



Digital Leadership in Medical Technology – Developing an Innovative Competency Profile for Successful Leadership in the Digital Age

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Abstract

This paper explores how leadership can be effectively applied in the medical technology sector amid digital transformation. The study addresses the central research question: “How and in what form can digital leadership be implemented in medical technology with regard to the competence requirements for leaders?”

To answer this question, qualitative expert interviews were conducted to identify the key challenges for leaders in the digital age. These include maintaining trust in remote settings, increasing communication demands, ensuring customer and employee engagement, managing generational differences, supporting digital transformation in clinics, and addressing high psychological stress among employees.

Based on these findings, a competency profile was developed, outlining the essential skills for successful leadership in a digitalized environment. The study reveals a shift in leadership focus from predominantly professional-methodical competencies toward social-communicative skills, while still recognizing the relevance of all four fundamental competency fields: personal competence, activity- and action-related competence, professional-methodical competence, and social-communicative competence.

The proposed competency profile includes key skills such as empathy, communication, employee development, teamwork, adaptability, trust, self-management, speed, technological understanding, analytical skills, goal-oriented leadership, initiative, and a systematic-methodical approach. These competencies provide a foundation for leadership selection, evaluation, and development programs, ensuring that leaders are equipped to navigate the complexities of digital transformation in the medical technology sector.

Keywords

Medical Technology, Digital Leadership, Competency Development, Innovation, Artificial Intelligence.

Problem statement

Digitalization has permeated all aspects of human life, impacting social, economic, and corporate structures (Handelsblatt 2023). In an increasingly digitalized and globalized world, business leaders face mounting challenges in navigating complex transformation processes. The concept of the VUCA world—an acronym for Volatility, Uncertainty, Complexity, and Ambiguity describes the unpredictable and rapidly evolving nature of

digital transformation, creating a challenging market environment characterized by information overload and instability (Lenz 2019; Bennett & Lemoine 2014a; Bennett & Lemoine 2014b; Ciesielski & Schutz 2016; Jordaan 2019). In addition, crises such as the COVID-19 pandemic have intensified the need for decentralized and flexible work models, accelerating the shift towards remote work and virtual collaboration (Handelsblatt 2020).

Under these conditions, leaders face increasing pressure to act quickly and decisively despite uncertainty and disruption (Meyer, Meijers & Hoppe 2020). However, fear of the unknown and doubts about effective adaptation strategies often lead leaders to rely on traditional leadership approaches, without assessing whether these methods are suited to the digital era. In contrast, agile leadership requires the ability to adapt dynamically, switch between leadership styles, and foster innovation (Meyer, Meijers & Hoppe 2020). The growing need for a new leadership paradigm - one defined by entrepreneurial thinking, digital fluency, and adaptability; raises the critical question of how leadership should evolve in the workplace of the future (Jordaan 2019).

Relevance of the chosen topic

One industry that has undergone profound transformation due to digitalization is the medical technology sector. The integration of advanced digital solutions, including robot-assisted procedures, artificial intelligence, imaging technologies, and telemedicine, has not only revolutionized patient care but has also fundamentally reshaped internal workflows, collaboration, and leadership dynamics (Fraunhofer 2023). The successful implementation of these technologies requires organizations to restructure traditional processes, foster digital competencies among employees, and embrace new forms of leadership. Furthermore, organizations in the medical technology industry must develop agility and adaptability to maintain a competitive edge in an environment shaped by regulatory changes, technological advancements, and global health crises (Meyer, Meijers & Hoppe 2020).

Recognizing these shifts, companies must invest in leadership development, equipping managers with the skills necessary to navigate digital transformation, drive innovation, and foster a digital mindset. In this context, digital leaders play a crucial role in facilitating knowledge transfer, enabling cultural change, and ensuring the long-term success of digital transformation initiatives (Handelsblatt 2022).

Analysis of recent research and publications

The German government, through its “Hightech-Strategie 2025,” has introduced a funding program aimed at positioning Germany as a leading producer of medical technology within the ongoing digital transformation of healthcare. This initiative specifically supports small and medium-sized enterprises (SMEs) in the medical technology sector, enhancing Germany’s role in medical technology while fostering promising technological trends (BMBF 2023). E-health applications, such as the electronic patient record (ePA) and the e-prescription, have paved the way for the future of digital healthcare in Germany. Laura Richter, a partner at McKinsey, emphasized that these digital innovations play a key role in laying the foundation for the upcoming transformation in the healthcare sector (McKinsey & Company 2022). The introduction of the ePA on January 1, 2021, aimed at improving patient care, is set to evolve into a mandatory, universal system by 2024, allowing patients to actively decide on access to their data and its use for research purposes (BMG 2023). In addition, the e-prescription for prescription medications will replace the paper prescription starting from January 2024 (KBV 2023).

Artificial Intelligence (AI) is revolutionizing diagnostics and treatment strategies by enabling faster and more precise diagnoses (Malviya, Rajput, Roy, Ahmad & Srivastava 2025). AI is also being explored for broader applications beyond diagnostics, including patient triage in emergency settings, chatbot communication, Augmented Reality-based patient education, and the development of AI-powered medical apps for preventative healthcare strategies (Fraunhofer 2023). In the field of surgery, digitalization has shown considerable potential, especially with the introduction of advanced surgical robots. These robots, such as the Da Vinci Xi, enable highly precise operations with minimal invasiveness, guided by AI-supported systems. The integration of AI and human expertise offers significant promise, with studies indicating that AI currently achieves lower error rates than human experts in specific applications, such as breast cancer detection through MRI scans (Asadizeidabad, Hosseini & Vetshev 2024).

Despite the promising opportunities presented by digitalization in healthcare, several challenges and barriers to the development of digital solutions and medical devices remain. One significant challenge is the Medical Device Regulation (MDR), which mandates a new certification process for existing and new medical technologies. Over 450,000 products will need to undergo re-evaluation, slowing the market introduction of innovative medical technologies (BVMed 2022). Additionally, the rising investment costs for new technologies can represent a significant burden, with estimates suggesting they could account for up to 10% of a company’s revenue (BMWK 2023). Another challenge is the increased focus on data privacy and cybersecurity as the

digitalization of patient data continues to expand, requiring stringent standards for secure data processing (Wenner 2022). The modern economy is increasingly shaped by the concept of VUCA (volatility, uncertainty, complexity, and ambiguity), forcing companies to rethink their strategies in the face of rapidly advancing technological developments (Kühl & Schäfer 2019).

Digital transformation is driven by three key factors: exponential technological growth, economies of digitization, and technological compatibility (Petry 2019). Recent research highlights that digital transformation is not merely about implementing new technologies but also requires profound organizational, strategic, and cultural changes. Companies that do not perceive digitization as a purely technical issue but as a fundamental shift secure significant competitive advantages. Alongside these technological advancements, the demand for digital leadership has also become increasingly evident. As the medical technology sector undergoes digital transformation, effective leadership is crucial in driving these changes. Leaders must be able to foster digital competencies within their teams, encourage creative risk-taking, and establish collaborative structures that facilitate innovation (Deloitte 2023). However, despite the growing importance of digital leadership, the healthcare sector has been slow to adapt. This has resulted in a research gap regarding the competencies required for digital leadership in the industry. The present study aims to address this gap by developing a comprehensive competency profile for digital leadership in the medical technology sector, incorporating various competency frameworks from existing literature (Matusiewicz, Henningsen & Ehlers 2020).

As digital technologies continue to evolve at an accelerating pace, companies must not only integrate new tools but also redefine their competitive strategies. Whereas factors such as market access, customer relationships, and infrastructure were previously considered key competitive advantages, scalable digital business models with high levels of innovation and adaptability have now come to the forefront (Petry 2019). The increasing use of Big Data, real-time analytics, and direct digital customer interaction forces companies to accelerate their transformation processes (Bergamin, Braun & Glaus 2020). These developments demonstrate that digital transformation is not merely about technological advancements but also entails significant leadership challenges.

Purpose of the article

The primary objective of this paper is to identify the key components of successful leadership in the context of the digital transformation, new leadership models, and particularly within the medical technology sector. This study aims to provide insights into the competencies that digital leaders will require in future collaboration with employees. By doing so, it seeks to identify actionable success factors of digital leadership, which will lay the foundation for a sustainable corporate culture in the medical technology industry. The title of this paper narrows the research framework to the areas of digitalization, medical technology, and digital leadership as shown in Fig. 1.

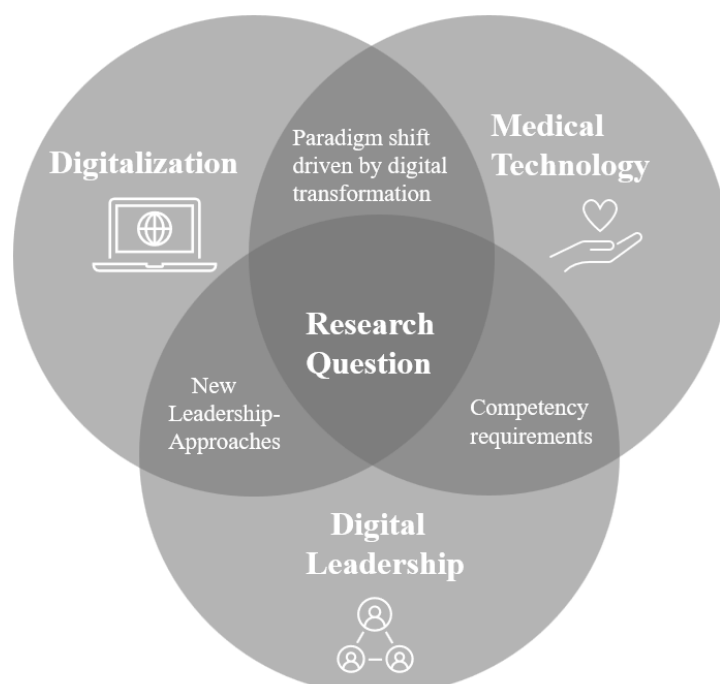


Fig. 1: Research Framework

Source: Own illustration

The intersection of these three fields results in the central research question addressed by this paper: How and in what form can digital leadership be implemented in medical technology with regard to the competencies required of leaders? In order to answer this central research question, it is necessary to break it down further and address the following sub-questions:

- What impact did the Covid-19 crisis have on the digital transformation in the medical technology industry?
- What challenges do digital leaders face?
- What are the most important key competencies for digital leadership?
- Which competency areas will gain the most importance in the future?
- What practical recommendations can be derived for the industry?

This paper aims to contribute to the ongoing discourse on leadership in the digital age, with a specific focus on the medical technology sector, and provide valuable insights for both academic and practical applications in the field of leadership development.

Presentation of the main research material and results obtained

This study examines the application of Digital Leadership in the medical technology sector and the corresponding competency requirements for executives. Through a comprehensive analysis based on empirical expert interviews, the research explores the multidimensional nature of Digital Leadership and its significance for modern leadership culture. The findings highlight that defining Digital Leadership is inherently complex due to its diverse elements. Beyond the mere application of digital tools, intangible factors such as trust, empathy, and sensitivity emerge as critical components for success. In defining Digital Leadership, 14 key elements were identified, as visualized in the following word cloud in Fig. 2.



Fig. 2: Word Cloud on the Definition of Digital Leadership

Source: Own illustration

Another key focus of the study was analyzing the impact of the COVID-19 crisis on the digitalization of the medical technology sector. The findings indicate that, despite an accelerated transformation, the industry remains in an early stage of digital adoption. While the pandemic acted as a catalyst, significant challenges persist regarding the acceptance of new digital approaches by medical institutions and patients.

Additionally, expert interviews identified specific leadership challenges in the digital era. The Top 6 leadership challenges include:

- Maintaining trust despite physical distance
- Increased communication demands
- Sustaining relationships with customers and employees
- Managing generational differences
- Supporting healthcare institutions in their digital transformation
- Addressing employees high psychological stress levels.

A significant emphasis was also placed on identifying the key competencies necessary for successful leadership in the digital era. The study reveals 14 core competencies (summarized in Tab. 1), with a particular focus on social and communicative skills such as empathy, effective communication, and understanding. These competencies are grouped into four categories:

Table 1. Key Competencies for Success

No	Core Competencies
	Personal Competencies
1.	Employee Development
2.	Trustworthiness
3.	Self-Management
	Activity & Action Competencies
4.	Speed
5.	Goal-Oriented
6.	Initiative
	Methodical Competencies
7.	Technological Understanding
8.	Analytical Skills
9.	Systematic-Methodological Approach
	Social & Communicative Competencies
10.	Empathy & Understanding
11.	Communication Skills
12.	Teamwork
13.	Employee Orientation
14.	Adaptability

**compiled by the author based on his own research*

Experts were also asked which competency field would gain the most importance in the future. The results indicate a clear shift towards social and communicative competencies, emphasizing the increasing relevance of interpersonal interaction and effective communication in a digitalized work environment. Interestingly, technical-methodological competencies were not explicitly mentioned by any expert, possibly suggesting that they are either assumed to be a given or are being overshadowed by the growing emphasis on human-centric leadership skills. This finding highlights the evolving dynamics of leadership competencies in the digital transformation era.

The study underscores the need for a fundamental shift in leadership culture—from transactional leadership, based on control, to transformational leadership, which fosters trust, collaboration, and engagement. Leadership today is no longer about micromanagement but about coaching, vision-setting, and empowerment.

The research question “How can Digital Leadership be applied in the medical technology sector, considering the competency requirements for executives?” can be answered as follows:

- The definition of successful leadership has evolved in the digital era, incorporating 14 essential competencies (though not claiming to be exhaustive).
- The most critical competencies include empathy, communication skills, and employee development.
- Social and communicative competencies are increasingly seen as the foundation for future leadership success.
- The identified competencies provide a framework for the future development of leadership models, ensuring they meet the demands of an increasingly digital work environment.

It is crucial for leaders to flexibly adapt their competencies to changing circumstances. Mastering the 14 key competencies and applying them situationally will be essential. These competencies should not be seen in isolation but as part of an interconnected system.

The development of leadership competencies in the digital transformation era must be an ongoing process, not a one-time effort. To ensure effective leadership in the German medical technology sector, continuous learning and adaptation are required.

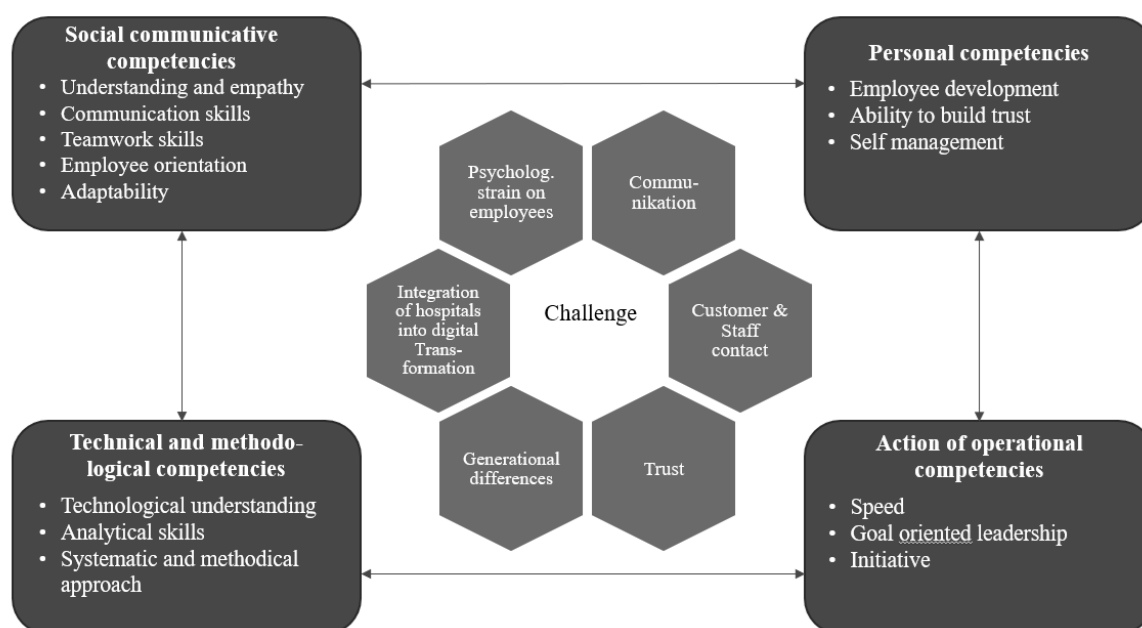


Fig. 3: Recommendation for Action

Source: Own illustration

Based on these findings, 14 strategic action maxims can be derived that characterize successful leadership in times of digital transformation in the medical technology sector. It is important to emphasize that this list should not be seen as exhaustive or universally applicable. Rather, it serves as a foundation and guideline for digital leaders in medical technology to develop their leadership competencies and shape their approach to leadership. The following maxims are versatile and may vary depending on the context. Nonetheless, they provide guidance and a foundation for leadership success:

- Empathize with your employees and make yourself understood!
- Communicate openly and purposefully with others!
- Promote and develop your employees!
- Work successfully with teams and strengthen cohesion!
- Keep your employees at the appreciative focus of your leadership actions!
- Adapt to changing environments and work processes!
- Trust in the skills and motivation of your employees!
- Shape your own actions!
- React quickly to changing situations!
- Integrate knowledge of information technologies!
- Analyze facts and problems deeply!
- Align others toward goals!
- Initiate actions proactively and embrace innovation!
- Pursue action goals systematically and methodically!

These maxims are designed to provide leaders with a framework to act adaptively and successfully in the rapidly changing digital landscape of medical technology. In general, shifts in the requirements for leadership compared to the pre-digital era are evident. The focus has shifted from technical-methodical competencies to a greater appreciation for social-communicative competencies. The competency profile created serves as a guide for leaders to succeed in the digital age of medical technology. The results of this research offer important insights into how digital leadership can be successfully applied in the medical technology sector and which competencies leaders need to develop for this purpose. They thus make a valuable contribution to the development of future leadership concepts in an increasingly digitized work environment.

Conclusions

In summary, this study highlights the growing significance of Digital Leadership as digital transformation continues to reshape industries, including the medical technology sector. The findings underscore that successful leadership in the digital era requires a fundamental shift from traditional, control-based leadership approaches to more adaptive, visionary, and people-centered leadership models. As organizations navigate the complexities of

digitalization, leaders must embrace trust, communication, and agility as core competencies to drive sustainable success.

The path to becoming a successful leader in digital medical technology is not optional—it is an inevitable evolution driven by the increasing integration of advanced technologies, new work environments, and shifting employee expectations. Executives who fail to recognize these fundamental shifts risk falling behind in an era where digital competence and human-centric leadership are key differentiators.

A Chinese proverb states: “When the wind of change blows, some build walls, while others build windmills” (Trieschmann 2019). This wisdom is particularly relevant to leadership in digital transformation. Leaders who attempt to resist change by holding on to outdated models will struggle in the face of rapid technological advancements. Instead, the leaders of tomorrow must learn to harness the momentum of digital transformation, using it as an opportunity to foster innovation, drive cultural change, and continuously develop their own leadership competencies.

Ultimately, Digital Leadership is not merely about technological proficiency—it is about creating an environment where people and technology work together seamlessly to shape the future of healthcare. Organizations that invest in cultivating adaptive, empathetic, and visionary leaders will be best positioned to thrive in an increasingly digitalized world.

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