Basics and Implementation of Document Automation in the Image Processing Industry

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Abstracts. With the introduction of a Component Content Management System (CCMS), companies combine the expectation of creating efficient and effective customer-specific documentation in the face of increasing product variance due to individual customer requirements. In addition, the documentation should meet both quality requirements and increasing cost pressure. In order to meet these expectations and utilize all the possibilities of the system, fundamental considerations must be made as part of a system introduction or optimization of an existing system. These considerations include a viable metadata concept and a modularization concept suitable for the product portfolio. When developing a modularization concept, a suitable module structure as well as an appropriate module size should be determined. To maximize reuse, the content should also be standardized at the linguistic level. The metadata concept we consider is based on a PI classification and is the basis for controlled reuse and automation of the documentation creation process. We will show that, especially in larger editorial teams, collaborative work on a product portfolio crucially depends on the standardization of content creation as well as on content classification. It ensures, for example, that modules valid for a given product can be easily searched, found, and reused. It also counteracts increasing module variance caused by a common lack of specification in content creation without CCMS. The effort required for the aforementioned concepts and their implementation in everyday editorial work initially appears considerable, but subsequently leads to significant savings in regulated work processes, translation costs, document creation, as well as in the quality of the entire editorial process. Our considerations and findings refer to practical examples from the image processing industry and the corresponding implementation of content and processes in a CCMS.

1 Introduction

The company considered for the CCMS use case develops, produces and sells components, systems and services as a leading global supplier for public customers who want to make roads and municipalities safer worldwide [1][2]. Due to the innovative developments in the field of hardware and software, complex and individual customer solutions can be realized [2]. This results in a product portfolio for solving individual customer requirements that is characterized by a highly configurable modular system of hardware and software. The company thus offers a suitable starting point for considering typical initiatives for optimizing information management in technical communication and the associated processes.

In order to cover the product portfolio with increasing product variance through individual customer wishes in the documentation, various measures in the technical documentation have been continuously developed further in recent years.

The realization of customer solutions via the reuse of hardware and software from the configurable modular system forms the basis for transferring this concept to technical documentation as well. The core tasks of content engineering are content management and the modularization of information and its multiple reuse [3]. In addition, the control of content, structures and processes, such as the translation process, should be ensured within the framework of quality assurance [3]. These requirements, with the aim of efficiently and effectively generating customer-specific documentation to counter increasing cost pressure, were the reasons for introducing a Component Content Management System (CCMS). An XML-based CCMS was introduced for the company via a system selection process [4].

A standardized definition of key figures in terms of a quantitative metric was implemented to show the

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efficiency of the CCMS after system implementation. Through the implementation in the CCMS, the data can be obtained and analyzed from the productive system via the report exchange (REx) mechanism [5]. With this continuous analysis of the data, it is possible to derive quantitative statements on further optimization measures for the CCMS and the editorial work [5].

The quantitative statements and the measures derived are also directly related to the staffing of technical documentation with qualified technical writers. In the context of collaborative work on the product portfolio, special attention must be paid to product knowledge, standardized working methods and processes in the case of larger editorial teams, so as not to jeopardize the improvements gained with the CCMS.

The next stage in the continuous optimization of technical documentation is measures to automate documentation. This is linked to the desire for further efficiency increases in the generation of product-specific and customer-specific documentation.

2 Initial situation

The first question is what influence the product portfolio with its highly configurable modular system has on documentation. One answer is provided by the distribution of module usage figures obtained from the CCMS, as shown in Figure 1.

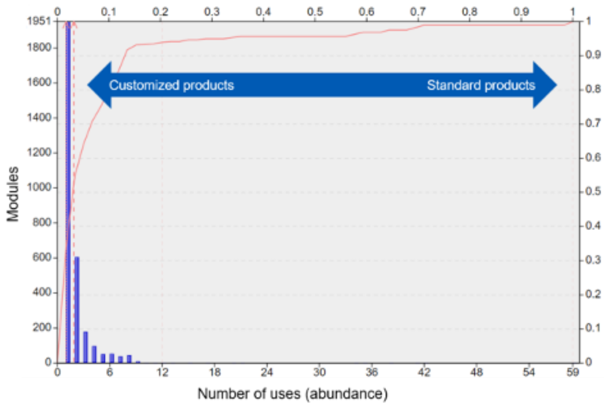

Fig. 1: Distribution of module reuse numbers in CCMS; bar height indicates the number of modules to a reuse number. Indicator for customized products and standard products [10].

The distribution shows an accumulation of modules that have only a low reuse. The very high proportion of modules that are only used once in the CCMS and have no further reuse is pronounced.

If this observation is related to the product portfolio in the first step of the analysis, then the distribution is an indicator that a high proportion of new products or products with a high variance and low range are documented [10]. Technical documentation has no influence on these factors, which result from the further development of the customer-specific product portfolio, through optimization measures.

Another reason for low reuse is the presumption of less than optimal standardization, modularization, or a lack of classification to search and find valid modules.

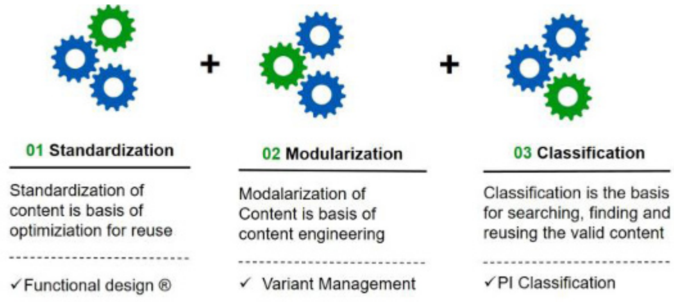

Fig. 2: Basic building blocks for successful implementation of documentation automation

As Figure 2 and the following chapters show, the basic building blocks of standardization, modularization, and content classification must interlock for successful automation [3].

3 Standardization of content

In this section we deal with the standardization of content as a basis for automating documentation.

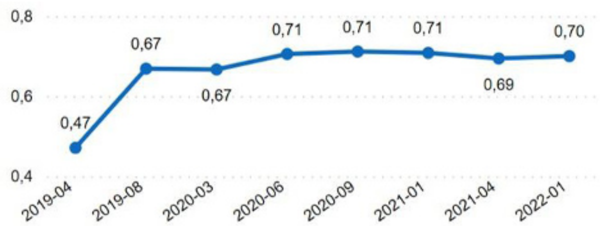

Fig. 3: Time course of the mean value of the module-based document reuse rate (redundancy).

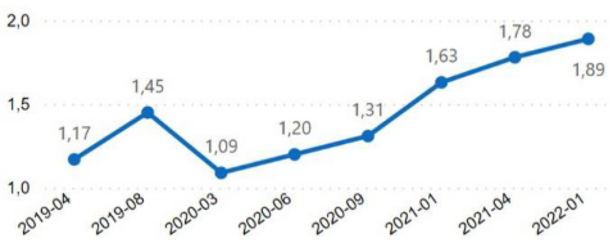

Fig. 4: Time course of the mean value of the modules used (abundance).

The two key figures in Figures 3 and 4 show that the document reuse rate (redundancy) as well as the coverage of the modules (abundance) are only weak [3]. On the one hand, this is a consequence of the product portfolio shown in the practical example. On the other hand, a document analysis carried out shows that there is potential for optimization in the area of structure, wording and design of the content.

For optimization and quality assurance, the established method of function design was introduced for standardization and structuring of content in technical documentation [3][6].

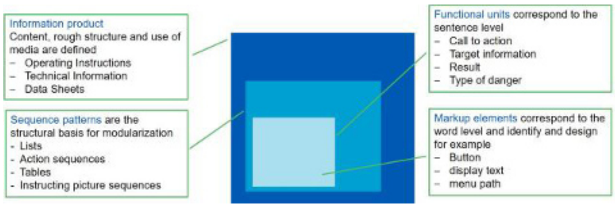

Fig. 5: Functional design works on 4 levels [6].

Based on the information needs of the target groups, logistical and legal requirements, the information is structured and standardized on 4 levels. For each information product that the technical documentation develops and produces as a document, the rules on its 4 levels are described in an editorial guide for the work of technical writers [6].

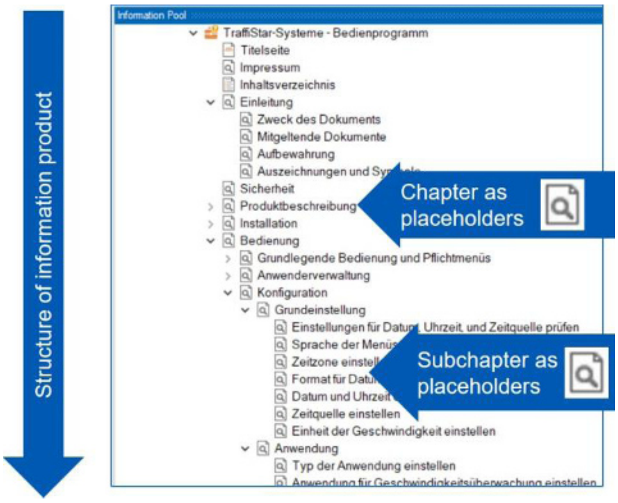

Fig. 6: Example of the structure of the information product user manual

At the first level of functional design, the standardized structure for each information product in the CCMS is mapped via a template. The template is a kind of maximum bill of materials for the content and contains all chapters and subchapters that are possible for a product line via so-called placeholders. As will be shown in the further course of this publication, the placeholders are filled with the valid modules for a selected product in a later automation step.

The described methodology also has the added value of quality assurance. All changes to the structure of the information product for a product are maintained centrally in the template and only the valid structure is available for use in the production of documentation for a product variant.

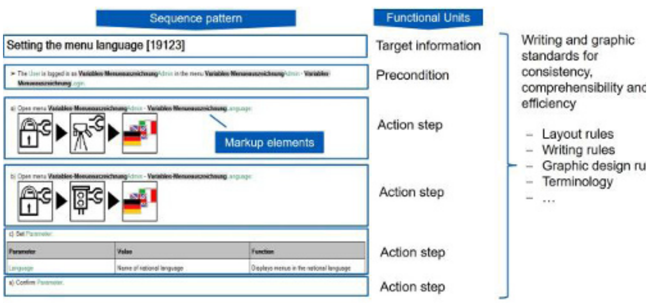

Fig. 7: Example of the "Action sequence" sequence pattern

For each chapter or subchapter in the information product, the corresponding sequence pattern is assigned in the next level of the functional design. For example, Figure 7 shows a sequence pattern "Action sequence" and is assigned to the subchapter "Setting the menu language" in the template of the information product. The sequence pattern itself in turn consists of the other levels such as Functional Units and Markup Elements. The sequencing and specifications for use are also described in the editorial guide.

Further measures of standardization take place via layout, writing, and graphic rules as well as the adherence to a company-wide terminology.

4 Modularization of content

For modularization and variant management of content, the example uses the different sequence patterns as the basis for module boundaries and module structures.

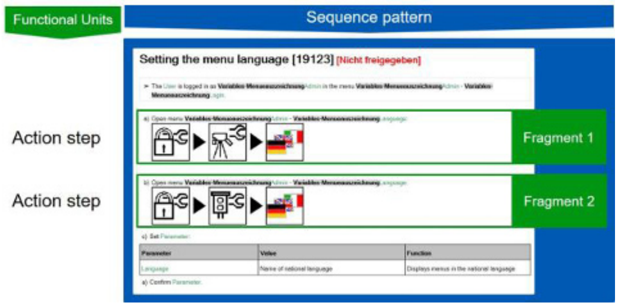

Fig. 8: Example of a variant collection as modularization based on the sequence pattern "action sequence”

For variant management, Figure 8 shows an example of variant collection as a method of modularization. Based on the corresponding sequence pattern, all fragments that are valid for different variants of the product are collected in a module [3]. For variant management, the fragments within the module are labeled with validities using a classification. Filter mechanisms can thus be used to control valid expressions of these modules automatically and individually when publishing the documents [3].

Therefore, for end-to-end modularization and variant management as a basis for automating documentation, it is necessary to define the appropriate sequence patterns in the structure of information products, the method for forming variants, and the associated classification.

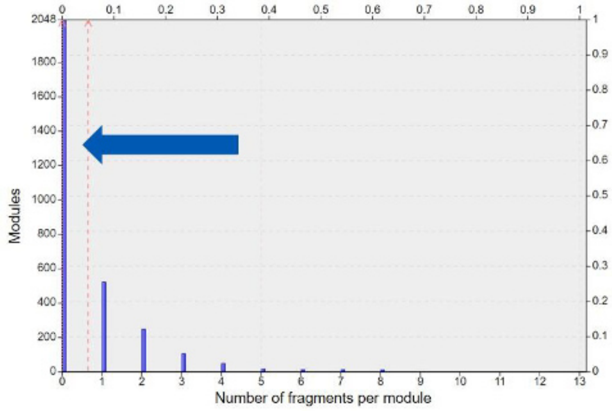

Fig. 9: Distribution of the number of fragments per module in the CCMS; bar height indicates the number of modules to the number of fragments in the module.

Currently, these points are being examined in more detail in the practical example in relation to the products in the CCMS. The aim is to optimize the large number of modules without fragments shown in Figure 9 by means of better modularization and suitable variant management, and thus to increase the range of the modules.

5 Classification of content

The use of the modules in the CCMS and especially the reuse of the modules critically depends on the management properties of the modules in the CCMS [3].

In the practical example, to manage the modules, the PI classification was introduced as a method for classifying the modules in the CCMS. The method is based on the classification of metadata according to product and information criteria [8]. In the context of automating documentation and variant management, content is managed in intrinsic and extrinsic categories for further differentiation [7][8]. A real-world example of the use of intrinsic and extrinsic PI classification is shown in Figure 10 below. In the example, the intrinsic classification is used to control which modules from the information pool in the CCMS are valid for a placeholder in the information product template. The extrinsic classification is used to filter the modules relevant for a product execution.

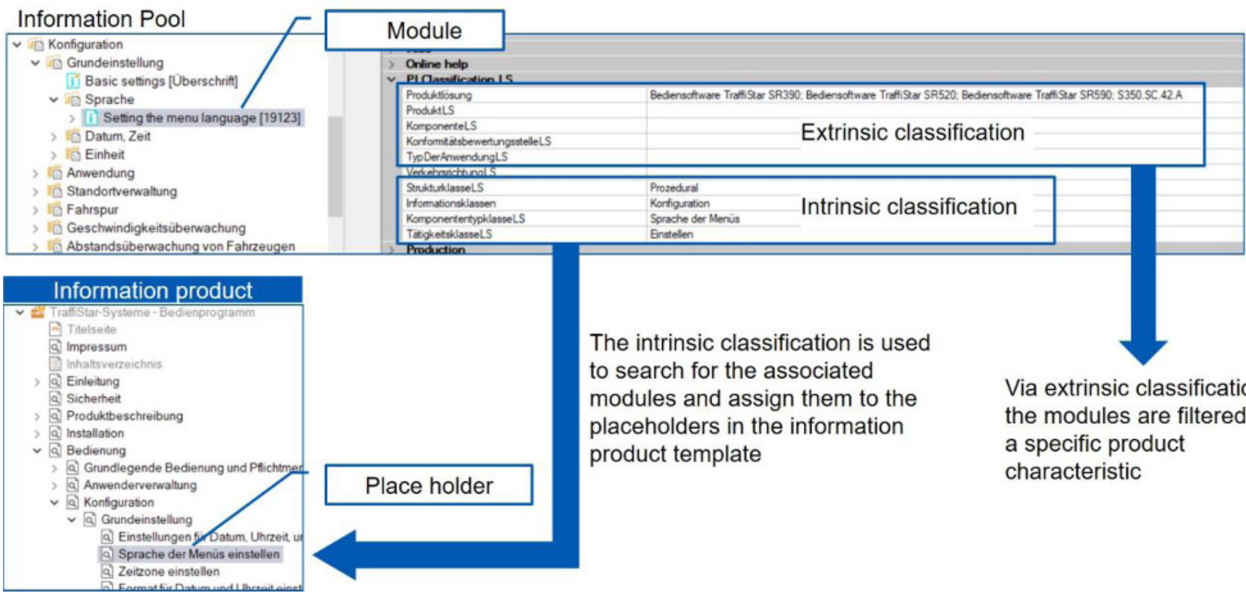

Fig. 10: Example of the application of a PI classification with intrinsic and extrinsic metadata.

6 Automation

With the standardization introduced in the practical example and the structure for the information products mapped as a template, modularization with variant management, and PI classification, the first product lines are already mapped in CCMS Schema ST4. The project configurator integrated in CCMS can be used to configure and automatically generate the documentation for the customer-specific product version.

In the first step, the template of the desired information product with the placeholders is loaded into the project configurator. The next step involves the configuration of the desired product version. Using the PI classification, the project configurator searches for the valid intrinsic and extrinsic modules from the CCMS information pool for the selected configuration. The modules found are displayed in a hit list. During production, the placeholders are replaced by the valid modules and played out as a document.

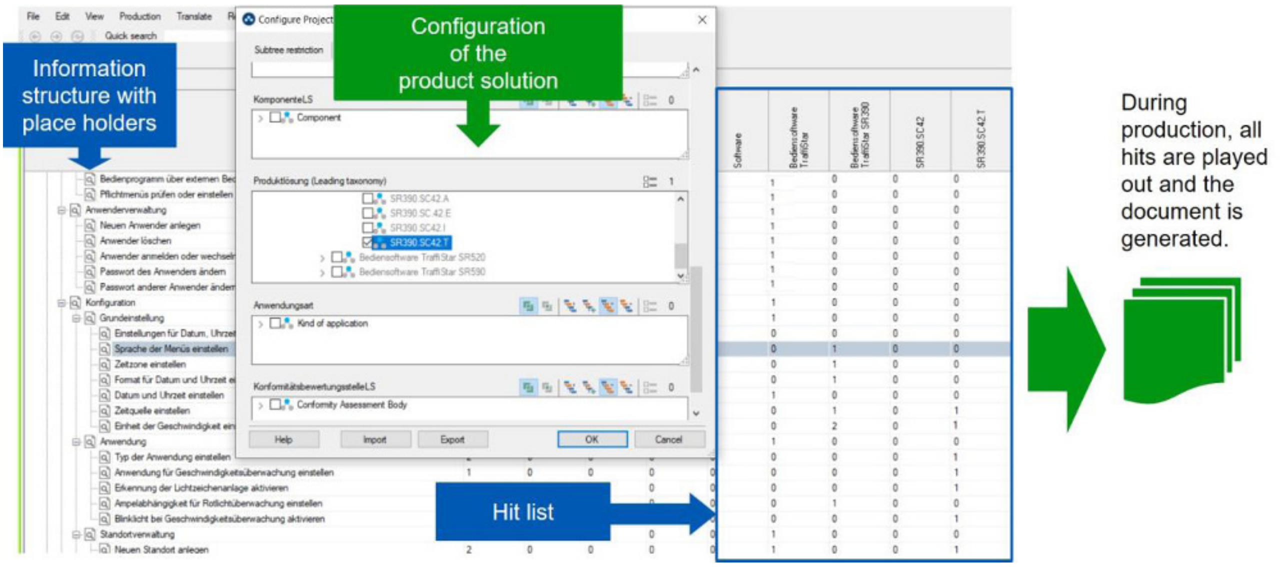

Fig. 11: Example of automation of documentation in CCMS Schema ST4

7 Outlook

As already shown, the focus in the practical example is initially on optimizing the standardization, modularization and classification of the information products and modules as well as the implementation for further product lines.

To ensure that product structures and configuration options as well as product relationships and characteristics for classification in the CCMS become clear early on in the development phase, the introduction of a semantic model for the products is planned as the next level of documentation automation. Based on the semantic model, the structures of the information products, the required modules, variant management and the required PI classification will be derived for each product as part of content engineering and implemented for a next level of automation in the CCMS. The aim of these measures is to ensure that documentation is generated from the CCMS in an automated and efficient manner for the individual configuration of a customer-specific product solution, tailored precisely to the product and the target group, and thus complying with the normative and legal requirements [9].

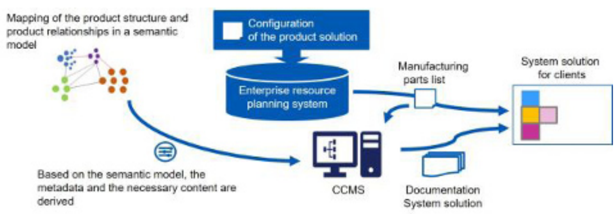

Fig. 12: Further steps for automating documentation

With all measures for the improvement of standardization, modularization and classification, we expect a cost reduction in the production of customer-specific documentation through automation. The aim is to achieve a quantifiable improvement in the distribution of fragments per module and the resulting higher number of module reuses as a parameter for the range of the modules.

Summary

The article shows a company with a product portfolio that is characterized by a highly configurable modular system of hardware and software based on individual customer requirements. With the help of standardized key figures from the CCMS introduced in the company, it can be shown that the product portfolio under consideration has a direct influence on content engineering. The standardization, modularization and classification of content as basic building blocks for the implementation of documentation automation can be analyzed via the quantitative statements of the key figures and the effectiveness of optimization measures can be checked. With the continuous optimization of content and the planned measures for the automation of documentation, the goal of efficient and effective production of customer-specific documentation is continuously pursued.

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