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Applying Minimalism in the Real World: Results From a Workshop

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Minimalism is a user-centered, contextual and goal-oriented approach to technical communication originally developed by John M. Carroll (1990). In minimalism, the aim is to produce user documentation that focuses on the user's needs, helps the user recover from error situations, and strengthens the user's skills in working with the system (Carroll & van der Meij 1995: 245). The challenge with minimalism has been its practical application: although user-centeredness – the core of minimalism – is the key issue in technical communication, the abstract nature of the approach and its focus on software documentation has made it difficult to apply in industry settings (Virtaluoto, Suojanen & Isohella 2018; Virtaluoto, Suojanen & Isohella, forthcoming). Consequently, there is very little evidence on the suitability of minimalism for software documentation and no evidence at all for hardware documentation. In this article, we explore the application of minimalism to heavy industry machinery end-user instructions through a workshop with technical communication professionals. In the workshop, the participants reviewed heavy industry machinery end-user instructions using a revised set of minimalism heuristics as a practical review tool (Virtaluoto, Suojanen & Isohella, forthcoming). The results show that the revised minimalism heuristics were applicable to heavy industry machinery end-user instructions, but further development ideas were also suggested.

Keywords: hardware documentation, heavy industry machinery end-user instructions, heuristic evaluation, minimalism, technical communication

1 Introduction

The field of technical communication focuses on the design and production of technical information to different user groups in different formats. Historically, the field is deeply rooted in practice, as academic research started to surface only in the 1980s (Malone 2007). Since then, technical communication has been strongly characterized both by theory and practice, which is manifested in research literature: the interfaces between academia and industry continue to be a popular topic among researchers (see e.g. Suojanen 2018: 33–44; Suojanen & Virtaluoto 2016).

As Andersen and Hackos (2018) have noted, while technical communication journals publish articles in the hope that professionals use the research results in their work, we have very little information about how professionals use academic research or if they find it valuable or relevant. Although there is some evidence that Finnish technical communication professionals have actively followed research in the field (Suojanen 2000), in a more recent study, Andersen and Hackos (2018) found that while professionals do think

that research in technical communication is relevant to their work, applying research findings into practice is difficult. Minimalism appears to be a prototype candidate for the dilemma described by Andersen and Hackos.

Minimalism is a user-centered, contextual and action-oriented approach for producing technical documentation, where the main goal is to support the usage of a product and take into consideration the user as much as possible (van der Meij & Carroll 1995; van der Meij, n. d.). The existing literature has mainly focused on minimalism in the context of novice users and consumer software (Nowaczyk & James 1993). Minimalism has been one of the key trends in technical communication since the 1990s (Lanier 2018), and it is also a part of the most recent ISO standard for producing technical documentation (IEC/IEEE 82079-1:2019: 21). Despite all this and despite a call for a strategy for applying minimalism in practice since the beginning (Anson 1998: 115), there is very little evidence on recent practical applications of minimalism for software or hardware documentation (Virtaluoto, Suojanen & Isohella, forthcoming). In particular, there are no studies on the application of minimalism in the framework of heavy industry machinery end-user instructions, which is the topic of this article.

Minimalism includes a set of heuristics through which minimalism is intended to be applied in practice (van der Meij & Carroll 1995). Heuristics are an inherent part of a popular usability evaluation method, heuristic expert evaluation. It was first introduced by Nielsen and Molich (1990) and is today the best-known expert evaluation method (Petrie & Power 2012: 2107). In heuristic evaluation, experts or novices use a set of heuristics – a list of principles or rules – to evaluate the usability of a selected target, in this case technical documentation.

The need to modify the original minimalism heuristics for a broader domain of deliverables and different target audiences was suggested as early as 1998 (Redish 1998: 243). While the user types, their needs, and the use situations of consumer software and those of heavy industry machinery are obviously different, the core idea of minimalism applies. With the aim of developing the minimalism heuristics into a widely adaptable tool for technical communication professionals, Virtaluoto et al. (forthcoming) have created a revised version of the original minimalism heuristics. Our main research question pertains to examining these heuristics: to what extent are the revised minimalism heuristics applicable to evaluating heavy industry machinery end-user instructions?

In this article, we will first describe the revised minimalism heuristics. Then we will introduce our data and methods: the heuristics were tested in a minimalism workshop with technical communication professionals. The workshop participants tested the heuristics on heavy industry machinery end-user instructions, reported their findings on an evaluation form, had a joint wrap-up discussion about their individual findings, and replied to a questionnaire. Finally, we will present our findings and discuss the applicability of the

revised minimalism heuristics to heavy industry machinery end-user instructions. In addition to answering our research question, we will offer some empirical evidence for the heuristics' further iterative development.

2 The Revised Minimalism Heuristics

For the pursuit of an optimal user experience, minimalism offers four principles and their corresponding set of original minimalism heuristics (van der Meij & Carroll 1995). According to minimalism's first principle, users should be given an immediate opportunity to act. The corresponding heuristics state, for example, that users should be encouraged to try things intuitively, but help should also always be available. The second principle and related heuristics focus on the importance of real tasks: what is important is the user's actual goal, not the product that is documented. The third principle and its heuristics concentrate on effective error prevention information offered to the users. Finally, the fourth principle states that the documentation should be as concise as possible, and not everything needs to be explained (van der Meij & Carroll 1995: 244–257).

The creation of the revised minimalism heuristics has been described in detail in Virtaluoto et al. (forthcoming). The principles of minimalism are well in line with what is widely acknowledged in technical communication literature: a good document is accurate, relevant, easy to understand, and accessible (Strimling 2019; van Laan & Julian 2001). However, the importance of effective visuals, which are seen as a crucial means for the user to accomplish their tasks (Schriver 1997), was disregarded in the original minimalism heuristics. In the development of the revised heuristics, the original heuristics introduced by van der Meij & Carroll have been used as a starting point and complemented with current best practices of technical communication and the results of a company pilot study where the revised heuristics (see Table 1) were tested. The best practices were incorporated in the revised heuristics to demonstrate that today, minimalism can hold its own as one user-centered approach to good technical documentation among many (Virtaluoto et al., forthcoming). The revised set of minimalism heuristics is intended to be applicable both to the worlds of software and hardware.

Table 1. Revised minimalism heuristics (Virtaluoto et al., forthcoming)

1 CORE TASKS AND GOAL-ORIENTATION	
Core tasks	1.1 Does the documentation concentrate on the user's core tasks?
	1.2 Does the documentation reflect the real-life structure of each task?
	1.3 Does the documentation explain why the task is done, in addition to how?
Getting to work immediately	1.4 Can the users start working on real-life tasks immediately? Does the documentation contain irrelevant: • general information • introductions • prefaces • metatext • introductory sentences before steps?

Immediate assistance	1.5 Is the documentation available when needed?
	1.6 Does the user get targeted instructions at the relevant touch points on the user journey?
2 ACCESSIBILITY	
Content	2.1 Is the documentation as concise as possible: • in the selection of the contents • in providing detailed explanations?
	2.2 If detailed explanations are necessary, are they located after the steps in each procedure?
Findability	2.3 Is the overall structure of the documentation logical and consistent? Are all topics/sections structured in the same way?
	2.4 Do the users find what they are looking for? Does the documentation contain: • a clear and precise table of contents • a clear and intuitive index • clear, intuitive headings and keywords • an accessible and intuitive search functionality for online or electronic documentation?
Understandability	2.5 Is the information in the documentation easy to understand? Does the documentation contain: • long tasks broken into shorter sequences • clear, action-oriented steps • short, simple sentences • verb forms relevant to the information type • terminology that is appropriate to the user group • clear, simple language?
Visuals	2.6 Is the documentation visual? • Have graphics, images, videos, etc., been used where appropriate? • Are the used visuals relevant? • Are the visuals used consistently? • Are the visuals clearly labelled (titles, figure numbers, etc.)? • Are the images and text in the documentation clearly connected using callouts, for example?
3 ERROR MANAGEMENT	
Preventing errors	3.1 Have errors been prevented?
Warnings and notes	3.2 Have all the applicable safety standards, such as the Machine Directive, been taken into consideration in the documentation?
	3.3 Are all the warnings and notes necessary?
	3.4 Are the warnings and notes located next to the relevant procedure?
Error recognition	3.5 Does the documentation offer error information: recognition, diagnosis, solution?
	3.6 Is the error information located close to the relevant procedure?
Troubleshooting	3.7 Does the documentation contain a troubleshooting section? • Is the troubleshooting section clearly visible in the table of contents? • Does the troubleshooting section contain the problems most often faced and/or reported by the users of the product?

The revised minimalism heuristics fall into three main categories: core tasks and goal-orientation, accessibility, and error management. The heuristics in the first category emphasize the importance of understanding the user's real situation, asking: Does the documentation support the user's actual tasks? Does it support getting to work immediately, and does it offer help when the need arises? The second category pertains to different aspects of accessibility, asking: Is the information provided in the documentation con-

cise? Are the users able to find what they are looking for, and is the information under-standable? Are visuals used appropriately, so that they support the user's tasks? The third and last category deals with error management, asking: Does the documentation prevent errors? Does it present all the required warnings and notes but in a usable manner? And finally, does the documentation help the user recognize and recover from the errors?

The findings of the heuristics can be rated to assess the impact of the problem and the need to fix it. In usability research, a commonly used severity rating scale is by Nielsen (1994):
0 = Not a usability problem at all
1 = Cosmetic problem
2 = Minor problem, not very important to fix
3 = Major usability problem, important to fix
4 = Usability catastrophe, must be fixed

The revised heuristics presented above are designed to examine whether the documenta-tion is usable from a minimalist point of view. In the following section, we will explain how the heuristics were tested in this study.

3 Data and Methods

To gather data on how the revised minimalism heuristics work as a practical review tool of heavy industry machinery end-user instructions, we arranged a minimalism workshop with technical communication professionals in the spring of 2020. Five people took part in the workshop: a researcher and four technical communication professionals. The work-shop was held online and prefaced by a short presentation given by the researcher outlin-ing the main concepts of minimalism and a walk-through of the heuristics, severity rating, and the heavy industry machinery end-user instructions to be evaluated. Following the preface, each participant had two hours for individual evaluation before reconvening to the group discussion to present their findings. During the individual evaluation, the par-ticipants listed their findings on an evaluation form, listing the heuristic used, describing the found problems with their severity ratings, as well as giving suggestions for solving the found problems and possible other comments. After the workshop, the participants completed a short questionnaire about their views of using the heuristics. The language used in the workshop was Finnish, and in this article, we have translated the direct quotes from Finnish into English.

The heavy industry machinery end-user instructions to be evaluated were part of a docu-mentation set for a veneer manufacturing technology, namely, a maintenance manual for industry professionals. Two of the workshop participants (#1 and #4) were familiar with the production environment of the manual, and all had experience with heavy industry

machinery end-user instructions in general. One of the participants (#3) had worked extensively with heavy industry machinery installation and maintenance instructions, another (#2) with illustrations and other visual aspects of documentation, and one of the participants (#4) had recently returned to technical communication after several years of working in another field entirely. The researcher was familiar with the maintenance manual, the documented technology, and the production environment of the manual. For the evaluation, severity rating 0 was not considered relevant, and only ratings 1–4 were used.

We collected three data sets: an audio recording of the minimalism workshop wrap-up discussion, an evaluation form data set and a questionnaire data set. All data sets were handled according to the instructions of the Finnish National Board on Research Integrity (https://www.tenk.fi/en).

The workshop audio recording is 70 minutes long. Three of the participants (#2, #3 and #4) presented the findings in their evaluation forms and discussed the findings of their heuristic evaluation as well as their views on applying the revised minimalism heuristics to the maintenance manual. One of the participants (#1) was unable to complete the evaluation during the workshop due to scheduling problems but participated in the wrap-up discussion and completed the evaluation and returned the filled evaluation form later. One of the participants (#3) had to leave about halfway through the wrap-up discussion but presented his findings first. All participants answered the short questionnaire after the workshop.

The aim of the questionnaire data set was to investigate how the participants viewed using the revised minimalism heuristics and see if they had any further development ideas for the heuristics after having some time to reflect on the experience. However, as the questionnaire data set did not provide any additional insights to those gained from the evaluation forms and wrap-up discussion, it is not included here. The evaluation forms and wrap-up discussion proved to be the most valuable data, providing on-point information about the applicability of the revised minimalism heuristics to heavy industry machinery end-user instructions, the usability of the heuristics, and the workshop in general.

We used thematic analysis – a method for "systematically identifying, organizing, and offering insight into patterns of meaning (themes) across a data set" (Braun & Clarke 2012: 57) to make sense of our data. Our approach was primarily inductive: we were driven by what was in the data, rather than applying a specific theoretical concept or framework to make sense of the data (Braun & Clarke 2012: 58). Braun & Clarke (ibid.) suggest, however, that in reality, a combination of the inductive and deductive approaches is often in place: researchers move between data-based meanings and researcher-based meanings in their analysis. This was the case for us, too, through our previous work in minimalism and as technical communication scholars and professionals.

We analyzed the data using the six-phase approach of thematic analysis (Braun & Clarke 2006). We conducted the first two phases – 1) familiarizing oneself with the data and 2) generating initial codes – independently, and arranged joint online project meetings for the remaining phases: 3) searching for themes; 4) reviewing potential themes; 5) defining and naming themes; and 6) producing the report. In the following section, we will discuss the themes we discovered from the data when searching for the answer to our research question. The two main themes we discovered when testing the applicability of the revised minimalism heuristics to heavy industry machinery end-user instructions were 1) the overall usability of the heuristics and the workshop process, and 2) the awareness of the constraints of "the real world" on the documentation process. The importance of minimalism's core tenet, knowing the user and focusing the evaluation on the user's needs, pervaded the workshop.

4 Findings and Discussion

To begin with, we searched for an answer to our research question: to what extent are the revised minimalism heuristics applicable to evaluating heavy industry machinery end-user instructions? As mentioned above, in the analysis of the minimalism workshop data we found two main themes which are directly linked to the research question, and which we will discuss further in this section.

Applicability of the revised minimalism heuristics to heavy industry machinery end-user instructions.

During the workshop's two-hour evaluation phase, each participant found around ten problems in the manual and reported them on their evaluation forms. While all participants were familiar with the concept of minimalism and one had used usability heuristics before, none had previously applied minimalism heuristics to documentation. The heuristics seemed to provide the participants with a helpful tool for focusing on specific features of the document they were evaluating. The findings mostly focused on category 2 of the heuristics: accessibility. The relatively high number of findings in a short time seems to suggest that the heuristics are applicable to evaluating heavy industry machinery end-user instructions too, although the roots of minimalism are in software, as discussed above. The impact of the workshop's time constraint is discussed further below.

Usability of the heuristics and the workshop process.

As for the general usability of the heuristics and the workshop process – the first main theme in the data – the workshop participants found applying the heuristics to be relatively easy. Two of the participants commented that the heuristics would also work as guidelines for producing documentation, in addition to evaluating it:

(1) You could use these directly as a writing guide. (#1)
(2) I think I've used these [heuristics] unconsciously when writing. (#2)

The participants noted that there was some overlap in the heuristics: for example, heuristics 1.6 and 2.3 were seen as relatively similar:

(3) There is some overlap, such as 1.6 and 2.3, which are quite similar issues at least during the production stage of the manual. (#2)

Virtaluoto et al. (forthcoming) have suggested that the idea is to apply and adapt the heuristics in each individual situation, and choose which ones are relevant to the task at hand. Heuristic 1.6. refers to providing the user with targeted instructions at specific touch points and may be more applicable for software, whereas heuristic 2.3 focuses on how logical and consistent the structure of the documentation is, taking into consideration the user's real-life tasks, for example.

The two hours allotted for the evaluation was a relatively short time, which was brought up in the wrap-up phase of the workshop. The participants felt that they had not had enough time for extensive evaluation in all the heuristics categories. As discussed above, the large number of findings even in a short period of time indicates that the heuristics work quite well for evaluating purposes. However, it is likely that the time constraint caused the evaluators to prefer the more easily applicable heuristics, and they reported that having more time would have been beneficial. Another time constraint issue was also mentioned, namely the need to have some time between producing the instructions and evaluating them, if the same person is performing both tasks.

(4) These were all I had time for. I would use a lot more time [1–2 days] for going through one of my own manuals. [...] And I'd need at least a couple of months in between [writing and evaluating the instructions] (#3)
(5) The only challenge [with using the heuristics] was that I didn't have enough time. (#2)

As mentioned above, most of the findings were in category 2 of the heuristics, implying that concentrating on the accessibility of information is easy for communication-oriented people. The professionals also indicated that the shortness of their evaluation time played a role in preferring this category: the heuristics in this category are typically easy to apply for language professionals, who are familiar with the best practices of technical communication.

The workshop's wrap-up discussion where each participant presented their findings was an important part of the evaluation. It was also valuable for the participants to hear what findings the others had made.

(6) There were some interesting differences of opinion. I really had some aha! moments there, as [the others participants' findings] were things I would've never paid any attention to myself, I learned something. (#2)

Constraints of the real world on the documentation process.

The second main theme in our data – the impact of "the real world" on the documentation process – was brought up multiple times in the wrap-up discussion. The workshop participants were seasoned technical communication professionals with plenty of prior experience in the field, and they made several remarks about the way the real world restricts what can and cannot be done, both in producing documentation and evaluating it.

The participants were acutely aware of the possibilities and the constraints of the instructions' production environment – schedules, resources, and the need to keep including legacy data in the instructions, to name a few.

(7) [Discussing the difficulty of harmonizing terminology in the manual] It's just, ballast from the past, that's what it is. (#3)

(8) [Discussing problems in the manual structure] There's always a reason why it's been done like this, even when you know it's not the best way, but there's been a [tight] schedule or some other reason. (#1)

(9) It's just difficult and time consuming to find out who reads [these manuals] and what [information] can be left out and what definitely can't be left out, and it would take a lot of resources to find that out […] if you're customizing manuals for different target audiences, that's just too much, takes up too many resources. (#2)

Relating to this type of background knowledge, one of the participants (#4) commented that it is easy to apply the heuristics to materials you know nothing about. Experience and knowledge of the production environment may indeed be a double-edged sword, at times making it difficult to decide whether to apply certain heuristics at all. Fresh eyes evaluating the documentation may also bring up problems that have not been addressed because "this is the way it has always been done". For example, two participants (#2 and #3) who were not familiar with the production environment and the larger set of technical documentation of which the evaluated manual was part, commented on certain structural issues in the manual. Participant #1, who was familiar with the evaluated manual's production environment, noted that she would have ignored this problem because of her background knowledge.

(10) It's maybe good that [#2 and #3] also looked at this, they might be closer to the actual user's point of view, seeing as I wouldn't have even commented on this because I know why [the structure of the manual is what it is]. (#1)

All participants were also aware of a single manual being part of an entire document set – even when they were not familiar with the specific document set – as well as in the wider context of heavy industry machinery end-user instructions in general. They talked about parts of documentation outside the manual to be evaluated, such as mechanical drawings, and noted that it would have been easier to evaluate the single manual in conjunction with the rest of the documentation set.

(11) It would have been easier to evaluate the documentation as a whole; would have made more sense to see the entirety of it. (#3)

(12) It would have been good to see the entire documentation set, just so I wouldn't comment on a problem that's already been solved in another manual. (#2)

The participants also commented on their own double role as both the producer and the evaluator of the instructions, noting that separating the two may at times be challenging.

(13) I was wondering whether to report this problem at all because I know the reason behind it. There's this problem of distancing yourself from [content in whose production you are involved]. (#1)

(14) It was difficult to put on the doctor's hat and start the examination [...] it's easier to do an autopsy on someone else's text. (#4)

(15) I don't like reading my own manuals, that would be pointless, I wouldn't find any problems because I subconsciously know what it should say, even if it doesn't. (#3)

The specific areas of the participants' expertise were reflected in their findings. This was the case especially with participants #2 and #3 who commented on problems relating to task structures and visuals in length and were aware of the possibilities afforded by the tools used for the work.

(16) The visuals are not consistent, the callouts in the illustrations are different shapes, sometimes with numbers and sometimes with letters [...] the text doesn't follow the same order as the visuals. (#3)

(17) [About an unclear visual in the manual] I know the difficulties with lighting when working with these 3D models. (#2)

Widely used tools in technical documentation are also component content management systems, which enable modular documentation – separating individual topics of information and instructions into standalone modules. Modular documentation may also pose certain challenges to applying minimalist heuristics and avoiding unnecessary repetition. Repetition is also a necessary evil from the user's point of view since, as one of the participants (#3) commented, users tend to look at only the specific instructions for a wanted task instead of reading the entire manual through (see also e.g., Schriver 1997: 165). The idea of being able to use and reuse a certain module of documentation anywhere as a standalone text will, however, unavoidably cause repetition when the modules are combined into one manual.

(18) But [explaining an acronym only once, for the first time it's presented in the manual] just wouldn't work in our world, you just don't know if this is the first time something's mentioned, the module might end up anywhere. (#4)

(19) [Avoiding repetition] is challenging, you take [a module of documentation] and reuse it wherever. (#4)

Knowing the user.

As discussed above, minimalism has been one of the key trends in technical communication since the 1990s, and many professionals say they apply it in their day-to-day work. The cornerstone of minimalism is knowing the user and providing only the information

the user needs to accomplish the task at hand. However, in the workshop, the participants mainly focused on category 2, accessibility, and skipped category 1, which focuses on knowing the user's real-life tasks and context of use. Obviously, the aspects of accessibility alone, such as clear and concise language and the appropriate use of visuals, do not guarantee the usability of end-user instructions. In minimalism, knowing the user's core tasks and providing an immediate opportunity to act are the key features of usable documentation.

Although the participants reported no findings in category 1, it became clear that all the professionals had – perhaps unconsciously – kept the end-user in mind during the evaluation. In the wrap-up discussion the end-users are often mentioned as the reason for commenting or not commenting on certain problems in the manual. The participants were very aware of the intended target audience of the instructions.

(20) The challenge is knowing your target group and knowing what information they need. And also knowing enough [about the subject matter] yourself so that you can weed out what's unnecessary [in the text]. (#1)

(21) [Concerning an unclear passage describing the user interface of the machinery] But also, if you're someone who [operates the machinery] daily, you'll just know what [the description] means. (#4)

(22) I'm thinking of these service people, would they really want to read a text as long as that. (#4)

One of the participants also explicitly said that using main categories 1 and 2 was easy:

(23) Applying the first two main categories was easy. The first [category] is more for software, but quite applicable to this kind of documentation too. I found applying [the heuristics] easy as we went over them together in the beginning [of the workshop]. (#2)

The above seems to suggest that the minimalism heuristics work for heavy industry machinery end-user instructions, too. However, using the heuristics does require experience in technical communication. The process also seems to benefit from a short introduction to minimalism and a walk-through of the heuristics prior to conducting the evaluation.

6 Conclusion

In this article, we have explored the applicability of a revised set of minimalism heuristics to heavy industry machinery end-user instructions through data from a minimalism workshop. The revised minimalism heuristics seem to be applicable here as well. The use of visuals, clear language, conciseness, and focusing on the real-life tasks of the user are as relevant for heavy industry machinery end-user instructions as they are for software documentation.

While the length of the workshop was not optimal, the participants were able to gather a relatively high number of findings and felt that the process of applying the heuristics was easy. They were aware of the constraints of the real world around them and reflected on

the background knowledge and needs of the users of the documentation in the wrap-up discussion.

However, the heuristics in category 1 – core tasks and goal-orientation – are key in producing truly user-centered documentation. While it was evident that the documentation was far from perfect in this sense, almost none of our workshop participants reported findings in this category. However, it became clear in the wrap-up discussion that they had kept the user's needs in focus throughout the evaluation, as discussed above. In future workshops, it may be beneficial to emphasize the importance of category 1 as the basis of the evaluation.

The professionals' work experience places them in an interesting position when evaluating instructions. The need for stepping outside oneself as the technical writer, putting on "a different hat" for evaluation, was discussed alongside many of the findings. Through their work, the professionals had already developed knowledge beyond the novice user level. As discussed above, the professionals were acutely aware of the restrictions of "the real world". This may have an impact on the findings. It is also often stated that technical communicators seldom have enough access to user or feedback data (Virtaluoto et al. 2018), which may explain why the workshop participants especially in their evaluation forms focused more on the documentation they were evaluating and less explicitly on the users of the documentation.

The documentation that was evaluated in our workshop was provided to the participants in PDF format, as this is still the preferred method for many heavy industry contexts of use. In the future, however, industrial maintenance documentation will very likely be provided through extended reality (XR) solutions, such as smart goggles. This type of work typically requires the user to hold equipment and tools or wear gloves while accessing documentation, so smart phones or other current access methods to electronic documentation portals are not usable (Siltanen & Heinonen 2020). Paper documentation is equally difficult to use when one's hands are busy or get dirty, as typically is the case in maintenance tasks. According to Siltanen & Heinonen (ibid.), XR solutions require context-sensitive information in an easily understandable format, making minimalism a key candidate for creating the information: the smaller the screen, the more need for minimalism.

In our workshop, the participants stressed that the heuristics would work as general writing guidelines for technical communication and could be further developed into a minimalism handbook. In a recent study, Heinonen et al. (submitted) discovered that the participants of a small screen documentation usability test preferred the minimalist version of the documentation to conventional and visual versions, and task completion was also highest with the minimalist version. Therefore, ongoing technological changes in industrial settings seem to provide an important platform for further developing a minimalist handbook, which would cater both for writing minimalist documentation and assessing it

through heuristic expert evaluation. The lack of a handbook for minimalism has been reported as one of the reasons why minimalism has not gained the ground it was expected to (Dubinsky 1999) and developing the writing tool would go towards answering this call.

This article is the first report on applying minimalism to heavy industry machinery end-user instructions, and the results are tentative, especially considering the small number of informants in this study. In our further studies, we will develop the heuristics tool iteratively as well as our research setup, as we continue to conduct workshops in new environments.

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