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# Technical Documentation 4.0

How the latest trends in manufacturing lead to new paradigms for technical writers

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# Technical Documentation 4.0

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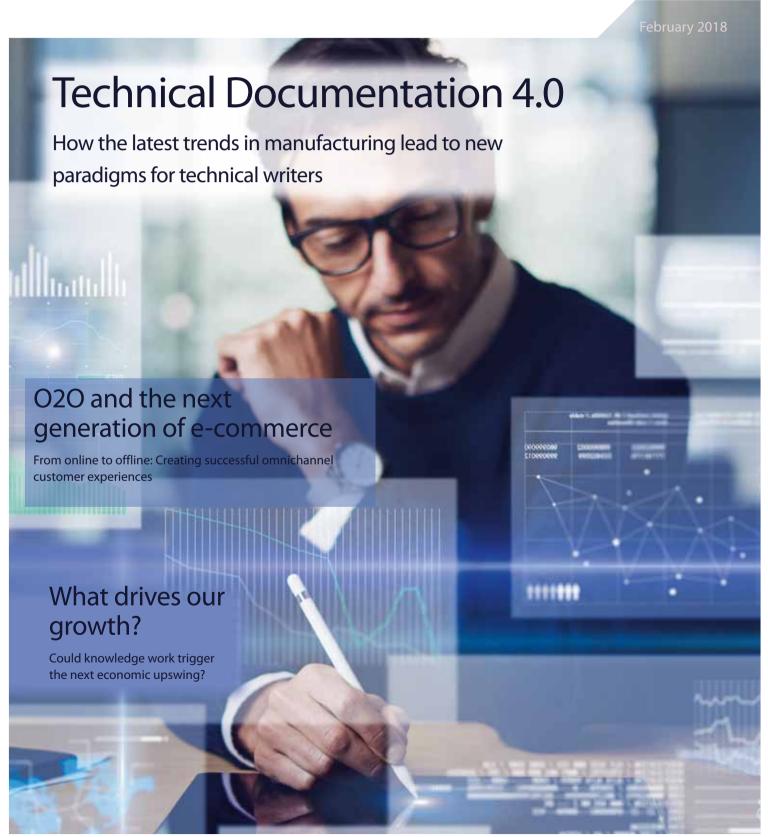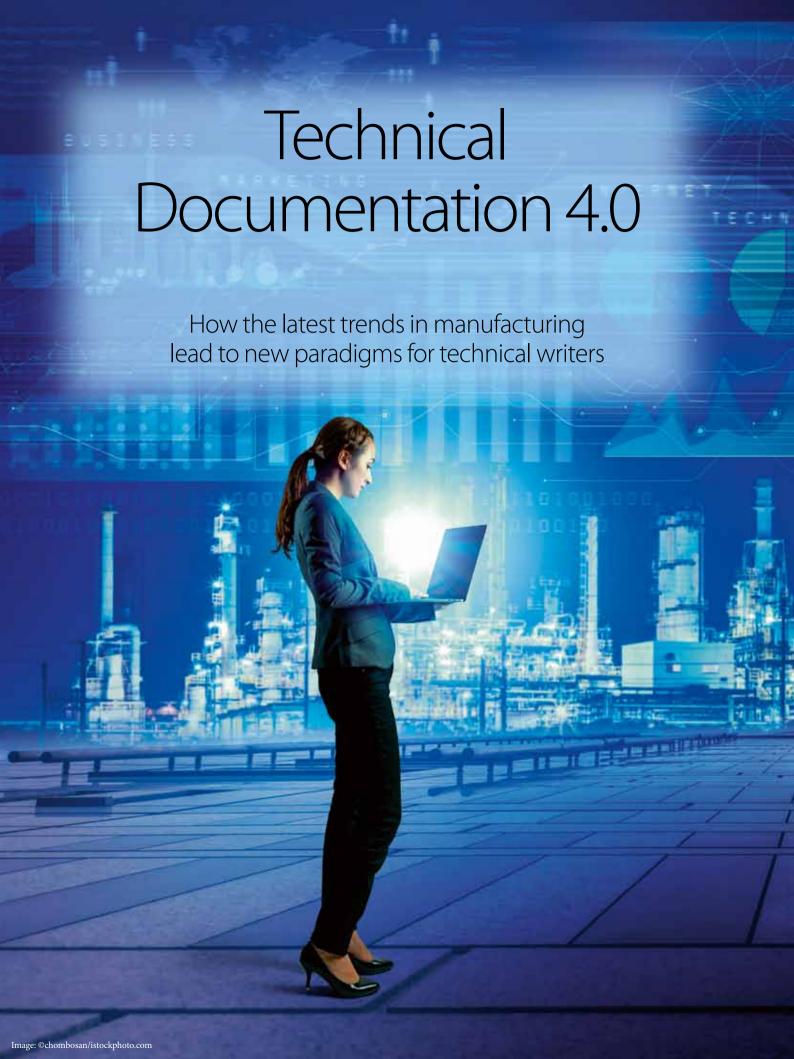lead to new paradigms for technical writers

Text by Jan Oevermann

The manufacturing industry is facing yet another revolution that transforms the way machines, humans and factories work together: Industry 4.0 – a term introduced by the "High-Tech Strategy 2020" of the German government [4]. The version number of this buzzword refers to the 4th industrial revolution, putting it in direct lineage to the first industrial revolution, which changed the world forever. Skeptics dismiss the term as hype but nobody can deny that the main characteristics of Industry 4.0, such as mass customization and the merging of products and services, are visible throughout the market.

Industry 4.0 summarizes multiple smaller trends in manufacturing, including the advance of cyber-physical systems, predictive maintenance and smart factories [4]. The rise of applications powered by Artificial Intelligence is another tangible characteristic in the progress of automated manufacturing [3]. All industries, from bakeries to banking, are affected by a global digitalization driven by market demand and the need to increase efficiency.

But what about Technical Documentation 4.0? Which challenges will technical writers face in the next decade and how will it change the way documentation is written and published? How does content have to be structured to fit into processes fueled by ever-growing amounts of data in a smart factory? Are we ready?

## From products to services

A radical change that comes with Industry 4.0 is the ongoing transformation from products to services. While sectors like software (SaaS), building utilities (Cooling-as-a-Service) and aircraft engines (Power-by-the-Hour) have already established profitable service models, most manufacturers are still in the early stage of "servitization" of their products [2].

Companies that provide their products and maintenance services on a subscription-based model have an increased interest in reducing the operation times of service technicians. This can be achieved, for example by reducing the time a technician needs to find the necessary information for a task [1]. To make this kind of targeted

access to important content possible, information must be shaped in certain ways that are different from how they are presented today.

The increasing value of content results in new business models, such as "Information-as-a-Service", where customers pay to receive additional content or metadata of better quality. This can already be observed in sectors such as heavy machinery, where service manuals must be purchased by customers through web shops embedded in content delivery portals.

## Smart factories require smart documentation

Another recent development is the smart production line, built from semi-autonomous components of different manufacturers that communicate with each other or via a control station using standardized protocols. If single components are added or changed, the whole production line can automatically adapt itself to the new configuration. While this advanced machine-to-machine communication is already in production, the digital manuals for these components are static and not able to adapt to changes. This seems a bit anachronistic in times of smart factories.

With these modularized and interconnected factories becoming a reality, it is counterintuitive that technical documentation is still delivered in monolithic document formats lacking structural information and metadata, especially when these documents were published by component content management systems containing the additional information. The cause for this lies in strict legal requirements, lack of exchange standards, and a notoriously conservative manufacturing industry.

## Information becomes intelligent

However, in the past years a concept called "intelligent information" has gained interest in the technical documentation sector, promising a solution for the dynamic delivery of content [5]. The term describes content that is modularized in self-contained topics and enriched with classifying metadata. Due to this, a granular and targeted access to information becomes possible, which allows the integration into data-driven processes. For example, a predictive maintenance event could trigger the request for the appropriate service procedure already filtered by machine type, affected component, and target group [1].

The underlying concepts of intelligent information – modularization and classification – are not new or revolutionary, but in the context of Industry 4.0 they become more important than ever. Semantic access to information can work across different data sources and software but often fails due to heterogeneous metadata concepts.

The harmonization of metadata can be managed by company-wide standardization or through divisional mapping. Relations between different lifecycles of production, assemblies and functions can be expressed by ontologies. However, it is important to keep in mind that this is first and foremost a methodical process and not a technical problem.

## New challenges for technical writers

Due to the importance of metadata and classification concepts, the methodical knowledge of technical writers will remain crucial for bringing information into the proper shape for dynamic content delivery outside the document context. As experts of metadata-driven content creation, they will evolve into knowledge managers and work at the intersection of production and IT.

Technical writers must embrace a systematic component content management approach to future-proof their work and review requirements for metadata not only in the documentation department, but also in other areas of the company where the content is being used. Only this prerequisite enables a tight linking of processes, components and corresponding content [9]. Classification frameworks, like PI-Class® or the standardized iiRDS relation model, can help to develop these universal metadata concepts. In the past, metadata was mainly used internally by technical writers; however, with new use cases this shifts to an external utilization of this valuable additional information.

Context will be another important factor to consider when writing documentation, as there will no longer be any surrounding content as in documents, but instead, single self-contained topics will be presented, based on situational parameters like position, role and task. This leads to a radical change in information consumption, which technical writers must keep in mind.

## Quality over quantity

Precise information access relies on unambiguous and distinct data points for good results. With an increasing number of content components and associated metadata, data quality will become a new challenge that technical writers have to face. Not only will it be crucial in keeping the ever-growing content database free from duplicates and uncontrolled variants, but it will also be important for consolidating metadata into a process of continuous improvements.

Due to the wealth of information it is often impossible to control quality manually. Therefore, software tools for analyzing and reporting data quality are indispensable [5, 6]. These helpers can find semantically similar texts, incorrect metadata entries, and content components that are not (re)used.

## New splendor for old content

While new documentation will be written with metadata in mind and prepared for contextualized delivery, valuable legacy content is often excluded from Industry 4.0-style use cases due to its document-oriented format and presentation. Most companies are not willing to invest the time and manpower to transform existing manuals into intelligent information and are, therefore, limited to new content (and often new products) to provide users with more dynamic scenarios where granular access to topics is necessary [7]. The differences in content quality and access methods often rupture the user experiences.

AI and other computational methods can be a solution to these problems. Approaches based on Machine Learning can already be applied in real-world scenarios to annotate, segment and classify technical content to enhance legacy data for content delivery portals. Combined with human quality control, it becomes feasible to process even large numbers of documents in an automated fashion and provide the same retrieval and filtering methods for older as well as new content.

Image: © Kinwun/istockphoto.com

*Image 1: In the smart factory, components of machinery can communicate with each other, enabling processes that need little human intervention.*

## Integration needs standardization

With Industry 4.0, new use cases emerge that combine content from various data sources. Production lines with documentation material from various vendors that use different metadata are a case in point. A service technician who needs access to service reports, technical documentation and predictive maintenance messages is another example. To make these use cases work and to achieve a seamless integration, standardization of metadata and data formats is necessary.

To tackle these problems, a working group at tekom has developed a new standard named iiRDS (intelligent information Request and Delivery Standard) [8].

Based on semantic technologies, it provides a basic ontology for expressing relations and metadata in technical communication along with a standardized data format to allow for an easy exchange between various software tools. With Industry 4.0 usage scenarios in mind, iiRDS includes mechanisms to combine documentation from a variety of vendors and data sources as well as structuring information compliant with relevant norms. It enables applications to provide information units dynamically according to context and usage scenario, and can serve as a framework to build custom semantic models for content and products [8].

## The times they are a-changin'

Buzzword or not, the changes that are coming with Industry 4.0 and the gradual digitalization of companies will transform the way technical writers work. New challenges, like individualized product documentation and dynamic user assistance, require that content is provided as intelligent information.

Now is the time for a paradigm shift in technical documentation – away from document-based product manuals towards a service-oriented content delivery. To be ready for future usage scenarios, technical writers need to adapt methodical concepts like modularization and metadata models and start to provide their content in a standardized format.

The sector of technical documentation is well equipped with methods and technologies to face the new challenges that come along with Industry 4.0. Now it's up to us to start a revolution!

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