

DITA: A Universal Solution?

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Abstract

During the last few years, DITA has spread in many companies and sectors and is often considered as the “must have” tool for technical writing thanks to its flexibility and adaptability. However, does DITA really live up to its reputation?

We start with noting that the concept of DITA was designed to serve this purpose. We then try to learn more about DITA and its implementation through webinars, specialized articles, surveys about DITA, and especially one that we conducted from March to May 2015. We came to two main conclusions.

First, financially speaking, DITA remains relatively affordable for larger or smaller companies, as long as they are not looking into specialization, and provided that the implementation plan is complete and fully backed by management. In addition, the productivity gains they get from transitioning to DITA are mainly determined by the implication of companies and the context of the implementation.

Secondly, DITA is not restricted to the software sector. It brings a lot to a wide variety of domains thanks to its universal benefits: content reuse, its linking system, the expansion of electronic documentation and the possibility to be specialized. Besides, even though DITA is for now mostly used by documentation teams composed of professional technical writers, Lightweight DITA seems to be quite promising in improving the spread of DITA outside the documentation departments.

Key Words: DITA, Universal, DITA Implementation, Productivity, Domain of Activity, Paper-Based Documentation, Electronic Documentation, Content Reuse, Linking System, Company Size, Topic-based Writing

Introduction

When studying technical writing, authoring in DITA has become an unavoidable course. Nowadays, more and more companies use DITA and it is thus very convenient for them to hire technical writers already trained to the DITA standard.

When we started our apprenticeship, some of us were immediately immersed in a DITA environment while others worked with different documentation tools. The origins of this research stem from these different professional environments:

- two business contexts (GE Healthcare and Dassault Systèmes)
- two types of documentation (paper-based and electronic)
- two types of product (software and hardware)
- three writing methods:
 - One member is working with unstructured FrameMaker (in the process of migrating to DITA).
 - Another is writing in structured XML (in the process of migrating to DITA).
 - Two members are writing with XML DITA.

Thus, our questioning around structured writing started from these very distinct writing methods. We wondered why some companies decide to migrate to DITA, why others have migrated and finally what kind of companies are interested in the migration.

More widely, we noted that DITA has invaded the technical writing world over the last few years, and that it was often considered to be at the cutting edge of technology and the dreamed solution for all types of documentation. But does DITA really live up to its reputation? Is DITA really universal?

In this article, we will first consider the origins of DITA, and we will especially show that DITA was designed to be universal. Then, we will focus on the facts about DITA and its implementation: we will present the results of a survey we conducted from March to May 2015 and describe the current situation of DITA, making explicit the types of sectors and companies in which it is used. Finally, we will analyze more precisely these data by examining the financial aspects of DITA on the one hand and, on the other hand, the possibilities to adapt DITA to all

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sectors, to all types of documentation, and, why not, to use it also outside the documentation departments.

DITA: The Origins

The concept of DITA was developed by IBM Software & Services in the early 2000s for its internal documentation “as an alternative XML-based documentation system, designed to exploit XML as its encoding format” (Priestley and Schell, 2005). The company wanted to replace its existing and very complex SGML DTD, called IBMIDDoc. The workgroup in charge of this task finally came to the ideas of topic types that are gathered in maps and of specialization. In 2005, IBM donated this material to the Organization for the Advancement of Structured Information Standards (OASIS) to release it to the public. In fact, IBM realized that it “would be more useful if [it] could actually have this spread to other firms that [it was] dealing with, other vendors, other suppliers, so that they could then have a common format for all the documentation and be able to share treatments back and forth and in a common XML based format” (Schengili-Roberts, June 2015). The concept became a standard and DITA 1.0 appeared in June of the same year.

The acronym DITA stands for “Darwin Information Typing Architecture” which describes precisely the concept of DITA. The core element is “architecture” since the aim of DITA is to provide a new way of structuring information. DITA is based on an XML document type definition (DTD) called “the topic DTD” that was designed “to support many products, brands, companies, styles, and delivery methods” (Priestley and Schell, 2005). DITA, as a User Assistance Development Director at Dassault Systèmes explains, appears as a natural evolution of documentation authoring, from the unstructured to the most structured authoring: from a simple text document to the use of FrameMaker, then HTML that becomes XML, which finally leads to DITA.

DITA is a relatively recent tool that was originally created for electronic documentation so it is well adapted to this type of format. This comes at a moment when electronic documentation is expanding and replacing printed documentation. Electronic documentation is easier to manage by technical writers and findability is improved for users. Printed documents not only need to be stocked, occupy space and are cumbersome, but the content is also static, knowledge is lost and content reuse is difficult. DITA certainly benefited from this expansion of electronic documentation, which may explain its success.

This global context, and the environment in which the concept of DITA was developed, that is in a software company, favored the spreading of DITA in this sector. The early DITA adopters were either software firms, such as Adobe, or companies that had a software component, like for

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example Nokia or Blackberry (Schengili-Roberts, June 2015). In fact, programmers were already familiar with that kind of tools and they found in DITA some aspects that were similar to their way of working.

Indeed, “the Control Version Systems (CVS) used for software development could also be used for DITA content” (Schengili-Roberts, June 2015). Programmers already worked with a CVS that allowed them to update a file without losing the previous version of the file. At any moment, they could get back to one of the numerous versions that were saved. Thanks to that tool, when they created a new component for a product and did something incorrect or wrong that they had to revert, they could get back to a previous version of their work. Similarly, with DITA, all the versions of a topic are available at any moment and it is easy to go back to a previous topic version. In addition, DITA was considered to manage object-oriented content which was linked to the idea of content reuse, a well-known concept for programmers: they “[realized] immediately some of the possibilities of such a system” (Schengili-Roberts, June 2015). In software firms, employees have the perfect background to understand the way DITA works, and they feel familiar with this system.

At the beginning, DITA was thus mostly used in software technical documentation departments. However, DITA developers wanted to create a concept that could be used by a majority of firms, in the software domain as well as in the industry sector. To achieve this goal, they tried to make DITA as flexible and adaptable as possible. The main topic types (task, concept, reference) are thought to be relevant for all document types and their fine granularity allows infinite possibilities of combinations and linking systems that are established in maps. A topic can appear in many deliverables and when it is updated, the changes are set in all of them. One expert in technical writing we interviewed emphasized these aspects when comparing XML use with Arbortext and DITA: “The previous template was incomplete and DITA offered more possibilities with relationship tables, DITA maps and the ability to reuse content” (our translation).

DITA was intended to be large enough to take into account as many needs of a wide range of firms as possible, and in that sense to be flexible. But DITA is also adaptable since a company can integrate some particular features, specific to the company, in its own DTD especially thanks to specialization. The DTD is composed of a basis that is common to all DITA users and this basis can be expanded according to the firms. A French leading company in 3D software, for instance, has added some elements to its DTD so that it matches the needs of the company. A series of elements to create interactive tutorials has been created, in particular elements to integrate the script in a task, and concerning tooltips, <dl> has been defined so as not to allow useless information such as a list title or a table in a <dd>.

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A User Assistance Development Senior Manager in this French company underlines that the advantage of DITA semantic markups (specialized if needed), is that writers focus more on the content they are authoring than the final layout. For instance, for them the <uicontrol> tags result in bold characters in the published file: technical writers now use <uicontrol> for all elements enabling users to control the user interface, and do not use <bold> tags anymore which do not have other meanings than formatting ones. The differences in font weight or style are meaningful, they represent specific units of information that need to be emphasized, and they are not just an esthetic problem. There must be a reflection to categorize what is to be authored, and technical writers do not have to be preoccupied by layout problems, which can necessitate a lot of time and distract them from content.

As far as the user is concerned, the User Assistance Development Senior Manager we interviewed mentions that “the goal of DITA is to improve the user experience. [In our company they] are not looking for advantages that would impact the technical writer, but what it brings to the user” (our translation). DITA is, according to her, one of the best tools to improve user experience because thanks to the electronic medium, topic types, DITA maps and the linking system, the user is able to retrieve information faster.

What served DITA developers in their wish to spread their concept to as many firms as possible is that the technical writers who worked in companies that adopted DITA as soon as it was released brought their knowledge of DITA to other firms when they changed jobs. Now DITA is well-known and is more and more used by companies because it is a standard, and it is considered to be a modern tool for authoring. When a company uses obsolete tools for its documentation and decides to invest in new tools and a better organization, it will start with considering the DITA option. In addition, there are specialists of DITA that have consulting firms that help companies to adopt DITA: they estimate costs, prepare the migration, and organize the training of technical writers (Schengili-Roberts, June 2015). However, in some companies the choice of DITA is sometimes imposed, especially for small firms that have been taken over by bigger structures. A technical writer we questioned explained us that for his company “it was a corporate necessity because [it] was acquired by [an American multinational firm]and [they] were obliged to align with [its] tools and practices.”

Even though DITA was created 15 years ago with the purpose to satisfy a wide range of companies, it was at the beginning almost exclusively used by software firms or at least firms developing software components. Things have changed over the past few years, and it is now interesting to focus more closely on the expansion of DITA and the type of companies and sectors where this standard is used.

DITA: The Facts

Figures and facts about DITA are important to analyze in order to get an objective point of view on the whole subject. Even though we found surveys presenting different fact information about DITA and we all work in companies and documentation teams with a different experience of DITA, it immediately appeared necessary to go beyond these business contexts and to collect the thoughts of experts from different sectors and companies in order to have a more neutral and complete viewpoint. We thus decided to conduct a survey, summarizing all the questions we had about DITA implementation into a form. This survey was posted on the business-oriented social network LinkedIn (on the “DITA in France” discussion group), and emailed to 23 technical writers working for various companies. We also interviewed the Senior Technical Writer who is in charge of documentation architecture, structure and tools management at Dassault Systèmes and who managed the Frontpage to DITA migration between 2008 and 2011.

The form was split into three sections, each corresponding to a different experience of DITA. We asked respondents to fill in the section that corresponded to their own experience:

- The first section was dedicated to technical writers or information architects who currently write non-structured or non-DITA content. The questions were:
Would you like to migrate to DITA? Why? Does your company intend to migrate to DITA? Why?
- The second section was dedicated to technical writers or information architects who have experienced a DITA migration. The questions were about the different stages of the migration process:
 - Information background on DITA migration in the company: When did the migration start? When did it end? What was your position during this migration? Before migrating to DITA, what authoring tools were used in your company?
 - Reactions to DITA migration: If you were working for the company at this time, how did you react when you were informed of the migration? Have you or your company experienced any technical difficulty? If so, can you be more specific? Have your writing habits been challenged? If so, can you be more specific? Have you or your company faced behavioral challenges? If so, can you be more specific?
 - After the migration: Has your company produced an evaluation report after the migration was completed? If so, on which criteria was this report based and

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what conclusions were drawn from this report? According to you, what benefits did the authors and your company get from this DITA migration? Do you have any reservation about this migration or about DITA in general? If so, can you be more specific?

- The third section was dedicated to technical writers or information architects who currently write in DITA but have never experienced a DITA migration. The questions were: Have you ever worked in other authoring environments that were non-DITA? If so, can you be more specific? From the writer's point of view, what are the positive and/or negative points of DITA? According to you, what are the positive and/or negative points of DITA for your company?

All respondents also had the possibility to add further comments, experiences, ideas or thoughts at the end of the survey.

The limits of this survey were also parts of its strengths: spreading it on discussion groups or social networking services reduces the possibility to establish a precise number of sent forms and some members of the discussion group directly answered in a comment to our post rather than following the provided questions in the form. However, it enabled us to reach more technical writers who would not have filled in the form and to get information like useful links and readings we would probably never had without this possibility of direct comments.

21 respondents filled in the form and we got 18 relevant testimonies. We obtained the following results in terms of numbers:

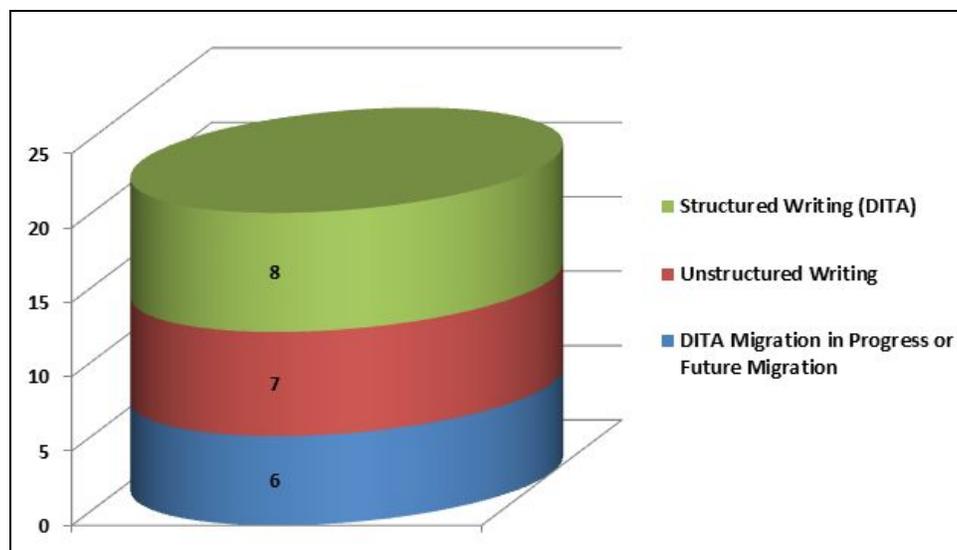


Figure 1: DITA Usage Among the Respondents

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According to our survey, the software industry is more attracted to the DITA standard (see Figure 2).

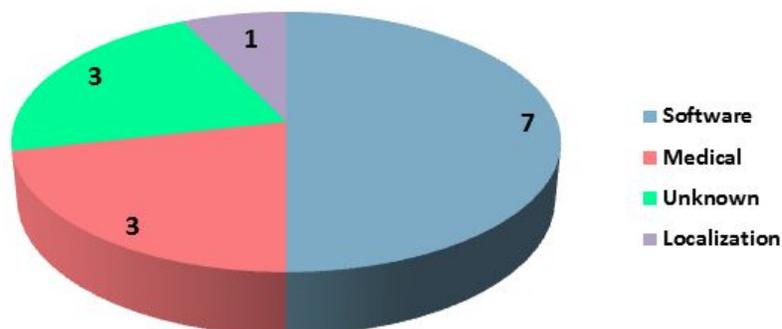


Figure 2: DITA Usage by Industry Sector Among Our Respondents

Respondents whose companies had migrated to DITA reported that this migration was carried out between 2008 and 2014. For those who have implemented DITA, the migration took on average 1 to 4 years, depending on the size of the company.

Ten of the respondents who are already using DITA or currently migrating to DITA are working in multinational companies with a minimum of 500 employees, a gross turnover superior to one billion euros and large documentation departments. Only 2 of our respondents using DITA are known to be working in small or medium-sized companies. It seems that there are more multinational companies using DITA than small or medium-sized ones (see Figure 3).

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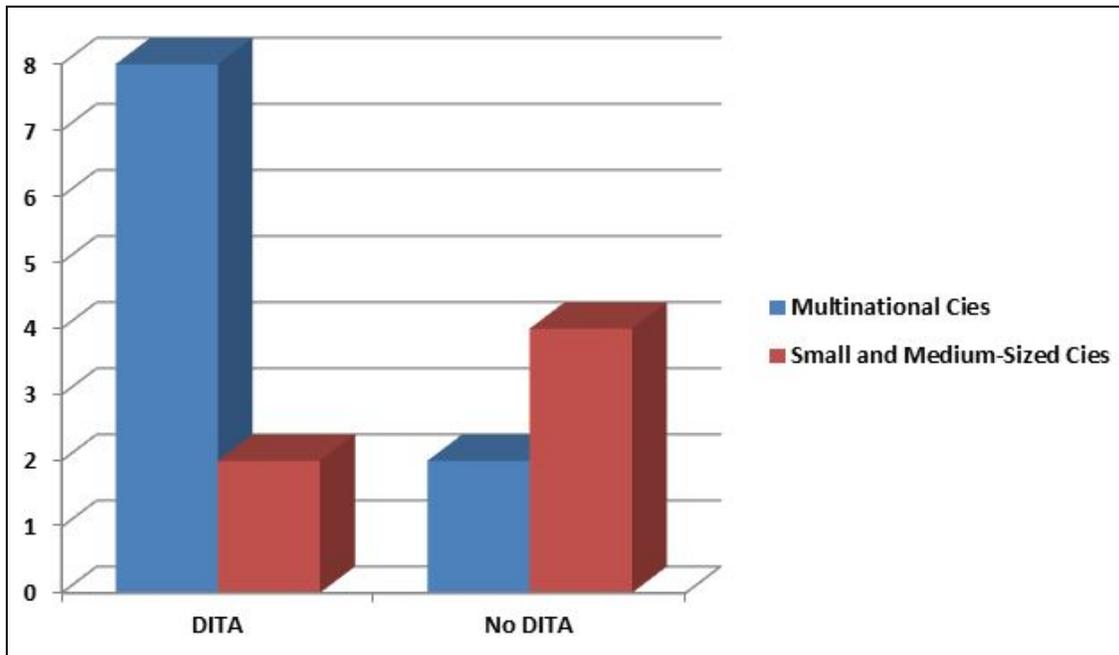


Figure 3: DITA Distribution by Company Size

To the question “Would you like to migrate to DITA?”, most of the concerned respondents gave a negative response that reveals reluctance (see Figure 4).

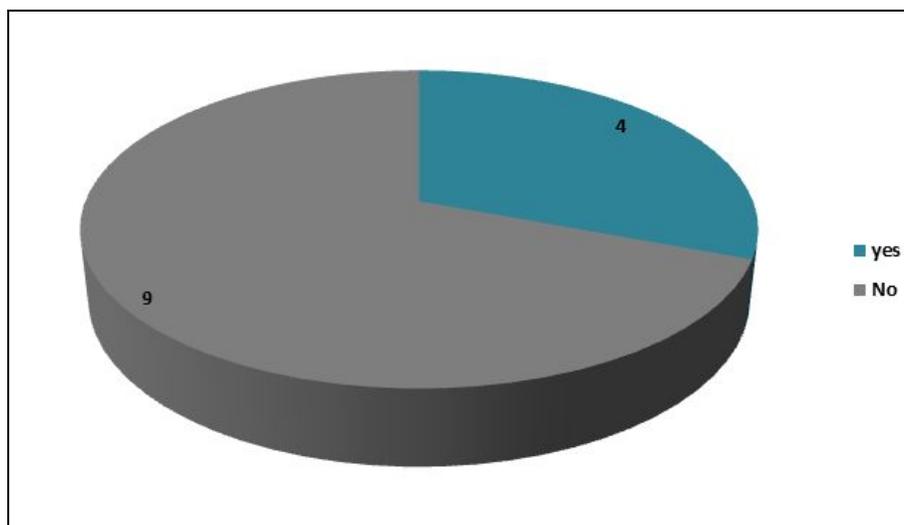


Figure 4: Number of People Willing to Migrate to DITA

This survey enabled us to better understand the subject through a wide range of experiences and provided us the information we needed to properly analyze the question of the universality of DITA.

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On the one hand, we collected important accounts from professionals (colleagues, tutors, other), but they remain personal and subjective. On the other hand, our survey mainly gathered partial collections of facts and opinions but no figures. To complete our analysis, we turned to specialized articles, newsletters and surveys conducted and written by experts. We also followed two webinars in line with our questions: one was presented by Leigh White, a specialist in DITA documentation at Ixiasoft, and the other by Keith Schengili-Roberts, a DITA information architect. These resources helped us to determine what kind of companies use DITA in terms of domain, size, turnover and so on.

In 2013, Keith Schengili-Roberts conducted a survey called “Who is Using DITA and Where is it Being Used?” published in the CIDM (Center for Information-Development Management) newsletter *Best Practices*. He collected information from conferences listings, emailing and customer references in order to know which companies are using DITA to produce their technical documentation. This survey shows that “400 firms have been identified as using the documentation standard. Undoubtedly there are more firms out there waiting to be discovered.” According to a 2015 survey (see Figure 5), DITA usage has increased and there are apparently 500 companies in the world using DITA and 1,200 technical writers out of 150,000 registered on LinkedIn claim they are currently using it (Schengili-Roberts, February 2015).

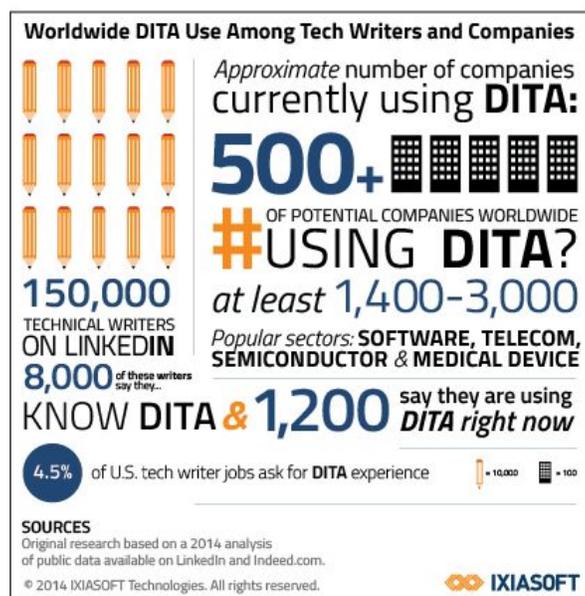


Figure 5: Worldwide DITA

We can draw a parallel with the curve presented by Keith Schengili-Roberts in his webinar which took place in June 2015, showing that DITA is by far the most used XML model (see Figure 6).

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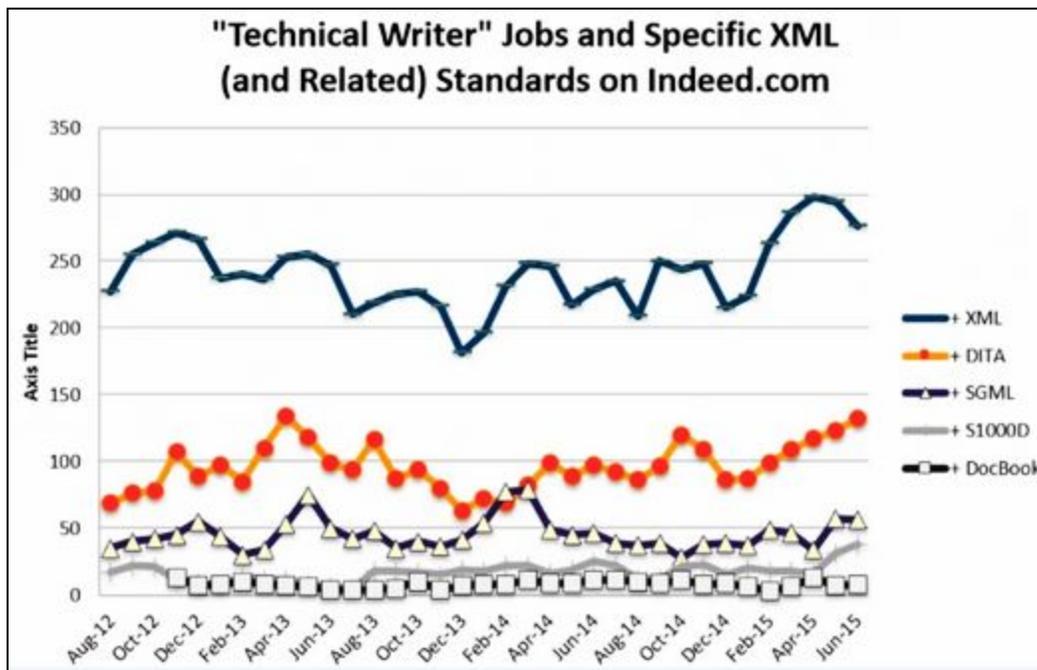


Figure 6: Usage of XML Standards

Investigating DITA universality also implies investigating the position of DITA on a global scale. In his survey, Keith Schengili-Roberts reports that “the majority of firms and organizations using DITA have headquarters based in North America” (Schengili-Roberts, 2013). A pie chart of DITA usage by continent illustrates his statement (see Figure 7).

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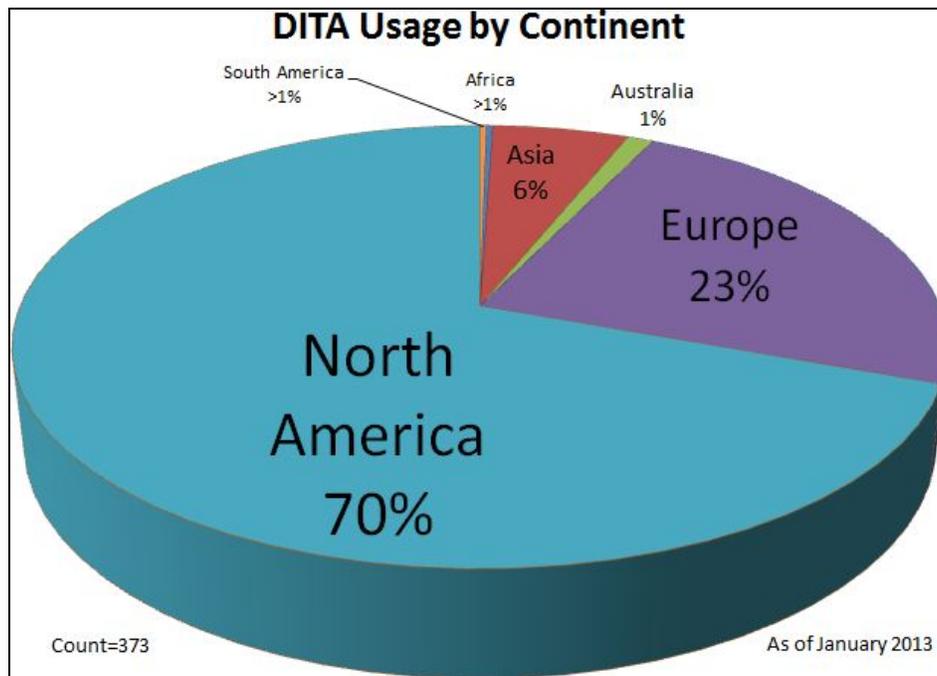


Figure 7: DITA Usage by Continent

Here is the detailed and exhaustive breakdown by country:

- USA (61%)
- Canada (8%)
- UK (5%)
- France (3%)
- Germany (3%)
- The Netherlands (3%)
- Japan (2%)
- Australia (1%)
- Belgium (1%)
- China (1%)
- Denmark (1%)
- India (1%)
- Israel (1%)
- Finland (1%)
- Norway (1%)
- Sweden (1%)
- Switzerland (1%)

Even though these figures reveal that DITA has spread mainly in North America and that it is perceived as an “English-language-only phenomenon” (Schengili-Roberts, 2013), it also proves that DITA is globally spread. Indeed, regarding the number of European and Asian companies using DITA, we can say that the data model has a world influence.

Along with the nationality of the companies using DITA, the sectors in which they are specialized must also be taken into account when studying the universality of this standard. Another pie chart (see Figure 8) identifies trends in 2015 about this issue (Schengili-Roberts, June 2015).

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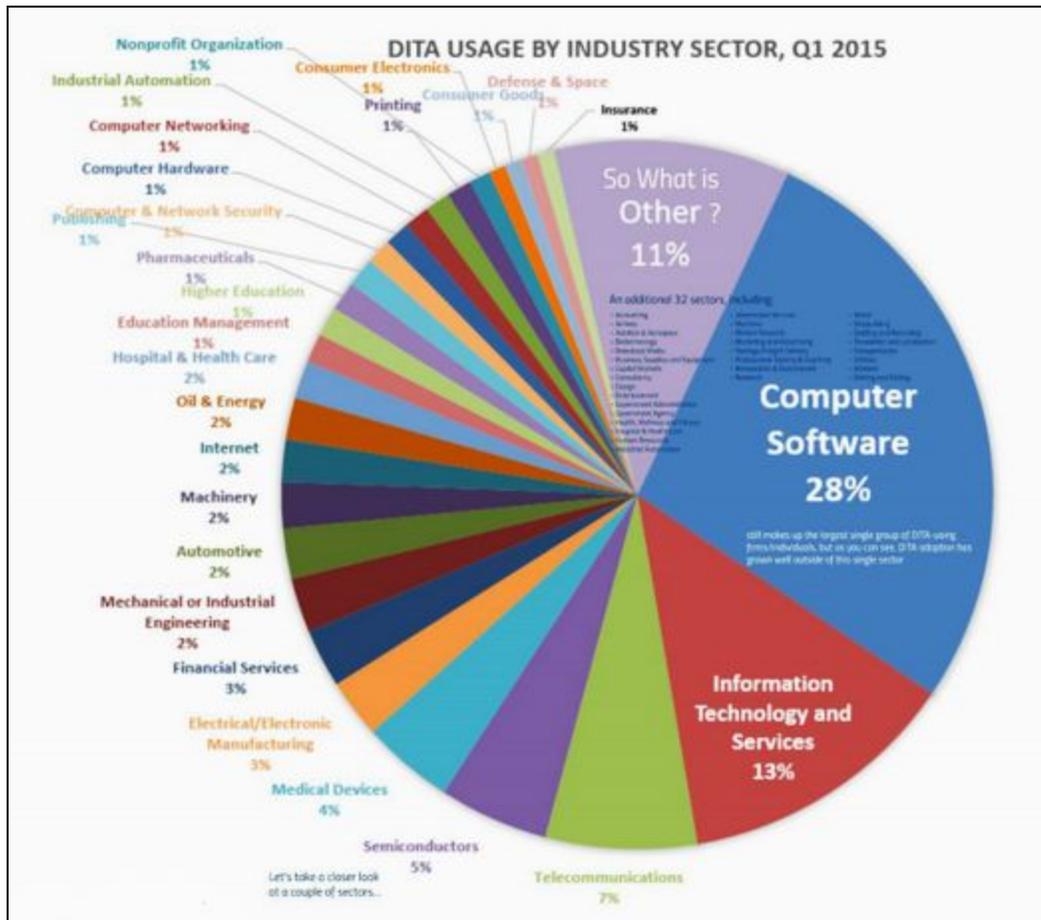


Figure 8: DITA Usage by Industry Sector in 2015

Here are the details of the remaining 11%:



Figure 9: The Remaining Industry Sectors Using DITA

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Even though Figure 8 shows that DITA is adapted to a variety of business sectors, we can notice that DITA is mainly adopted by the software industry. This sector is followed by the information technology and services industry category, with 13 percent of companies using DITA. Then, there is the telecommunications industry with 7 percent, closely followed by the semiconductors industry with 5 percent and the medical devices industry with 4 percent of companies using DITA.

Here is an approximate list of the software companies that constitute the percentage of companies using DITA in 2013 (Schengili-Roberts, 2013):

- Adobe
- Autodesk
- Borland
- Compuware
- FICO
- Platform Computing
- Jack Henry and Associates
- Minitab
- Progress Software
- Quark
- SAP
- Sybase
- VMware
- Webtrends Absolute Data Group
- CEDROM-SNi
- Dell Kace
- EMC
- Hitachi Data Systems
- IBM
- Jorsek
- NetApp
- Oracle
- Ricoh
- Tech-Tav Documentation
- Xerox

The results are quite positive in terms of diversity but they should however be tempered because the list of the computer software companies that comprise the largest single category is a list of big companies with a high turnover.

Some people may think that “it would primarily be the larger companies that are using DITA, but that turned out not to be the case” (Schengili-Roberts, 2013).

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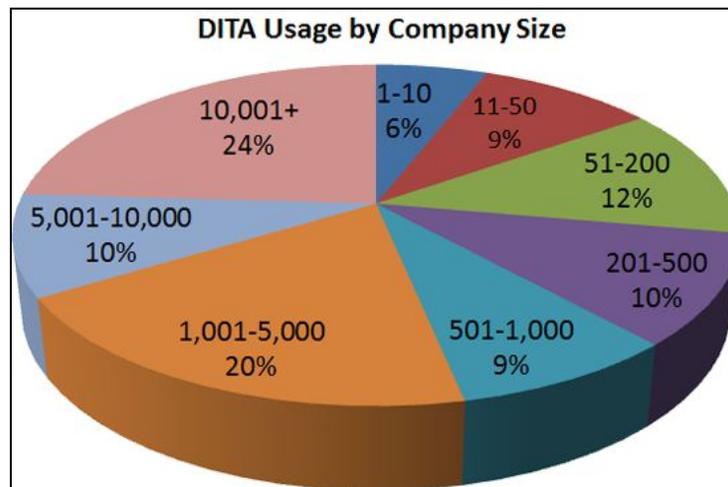


Figure 10: DITA Usage by Company Size (number of employees)

This pie chart is quite surprising and goes against prejudices because it shows that many small and medium-sized companies are using DITA (see Figure 10). Keith Schengili-Roberts notes that “if we take 500 employees as the cutoff point between large and small, then yes, a majority of “large” firms are using DITA. But at 63 percent this is not exactly overwhelming” (Schengili-Roberts, 2013). Even though over half of the companies listed on the pie chart are companies with more than 1,000 employees, we can see that the size of the company does not hinder DITA implementation.

Schengili-Roberts concludes that “the spread of DITA within the corporate world is broad, not just in terms of company sectors but in terms of company size as well as its geographical spread” (Schengili-Roberts, 2013). However, we can wonder about the concrete results of DITA migration for the companies, as JoAnn Hackos presented in a 2014 article:

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Figure 11: Productivity Results Survey

As illustrated in Figure 11, “50 percent testify that their productivity has increased either significantly or moderately. Another 14 percent believe that productivity has remained about the same. 20 percent and 16 percent respectively note that productivity has decreased moderately or significantly” (Hackos, 2014).

All these figures and charts provide a wide and clear vision of the companies that use the DITA standard, and we can see that some results do not reflect what we would have expected. After focusing on the facts, we can now try to explain them and determine whether DITA is truly universal as it was originally designed for, or if this universality remains a mere ideal.

DITA: Is It Universal?

After almost 15 years of development, DITA has now reached a stage of maturity. We saw that it has been adopted by a certain number of companies or organizations and spread all over the world. Mastered by 5% of the 150,000 technical writers registered on LinkedIn (Schengili-Roberts, February 2015), DITA is not the most widely deployed authoring tool but according to Schengili-Roberts, its growth is quite significant if we compare it to FrameMaker which has been in use for more than 25 years and represents only 20% (Schengili-Roberts, June 2015). As explained earlier, the growth and success of DITA cannot be denied, but does this mean that it is fit for every type of company? Our intention is to first look at the financial issues

implied by a DITA adoption to determine if every company can afford it, and then to focus more on the question whether DITA is really fit for every domain and every type of documentation.

Is DITA Affordable for Any Company?

A starting point to identify any financial limitations is to look at the costs involved in a DITA implementation initiative. We will then try to assess if the workload involved in implementing DITA can be an issue for some companies, and if the productivity objectives can be achieved when adopting DITA.

There is a whole variety of companies and authoring teams in the world. The budget plan of in-house documentation departments of multinational companies cannot compare with small and medium-sized enterprises. Are companies with bigger financial capability more likely to adopt DITA, or can smaller ones also afford it?

The number of DITA solutions has increased over the years, ranging from standard desktop software to Web-based editors (Schengili-Roberts, May 2015). Based on XML editors and the OASIS open source toolkit, the newest tools have been optimized to create DITA content, and they have also become more user-friendly. Standard prices for a simple XML-DITA editor start at around EUR 800 per license, which is relatively cheap compared for instance to FrameMaker (EUR 1,500), but still more expensive than Microsoft Word or open source LibreOffice Writer that is available for free.

Depending on the size of the authoring team and the volume of documentation to handle, a DITA editor might not be sufficient. If team members need to share and reuse content (one of the key advantages of DITA), their company would need to implement a Component Content Management System (CCMS) to manage and track all information files, and also be able to create localization kits, if need be. CCMS systems differ a lot from each other, both in price and functionality. DITA-capable CCMS can be offered as standalone or as SaaS (Software as a Service) and cost from around EUR 800 to several thousands of euros (Schengili-Roberts, 2014).

Software tools are not enough to implement DITA. Technical writers need to be trained not only to learn how to use them, but also and most importantly how to structure DITA compliant content. Also, legacy documentation needs to be migrated and post-edited by writers or by a DITA expert contractor acting as an information architect. DITA might also need to be adapted to a specific information model. The process of “extending” DITA (called specialization) by creating new structures or adding new elements to existing structures is, according to an IBM Information Architect who answered our survey, particularly costly. Implementing DITA should thus be carefully pondered as extra costs can be added to the initial software investment.

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It is widely expected that, due to financial reasons, small and medium-sized enterprises would be reluctant to implement DITA, but we can observe that it is not the case. Even DITA specialists recognize it is a surprising fact : "My expectation from my experience as an industry consultant was that it would primarily be the larger companies that are using DITA, but that turned out not to be the case" (Schengili-Roberts, 2013). As seen earlier, 37% of companies having implemented DITA are small businesses with under 500 employees according to US administrative standards, thus confirming that while multinational companies can easily invest in a DITA solution - 63% are larger companies (Schengili-Roberts, 2013) -, there must have been strong arguments in favor of DITA to convince them to choose this standard. Besides, we can also note that we have found a few French medium-sized companies (under 250 employees according to French standards) where the global cost of DITA has not prevented them from adopting it.

Furthermore, the financial argument can be compensated by the level of expertise and skills brought in by the authoring team members. Newer generations of students are now trained to use DITA (for example, French universities, such as Paris-Diderot University or Rennes 2 University, offering programs in technical communication have integrated courses in XML-DITA to meet market demands). This trend might help reducing DITA training costs for companies as they will have the right people at hand.

After considering the financial costs, companies need to assess the workload involved in implementing or migrating to DITA. A successful initiative requires a lot of time and effort, added to careful planning and governance of the transition. The success also depends a lot on the structure of the existing documentation team and their ability to adapt to new tools and new ways of writing documentation.

Respondents to our survey explain that new roles needed to be identified in order to prepare the migration. At a French leading 3D software company, a dedicated person was in charge of the technical tools used to structure the workspace and to publish the documentation. Technical writers were first requested to migrate FrontPage files to HTML topics corresponding to task, concept or reference information, before they could be automatically converted into DITA using a tool developed by the company for this purpose. At a leading medical solutions provider, a Technical Publication Project Leader and a Senior Technical Writer have been recently appointed information architects to prepare and lead the migration process as they will have to define new processes and content structure to ensure global consistency. In some cases, technical writers were not involved from the beginning in the decision making, adding more challenges and pressure to their current roles. As reported by one of the respondents to our survey:

“(we faced) difficulties with our management: the objectives were a top-down decision, still they were courteously presented to us, but writers and technical communicators did not take part in the decision making. We faced difficulties with our structure: officially, new tools had been announced, but the staff had been given the “fullest” autonomy to learn how to use and integrate them. We faced difficulties with HR: the staff had been reduced to anticipate the arrival of new contractors who would impact negatively on the new environment. These three difficulties have resulted in adopting an documentation engineering approach, whereby we used a Python program to automate the migration.”

As outlined earlier, new tools need to be introduced and managed. According to JoAnn Hackos’s survey on productivity, 31% of the companies report that they spend more time on managing these tools (Hackos, 2014). Technical writers need to be properly trained to use them and learn how to write DITA content. For that purpose, a DITA training session was organized for all documentation teams of a major company in the healthcare sector based in France in preparation for the migration and regular presentations were made by the User Assistance Development Senior Manager in charge of the migration at a leading 3D software company to explain the principles of DITA and present the migration process at every stage of the process. Training is also crucial as it will impact the productivity gains expected by companies when implementing DITA.

Implementing DITA is not just a matter of bringing new technologies to the documentation department. As highlighted by Leigh White, “(authors) will have to learn a new way of writing, new tools, a whole new way of thinking about their content” (White, 2015 webinar). Indeed, respondents to our survey also report that they had to face this kind of challenges when migrating to DITA. One of the respondents to our survey reported:

“Some old-school writers were reluctant to change. XML can be impressive at the beginning, especially if you don’t know a thing about it. You need to find the right words and maintain good relationships with them in order to convince them and assist them during the process.” (our translation)

Another Senior Technical Writer recalls that “some authors are reluctant to any kind of change, either out of conservatism (they are scared to move away from their core functions, they are scared of changing), or out of technical incompetency” (our translation). Companies will need a complete communication plan to make sure that all stakeholders know what to expect and what will change, and that skeptics are listened to and reassured in order to create a feeling of ownership among the team members.

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Whatever the workload involved in implementing DITA, a functional structure thus needs to be set up in the authoring team with clearly-defined roles. Larger companies with a large documentation service might find it easier than smaller companies relying on smaller teams. Change management also needs to be taken into account, as the skills and mindsets of the team members are key to the success of the process.

When the decision to implement DITA has been made, tools and training costs must be supported and approved by top-level managers who will in return expect proven benefits from the transition. As a number of companies have already implemented DITA in their documentation processes, potential DITA candidates might find it inspiring to know what productivity objectives they can achieve.

As mentioned earlier, companies that choose DITA expect to make their content production chain more efficient and boost the productivity of their documentation department. DITA is reported to eliminate inefficient “cut & paste” operations and reduce file management. This is confirmed by the case of a British pharmaceutical publication who chose to migrate to DITA:

“In the past, a great deal of content was copied and pasted, or retyped manually, to keep the two publications in sync with each other. DITA offers the possibility not only to share fragments of text using content references (conrefs), but also to reuse entire topics thanks to the organisation of the publications into DITA maps. The BNF map is now being gradually amended to include topics directly from the BNF, with conditional text added to the BNF record as needed.”
(Burrows, 2013)

Respondents to our survey explain that they achieved substantial benefits in terms of production time and cost, as one reports: “We went from taking a week to produce all the documentation for a release down to a day”. Similarly, a Senior Information Developer at IBM and Lecturer at the Paris-Diderot University confirms that it took his team much less time to publish their documentation set (starting from eight working days with structured FrameMaker down to only one with DITA). A Content Manager at a software company and Lecturer at the University of Sophia-Antipolis recalls that migrating to DITA has helped “improve the global quality of content (as) writers spend more time upstream on defining and structuring content, and less time on authoring and publishing. The company also achieved substantial cost reductions on reviewing and translation” (our translation). Nonetheless, he admits that there was a price to pay, as it required a lot of time and effort in terms of project management and information architecture to achieve their transition to DITA.

However, JoAnn Hackos’ survey on productivity, revised in late 2014, shows contrasting results concerning productivity gains through DITA and highlights a “productivity paradox”. The title of

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the corresponding article refers to the so-called Solow computer paradox: Robert Solow, a renowned American economist, noted in 1987 that “you can see the computer age everywhere but in the productivity statistics”. In other words, the technological advances brought by the new information and communication technologies have not impacted the economy as much as it was expected. There is a contradiction as computers have slowed down the economy growth. The DITA toolbox has also highlighted this paradox. According to the same survey, “50% (of the companies having implemented DITA) testify that their productivity has increased either significantly or moderately”. In other words, the remaining 50% have experienced unchanged or decreased levels of productivity – a surprising result. The survey shows that the longer the DITA experience, the higher the percentage of more productive companies, but this percentage never exceeds 56% of all respondents. The main reason reported is the lack of high performance tools and training for authors. Though successful companies report that “writing, editing and review time has decreased” with “reduced translation costs (and) publication time”, others do not get the expected productivity gains even after years of using DITA (Hackos, 2014) – quite a paradox indeed . As they are now planning to get better tools and more training for their teams, it confirms that implementing DITA can be a highly complex process.

Financing the tool costs is still relatively affordable for larger or smaller organizations as long as they are not looking into DITA specialization as it takes time and resources to analyze the legacy content, implement and maintain the new structures. Like in every operational transition, the team is at the core of the success of a DITA implementation. It might be easier for larger companies as they can rely on more in-house staff, but also more difficult if team members are reluctant to change or not ready for closer collaboration. Smaller teams might be more flexible but will need to take on the added pressure due to the workload, especially if their management does not outsource the new roles involved. DITA can thus fit any type of organization, large or small, and can be a “one size fits all” solution (Schengili-Roberts, 2013) provided that the implementation plan is complete and fully backed by management. The authoring team should also be aware of the challenges they are going to face and of the extent of the effort required. These conditions mainly determine the productivity gains they will get from implementing DITA in their company.

Financial and productivity aspects can challenge the universality of DITA, but even though DITA can be adopted by any type of company, if the decision is made with a complete awareness of the challenges imposed on the documentation team and of the need to have a well-built plan for the whole implementation process, we need to go further in our analysis to determine whether DITA is completely universal. As presented earlier, DITA is widely adopted by software companies, mainly because of historical reasons, but we also saw that other sectors have adopted DITA. It is thus important to wonder if DITA is really fit for these other domains of

activity. In this analysis, it will also be necessary to determine if DITA is universal enough to produce any type of documentation.

Can DITA Be Used in Any Domain of Activity and for Any Type of Documentation?

The universality of DITA also lies in the different domains where it is used. As outlined earlier, the fact that it has been designed by IBM reinforced its development in software companies. Nevertheless, its adoption rate in different sectors keeps growing. If we compare the 2015 figure showing the different sectors using DITA (Schengili-Roberts, June 2015) with the 2012 diagram showing the same data (Schengili-Roberts, 2013), we can see that new sectors have appeared. Schengili-Roberts explains that it is due to the fact that in 2012, these sectors represented less than 1 percent of the companies using DITA and were part of the “Other” section. Between 2012 and 2015, DITA conquered more and more companies in these sectors, which are now represented under their sector name. The figures are quite eloquent: more than 50 sectors are now using DITA, infirming the fact that DITA is only adapted to software companies. According to Schengili-Roberts, the reasons for this spread are diverse. The first reason is that DITA can be adapted to your needs, as explained at the beginning of this article: the core architecture is flexible, and a lot of different things can be done with the three core topic types. Schengili-Roberts notes that “DITA is an ever ongoing, evolutionary process, people learn how to use DITA for their own purposes. They come back and adapt it, they change it and it becomes better suited” (Schengili-Roberts, 2013). Moreover, the perspective of content reuse seduces a lot of sectors. Two aspects of content reuse are appealing to a lot of companies:

- Writers produce more since they do not have to write the same things over and over again.
- They also produce better content since first, they have more time to write documentation, but also because when a topic is reused, if things are done correctly it is read and reviewed several times, and potentially improved if needed each time the content is reused (Schengili-Roberts, June 2015).

As said in Schengili-Roberts’ survey, “there is significant growth happening for DITA adoption in the medical device and machinery sectors” (Schengili-Roberts, 2013). We saw earlier that the medical device sector now represents 4 percent of the companies using DITA. 60 percent of the top 10 medical device companies have adopted it (Schengili-Roberts, June 2015). The author of the survey supposes that “given that this sector is heavily regulated, it tells me that the relative success of DITA adoption in this sector proves that it cannot only stand up to rigorous

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regulatory scrutiny, but due to the myriad tools and CCMSs available, likely makes this process easier to manage” (Schengili-Roberts, 2013). He presents the documentation challenges of this sector as follows:

- Need for regulatory compliance (with an extra challenge since documentation requirements differ from country to country)
- Need to efficiently localize the content
- Significant input from the SMEs who often directly contribute to content

Using DITA does not make the validation process faster in this sector because documentation is validated as a whole, there is no individual topic validation. However, this validation process becomes more efficient thanks to content reuse since all the reused content is validated only once. This system of reuse is very useful for such companies since there often are different manuals derived from bigger ones. For instance, a technical writer working for a healthcare equipment company explains that some manuals are extracted from bigger manuals: the Operator Manual Extract (OME) is derived from the Operator Manual (OM), and DITA will also enable them to reuse the OM content to create parts of the Service Manual (SM), which is itself produced in several versions depending on the type of field engineer the manual is intended for. In such a case, content reuse in DITA will make these manuals more consistent, more easily reviewed with less risks of information transformation, which are huge benefits for the company. Besides, conditionality can be a way to deal with the different documentation requirements across the world. In terms of regulatory compliance, tracking content is also made easier with a DITA-based CMS, traceability being very important in this sector since a dozen of people with different roles review every document.

As presented earlier, the semiconductor industry is another example where DITA is now well-implemented (5 percent of the companies using DITA), the leading companies Intel and Samsung having adopted it. This sector produces different types of documentation (end-user’s guides and engineering documentation) so content reuse brings a lot of advantages to them, even more so because they localize their documents in many languages (Schengili-Roberts, June 2015). Schengili-Roberts also insists on the fact that one of the core activities of this sector is to sell information, meaning telling other engineers how to work with their components. It is therefore extremely important for them to have a clear, professional and reliable documentation.

While the advantages brought by DITA may also apply to domains other than software development, specialization can sometimes help DITA to better fit the company's needs. The

specialization can take several forms. One of them is to design new topic types as presented by Priestley and Schell when talking about the value of specialization:

“A company that has specific information needs can define specialized topic types. For example, a product group might identify three main types of reference topic: messages, utilities, and APIs. By creating a specialized topic type for each type of content, the product architect can ensure that each type of topic has the appropriate content. In addition, the specialized topics make XML-aware search more useful, because users can make fine-grained distinctions. For example, a user could limit a search for xyz only in messages or only in APIs. A user could also search for xyz across reference topics in general.” (Priestley and Schell, 2005)

But the specialization can also be designed at the element level to provide relevant tags depending on the specific information to be inserted in the topics. The case of the British National Formulary (BNF) is quite interesting to illustrate this type of specialization. The BNF, one of the Pharmaceutical Press’s most important publications, was converted in 2011 to a specialized DITA XML structure and had its production process updated. This case gives a precise example of how customization of tags enables DITA to exactly fit the needs of a type of documentation and meet the wish to use semantic tags:

“The ability to specialise the schema and organise mark-up into type hierarchies means that specific information that might need to be extracted from the BNF as data—lists of drug contra-indications, for example—can be tagged with semantic mark-up (for instance, an element called <contra-indications/>) while allowing elements to be grouped, for example for styling, and also provide a “base” DITA element so the content can still be consumed by generic DITA tools.” (Burrows, 2013)

However, even if their transition to DITA was a success thanks to the specialization of tags, this method also has limits, as explained later in the article:

“One of the reasons for choosing a standard format for our customers was to save them the extra development work required to consume our products. In the past, a customer receiving the BNF in XML would have needed to adapt their tools to handle <contra-indications/> and about 100 other custom elements. With DITA, it is possible to generalize the specific mark-up back to plain structures on export. Thus, customers will receive the contra-indications data as the DITA element <section/> instead of <contra-indications/>.” (Burrows, 2013)

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Indeed, specialized tags are very convenient and relevant for writers who produce the BNF, but exporting their specialized model of DITA would have cost too much to their clients. Therefore, the BNF's clients lose the advantages of specialization and go back to a standard version of DITA. This does not mean that DITA loses its universal features since it is possible for clients to read and understand these documents with standard DITA elements, but the XML files are less explicit. Specialization is a very useful possibility of DITA but as said earlier, its limits are mostly financial: it is costly to set up, and therefore sharing specialized DITA XML documents implies such high expenses that the idea is often abandoned.

The question of the different domains where DITA is used does not only concern the domain of activity of the company, and we can also question the universality of DITA by asking if DITA is used outside documentation departments. In the survey we led between March and May 2015, a technical writer working for a company specialized in pipelines reported that her company uses a simpler edition software because this tool can be learned in a short period of time and therefore enables engineers and other employees to write documents without having to master a standard like DITA. Indeed, in his presentation about LightWeight DITA, Michael Priestley recognizes that DITA is a hard-to-learn tool by saying that “full DITA can have a high learning curve that pays off with high functionality only for full-time professional authors” (Priestley, 2013). Since only fully DITA-trained authors can efficiently update topics, it is then difficult for other departments to use DITA to produce their documents. Priestley notes in fact that the different departments of a same company have separate documentation production environments and therefore prevent one another to reuse their content. This restriction raises expectations, as we have concluded when reading some answers to our survey. A technical writer explains that she expects DITA to bring a better collaboration between the different departments like R&D, Marketing and Support, while another one underlines the issue that the collaboration between departments should be improved, for instance to encourage SMEs to write some parts of documentation, as it is required in some domains like in medical device companies.

In this context, LightWeight DITA could be a solution to make DITA more universal across the different departments and professions. Michael Priestley is a strong believer of this idea: “By clearly defining a LightWeight DITA adoption point, we make it easier for new groups to adopt DITA with occasional, contributing, or just lighter weight authoring needs” (Priestley, 2013). According to Schengili-Roberts, LightWeight DITA will take out the tags and focus on the core. The purpose of this new version of DITA is to go beyond documentation teams and become more “mainstream” (Schengili-Roberts, June 2015). Thus, LightWeight DITA may be the solution for the standard to become universal across the departments, but it also proves that standard DITA has not been successful yet in achieving this goal.

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Even if DITA has now spread to a lot of diverse sectors and LightWeight DITA might be a solution to spread the model across the different departments of a company, the question of the universality of DITA remains when focusing on the different types of documentation.

One of the first issues about this question is the so-called opposition of paper-based documentation and electronic documentation. As presented at the beginning of this article, DITA has been designed by a company specialized in computers and software. Therefore, such documentations are mostly electronic (online or installed on the computer) and DITA is seen as particularly adapted to this type of user assistance. As an Information Architect explained when responding to our survey, topic-based writing mostly fits electronic documentation and online help: “I think DITA was the final step in the transition from paper-based user’s guides to online help, thus making topic-based writing a new standard” (our translation).

The example of a large healthcare equipment company is quite interesting since they produce both electronic and paper-based documentation, and some of their documentation teams are now migrating to DITA. Indeed, as one of their technical writers thinks, DITA will help them produce their documentation thanks to content reuse, as presented earlier, and therefore appears to be a right and justified choice for their company. For regulatory reasons, GE Healthcare must also provide paper-based manuals with their medical devices. Thanks to a new XSL-FO stylesheet, the manuals which will be created with DITA will look exactly the same as those which are now created with FrameMaker. Thus, DITA will enable them to single source their documentation for their paper-based documentation, CD/DVD documentation, and later their online help. As for the User Assistance team of the leading company in the 3D software edition already mentioned earlier, they produce online helps and electronic documentation for all their software solutions: the whole User Assistance is composed of thousands of files, organized in different user’s guides. A good organization between technical writers and an efficient CMS lower the difficulties to handle all these topics, and the fact that their User Assistance is online makes it easier to write the documentation following the DITA standards. In essence, the principle of electronic documentation is that the user can search the whole guide and enter it through any topic (or use F1 from the interface in the case of a software user’s guide). Therefore, topics must be self-contained and independent: the user should not have to read other topics to understand the information. On the other hand, some types of documents can be more linear, and some argue that DITA does not fit this linearity necessary in some guides. A research team (Unité Ingénierie des Contenus et Savoirs - ICS) that develops a simpler edition software dedicated to the creation and management of technical documentation, explains that according to them:

“DITA produces non-linear documents and a ditamap is an aggregation of pieces of self-contained and independent topics. This feature is typical of all DITA

documents we could find and it perfectly fits some types of documentation like user's guides or reference documents, but is less appropriate for documents needing more writing and links between the different pieces, like a technical training guide." (ICS, undated)

The issues about the use of DITA in terms of documentation type do not only concern linear documents. The Information Architect mentioned earlier argues that "the concept-task-reference model does not reflect the whole spectrum of technical information, especially when we think about more interactive content (tutorials, samples, embedded help)" (our translation). This is currently what is happening in the 3D software edition company where they are improving their embedded help in their software: the tooltips available in the user interface used to be written by developers themselves, the project is now to allow technical writers to write the content of these tooltips in order to provide a more complete user assistance directly in the software. These new tooltips are now managed with XML reusable components (DITA elements), which are then inserted in the user's guides to describe the user interface. New tags have been created for these tooltips: one tag is used to insert a sentence describing the command and another one is used to give additional information (how to use the command or more information about the command or concepts), which do not fit in the traditional task-concept-reference classification of information. Furthermore, this Information Architect also explains that the principle of the three core topic types of DITA is simplistic and not based on common classification models in technical writing like Information Mapping, which contains more nuances. She later argues that writing with DITA sometimes consists in making information artificially fit into one of those three topic types, which can result in topics with little or no meaning. This remark raises the question whether DITA can be used when documenting any type of product. When we asked this question to the User Assistance Development Senior Manager from this 3D software edition company, she made it clear that this was not a difficulty for all their range of products. She thinks DITA corresponds to the kind of documentation they want to produce in the company, that is task-oriented user's guides. She argues that their former HTM files contained too much information that could overwhelm the user and hide the core information: helping the user do a task. This task-oriented approach is particularly adapted to their 3D modeling software. In the case of their software specialized in simulation on 3D-modeled objects, the user's guides contain more reference topics since the user is mostly interested in learning how to fill in a dialog box and how parameters impact one another. This Senior Technical Writer strongly believes that the separation of information according to its type is a success and enables technical writers to identify which type of information the user needs. Another DITA specialist who responded to our survey shared with us her experience:

“For the other writers it was more difficult as they had gone down many paths that were very specific to their products, which made it challenging to find a single standard that would work equally well for everyone. And many writers were very attached to their specific use cases just because they had always done it that way. Getting them to realize there were other approaches was not always easy.”

The question of the universality of DITA in terms of product types is difficult to answer. DITA can be used for documenting any type of product, using more tasks, more concepts or more references depending on the information needed by the user. Nevertheless, the feedback of several respondents to our survey shows that some products might need more diverse information types, even if this belief sometimes seems to come from the writing habits of technical writers and not from a real limitation of DITA. Thinking documentation in DITA standards requires, for now, a lot of open-mindedness from the technical writers' part to think about their documentation in a complete new way and new organization. But considering the growing success of DITA and the spread of the model throughout so many different sectors, it may some day be difficult to get away from it: new technical writers are now trained to use DITA and will probably use it at some point in their career. Writing documentation in another way could thus be a challenge for them in the future.

Considering all this, DITA certainly presents universal features in terms of domains of activity, but some reservations are raised concerning the whole variety of documentation types. DITA succeeded in convincing a wide range of companies, no matter their activity, thanks to its universal core features like content reuse and linking system. Furthermore, while DITA is often seen to only fit electronic documentation, producing paper-based documentation appears to be possible with DITA, provided that the company creates a stylesheet dedicated to PDF format. Nevertheless, it is still hard to determine if DITA fits any type of documentation: some argue that all products can be documented with DITA while others think its three topic types are too limited.

Conclusion

When IBM donated DITA to the OASIS organization in 2005, the main purpose was to spread it to other companies, outside the software world and to make it a universal information model. Ten years later, figures seem to confirm that DITA has gained ground with a growing community of technical writers knowing how to work with DITA, not only in software companies where it is still mainly used, but also in a variety of industries ranging from semiconductors to medical devices. This success can be partly explained by the relatively low

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tool costs implied by a DITA implementation compared to other mainstream authoring software. A DITA toolset is affordable not only for global firms but also for a growing number of small and medium-sized companies.

If all DITA adopters have taken the step to reap the expected benefits of topic-based writing and content reuse (that is to say, less publication time and localization costs), 50 percent of them have not raised their productivity, thus suggesting that a successful implementation is not only a matter of tooling.

Indeed, the DITA model implies a new way of thinking and designing content and requires properly trained writers who are ready or well-prepared for change in case of a DITA migration. Hence, transitioning to DITA not only requires to perform a complete content analysis beforehand, define new roles in the documentation team and dedicate more time to tool and project management, but it also needs a careful change management. Moving to topic-based writing should be a bottom-up process rather than a top-down decision.

Once the proper environment has been set up, DITA can be easily adapted or extended. Its core architecture makes it flexible enough to meet documentation needs in virtually all domains of activity as illustrated by recent trends. However, this specialization has a cost as it takes extra time and resources to analyze the legacy content, implement and maintain the new structures at the topic-level or element-level, not only for the organization that chooses to go for specialization, but also for all the stakeholders that are supposed to share its content. Specialization is a very useful possibility of DITA, but its limits are mostly financial.

It also should be emphasized that over the past decade, DITA has been exclusively used by documentation teams. The reasons are twofold: DITA is a hard-to-learn tool, and other departments (R&D, Marketing, Support...) usually have their own content production chains and habits. IBM has recently come up with a new model called "LightWeight DITA" to encourage more collaboration and content sharing between departments and teams. This simplified version of DITA may be the solution for the standard to become universal across the departments, but it is also proving that standard DITA has not been successful yet in achieving this goal. Another challenge ahead is now to convince them to adopt this new toolset.

The DITA model can be equally used to produce both paper-based and electronic documentation, as illustrated by the use cases in a major company in the healthcare sector and a leading French 3D software company, with no limitation on size or volume. It can also be used to document any type of product though it would need specialization in some cases. However, it is not adapted to linear documents or other types of interactive content (for example

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tutorials, e-learning material, samples or embedded help) where the core DITA topic types are simplistic and too restrictive.

As figures suggest that growing numbers of companies, industries and technical writers have globally adopted DITA to meet their documentation needs, its universal adoption appears to be limited as it is complex to learn for every kind of content developer, costly to adapt to specific needs, and not fitted for certain types of content. Newer generations of technical writers are now trained to topic-based authoring and will undoubtedly be instrumental in spreading DITA in the future. Further developments of the DITA standard might also help making it more flexible and more universal.

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