

## *Alternatives to PDF in Technical Documentation*

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### **Abstract**

Technical documentation has become an outstanding resource in the IT industry and the last decades have witnessed a boom of high-performance technical authoring tools.

Despite the multitude of innovative technical writing tools, it has been observed that the dominant output format remains the PDF file, invented in the 1990s.

In the sight of this sluggishness as far as innovative end-user technical documentation is concerned, questions arise: Why has the PDF output survived for so long and what justifies its supremacy over other formats? Another question is, can disruptive innovations be implemented on end-user technical documentation so as to bring about more sophisticated or user-centered output formats?

By discussing with subject matter experts, we are seeking answers to these questions. We are also seeking to explore to what extent modern technologies like virtual reality, artificial intelligence devices among other alternative formats are applicable to end-user technical documentation.

**Keywords : innovation, technical documentation, digital transformation, technical communication, user experience.**

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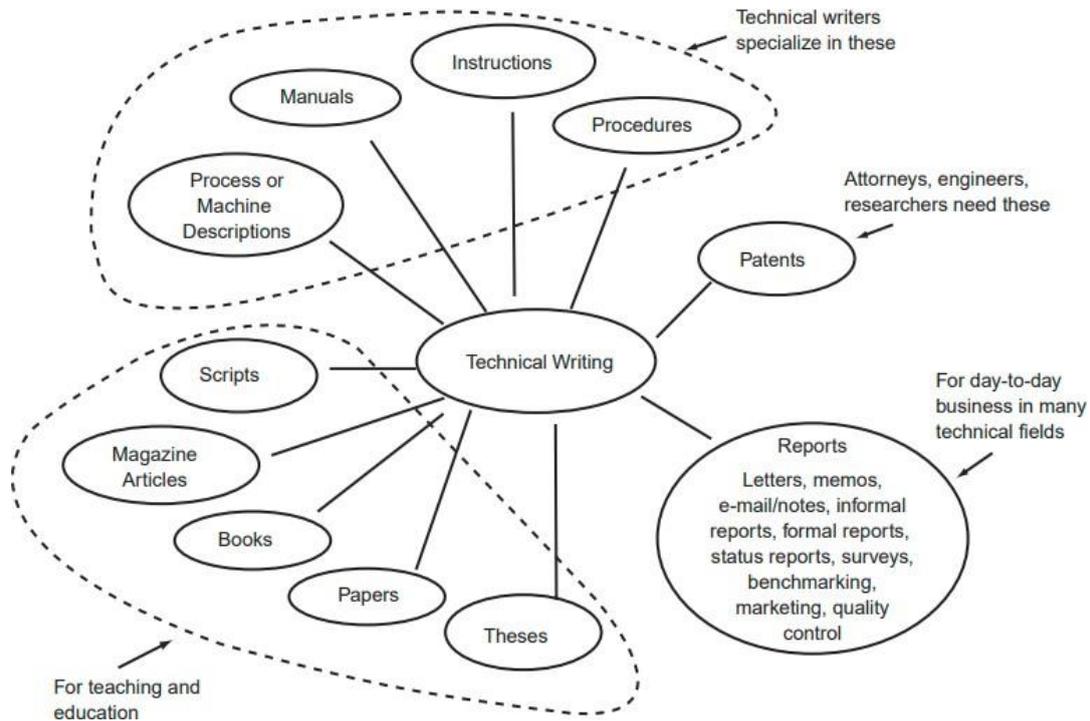
## Introduction

Technical writing can be described as a type of writing where the author writes about technical aspects related to a particular subject that requires direction, instruction, or explanation. This style of writing has a very different purpose and different characteristics from other writing styles such as creative writing, or academic writing.

Technical writing is performed by a technical writer and the technical documentation produced in the process can be grouped in four major categories<sup>1</sup>:

- Reports and business communication.
- Technical papers, magazine articles, books, and dissertations for purposes of education, teaching, and the sharing of information and knowledge.
- Patents.
- Operational manuals, instructions, or procedures.

ASM International, a leading company in the supply of semiconductor process equipment for wafer processing, has designed a spectrum of technical writing<sup>2</sup>. This spectrum presents the different aspects, fields of technical writing and also presents the kind of end-user technical documentation produced for each sector.



*Figure 1. The spectrum of Technical writing*

Technical writing is therefore a broad term that encompasses a wide variety of documents in science, medicine and engineering among others and technical writers specialize in the production of technical documentation including instruction manuals, procedures, descriptions, getting started guides, just to name a few.

When digital authoring was introduced with the development of digital applications, a wide number of digital authoring norms also emerged, which consequently led to the development of modern authoring tools such as ArborText, Interleaf and FrameMaker<sup>3</sup> among others.

Over the years, Technical writing has acquired an important role in the IT industry and has known an outbreak of more and more efficient authoring tools.

One of the most interesting observations that have been made is that, regardless of the line of business and the efficiency of authoring tools, the PDF file has remained the fundamental output in technical authoring.

Historically, the origins of the PDF can be traced as far back as the early 1990s. Designed by John Warnock<sup>4</sup>, co-founded of Adobe, the main objective of the PDF was to enable users to view, print and exchange documents more easily. Publishing was becoming a necessity and the PDF stood as a solution to get copies of documents while preserving their original formatting<sup>5</sup>.

The PDF format has been used over the years and has witnessed an outstanding development of features such as editing, e-signature, or responsive design.

Most of the modern technical authoring tools are developed to produce multiple outputs. A clear example to back this idea is MadCap Flare authoring tool which is now capable of producing HTML and online help outputs. Despite this technological leap, the PDF remains the dominant output in most, if not all technical authoring tools.

According to a paper<sup>6</sup> published by the University of Berkeley, California “*In the 21st century we are surrounded by constant innovation, technology enhancements, and a connection to a global network, all of which has created a new normal of perpetual change*”. This quote clearly describes the scramble for digital transformation experienced by most businesses. In effect, digital transformation is the digitization of processes, assets and products with the aim of optimizing efficiency, increasing consumer value, generating new revenue and increasing customer satisfaction. Digital transformation is therefore indispensable for maximizing global productivity inside a company.

So, in the light of this setting, the question that comes to mind is to know to what extent end-user technical documentation can follow the trend of digital transformation, in order to deploy innovative alternative formats to the long-used PDF file.

This question is important because in a world of constant innovation as described by Berkeley University, end-user behavior as well as consumer needs witness constant changes. New issues such as user centered design or accessibility are addressed and there is therefore a need to

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explore in what ways technical documentation can comply with these changes, in a bid to keep businesses competitive, and on the other hand, optimize user experience.

The shared thought around this research paper is that, thanks to the digital transformation trend and on point technology, alternative output formats can be adopted to produce more effective end-user technological documentation. This idea is supported by the fact that, in addition to high performance technology, technical writers can take advantage of studies on user experience to design more effective, accessible and time-saving technical documentation<sup>7</sup>.

## **1.1 Research methodology**

### **1.1.1 Literature review**

To answer the research question about implementing disruptive innovations in technical documentation, we started by reviewing existing literature about three principal aspects:

-Technical writing: We carried out research on technical writing as a discipline and how it has evolved over the years. We examined the history of the PDF that has been the dominant format and explored how it has evolved.

-Digital transformation: Research on digital transformation has helped understand why companies embark on innovation, why it is important for companies to change regardless of success and what drives digital transformation inside a company.

-User experience studies: Research on user experience studies enabled a better understanding of how taking into consideration user needs and behavior can shape product design and consequently end-user technical documentation.

### **1.1.2 Interviews with subject matter experts**

Based on our findings, we compiled interview questions for subject matter experts in technical communications. Our interviewees four in total, were all technical writers and belonged to four different sectors: the automotive industry, information technology, technology and the medical sector. We compiled a total of 10 open questions, aimed at making our participants expand their points of view in a bid to be as exhaustive as possible on the different topics discussed. The interviews lasted a maximum of 30 minutes each, and were all made in recorded conference calls, with the consent of all the participants. Some of our interviewees were people we knew

from our workplaces, while others were people we got into contact with through our connections. The interview were conducted in French and some of the quotes used in this research paper have been translated to English.

It should be noted that all our interviewees still use the PDF output in their companies, even though some have started opening to alternative formats like mobile apps or video tutorials.

The questions varied from the reasons for the survival of the PDF, to the extent to which innovations can be implemented in end-user technical documentation, through the adoption of disruptive alternative output formats.

## Results

In order to gather subject matter experts for our research topic, we could proceed in 2 ways, conducting a survey or conducting interviews. As mentioned earlier, we conducted interviews. It turned out that talking to subject matter experts was much more relevant since we were dealing with something very specific.

In which sectors do our interviewees work?

The different fields of our subject matter experts provided us with interesting results. The responses from the documentation managers in their sectors allowed us to take a more lucid look at the challenges of technical documentation and its various formats.

We chose to communicate the results obtained by categorizing them. This allows us to identify the main issues that came forward during the interviews. In this way, we can better highlight the most relevant points.

## **2.1 The issue of the PDF**

The PDF has been around for years and is losing its appeal to many companies. However, it is still useful today. With technical documentation constantly evolving, a power shift is taking place.

By definition, the PDF is a portable document that is easily accessible and uneditable. It has long been the preferred format for businesses because it is available on multiple media, be it on mobile, computer or tablet. The primary purpose of the PDF is to provide information that is both clear and accurate. Even though new formats are now being used, the PDF is still preferred by users.

## **2.2 Why is the PDF so successful?**

Through our interviews, we realized that the PDF is still around, due to a very strong customer demand. The ease of access of the PDF makes it almost indispensable. And although some companies want to "get rid of it", for the time being, this is not possible. According to a senior documentation specialist interviewed for this research project, it is mainly a question of habit. People are used to the PDF file and are not always eager to change.

Moreover, the complexity of a product is closely linked to the production of a PDF. Indeed, given the complexity of the product, a lot of information must be included in the technical documentation, and the use of the PDF offers this possibility to users. According to subject matter experts, the PDF file is still popular and indispensable nowadays because it meets the needs of first-time users, with structured information.

Nevertheless, the high demand for PDFs does not hinder the advent of new concepts and new ways of providing information.

## 2.3 Disadvantages of the PDF

In order to take a more lucid look at the use of PDFs, we had to make a double-sided analysis. In our interviews, we found out that companies have different views on the use of this type of output. Cost is a fundamental criterion. Reducing costs is a key issue for companies, as a manager of an automotive record company underlined. Even though it may not sound obvious, the production of PDF and paper can generate considerable losses for a company.

The PDF is not supported by all operating systems (OS), so, if a company decides to use an OS other than Windows or Mac, they might have trouble opening, viewing or editing a PDF file. Editability can be a source of trouble as well. In effect, information extraction can be a problem depending on the nature of the PDF file. In effect, information can be extracted from native PDF files with the help of software. On the contrary, if a PDF document is scanned, information extraction and conversion become almost impossible.

PDFs only support static layouts, no fluid or dynamic layouts and do not support features like videos, animated images, or interactive charts.

## 2.4 Alternative formats and customer feedback

When asked about alternative output formats used by their respective companies, the subject matter experts provided interesting feedback that is going to be analyzed in the subsequent section. However, one factor must be taken into account: the end users' opinion. We asked the subject matter experts about their strategies to comply with customers' needs and expectations. Out of four, only two mentioned taking customer needs into consideration.

This is important to note, but is not to be taken as evidence. Further surveys need to be conducted.

## Discussion

In this section, we are going to analyze in a more detailed manner, the different alternative formats used by companies while nuancing our observations by taking an objective look at the use of PDFs.

### 3.1 New formats and customers habits

Nowadays, companies are remarkably inventive, always thinking about what will foster their growth, especially in terms of technical communication. At first glance, it may seem simple for a company to migrate its technical documentation to another framework, but this is not the case. There are many factors to consider. The first and perhaps most important is customer demand.

As mentioned earlier, an abrupt change in documentation output can be unpleasant. According to a technical documentation manager operating in the medical field, it depends on the field. A test conducted on alternative technical documentation in her company revealed that the target users preferred the good old PDF file to a new format explaining procedures through practical diagrams<sup>8</sup> rather than text.

This is just an example to show that experts in a given field will be prone to working with specific documentation output. Therefore, changing their habits from one day to the next may create an unexpected challenge. In the medical field specially, the end users as well as regulations require that PDF be the main output of technical documentation. They demand a PDF format so they can print it out and write notes on it.

Such situations account for the complexity of our research question. From the results we reported lately, it can be observed that the choice between alternative formats and PDF is not to be taken lightly. It is a decision that must be carefully considered, so much so that no final decision has really been made, based on our results.

In addition to the area of expertise, age is a factor to consider too. It is quite possible that older end-users, for instance, are not open to change. This was pointed out by a manager of an automotive leaflet, when asked about the demands of some of his customers.

With the advent of technological breakthroughs, standards no longer require manufacturers to provide paper manuals in 2022. This allows companies to save money, because printing paper represents a significant cost when requests are multiplied. As a reminder, in order to generate a paper notice, one needs a PDF version. It should be noted that not wasting paper contributes to the well-being of nature. Companies greatly consider moving in this direction.

Despite these new practices and considerations, the demand for PDFs has never stopped and is not close to stopping. The end-user likes to have his or her paper instructions at hand. Moreover, a customer who has always been used to working in a given way will not want to see his or her habits change. As mentioned earlier, the way the information or data is transmitted will get the user acquainted with a certain format. When a PDF file consistently accompanies a product, it is usually structured. This helps the target users find their way around. A medium other than PDF would create a disruption.

Another technical documentation team leader reinforces this idea by pointing out that it is "very complicated" to impose a more advanced format on a "loyal" PDF user. The reason being that presently, the PDF is still meeting the needs of end users, which is one of the reasons it is so ubiquitous. The fact that it has a great accessibility is also an element that delights customers that are PDF advocates.

### **3.2 Accessibility**

A customer's requirements can be high regarding the transmission of technical documentation. The PDF allows to provide complete information about a product. The complexity of the product plays a major role in the documentation delivery. This also explains why many end users prefer PDFs.

Nevertheless, the choice to provide a particular documentation format is not exclusive to customers, companies also see a beneficial side to it, especially in relation to costs. As mentioned earlier, PDF is successful with customers because people do not like to leave their comfort zone. One aspect that stood out in our interviews was the accessibility of the PDF, its practicality. According to technical writers interviewed for this paper, the PDF is seen as a "cross support" format, as its compatibility with other systems gives it a versatility that no other format can offer. No matter what medium one is working in, it will be possible to open a PDF file. It is a true pioneer, so much so that it is even called a "universal format". The PDF has

become a must in the field of technical documentation, but this does not prevent many companies and collaborators from innovating in the way they provide this documentation. We will discuss the reasons for this change later.

Indeed, the abundance of information (in the good sense of the word) that it can provide, earns it a special status among end users.

When we asked our subject matter experts about the accessibility of the PDF, one element kept coming up. It is the ease of access to information. This is because this type of file is searchable at the discretion of the end user.

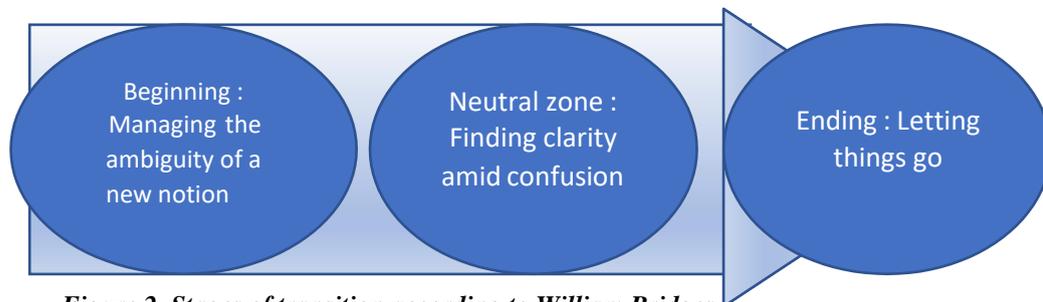
If the PDF is so popular, is it possible to coexist with other new alternative formats? Will end-users be interested in the latter? That is what we are going to try to analyze. Although the PDF has all the advantages we have mentioned, it is still questionable.

The PDF faces challenges of data obsolescence in fields such as the medical sector. A product may take a long time to develop and get to the market, in which case the information present must be valid throughout the product creation process. This represents a lot of technical documentation as creation processes can last for decades. Medical documentation professionals underline that it might be better to use an alternative format to help manage huge amounts of technical documentation. The introduction of new formats therefore needs to be addressed.

### **3.3 The Transition to Alternative Formats**

The transition to alternative formats involves two types of changes: incremental and transformational. It is naturally easier to implement a change over time than to force it. If we take for instance end-users who have become accustomed to getting their technical information from the traditional PDF documentation. When it comes to technological transformation or even regular changes, some may find that challenging. Change may not only represent a change of habits; it may also represent a change of culture. This can sometimes be a good thing. At first glance, using the PDF may seem simple and intuitive, but the truth is quite different. From our interview with the documentation manager in the medical field, we learned that some of their customers had a complicated relationship with the PDF. They had trouble even downloading PDF files. In cases like this, it would be good to have other ways to submit technical documentation that are much more intuitive and time-saving.

These changes are not always obvious. Given the fact that they obviously cause a change of behavior in users, they are to be done in stages. William Bridges<sup>9</sup> proposed a scheme to manage change.



*Figure 2. Stages of transition according to William Bridges*

For clarification, these three ideas address the following issues:

-The first step is managing the ambiguity of starting when something new is implemented. It is necessary to understand why the old way of doing things had to change, in order to have a picture in mind of what is both expected and hoped for, a plan to get there, and an action plan for the new concept.

-The zone of neutrality that we find in this diagram is about finding clarity in confusion. It is the space between the old familiar pattern and the next. It consists of both danger and opportunity. So, it can seem confusing.

-Finally, the ending phase is simply letting go of things as they have been. Of course, this involves recognizing what is about to end but also welcoming what is coming up.

The issue of post-PDF has been around for some time. With the constant evolution of technologies, this leads to the question of various ways of providing technical documentation. The transition has already begun, however, given the importance of PDF, it is a process that will take time.

In the present days, the goal is not to write off the use of the PDF in order to impose these new formats, but to see if alternative formats and the PDF can coexist. This is no small

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task. The choice to provide alternative formats to the PDF depends on the domain of expertise and the age range of the end users as mentioned earlier. In the automotive sector, paper is tending to disappear, which represents savings for the companies. The manuals can be made available in paper format at the customer's request. This represents a change from previous years, given that most manufacturers are opting for this strategy. The notices are now directly available on the customer's phone thanks to a mobile app. All he or she has to do is to install the application. This is a first example of a new format that works relatively well, as users can still access the PDFs if they wish.

Moreover, when a manual needs to be updated, because there is a new feature, the customer is prompted to update his or her application to have the most recent version of the documentation. This represents a considerable saving of time and costs. This point falls in line with our original hypothesis which states that it is possible to deliver documentation in formats other than the PDF.

During our research, we noted an interesting comment from the subject matter experts. In effect, in their respective companies, on technical documentation distribution platforms, there is always a "print" button. This shows that the impact of PDF is real and that it cannot be dismissed so easily.

Adopting a new format brings many questions that companies must consider. Is that really beneficial? Will we lose our customers? What are the potential consequences? All these questions must be addressed thoughtfully. In some situations, the alternative format will be beneficial to both parties, that is the company and the end users. A former pharmaceutical company technical documentation manager shared her thoughts on the issue, revealing that the transition to the new formats was necessary. She pointed out that PDF files were becoming too restrictive for her company. Indeed, the automation of information saves a lot of time and money. It is therefore a company strategy to opt for this. Some companies want to make their customers responsible and encourage them to update themselves on their new tools, so this can be double-edged. Customers will need more or less time to adapt depending on the complexity of the documentation.

Another technical writer at a digital company shares that "implementing alternative formats may seem simple, but it is a long process. There are brilliant ideas, virtual reality headsets, connected objects and many more.". The question is how long it will take to transition

to these formats. For now, most companies cannot afford to do it, so the PDF remains the dominant output format for technical documentation.

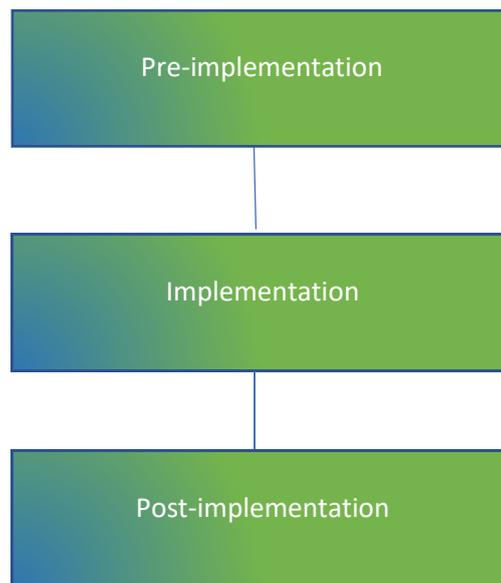
In the field of new technologies, there is an important testing phase before launching a product. Technical documentation products are no exception to this rule. This is a factor to consider when thinking about alternative outputs.

Disagreements on the desired format can sometimes occur within the same company. Typically, these differences of opinion occur between teams of designers or writers and their managers. A clear example to back this point is what happened to our medical technical documentation manager. The submission of technical documentation in the medical field is governed by strict standards and must follow a specific path. Once done by the writers, they must send it to an organization so that the documentation is validated. In this case, the organization rejected the documentation, instructing the writers to send the files back as text PDFs, as they did not have time to interact with the newly designed documentation. The files that the writers had submitted were keyword-based. The user only had to enter a word and that was it. In this complex field, the choice of PDFs does not seem to be a good one since, unlike keywords, the user will not be helped, as the PDF is a closed format.

It is important to know that with the documentation tool they had developed, entering a keyword allowed to have precise information on the product and an explanatory video was also available. This medical team tried to broaden the accessibility of its documentation by creating a YouTube channel. However, the videos did not have the desired effect.

Yet, the strategy adopted was interesting. Since the documents were for the pharmaceutical sector, the content of the videos was in English in order to have the greatest possible reach. Unfortunately, the greatest difficulty in this case was getting the audience to adopt a new format.

Thanks to increasingly innovative technologies, there are more and more opportunities to provide technical documentation. Companies must adapt to this expansion of new technologies in order to keep up with their competitors' methods. However, due to the reluctance of some customers, PDF is still being offered in one way or another. In this regard, the University of Berkeley has proposed a change management strategy that companies can draw inspiration from. This method aims at facilitating the arrival of new formats to customers. The strategy is composed of three steps.



*Figure 3. Implementing a change: The feedback strategy used by companies*

Pre-implementation is the awareness process. The challenge for a company is to collect opinions in order to know what works and what does not.

The implementation stage illustrates how the changes made have had an impact on the existing difficulties.

The last step, post-implementation, is more of a validation step. It allows us to see if the changes are still effective. Moreover, it allows for continuous improvement.

The above said, what would these other formats be? A lot of companies use alternative formats such as HTML or RTF for their documentation, these formats can solve format problems, OS problems especially. An alternative to the Portable Document Format (PDF) would be the Portable Web Document (PWD), used by the company Polar for instance. It is an offline caching of full HTML documents using HTML5 and Web Standard for more flexibility on their technical documentation. This alternative technology is interesting and proves that it is possible to implement a change, even if your own documentation is PDF-based, it is all about the transition.

It is undeniable that the digital transition of documentation is well underway, with innovative ideas flourishing every day. With concepts such as a natural language bar that displays a video that the user can consult, the world of technical documentation is about to undergo a revival.

Also, IT companies are also exploring the possibility of involving artificial intelligence and sophisticated devices like virtual reality headsets in technical documentation, but this is still under discussion given the costs and technological expertise these require. With the advent of the metaverse, companies will certainly get inspiration for more innovative outputs.

## Conclusion

Based on all that has been discussed in this research paper, we can state that the PDF is an all-around format, still very popular and used by the majority of companies nowadays, in all kinds of fields, because it is the format that suits the most right now. Although the PDF is the most conciliant, other formats exist and are available for use. The use of another format should answer a problem. In other words, changing documentation format from PDF to another depends on the context. The company's needs and to another extent user needs should be the key to such a decision.

The PDF has its own limitations, as everything does, in terms of dynamic presentation, OS support issues or editing processes that could cause bugs depending on the nature of the document (native or scan PDF for instance).

Moreover, other factors are to be considered; the customers habits should influence the types of support being used, accessibility as well. This is the reason why the PDF is so popular, all ages and all customer profiles know it, the accessibility towards the end-user is crucial for such a process. And even though companies are not reluctant to change, implementing something new is a multi-step process and can be difficult for companies with a lot of documentation already established.

Finally, our research leads us to possibilities other than PDF, such Web Documentation using HTML or RTF (Rich Text Format). Also, artificial intelligence and virtual reality will soon make their way into customer technical documentation. The whole point is making these formats accessible and available for the end-user through an implementation process.

## Notes

<sup>1</sup> ASM International – Engineer’s Guide to Technical Writing. See

<https://www.asminternational.org/documents/10192/3448649/ACFAA62.pdf/5890813c-31ba-46b4-b7fa-8f20eb03fb6e>

<sup>2</sup> *Ibid.*, p. 2

<sup>3</sup> See <https://adam.4dconcept.fr/technical-writing-history-and-evolution-of-the-discipline/?lang=en>

<sup>4</sup> Dr. John Warnock co-founded Adobe in 1982 with Dr. Charles Geschke. He was president of Adobe for the company’s first two years and CEO for the next 16 years. Warnock retired as CEO in 2000 and as the company’s CTO in 2001. Before co-founding Adobe, Warnock was a principal scientist at Xerox Palo Alto Research Center. Warnock holds a doctorate in electrical engineering (computer science), a master’s degree in mathematics and a bachelor’s degree in mathematics and philosophy from the University of Utah. See: <https://www.adobe.com/content/dam/cc/en/leaders/pdfs/warnock.pdf>

<sup>5</sup> See <https://scantopdf.com/blog/brief-history-of-the-pdf/>

<sup>6</sup> Berkeley University of California, *Change Management Toolkit: Tips, tools, and techniques for leading a successful change initiative*. See [https://hr.berkeley.edu/sites/default/files/change\\_management\\_toolkit.pdf](https://hr.berkeley.edu/sites/default/files/change_management_toolkit.pdf)

<sup>7</sup> Goiset C. et al., (2013), *How User Experience Helps Reshape Technical Documentation*, Université de Paris 7 Diderot. See <https://comtechp7.hypotheses.org/files/2015/11/2013-OceaneFrancCeliaGoiset.pdf>

<sup>8</sup> The important thing to remember is that this was not a problem because the target was educated and an expert in the field in question. However, in the medical field, a certain process has to be followed, which makes sense, because there is a lot at stake. For example, if we take documentation on an artificial heart, it must be viable from start to finish. That is to say, from the moment the idea is born until its first implementation. The documentation must be valid for a specific period of time, which is about fifteen years.

<sup>9</sup> William Bridges (1933–2013) was a preeminent authority on change and transition who transformed the way people think about change. As an author, speaker and consultant, his pioneering research provided a methodology to guide organizations and individuals during significant transitions that accompany a major change. His work offered fresh and humane perspectives on how people approach transition, both on a personal level and in organizations. See <https://wmbridges.com/about/william-bridges-bio/>

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