE USER SAFETY?

quality of the documentation.

One major challenge is going fast without losing quality. This is especially true in software context, where teams release updates quickly. Technical writers have to move fast as well. However, the car technical writer said that speed is increasing in every industry, not just software and that technical writers are expected to keep pace while still making sure the documentation is clear, accurate and safe.

Moreover, many technical writing teams do not have enough people or budget. One of the product owners said that documentation is often not a priority when it comes to resources. Industry reports agree: over 60% of teams say that lack of resources is their biggest problem for applying good safety practices. This lack of support makes it harder to carry out activities such as usability testing, teamwork, and keeping content up to date.

Also, technical writers usually need help from subject matter experts (SMEs), but these experts are often very busy, so it is hard to get their time. Technical writers also have to advocate for the importance of documentation. They must convince company leaders to take safety communication seriously, both in terms of money and strategy.

Among challenges, it is noteworthy that users do not read documents like before. One of the technical writers said that many users now want quick answers, visuals, or automated help. This makes it harder to share important safety information clearly. To respond to this, technical writers are using new formats like short videos, GIFs, and reading-time indicators. The goal is to keep users engaged while still explaining the risks. Technical writers must find a balance between what users want and what they need to stay safe.

Even with these challenges, the future looks bright. Technical writers are already exploring the use of new technologies in order to improve safety in their documentation. One industrial technical writer talked about Augmented Reality (AR) and emphasized that it can show safety tips directly in front of a worker's eyes. Early research revealed that this could cut human errors in half during maintenance or training. Artificial Intelligence (AI) also brings new options. AI could help spot risks early, adapt content to each user, analyze feedback to catch confusion, etc. In the future, technical communication could go beyond writing. It may become an interactive and smart experience that helps users stay safe in real time.

## 7. Conclusion

This research shows the crucial role technical writers play as far as user safety is concerned. Their work is not in the background, it is actually a key part of how products protect users. We found that a clear idea of what *harm* means shapes how safety content is written and organized. When physical safety is involved, companies use formal systems and strict rules. When it comes to data or money, they use faster and more flexible methods. But in all cases, good safety documentation depends on teamwork, following standards, and testing with real users. Technical writers are at the center of this process.

Still, they face big challenges. They have to move fast, collaborate with small teams, and constantly show the value of their role, but the future appears promising. New tools like AR and AI can help make safety content more interactive, easier to use, and tailored to real needs. In short, safety documentation is not secondary, it is a core part of protecting users. The work of technical writers, often invisible, is essential. Nonetheless, ensuring safety is a shared responsibility. It takes collaboration between technical writers, engineers, designers, legal experts, product owners, and users. Technical writers act as a bridge, turning complex knowledge into clear instructions. As future professionals, we see them as “unseen guardians” and key players in building a safer world.

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