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## Action Management – Status, Requirements And Implementation Strategies For SMEs

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### Abstract

Due to its great importance for a successful planning, control and improvement of business processes, action management is long established as essential management process in most companies. However, there is often a strikingly large gap between claim and actual implementation of action management. While internal and external requirements for action management are continuously increasing, its actual implementation – especially in small and medium-sized enterprises (SMEs) – is already often quite incomplete today.

First, this paper introduces in the topic field of action management as part of modern management systems. In its analysis part, the paper presents the current implementation status of action management in companies focusing on SMEs and portrays software-technical implementation possibilities. Taking into account the resulting fields of action, possible strategies to implement action management in SMEs' business processes in a more profitable way are presented. In the sense of a socio-technical overall system, not only methodical issues but also information-technical and organizational aspects are discussed. By means of a developed prototype and taking into account a concrete use case from industry, the characteristics, procedure, potentials and current limits of the proposed solution are critically evaluated and recommendations for action are illustrated. Finally, the paper ends with a summary, a discussion and an outlook towards future trends.

### Keywords

Process Management; Action Management; Planning and Control; Implementation Strategies; SMEs

### 1. Action Management as part of integrated management systems

Action management has long become an important management topic in companies around the world. In all areas and departments of a company there are many actions to be taken every day – both at a strategic and at an operational level – and its number is constantly rising due to increasing internal and external requirements. In this context, the effective and efficient planning and implementation of actions are mayor goals that all companies try to achieve with an expedient, systematic and seamless action management.

The great importance of actions is described in many sources and standards, foremost in ISO 9000:2015. According to [1] an action is defined as an “activity to achieve something”. In this context, actions can be subdivided into “actions related to nonconformities” and “actions on a product or a service”. Actions related to nonconformities can be preventive actions, corrective actions or corrections, actions on a product or a service are reworks, repairs or scraps. What all actions have in common is their novelty and uniqueness.

According to [2] and [3] “action management” describes the process of a company or an organization how to plan, implement, monitor, control and report actions to solve problems or challenges or to achieve specific

goals. The two key criteria for a successful action management are its effective and efficient implementation, both from a methodical, information-technical and organizational point of view.

In analogy to the PDCA cycle (PDCA: plan-do-check-act) the process of action management consists of four phases: plan actions (P), implement actions (D), check effectiveness (C) and ensure results (A). In the first phase “plan actions”, all relevant actions are defined and described and one responsible person per action is assigned. In order not to get bogged down in all the arising actions, setting the right priorities is of crucial importance. The second phase “implement actions” contains the implementation as well as the monitoring and control of the defined actions. The next step is to check the effectiveness of the implemented actions using defined criteria and a comparison between target plan and actual state is carried out. The last phase “ensure results” includes the orderly completion of actions as well as their documentation and reporting. The central document that is relevant for all phases of action management process is the action plan [4].

To meet the constantly increasing internal and external requirements and objectives in a reliable and systematic way, companies mostly have established topic-specific management systems. According to [5] a management system describes the way how companies organize their structures and processes to act systematically, ensure smooth processes and achieve their objectives. These objectives can relate to a number of different topics such as product and process quality, operational efficiency, environmental performance and many more. Management systems like quality management systems, environment management systems or even sustainability management systems [6] follow the so-called “High Level Structure” (HLS) that is defined in the respective ISO standards like ISO 9001 (quality), ISO 14001 (environment) or ISO 26001 (sustainability) [7]. Due to its central character, action management is part of all relevant management systems (Figure 1).

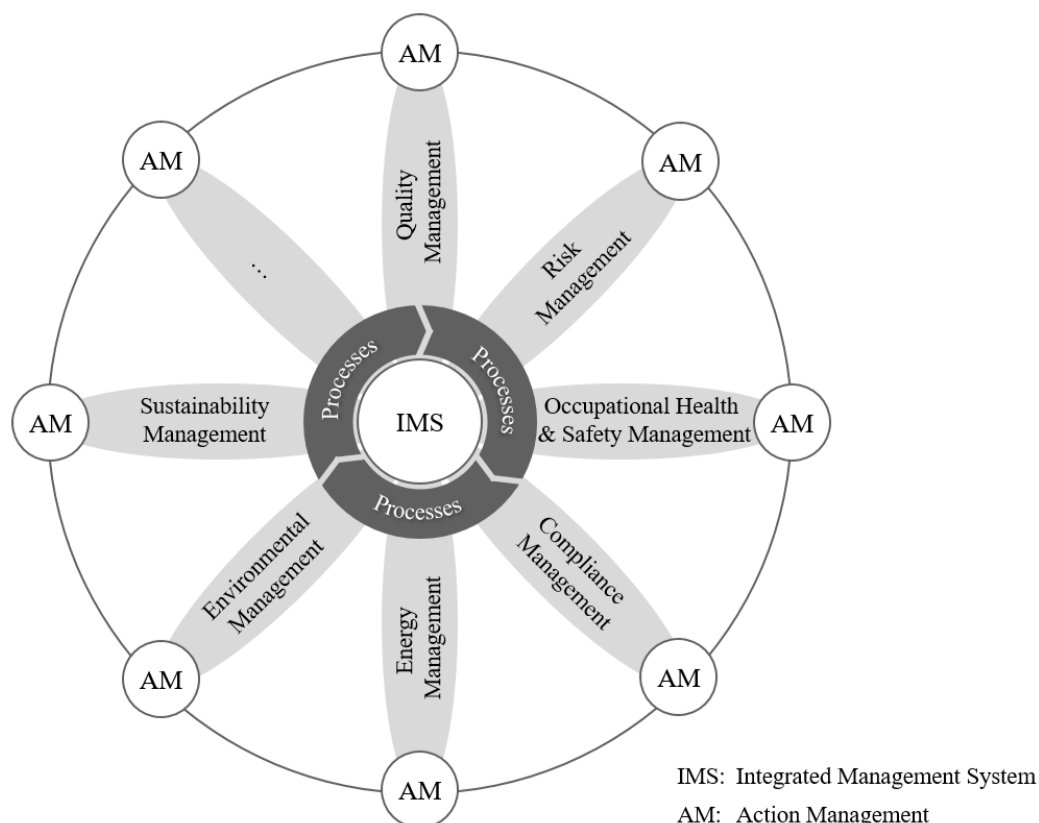


Figure 1: Action management in the context of an integrated management system

As illustrated in Figure 1 and as described in [8], an integrated management system (IMS) combines various management systems into a single, overall comprehensive and harmonized management system. This integrative approach provides a valuable overview of all relevant business processes and enables a consistent planning and control of them. Moreover, an IMS increases the transparency, effectiveness and efficiency of

all business structures and processes by creating valuable synergies. The ultimate goal of an IMS is the increase and the systematic continuous improvement of the corporate performance.

## 2. Implementation status of action management in SMEs

### 2.1 Sources for actions in companies

Due to the huge number of internal and external requirements and the high number of departments, teams and projects in companies, there is a huge and constantly increasing number of sources for actions. Sources for actions can be subdivided into department-specific sources such as FMEA's, simulation studies, quality circles or customer complaints and general (cross-sectoral) sources like meetings, audits, reviews, ideas, risk evaluations or data analyses. Actions arise along the entire product life cycle, they arise both from day-to-day operations (e.g. meetings), from projects and from strategic processes (e.g. risk analyses) and they can vary in complexity, scope and duration. The enormous variety and quantity of actions make it necessary to prioritize them absolutely clearly. Some actions are quite simple and can be implemented rather quickly, while others are very complex and require long-term planning and implementation.

### 2.2 Software solutions for action management

As portrayed in Figure 2, there are three “software classes” to realize action management in companies.

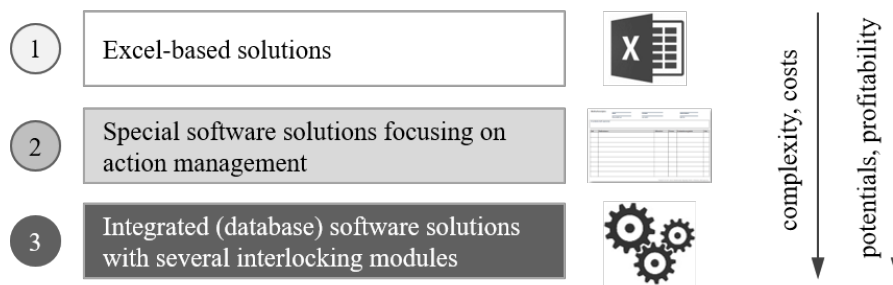


Figure 2: Classes of software solutions for action management

Due to their numerous advantages and future-oriented potentials, the software group of “integrated (database) software solutions with several interlocking modules” is considered in more detail below. In the context of action management, the two software groups of CAQ/ QMS (CAQ: Computer-Aided Quality Assurance, QMS: Quality Management System) software and IMS software are exemplary presented.

CAQ/ QMS software support companies to assure and improve the quality of their products, processes and services. Based on a central data backbone, different aspects of quality management like the definition and implementation of quality goals using specific QM methods and tools (QM: quality management) can be realized in an effective and efficient way. Moreover, CAQ/ QMS software enable companies to meet different customer- and standard-based QM requirements (such as according to ISO 9001). Nevertheless, focusing on SMEs, CAQ/ QMS software also have some drawbacks, foremost their complexity and the associated costs [9]. These two critical aspects refer not only to the purchase and maintenance of the software, but also to the training of the employees or to the information-technical integration of the software into the existing software environment of the company. Moreover, according to the knowledge of many change management projects, the great software complexity often leads to a lower user acceptance, which is a critical aspect to successfully introduce the new software in operational practice [10]. Companies need an appropriate IT strategy to answer the difficult question what topics and goals should be realized by what kind of software solutions or by what software modules. This situation is aggravated by the fact that you can realize different functions and topics by using different IT solutions [11]. For example, the implementation of action management can be realized either using respective modules of CAQ/ QMS or IMS software.

As shown in Figure 1, IMS software supports the integration of multiple management systems such as quality management and environmental management. It enables all management processes to be managed in a profitable way resulting in increasing quality, cost and time issues and it supports the fulfilment of requirements for various certifications (e.g. according to ISO 9001) by using one integrated IT platform. Apart from all these potentials, there are also some drawbacks using this kind of software similar to the use of CAQ/ QMS software solutions such as its complexity as well as quite high purchase, maintenance and integration costs.

As described above, all integrated software solutions like CAQ/ QMS software or IMS software have special foci and individual advantages and drawbacks. Therefore, the software selection should be aligned with the corporate strategy and the individual company requirements.

### **2.3 Implementation status in SMEs**

The current situation in SMEs shows that there is often no systematic and seamless process to identify the causes of actions, to prioritize and implement the actions or to evaluate the recommendation for action in a consistent way. The assessment of the need for actions rarely takes strategies and goals into account, which often leads to insufficient effectiveness. There is often no systematic planning of the required resources and everyone (or every department) manages 'its actions' in different IT tools (e.g. Excel) using different standards and methods. Action prioritization is often done without a methodical basis, which not rarely leads to unnecessary discussions, chaos or even more important problems (e.g. if risk-related actions were incorrectly evaluated). As a result, there are often redundant works and poorly targeted actions with low effectiveness and efficiency. Counterproductive actions can cause additional efforts and lead to confusion. Due to missing transparency and incomplete monitoring and control methods, actions sometimes 'disappear', the tracking of actions is often not really comprehensible and a systematic CIP (CIP: continuous improvement process) is just rarely executed [12].

### **2.4 Requirements for the implementation of action management in SMEs**

This section introduces the requirements for the implementation of action management in SMEs, which serve as common thread both for the evaluation of the implementation concepts (chapter 3) and the developed prototype (chapter 4).

The requirements for the implementation of action management in SMEs can be subdivided into three main groups: technical, economic and organizational requirements. All relevant criteria were gained and clustered by interviews of experts in the context of action management and by literature surveys such as [12].

The most important technical requirement is surely the fulfilment of all needed functions to plan, implement, monitor, control and report actions (e.g. use of an appropriate action plan). SMEs must ensure that their sensitive data (e.g. customer or internal data) is protected from unauthorized access and misuse. To support the SME's business processes, reliability is another important factor. Flexibility and a simple software customization (adaptations, extensions) is needed, as the SMEs' circumstances and needs may change over time. To realize a seamless, efficient and cross-sectoral dataflow, the used software should have appropriate workflow functions and it should be able to be smoothly integrated into the existing IT landscape (e.g. via appropriate interfaces) without causing too much efforts.

Due to the limitations of financial and human resources, economic requirements are also of great importance for SMEs. These requirements mainly refer to acquisition, training and ongoing operating costs.

Regarding organizational issues, a simple and intuitive usability as base for a sustainable user acceptance is a key requirement. In order to plan, monitor and control the actions, transparency, simple and efficient reporting possibilities and an adaptable authorization concept is very important. An authorization concept ensure that only authorized users or user groups can access and manipulate the respective actions to make changes.

Apart from the information-technical integration of the software solution, a low-effort introduction of the new software in the organization in the sense of a smooth change management is also of great importance.

### 3. Implementation concepts of action management in SMEs

#### 3.1 Implementation concepts

In general, there are several possibilities and concepts to implement action management in operational practice. As shown in Figure 3, in this chapter three different implementation concepts are presented: ‘use of decentrally organized, area-specific software solutions’ (concept 1), ‘use of a centrally organized, simple software solution’ (concept 2) and ‘use of a centrally organized, integrated software solution’ (concept 3).

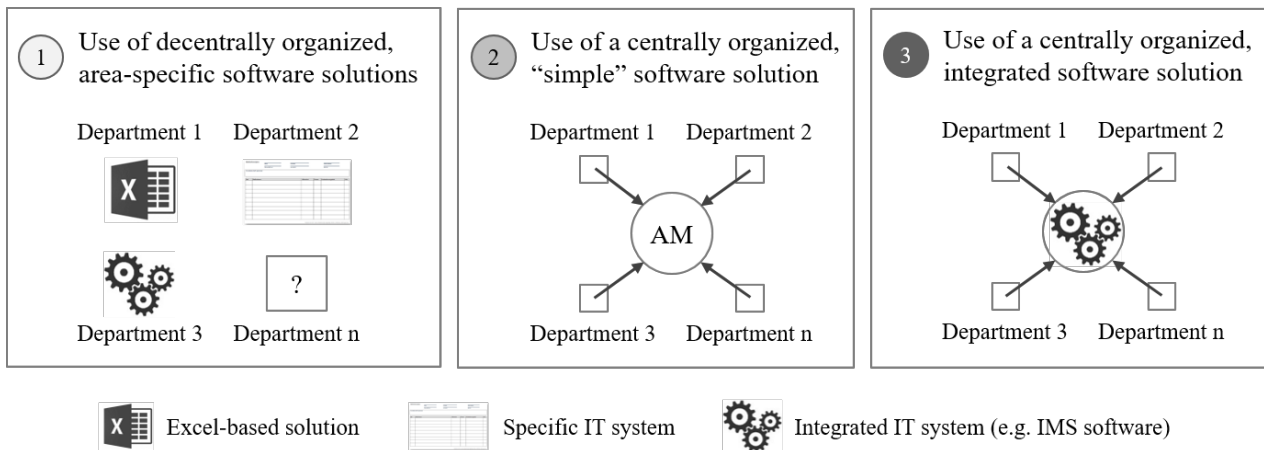


Figure 3: Implementation concepts for action management

In the context of concept 1, each department (e.g. production planning) decides for itself which software (e.g. Excel, special software) is best suited for action management, what enables better alignment with the needs of the business unit. The big advantage of using Excel as tool for action management is that it fundamentally works, every employee is familiar with it and there are no additional costs for the company. However, if action management is decentrally organized, there is no consistent, cross-sectoral procedure how to plan and implement actions. While department ‘A’ uses its specific software and procedure, department ‘B’ probably uses different ones. Therefore, it is hardly possible to realize an automated cross-sectoral workflow, there is no transparency about the whole action management process and there is also no possibility to get a central overview about all actions of the company, which lead to a significant loss in process effectivity.

From information-technical point of view, concept 2 could be exemplary realized by using MS SharePoint. Many companies already use such a centrally organized, ‘simple’ software like MS SharePoint, which saves additional costs. It offers a good and easy way to centrally store data and make it accessible to all employees in the company. Using a central software also makes it easier for IT administrators to make adaptations and upgrades, which simplifies monitoring and maintenance efforts. However, also such a ‘simple’ software solution like MS SharePoint can be quite complex and requires a certain level of IT knowledge to configure and customize it with regard to the needs of action management. To realize a seamless data flow, the central software solution has to be integrated in the existing IT environment (e.g. via links or via data interfaces).

The general advantages and disadvantages of using a centrally organized, integrated software solution like an IMS software was already discussed in chapter 2.2. By using a central data backbone, it is quite easy to import and export data to and from other IT tools, there is a consistent data management, automated workflows can be realized and a variety of reports and analyses are available. Apart from high acquisition and maintenance costs (e.g. to integrate this software into the existing IT environment), a further drawback is the dependence on the software vendor and low flexibility to adapt the software to the specific companies’ needs.

### 3.2 Evaluation of the implementation concepts

To compare and evaluate the implementation concepts in an objective way, a cost-benefit analysis using the requirements from chapter 2.4 is used. The weighting of these criteria were done by experts using the method ‘pairwise comparison’ [13], the scoring is scaled from 1-5 points (5: best possible fulfilment) and KO criteria are defined. The cost-benefit analysis illustrates that the best implementation concept for action management in SMEs is the use of a centrally organized, simple software solution according to concept 2 (Table 1).

Table 1: Evaluation results of the implementation concepts using a cost-benefit analysis

criteria	KO	weighting	concept 1		concept 2		concept 3	
			points	value	points	value	points	value
technical		40		105		165		170
functions (e.g. action plan)	x	10	4	40	5	50	5	50
data security/ reliability	x	10	3	30	4	40	4	40
flexibility/ adaptability		5	4	20	5	25	3	15
(cross-sectoral) workflow		5	1	5	4	20	5	25
integration	x	10	1	10	3	30	4	40
economic		30		135		135		70
acquisition costs	x	15	5	75	5	75	2	30
training costs		5	4	20	4	20	2	10
ongoing maintenance costs	x	10	4	40	4	40	3	30
organizational		30		106		128		120
simple usability	x	8	5	40	5	40	4	32
transparency		4	1	4	4	16	4	16
reporting		4	2	8	4	16	5	20
authorization concept	x	8	3	24	4	32	5	40
software introduction		6	5	30	4	24	2	12
total		100		346		428		360
ranking			3		1		2	

## 4. Information-technical implementation

### 4.1 Software-technical prototype

In general, there are several appropriate software solutions to realize the recommended implementation concept presented in chapter 3. One popular and widespread software that meets all these imposed requirements is MS SharePoint, which is used for developing the software-technical prototype.

As shown in Figure 4, the classification criteria for a defined action are for example its title, priority, status, topic and trigger. The ‘action title’ should be succinct to make the action clear to the relevant persons. The ‘action priority’ specifies the importance and urgency of the action; it can be exemplary carried out by using the Eisenhower principle [14]. The ‘action owner’ has to select the ‘action status’ (‘open’, ‘in progress’ or ‘completed’) and in the input field ‘topic’, an already existing topic can be chosen or a new one can be manually added. The action field ‘trigger’ describes the cause for the action. To make it as simple as possible, there are several preconfigured options such as ‘audit deviation’ or ‘suggestion for improvement’. Further classification aspects, which are also realized in the developed prototype, are the associated ‘management system’ (e.g. ‘quality management’ or ‘sustainability management’), a ‘short description’ of the action, the ‘due date’ when the action should be completed, the ‘action owner’ who is responsible for the implementation of the action and the ‘effectiveness assessor’. If the verification is successful, the assessor confirms that status and the action gets the status ‘completed’. To reduce the effort of data entry, not all input fields are declared as mandatory fields (marked with ‘\*’ in Figure 4). In order to pass the entire process of action management in a most profitable way, there is a defined workflow behind the whole procedure.

The image shows a form interface for creating an action. It includes a 'Title' field, a 'Priority' section with radio buttons for 'A', 'B', and 'C', a 'Status' dropdown menu currently set to 'open', a 'Topic' text input field with the placeholder 'Enter term', and a 'Trigger' text input field with the placeholder 'Enter term'. Each input field has a small green icon to its right.

Figure 4: Extract of the software-technical prototype for action management using MS SharePoint

If the actions are created using the described procedure, there is the simple possibility to get a central and compact overview about all actions. Figure 5 exemplary shows such an overview about all available actions considering a special, preconfigured authorization role according to the defined authorization concept.

Actions <span style="color: red;">△</span>						
Title <span style="color: red;">▼</span>	Status <span style="color: red;">▼</span>	Priority <span style="color: red;">▼</span>	Topic <span style="color: red;">▼</span>	Management system <span style="color: red;">▼</span>	Due date <span style="color: red;">▼</span>	
specify means of work	<span style="color: red;">🔗</span> in progress	A	means of work	environment	31.03.2023	
assess new packaging materials	<span style="color: red;">🔗</span> in progress	A	packaging	sustainability	31.03.2023	
check documents	<span style="color: red;">🔗</span> open	B	documentation	quality	31.03.2023	
introduce FMEA method	<span style="color: red;">🔗</span> in progress	A	QM method	quality	30.04.2023	
train employees	<span style="color: red;">🔗</span> open	A	hazard	quality	30.04.2023	
perform hazard assessment	<span style="color: red;">🔗</span> open	A	training	information security	15.05.2023	

Figure 5: Overview about all available actions in MS SharePoint

#### 4.2 Evaluation of the software-technical prototype

As portrayed in Table 2, the developed prototype meets most of the technical, economic and organizational criteria in a quite good way. It impresses with its simple usability, its transparency, with a well established authorization concept and simple possibilities to introduce the software into operational practice. All basic functions of action management such as the seamless use and processing of an action plan are implemented and the requirements for the topics of data security, data reliability, flexibility and adaptability are mostly or even fully met. The use of seamless, cross-sectional workflows is fundamentally possible, even though there are some ‘cosmetic’ limitations (e.g. visualization possibilities). MS SharePoint can be easily integrated into existing IT environments and into defined processes without having too much effort (e.g. via defined links). So, the gaps between the used IT systems can be easily bridged. The possibilities of generating reports or graphical dashboards out of MS SharePoint are currently quite limited. However, for these purposes, there are technical possibilities to connect MS SharePoint to appropriate IT systems (e.g. to Power BI).

Table 2: Evaluation results of the developed prototype

criteria	KO	degree of fulfilment
<b>technical</b>		
functions (e.g. action plan)	x	●
data security/ reliability	x	◐
flexibility/ adaptability		◐
(cross-sectoral) workflow integration		◐
integration	x	◐
<b>economic</b>		
acquisition costs	x	●
training costs		◐
ongoing maintenance costs	x	●
<b>organizational</b>		
simple usability	x	●
transparency		●
reporting		◐
authorization concept	x	◐
software introduction		◐

● Requirement fully met

◐ Requirement mostly met

◑ Requirement partly met

◒ Requirement met below average

○ Requirement not met

## 5. Summary, discussion and outlook

As presented in chapter 3, the most appropriate concept for action management in SMEs currently tends to be the use of a centrally organized, simple software solution like MS SharePoint. While the use of integrated software solutions like IMS software has great benefits in large industries, due to economic reasons its use is usually not (yet) worthwhile in SMEs. With respect to the pure need of action management, the technical possibilities of MS SharePoint are similar to the functionalities offered by powerful IMS software solutions.

However, the profitable implementation of action management is just one of various challenges that companies have to face. Further challenges like the profitable integrated implementation of different management systems like quality management, risk management or sustainability management have to be mastered – also within SMEs. In future, the objective will be less and less the development of very effective local solutions (like action management), but more about finding the most profitable overall solution from technical, economic and organizational point of view. And exactly that is the great strength of integrated software solutions.

It surely depends on the strategies, objectives, framework conditions and the risk appetite of each SME, but due to their great multifaceted potentials, integrated software solutions will certainly play an increasingly important role in future. Some meaningful advantages and potentials of such software solutions will be:

- Higher effectivity and efficiency using standards and AI (AI: Artificial Intelligence) algorithms [15]
- Simple realization of seamless, cross-sectoral workflows
- Simple and uniform visualization, analyses and reporting possibilities
- Simple information-technical integration due to standardized system interfaces
- Decreasing acquisition and ongoing costs due to tailored SME solutions
- Simple usability due to one uniform and user-focused software interface

The rapid developments in the fields of digitalization and AI will certainly contribute to the fact that the use of integrated software solutions like IMS software is becoming more and more profitable at an ever faster pace – also for SMEs. Apart from the development of all these (information-)technical potentials, the biggest challenges for SME will certainly be the smooth organizational introduction of these powerful software solutions aiming to a sustainable acceptance of their users. In this context, the topic of change management will be of great significance [16].



## References

- [1] DIN EN ISO 9001, 2015. Quality management systems – Fundamentals and vocabulary (ISO 9000:2015).
- [2] Alwert, K., Will, M., 2014. Leitfaden Maßnahmen managen. Fraunhofer-Institut für Produktionsanlagen und Konstruktionstechnik IPK.
- [3] Cockburn, T., 2009. Action Management: Strategies, Implementation, and Outcomes, SSRN Electronic Journal.
- [4] Schaefer, J., 2018. “The action plan” – A planning-focused exercise, in: Proceedings of the Strategic Religious Peacebuilding conference, Washington.
- [5] DQS Homepage, 2023. <https://www.iso.org/management-system-standards.html>, last accessed 2023/03/22.
- [6] El-Haggag, S., Samaha, A., 2019. Sustainability Management System. Roadmap for Global Sustainability – Rise of the Green Communities, Springer, pp. 49-58.
- [7] ISO Homepage, 2023. <https://www.iso.org/management-system-standards.html>, last accessed 2023/03/22.
- [8] Koubek, A., Pölz, W., 2014. Integrierte Managementsysteme – Von komplexen Anforderungen zu zielgerichteten Lösungen, Carl Hanser Verlag München.
- [9] Nguyen Duc, A., 2017. The Impact of Software Complexity on Cost and Quality – A Comparative Analysis Between Open Source and Proprietary Software, International Journal on Software Engineering and Application, vol. 8 (2), pp. 17-31.
- [10] Nienhuis, J., 2014. Using Change Management to Improve CRM User Acceptance, School of Management and Governance & Electrical Engineering, Mathematics and Computer Science, University of Twente.
- [11] Burr, H., Vielhaber, M., Deubel, T., Weber, C., Haasis, S., 2004. CAx/EDM-integration – enabler for methodological benefits in the design process, Proceedings of the 8<sup>th</sup> International Design Conference – DESIGN 2004, Dubrovnik, Croatia, pp. 833-840.
- [12] Kölsch, R., 2012. Maßnahmenmanagement, DGQ Meeting, Karlsruhe, Germany.
- [13] Ramik, J., 2020. Pairwise Comparisons Method – Theory and Applications in Decision Making. Springer; 1<sup>st</sup> ed. 2020 Edition, ISBN-13: 978-3030398903.
- [14] Covey, S., 2012. Focus – Achieving Your Highest Priorities, Audio book.
- [15] Kiefer, J., Ollinger, L., Precht, M., Beer, K., 2023. Potentials, limits and challenges of using data science methods to improve quality processes in manufacturing industry, Proceedings of the 17<sup>th</sup> Multi Conference on Computer Science and Information Systems, Porto, Portugal, pp. 269-276.
- [16] Kotter, J. P., 2012. Leading Change, Harvard Business Review Press, ISBN: 978-1422186435.

## Biography



**Jens Kiefer** (\*1978) studied production engineering at the Saarland University. After finishing his PhD thesis in 2007, he had been working in different positions at Daimler in the fields of production planning, lean management and digitalization. Since 2013, Prof. Dr.-Ing. Jens Kiefer has worked for the University of Applied Sciences in Ulm. His teaching, research and consulting areas are quality management, process management, digitalization and integrated management systems.



**Tara Rauch** (\*2000) studied production engineering at the University of Applied Sciences in Ulm. She wrote her bachelor thesis at Loacker AG/S.p.A., an Italian confectionery manufacturer based in South Tyrol, in the topic field of action management. Since March 2023, Tara Rauch has done a trainee program at Loacker in the field of procurement.



**Valesca Zeller** (\*1995) studied industrial engineering at the University of Applied Sciences in Neu-Ulm. After finishing her B. Eng thesis in 2023, she started to work at Liebherr in the department of industrial engineering. Before studying, she completed an apprenticeship as a technical product designer at Electrolux. Valesca Zeller has held different positions in the fields of digitalization, production planning and lean management.