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Minimalism Heuristics Revisited: Developing a Practical Review Tool

By Jenni Virtaluoto, Tytti Suojanen, and Suvi Isohella

Running Head: MINIMALISM HEURISTICS REVISITED

ABSTRACT

Purpose: This article looks at existing minimalism literature and the application of minimalism heuristics. It proposes a revised set of minimalism heuristics to be used at different phases of the minimalist documentation process. The goal is to offer a practical tool for technical communication professionals.

Method: The revised heuristics are a combination of a literature review, the best practices of technical communication, and a company pilot study where the heuristics were tested.

Results: The article offers a revised list of minimalism heuristics, to be used as part of the minimalist documentation process to ensure documentation quality.

Conclusion: The technical communication field is charting new ground in the era of responsive design and mobile platforms. In this new landscape, the principles of minimalism have much to offer. The proposed minimalism heuristics comprise one strategy of applying minimalism for better documentation quality.

KEYWORDS: minimalism, minimalism heuristics, minimalist documentation process, documentation quality

PRACTITIONER'S TAKEAWAY:

- Minimalism has been one of the major trends in technical communication since the 1990s, but there is a lack of literature on real-life applications of the theory.
- Low-cost, flexible solutions are needed for ensuring the quality of documentation in the changing technical communication landscape.
- The revised set of minimalism heuristics, to be used as part of the minimalist documentation process, provides a flexible tool to evaluate documentation quality.

INTRODUCTION [1st-Level Heading]

Minimalism has been one of the major trends in technical communication since the 1990s (Hackos, 2008; Lanier, 2018). It is a user-centered, contextual, and action-oriented concept for creating customer documentation (Carroll, 1990; van der Meij & Carroll, 1995; Dubinsky, 1999), making it well-suited to the general ethos of technical communication (e.g., Schriver, 1997) and information-development management (Hackos, 2007). Draper and Oatley (2000) find minimalism to be a well-grounded, thoroughly user-tested theory which can be applied “on the basis of little training other than reading one or two research papers” (p. 223). The benefits of minimalism seemed promising from the start: Minimalist manuals helped users make fewer mistakes, complete tasks faster, and explore the software with more independence (van der Meij, 1992, p. 15). It has also been suggested that minimalism could be applied to improve other kinds of professional communication (Manning, 1998).

Minimalism was the framework for a special training program we arranged for Finnish technical communicators in 2017–2018. The program—*Minimalism in Responsive Design*—was funded by the Finnish Ministry of Education and Culture, and it brought together 18 technical communication specialists and five Finnish universities. One of the aims of the training program was to combine theory and practice in the program contents. Minimalism as a theoretical and methodological concept was new to many of the participants although several had previously heard the term. It was clear from the beginning of the program that concrete, agile tools were needed to apply the principles of minimalism in practice in different company environments. In fact, there has been a call for a strategy to apply the principles of minimalism since the 1990s (Anson, 1998, p. 115). Today, this call is even more pressing, as the technical communication field is charting new ground in responsive design and mobile platforms, for example (Lanier, 2018, p. 83). This paper is one step towards developing such a strategy.

This article focuses on one methodological aspect of minimalism, namely minimalism heuristics, developed by van der Meij and Carroll (1995, 1998). The heuristics, i.e., general principles, are based on solid empirical research, and are intended as a tool for developing documentation. However, much like minimalism as a whole, our experience is that the heuristics do not seem to be applied in everyday practice. We will revisit the heuristics and revise them by supplementing the heuristics with the best practices of technical communication. This seems like a rational combination, as both minimalism and the best practices contain similar suggestions and recommendations; although early minimalism was more restrictive than other user-centered approaches to documentation, nowadays, those differences are diluted and we can regard minimalism as one user-centered approach to good technical communication. In addition, we will link the heuristics into the minimalist documentation process (Virtaluoto et al., 2018), where, in the spirit of minimalism, the user's journey steers the entire process (van der Meij & Carroll, 1995). The aim is to offer a practical, low-cost tool for technical communication practitioners.

In this article, we place minimalism in the context of modern-day technical documentation and typical user instructions. This is a very different starting point from what Carroll (1990) had when he developed minimalism. At the time, software was new to many people and it rarely came with a getting-started manual or tutorial, so the focus was on getting users started and guiding them to explore a new tool. The situation today is very different, and, hence, in the article, we will discuss the implications of this change for the minimalism heuristics.

We will first introduce the minimalist approach and the original minimalism heuristics. We will also discuss some of the reported obstacles to minimalism and conduct a brief literature review on minimalism. Then, we will present our model of the minimalist documentation process, including an explanation of the ways in which the different phases of the process are tied to minimalism heuristics (Virtaluoto et al., 2018). Finally, we will present the revised minimalism heuristics complemented with the best practices of technical communication and explain the use of heuristics as an evaluation tool through a company pilot study we conducted in 2018.

MINIMALISM AS AN APPROACH TO DOCUMENTATION [1st-Level Heading]

Although the concept of minimalism is familiar to many technical communicators (see, e.g., Lanier, 2018), a closer look reveals that the idea of minimalism among professionals might be very different from the actual minimalist approach (see Carroll & van der Meij, 1996). “Minimalism” is also used in different ways in technical communication literature (Oatey & Cawood, 1997, pp. 265–266; see also Obendorf, 2009, for an extensive account of the concept), and it is often seen as simply a way to publish less documentation (Virtualuoto et al., 2016, p. 13). In the following we will review the essentials of minimalism.

The two pillars of minimalism are the use of a product and its user. It is use-centered, as its main goal is to support the usage of a product. It is also user-centered, because it takes into consideration the user as much as possible (e.g., van der Meij & Carroll, 1995; van der Meij, n. d.). It should be noted that at the time when minimalism was being developed in the 1980s, other researchers (e.g., Rosenbaum, Hackos, Redish, and Schriver) were also actively developing user-centeredness and task-orientation in documentation (see Redish, 1989; 2010). The central design elements of minimalism are captured in its four principles presented by van der Meij and Carroll (1995), and they each include a set of heuristics (Table 1).

Table 1. Minimalist design principles and heuristics (van der Meij & Carroll, 1995; van der Meij, 2007)

Principle		Heuristic	
1	Choose an action-oriented approach	1.1	Provide an immediate opportunity to act.
		1.2	Encourage and support exploration and innovation.
		1.3	Respect the integrity of the user's activity.
2	Anchor the tool in the task domain	2.1	Select or design instructional activities that are real tasks.
		2.2	The components of the instruction should reflect the task structure.
3	Support error recognition and recovery	3.1	Prevent mistakes whenever possible.
		3.2	Provide error information when actions are error-prone or when correction is difficult.
		3.3	Provide error information that supports detection, diagnosis and recovery.
		3.4	Provide on-the-spot error information.
4	Support reading to do, study and locate	4.1	Be brief; don't spell out everything.
		4.2	Provide closure for chapters.

The first principle states that users should be given an immediate opportunity to act instead of giving general introductions; they should be encouraged to try things out on their own, and help should always be available. The second principle emphasizes the importance of real tasks: The product is not an end in itself, but the user has a real goal to achieve. According to the third principle, errors should be prevented by using hints, and users should be given effective error prevention information. This information should be provided near actions that are error-prone or when it is difficult to recover from the error. Information for correcting the error should be located near the actions where the error might occur. The fourth principle states that the documentation should be concise; not everything needs to be explained (van der Meij, 1995, pp. 244–257). We will discuss the above principles and their applicability in today’s technical communication environment further below.

Van der Meij and Carroll (1995, p. 244) have emphasized that neither the principles nor the heuristics of minimalism are rules that should be followed blindly but that they enable better designs. With this in mind, we have taken the main ideas from minimalism heuristics and combined them with the best practices of technical communication. In addition, we have turned the idea of a “design philosophy” (van der Meij, n. d.) into an “evaluation philosophy”: Instead of seeing the list of heuristics as a design tool, we see it as an evaluation tool. As discussed below, there is a distinct lack of recent reports on applying minimalism; with the evaluation tool, the current state of documentation in an organization can be evaluated as a low-cost first step towards minimalism.

Obstacles to Minimalism [1st-Level Heading]

Despite its promise, why has minimalism not spread as widely as expected (Brockmann, 1998, p. 387; Dubinsky, 1999; Rosenbaum, 1998)? According to Dubinsky (1999, pp. 46–47), there are three possible reasons: no minimalism textbook has been available, best practices have not been disseminated effectively, and there has been very little information available on the cost benefits of minimalism. Based on our literature review, the above still seems to apply in the 2010s. Draper and

Oatley (2000, p. 223) also point out that there are no hard and fast rules on the structure of minimalist manuals, or on what such manuals should or should not contain (see also van der Meij, 1992, p. 7). This can make it difficult to implement minimalism in the hectic R&D environments in which technical communicators work.

One reason why minimalism has not spread as widely as possible might also be that user-centered thinking has become recognized and established as an essential part of technical documentation, making minimalism just one approach among many. However, our experience during the training program was that even though the awareness of being user-centered and task-centered was high among the participants, it did not necessarily show in the user guides they produced. During the training, it became clear that tasks based on the writer's assumptions or tasks based on feedback from subject matter experts do not necessarily result in a user-centered user guide. Even though the power of contact with users has been recognized (e.g., Ramey, 2000), direct contacts with users remain rare (e.g., Dubinsky, 2015; Virtaluoto, 2015).

A further reason might be cost: User information may be difficult or expensive to obtain (Rosenbaum, 1998, p. 143; see also Nielsen & Loranger, 2006). Minimalist scholarship calls for collecting user data, involving users throughout the process, testing iteratively with users, and observing them performing their day-to-day tasks (van der Meij, 1992; Hackos, 1998; Mirel, 1998; Redish, 1998; Rosenbaum, 1998). According to van der Meij (2017), the production time of a minimalist manual is 30% longer than the production time of a conventional manual. In the business world, there is often very little time for the types of testing and observation techniques that minimalism requires (e.g. Rosenbaum, 1998, p. 122; Virtaluoto, 2015). Consequently, it is all too tempting to focus only on the often-cited minimalism principle of "slashing the verbiage" (e.g., Draper & Oatley, 2000, p. 225), and to neglect paying attention to the user as the key to the types of verbiage which can, in fact, be slashed (Draper & Oatley, 2000, p. 229).

Rosenbaum (1998) has called for publicizing the value added by minimalism practices and also suggested that the existing documentation and the people involved in creating it “supply a great deal of inertia” (p. 144) when new methods are introduced. The sheer mass of legacy documentation may seem daunting, and applying minimalism effectively means that subject matter experts as well as writers must change their traditional ways of working: For example, they may feel uncomfortable about providing incomplete information (Rosenbaum, 1998, p. 119). Dubinsky (1999) has also noted that “implementing minimalist procedures will not be easy” (p. 46). Minimalizing a company’s entire documentation set can indeed be costly and time-consuming, and it might be unrealistic to even expect such wide-ranging projects, but it would be helpful to see examples of smaller efforts where some elements of minimalism have been adopted. There is a lack of information on recent, concrete company projects that would give examples of migration into minimalism (see also Pflugfelder, 2013, pp. 135–136).

Minimalism is often discussed in the context of novice users of software (van der Meij, 2007), though its applications for complex systems and expert uses were already raised in one of the seminal works, *Minimalism Beyond the Nurnberg Funnel* (Carroll, 1998). This focus on the learning of novice users (e.g., Draper & Oatley, 2000) is understandable, as minimalism has its roots in the 1980s and 1990s, when consumer software was a new phenomenon, as we noted in the Introduction. So, the question is, What types of devices, software programs and users is minimalism effective for? (Kearsley, 1998, p. 403). According to Rosenbaum (1998, p. 131), minimalism works for certain types of documents, such as installation instructions, but not for all document types. Van der Meij (1992, p. 15) has also pointed out that legal requirements may turn minimalists into maximalists; this is especially true of complicated hardware systems. On the other hand, complicated business products may not be suitable for the type of guided exploration minimalism encourages. Williams and Farkas (1992), in fact, have challenged guided exploration overall and regard it as a controversial tenet of minimalism, unlike the other three principles. In their view, guided exploration may be inefficient and frustrating for the learner, lessening their motivation to

continue to learn. In addition, it does not allow the user to make decisions about what is important to learn and what is not, and it focuses on declarative knowledge rather than the acquisition of procedural knowledge (Williams & Farkas, 1992, p. 49). Certain minimalist concepts, such as *modularity* (creating stand-alone chunks of documentation) and *fading* (gradually leaving out bits of repetitive information as the user guide progresses) (van der Meij, 1992), can also appear contradictory or even dated. If all topics in a minimalist manual are standalone modules to be read in any order, how can the information for recurring actions be faded as the guide progresses? Today's modular content management systems, on the other hand, have all but resolved the issues to do with uniform structures and modularity in user guidance.

Recent Research on Minimalism [1st-Level Heading]

As discussed above, there seems to have been a long-standing interest and need for practical applications of minimalism, but little recent data is available on such endeavors. To see if this really was the case and to confirm our experiences during our training program, we went through six prominent technical communication journals, looking for articles highlighting practical use cases of minimalism. The journals were: *IEEE Transactions on Professional Communication*, *Information Design Journal*, *Journal of Business and Technical Communication*, *Journal of Technical Writing and Communication*, *Technical Communication*, and *Technical Communication Quarterly*. We searched for articles published in the past five years, between 2014–2019, using the keywords *minimalism*, *minimalist documentation*, and *minimal manual*, but came out empty-handed. Articles dealing with minimalism in these journals dated back to the 1990s–early 2000s. In one of the most recent articles, van der Meij (2007), discussed three research efforts to improve minimalist strategies but concluded that the insights the studies offered were more general and focused on the “optimization of people’s goal-related management and control of attention, time, and effort” (p. 304) rather than minimalism as such.

Some more recent discussions on minimalism have, however, been published elsewhere by, for example, Talley (2012), Thominet (2015), and Ramsay and Terras (2015). In his paper, Talley (2012, p. 291) presented a tentative process documentation model for the Dublin Core Metadata Initiative, with a focus on the elements a minimalist procedure should contain. Thominet (2015) suggested that the principles of minimalism could support amateur authors on writing documentation wikis, where the content is crowd-sourced. The technical communicator's role, then, would be in the production of guides on how to write content instead of the production of the actual content on the wiki sites. He sees the wikis and other crowd-sourced content as better in tune with the user's needs than traditional documentation. Ramsay and Terras (2015, p. 373) discussed minimalism in the context of providing user guidance in e-learning environments and see it as a strong foundation in building e-learning instruction. This is perhaps not surprising, as minimalism was originally a theory of learning (Draper & Oatley, 2000, p. 223). According to Ramsay and Terras (2015), advances in user interface design have been so great that the "quest for supremely fluid, usable, effective and pleasurable interactions has to a very great extent been won" (p. 374). They use automated teller machines as an example of technologies which are so easy to use that they require no user guidance, thanks to advances in user interface design. However, the functionality of a teller machine is very limited, whereas the kinds of information systems today's workplaces require us to use are so complex that using them effectively will require guidance into the foreseeable future.

In addition to academic articles, there are other efforts to develop and spread minimalism. The Center for Information-Development Management (2019) has been actively promoting minimalism through publications, blogs, webinars and other training events, and Flacke (2015, 2019) has specified and provided examples of what minimalism can mean in concrete terms at the documentation level through training events and various online resources. Another noteworthy dimension in the application of both minimalism and the best practices of technical communication is the role of international standards. For example, the standard for developing user documentation

in agile environments (International Organization for Standardization, 2018) offers several techniques for designing user documentation based on user needs and requirements, which supports the user-centeredness of minimalism. Minimalism is also included in the 2019 edition of the ISO 82079-1 *Preparation of information for use (instructions for use) of products -- Part 1: Principles and general requirements* that is currently under development (International Organization for Standardization, 2019).

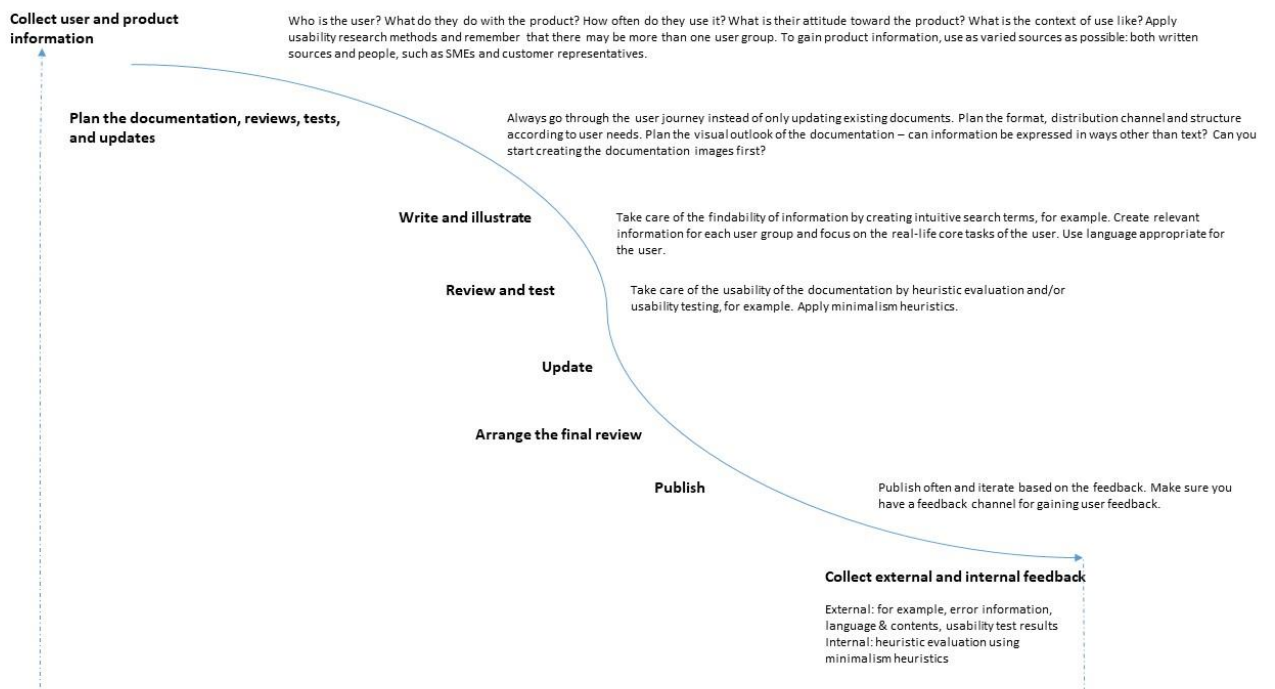
Although many obstacles to minimalism have been presented, the approach is both sound and noteworthy enough in the field of technical communication to warrant further development. During our training program, we not only started reviewing the original minimalism heuristics, but also examined some existing documentation process models (e.g., Hackos, 1994; Reiss, 2018) to evaluate them against the minimalist approach. We noticed that the user was often only implicitly mentioned in the process (see also van Laan & Julian, 2001). To apply minimalism efficiently, however, the user must be at the center of the activity, which is why we designed the minimalist documentation process presented below. In the process model, we aimed at simplicity and explicit user focus throughout. This is by no means a new approach, as user-orientation is included in many other documentation process models such as Redish (2000, p. 164; for an overview of different models, see Kister, 2016). However, we wanted to offer our own end-to-end solution for creating minimalist documentation so that we could pinpoint the process stages in which the minimalism heuristics can be used and explicitly highlight the role of the user. As discussed above, user-orientation is the dominant ethos of modern technical communication, but based on our experience during the training program and in various professional contexts, it is often hard to achieve. Hence, the importance of the user must be made explicit on the process level.

THE MINIMALIST DOCUMENTATION PROCESS [1st-Level Heading]

The minimalism heuristics discussed in the next section are designed to work with the minimalist documentation process (Virtaluoto et al., 2018), where the aim is to ensure that user documentation

is created and evaluated with the principles of minimalism in mind. We agree with Anson (1998, pp. 94–96; see also Dubinsky, 1999, p. 38), who emphasizes that minimalism needs to be incorporated throughout the life cycle of system development. The process, depicted below in Figure 1, begins with a focus on the user and the user’s needs for information.

Figure 1. The Minimalist Documentation Process; first published in Virtaluoto et al., 2018, p. 195



Usability methods; such as observation, personas, or use cases (Draper & Oatley, 2000; Strimling, 2018, p. 9); are helpful in the first phase: “Collect User and Product Information.” Written sources, such as feedback, quality data, test cases, and requirement specifications, to name just a few, offer invaluable background information in this phase (van Laan & Julian, 2001, p. 64). People working with the product as well as people working with customers and users are also an invaluable asset, as the technical communicator may not have direct access to the users (Dubinsky, 2015; Virtualuoto, 2015), but someone in the organization does have access (Hackos, 2007). Other sources, such as in-house testing, discussion forums, and analytics—as well as benchmarking and research data from sales and marketing—can offer a new perspective on the process.

In the “Plan” phase, it is crucial to always go through the entire user journey (Draper & Oatley, 2000, p. 227; Spinuzzi & Zachry, 2000; Strimling, 2019) instead of merely updating old documentation with new product features. The focus must be on what users do at each touch point on their journey with the product-to-be-documented and what they need at those specific points. The format and structure of the documentation as well as the publishing channel also need to be planned to match the user’s needs; for example, a quick guide, built-in help, and an online portal each offer unique benefits and drawbacks, and, in most cases, any single solution will not cover all the bases. The visual outlook of the documentation is also planned in this phase—is it possible to present information in other ways than text? Is it possible to create the images first?

In the “Write and Illustrate” phase, the focus should be on the actual core tasks of the user (van der Meij & Carroll, 1995, p. 245). General readability principles, such as appropriate and familiar terms, everyday vocabulary, consistency, clarity, and the use of the active tense also apply (van Laan & Julian, 2001, pp. 211–226; Schriver, 2014). In this phase, terminology work might also be useful as it provides the principles of a “good term” that can be found in textbooks and research for terminology work (e.g., Sager et al., 1980; Schmitz, 2007).

In the “Review and Test” phase, the minimalism heuristics presented below can be used to test the usability of the documentation (van der Meij & Carroll, 1995, p. 251). Reviews and tests conducted with the users also provide invaluable information about the product’s usability in addition to the documentation, and, as such, are also important to the R&D process. Face-to-face reviews are “exhaustive and exhausting” (van Laan & Julian, 2001, p. 130), but they are helpful as they make sure everyone has the necessary information. According to Schriver (1997, pp. 471–473), all reader groups benefit from user-focused revisions.

The documentation is then “Updated” based on the reviews and tests, and the “Final Review” is arranged. The aim is to “Publish” often and “Collect Internal and External Feedback.” There must be a feedback process in place to keep the user in the picture.

Minimalism does not delve very deeply into the work process of creating documentation, but it is recommended in technical communication literature that product and information designers work together (Schriver, 1997, p. 246) to create useful documentation. In our minimalism process above, we have also included other stakeholders; technical communication, by definition, involves communicating with a variety of people to form a complete picture of the product and the user. The R&D phases obviously affect the creation as well as the evaluation of documentation: For example, it may be impossible to write and test the troubleshooting information until after the release of the product. It is also a well-known issue in technical communication that the subject matter experts (SMEs) are busiest with their own work at precisely the same time when technical communicators would need them the most. This means that detailed product knowledge may not be readily available when it is needed. An efficient documentation process to which the entire organization is committed is a way to avoid some of these pitfalls.

Next, we will move to presenting the minimalism heuristics we have created based on the four major principles of minimalism.

REVISED MINIMALISM HEURISTICS [1st-Level Heading]

In her article published in *Minimalism Beyond Nurnberg Funnel*, Redish (1998, p. 243) suggested that modifications may be needed to the minimalism heuristics to broaden the domain of deliverables and different user groups. In Table 2, we offer a revised version of the heuristics. They have been divided under three headings instead of van der Meij and Carroll's (1995) original four. Our aim has been to transform the heuristics into an evaluation tool which can be used at the "Review and Test" and "Collect Internal and External Feedback" phases of the minimalist documentation process (see also Rosenbaum, 1998, p. 121).

Table 2. Revised minimalism heuristics. In the Table, OH followed by a number refers to the corresponding original minimalism heuristic as presented in Table 1.

MINIMALISM HEURISTICS

1 CORE TASKS AND GOAL-ORIENTATION	
Core tasks	1.1 Does the documentation concentrate on the user's core tasks? (OH2.1)
	1.2 Does the documentation reflect the real-life structure of each task? (OH2.2)
	1.3 Does the documentation explain why the task is done, in addition to how? (OH2.2, Extended)
Getting to work immediately	1.4 Can the users start working on real-life tasks immediately? If the documentation contains general information, prefaces, or introductory information before the steps, is the information concise and necessary? (OH1.1; OH4.1 Extended)
Immediate assistance	1.5 Is the documentation available when needed? (OH1.3)
	1.6 Does the user get targeted instructions at the relevant touch points on the user journey? (OH1.3, Extended)
2 ACCESSIBILITY	
Content	2.1 Is the documentation as concise as possible in its overall selection of contents? (OH4.1)
Findability	2.2 Is the overall structure of the documentation logical and consistent? Are all topics/sections structured in the same way? (OH4.2, Extended)
	2.3 Do the users find what they are looking for? Does the documentation contain: (OH3.1, Extended) <ul style="list-style-type: none"> • 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	2.4 Is the information in the documentation easy to understand? Does the documentation contain: (OH3.1, Extended) <ul style="list-style-type: none"> • 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	2.5 Is the documentation visual? <ul style="list-style-type: none"> • Have graphics, images, videos, etc., been used where appropriate? • Are the visuals relevant? • Are the visuals used consistently? • Are the visuals clear and readable both online and in print? • 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? (OH3.1)
Warnings and notes	3.2 Have all the applicable safety standards and legislation (e.g. the Machinery Directive) been taken into consideration in the documentation? (OH3.1, Extended)
	3.3 Are all the warnings and notes necessary? (OH4.1)
	3.4 Are the warnings and notes located next to the relevant procedure? (OH3.4)
Error recognition	3.5 Does the documentation offer error information: recognition, diagnosis, solution? (OH3.3)
	3.6 Is the error information located close to the relevant procedure? (OH3.4)
Troubleshooting	3.7 Does the documentation contain a troubleshooting section? (OH3.1, Extended) <ul style="list-style-type: none"> • 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?

As stated in the Introduction, we combined the best practices of technical communication with minimalism. After all, the central concept in minimalism discussed above—user-centeredness—is recognized as a key issue in technical communication literature, too (e.g. Price & Korman, 1993, p. 30; van Laan & Julian, 2001, p. 55). It is also the underlying principle in the above minimalist documentation process as well as the revised minimalism heuristics. In the following, we will explain the links between the heuristics and the best practices of technical communication.

Core Tasks and Goal-Orientation [2nd-Level Heading]

It has been stated that when designing new information, the writer must be aware of the users' activities and the resources at their disposal (Spinuzzi, 1999, p. 21), and the information presented must fit the user's context of use (Price & Korman, 1993, p. 294). According to van Laan & Julian (2001, p. 55), it is impossible to design a usable document without knowing what the intended user's needs are. In addition, it is important to supply the user with motivation, which supports them in completing their tasks (Loorbach, 2013, p. 6). In minimalism, the focus is also on the real-life tasks of the user (van der Meij & Carroll, 1995, p. 252). In the revised minimalism heuristics, these principles are applied in the following heuristics:

- 1.1 Does the documentation concentrate on the user's core tasks? (OH2.1)
- 1.2 Does the documentation reflect the real-life structure of each task? (OH2.2)
- 1.3 Does the documentation explain why the task is done, in addition to how?
(Extension of OH2.2; provides context)

Another key issue in minimalism, goal-orientation, which Wright (1994, p. 12) called the ease with which users can attain their goals, has been considered the single most important quality criterion for customer documentation. In the revised minimalism heuristics, this principle is applied in the following heuristics:

- 1.4 Can the users start working on real-life tasks immediately? If the documentation contains general information, prefaces, or introductory information before the steps, is the information concise and necessary? (OH1.1; OH4.1 Extended)
- 1.5 Is the documentation available when needed? (OH1.3)

1.6 Does the user get targeted instructions at the relevant touch points on the user journey? (OH1.3, Extended)

In heuristic 1.4, van der Meij & Carroll's (1995) idea of getting started on real-life tasks immediately has been supplemented with concrete examples by Flacke (2015).

Accessibility [2nd-Level Heading]

For the next three heuristics, we found support in Strimling's (2019) recent article where he presented a concise list of documentation quality factors: a good document is accurate, relevant, easy to understand, and accessible. In addition to being accurate, a good document is also complete and consistent (van Laan & Julian, 2001, p. 47). Especially for instructive texts, Göpferich (1998, p. 245; 2007, p. 430) emphasizes concision and calls for reducing redundancy. In the revised minimalism heuristics, these principles are applied in section 2:

2.1 Is the documentation as concise as possible in its overall selection of contents? (OH4.1)

In minimalism, it is recommended to provide a "home base" for the reader: Each chapter or module should start and end in the same way to provide closure and to be as independent as possible (van der Meij & Carroll, 1995, p. 257; see also van Laan & Julian, 2001, p. 219). Today's modular documentation systems have all but resolved this issue: There are DITA (Darwin Information Typing Architecture) templates for each information type, which means that a procedure, for example, always follows the same structure, and all the modules are written, stored, used, and even translated independently of each other (see also Stevens, 2018). This is why we have not focused on this issue in our heuristics. Instead, revised heuristic 2.2 covers the structure of the document set as well as each individual module:

2.2 Is the overall structure of the documentation logical and consistent? Are all topics/sections structured in the same way? (OH4.2, Extended)

We have also omitted the principle of guided exploration. In addition to being a challenged aspect of minimalism in general (Williams & Farkas, 1992), it does not sit well with heavy industry or hardware products and may feel patronizing with software, too. In today's digitalized world, people are comfortable with technology in a completely different manner than they were in the 1990s, as we stated earlier.

Both minimalism and technical documentation literature state that documentation must be designed so that the main ideas catch the reader's attention. In addition, the used language, both visual and verbal, must connect with the reader's knowledge and experience (Schriver, 1997, p. 166; van der Meij & Carroll, 1995, p. 249). In minimalism, it is recommended that the headings in a document should reflect the task structure and help users find the information they need (van der Meij & Carroll, 1995, p. 250; Stevens, 2018), while allowing them to skim the document (van der Meij & Carroll, 1995, p. 250; see also Schriver, 1997, p. 165). A good document uses language that is clear and consistent, avoids jargon and presents the information using the active and imperative voice (Anson, 1998, p. 95; van Laan & Julian, 2001, pp. 211–226; Price & Korman, 1993, pp. 361–376; Rosenbaum, 1998, p. 143; Schriver, 2014). In minimalism, these issues are discussed in heuristic 3.1: They are seen as ways to prevent errors (van der Meij & Carroll, 1995, p. 252), but in the revised heuristics they fall under accessibility:

2.3 Do the users find what they are looking for? Does the documentation contain:
(OH3.1, Extended)

- 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?

2.4 Is the information in the documentation easy to understand? Does the documentation contain: (OH3.1, Extended)

- 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?

Flacke (2015) has again provided concrete examples for van der Meij & Carroll's (1995) fourth principle of minimalism by emphasizing the importance of tables of content, indexes, and clear headings. However, the first element in heuristic 2.4—breaking long tasks into shorter sequences—might not be possible for complicated and large business products and systems (Rosenbaum, 1998, p. 124). In general, technical communication recommendations concerning language seem to be in tune with minimalism, but in technical communication the language used is positive (van Laan & Julian, 2001, p. 218): The aim is to not blame the user when something goes wrong. In other words, statements such as “You have chosen a wrong command” or “You have positioned the cursor wrongly” (van der Meij & Carroll, 1995, p. 255) are not generally favored. Instead, the user is told what to do to fix the situation: “Choose the correct command” or “Position the cursor correctly.” In the spirit of “slashing the verbiage” discussed above, positive language and the imperative voice often make for shorter sentences, too. Conciseness is a key aspect in minimalism (Stevens, 2018).

The visual aspects of the document are also important in the sense that words and images that “work well together” (Schriver, 1997, p. 408) get the message across better than either one alone. Illustrations or graphics can focus readers' attention, highlight concepts, aid recall, and help readers grasp relationships described in the text (Haramundanis, 1998, p. 124). Conciseness and visual clarity make the document more approachable: they convey the image that the document will not be hard work (van der Meij & Carroll, 1995, p. 256). Effective visualization involves the use of clear, relevant graphics and the titling and consistent numbering of all visuals, for example (Haramundanis 1998, pp. 124–126; Graves & Graves, 2012, p. 145). In the revised minimalism heuristics, the above principles are applied in the following heuristic:

2.5 Is the documentation visual?

- Have graphics, images, videos, etc., been used where appropriate?
- Are the visuals relevant?
- Are the visuals used consistently?
- Are the visuals clear and readable both online and in print?
- Are the visuals clearly labelled (titles, figure numbers, etc.)?

- Are the images and text in the documentation clearly connected using callouts, for example?

Error Management [2nd-Level Heading]

It is recognized in technical communication that a good document must present troubleshooting information (Schraver, 1997, p. 245; van der Meij, 2017) and allow the readers to distinguish problems that are their own fault from those that are not (Schraver, 1997, p. 247). However, minimalism goes further, which is why the minimalist approach to error information is perhaps the most notable contribution that minimalism can offer (van der Meij, 1992, p. 15; Draper & Oatley, 2000, p. 226). The aim is to offer ample error information near error-prone actions, which reduces anxiety and supports learning (van der Meij & Carroll, 1995, pp. 250–252; Stevens, 2018; see also Schraver, 1997, p. 247). We know that users frequently experience problems with the products they use, and these problems must be anticipated and addressed in the instructions (van der Meij, 2007, p. 301). In addition, the effect of these problems on the user's emotions and attitudes may be significant, which means that they require specific attention (Schraver, 1997, p. 211). In the revised minimalism heuristics, these principles are applied in the following heuristics:

- 3.1 Have errors been prevented? (OH3.1)
- 3.2 Have all the applicable safety standards and legislation (e.g. the Machinery Directive) been taken into consideration in the documentation? (OH3.1, Extended)
- 3.3 Are all the warnings and notes necessary? (OH4.1)
- 3.4 Are the warnings and notes located next to the relevant procedure? (OH3.4)
- 3.5 Does the documentation offer error information: recognition, diagnosis, solution? (OH3.3)
- 3.6 Is the error information located close to the relevant procedure? (OH3.4)
- 3.7 Does the documentation contain a troubleshooting section? (OH3.1, Extended)
 - 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?

In the next section, we will briefly explain the use of heuristic expert evaluation as a tool and present a pilot case where the revised minimalism heuristics were tested.

Using the Heuristics as an Evaluation Tool [2nd-Level Heading]

The existing minimalism literature gives little information on conducting a heuristic evaluation, a method where experts evaluate and identify the compliance of a product against a list of recognized principles. This is why we turned to guidelines presented in other fields, mainly usability research.

First described in Nielsen and Molich (1990), heuristic evaluation is the best-known expert evaluation method (Petrie & Power, 2012, p. 2107). With this method, expert and/or novice evaluators use a list of principles, namely heuristics, to assess the level of usability in software. They observe problems that do not follow those principles and determine a solution for each one.

Heuristic evaluation is commonly used because it is inexpensive relative to other evaluation methods. It is also flexible: It can be obtained early in the design process, and it can be used together with other methodologies (Nielsen & Molich, 1990). However, it has some degree of subjectivity (Dumas & Redish, 1993), as it is based on the subjective judgment of the evaluators. Paz et al. (2013, p. 120) argue that the clarity of the heuristics is the key to a successful evaluation.

In technical communication, heuristic evaluation has been used to evaluate documentation, both printed (Abtism et al., 2014) and digital (Greenough & Fakun, 2002; Kantner et al., 2002), as well as online help applications (Wallace et al., 2013). As a part of her MA thesis, Rautava (2018, English summary, p. 9) created heuristics for user documentation of mobile applications, making use of minimalism principles. These studies, among others, are a good example of the agility of heuristic evaluation: Heuristics can be tailored to suit the project at hand. Similarly, our minimalism heuristics are not intended as rules or guidelines (see Dubinsky, 1999, p. 46), but as a starting point, which can be tested and revised as needed.

Although there are various ways to conduct heuristic evaluation, the evaluation process usually contains the following steps: 1) establishing an appropriate list of heuristics, 2) selecting and briefing evaluators, 3) conducting the evaluation, 4) determining the severity of the findings, and 5) discussing the outcome with other evaluators (e.g., Evans & Sabry, 2003). Our pilot project, a one-day minimalism workshop where we tested the heuristics, primarily followed this process. The

workshop was arranged in January 2018 with 27 participants from a large, international company that is a world leader in its field. Before the workshop, the company sent us three existing user guides, which we reviewed using our heuristics.

At the start of the workshop, we gave an introductory, three-hour lecture which covered the principles of minimalism, the revised minimalism heuristics, and an overall explanation of heuristic evaluation. We had received three user guides from the company's documentation set prior to the workshop, so we were able to use real-life examples in the introductory lecture. However, we did not have a chance to organize a pre-evaluation workshop to train the evaluators, as in Evans and Sabry's (2003, p. 91) study. If there is time, a pre-evaluation workshop of this type may improve the quality of the findings.

The participants were then divided into seven groups, and each group of three to four participants received one of the three user guides. We also provided the participants with an Excel sheet where they could list the issues they discovered in the evaluation, in addition to a Recommendations section for suggesting ways to fix the issues. Nielsen (1994) recommends using three to five evaluators, as different people are likely to find different problems, whereas a larger number does not yield a great deal of additional information. The participants then had to decide on the scope of the evaluation, i.e., which part of the document they were going to evaluate. In other words, each group chose only a short section to concentrate on and try out the heuristics. They were given 30 minutes to work individually to examine the section and judge its compliance with the minimalism heuristics. They were asked to list each problem separately and provide a recommendation for improvement.

After the independent work, the participants discussed their findings first with their group and then in larger groups of seven to eight people who had worked on the same guide, listing the three main points they discovered. This took about 1.5 hours. Finally, a 45-minute group discussion took place where the groups presented their three-point lists to everyone, followed by a workshop wrap-up. In the wrap-up discussion, the participants offered us some general feedback about the

workshop and using the heuristics. Based on the feedback, we have revised our workshop template so that the participants now familiarize themselves with minimalism before the workshop, using materials provided by us, and after a short recap lecture, the entire day is then spent on applying and discussing the heuristics. The template is, of course, adapted for each workshop.

The pilot study showed that even in a short time and after a very brief introduction to minimalism, the participants were able to apply the minimalism heuristics and come up with recommendations for improvement. We were also able to revise our initial list of heuristics based on the pilot study. For example, we added one of the elements in heuristic 2.5 (connecting text and images) and included safety standards in heuristic 3.2 once we realized that it is crucial in various industries, such as those involving heavy machinery. In addition, we fine-tuned some details as well as the overall structure of the whole heuristics list. During the workshop, we also noticed that different professional roles are important in applying the individual heuristics effectively. For example, the heuristics related to the core tasks of the user require a thorough knowledge of the user and the functionality of the product, which means that SMEs and user representatives are needed for these. On the other hand, some of the heuristics—such as those related to the language or structure of the documentation—can be applied by non-SMEs, as they do not require as much knowledge of the product-to-be-documented; it may be possible to evaluate the language level based on previously created user personas. The aim is to apply the heuristics flexibly, as needed, throughout the minimalist documentation process.

CONCLUSION [1st-Level Heading]

In this article, we presented a revised set of minimalism heuristics, which can be applied in day-to-day technical communication work to evaluate the quality of the produced documentation. Building on the heuristics originally developed by van der Meij and Carroll (1995), the focus was on the user and the user's needs for accessible information at different points of the user journey. The revised heuristics are intended to be used as part of the minimalist documentation process, also presented

above. We discussed the heuristic evaluation process through a company pilot study, which allowed us to revise the heuristics further. When the minimalist approach becomes more mature in organizations, there might also be a need to develop a minimalist style guide for design purposes, for which the heuristics can be used as a starting point. This would anchor the minimalist principles into the technical communication process even more firmly.

As discussed above, minimalism requires much input and effort from organizations. They have to adopt different types of usability research methods and use them iteratively throughout the documentation process, as well as train writers and information designers to use that research data according to the minimalist principles. This requires the entire organization to adopt a new mindset, where the documentation is integrated into the product creation process, from the initial requirements to the production, delivery, and maintenance phases. Modularity and DITA seem to provide some answers regarding the consistent structure, reuse possibilities, and versatile publishing channels of documentation, but if user-centeredness is missing, true minimalism is difficult to put into practice. However, the entire R&D organization needs user information to produce usable products: Technical communicators could be an invaluable asset in creating and interpreting this information.

Perhaps the most important contribution of minimalism to technical communication is its focus on error information. However, this type of information may be difficult to obtain: Not all error-prone situations are known before the product is taken into widespread use, and companies may also wish to focus on the product features rather than error situations in the instructions, because of branding and corporate image issues, for example. Many companies also sell installation and maintenance services for business products, in which case a comprehensive account of all possible error situations can be seen to reduce expected revenue. It is also possible that the troubleshooting information related to the product is delivered by a different department and through different channels than the main documentation set. In this case, the troubleshooting

information may never get integrated with the rest of the product information. This, again, requires effective information gathering and dissemination processes within the organization.

In the end, it is the user who determines the quality of the documentation. Regarding the usability of the revised heuristics presented in this article, the next step is to have further testing. For example, a research setting where a documentation set is tested with real users before and after deploying the heuristics would provide valuable information for further development. Overall, the heuristics are intended to be modified to suit different companies, products, and users: Knowing the user is key. They can also be tested in different environments. Commercial software and business hardware, for example, often seem to come from two different worlds and require different types of tools in technical communication, too. All fields, however, would benefit from low-cost, easy-to-apply tools which can be applied flexibly.

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