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The Impact of AI on Leadership: New Strategies for a Human - Machine - Cooperation

Dr. René Rüth [α] & Dr. Torsten Netzer [σ]

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The first route, for which numerous publications are available, focuses on the implementation of AI and shows, which tasks leaders should perform to ensure acceptance amongst staff and smooth operation of AI in their companies. However, little can be learned about an AI as an established employee of a company. The perspective on the relationship between leadership and AI is only addressed by a small part of the research literature and forms the second route. It merely indicates procedural issues and ethical questions as challenges for AI leadership in years to come and also gives first considerations on future leadership by AI.

Once the current issues concerning management and AI have been compiled, it becomes clear that the decisive challenges from AI can only be overcome, if basic principles are followed. These are called transparent leadership in the following, outlined at the end.

I. Introduction: AI in Corporations

The dream of machines executing the work, while enabling people to focus exclusively on what they enjoy goes back centuries (Skilton & Hovsepian, 2018). Today we are closer than ever to accomplishing this aspiration. But contrary to the original hopefulness, the image of endless bliss and sweet idleness seems far from being within reach. AI keeps us on our toes, and its translation into economic processes even increases the tasks to be accomplished. Frequently new technologies not only replace earlier action steps, but also create new ones in addition to existing procedure. Some examples from recent developments (may) confirm this notion.

Software for optimizing business processes has been in use for a long time. SAP, one of the most prominent providers in this field of applications, covers many business activities in planning and execution, including: controlling, sales, logistics, HR, CRM and R&D (Leukert, Müller, & Noga, 2019). AI has given this management software a boost: Once connected to automated monitoring sensors in warehouses and interfaces with devices throughout the enterprise, AI is able to independently aggregate data, evaluate what should be done in future, and even execute decisions (Leukert et al., 2019). Although this accelerates the usual business processes, care and conscientiousness must be invested in the adoption of such a system into the company, in the development and maintenance of the respective software tools and in monitoring the decisions of the automated system. Once firmly established, AI creates many more possibilities for analyzing and controlling business process than were previously achievable by employees only. However, instead of replacing these people, their tasks have changed to interpreting automatically generated data analyses and operating with new parameters for evaluation.

Another example comes from the financial sector, which is particularly prone to the implementation of AI measures and in which the automation of workflows is also an issue, e.g., the automatic verification of a debtor's credibility or the cross-checking of relationships between people involved in financial fraud (Kreutzer & Sirrenberg, 2020). However, AI-based applications were also developed to perform high-frequency trading and decide on huge investments in a fraction of a second (Kreutzer & Sirrenberg, 2020). In such cases the data quality and the precision of the algorithms must be double-checked consistently. Otherwise, a flash crash like the one on May 6, 2010, which shook the financial world to its bones, could occur (Bowley, 2010). Obviously, AI does not replace human beings, but confronts us with new tasks and requires a new kind of interaction. This is surprisingly little reflected in current leadership studies.

Although there are many theoretical and best-practice models for implementing AI (Ashri, 2020; Bootle, 2019; Burgess, 2018; Castrounis, 2019) there is often little talk about how to tame, control and manage AI technology in companies (Klein, 2020) by enabling people to develop a thorough understanding of an 'augmented collaboration' to secure a company's survival in the future. So, what about leadership with AI? How to co-work with machines? Does AI change leadership in terms of its goals and means? In this article we will look at leadership beyond digital leadership. It will present some very current strategies for leadership with and in the face of AI. Finally, it will build on these ideas and outline a comprehensive model of transparent leadership that will be able to integrate the various demands that AI presents to business leaders.

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II. Leadership and Artificial Intelligence

a) *Envisioning the Future*

Managers have long been recognized as leaders in business (Zaccaro, 2014). A few decades ago, however, two roles were distinguished (Kotter, 1990). Since then, managers are identified with executives who run the day-to-day operations, review the numbers and take care of all business processes (Yukl, 2013). This must be separated from the role of leadership in companies (Algahtani, 2014). Of course, the tasks of both roles can also be performed by one and the same person. But the larger the corporation and the higher the hierarchical position, the more these two roles should be separated. In contrast to management, leadership goes beyond the daily business processes and focuses on the future of a company (Northouse, 2016). The reason for this is a need for envisioning future business models with a better ROI by anticipating innovations that could improve the company's market position, or by reflecting the behavior of customers and competitors in order to predict how the market might change in future (Yukl, 2013). In times of rapid change such as the current digital transformation, it is particularly important to think about the future and dissociate from the everyday perspective, because the changes ahead could be revolutionary for many companies. Therefore, being "innovative visionary" and "having a futurist entrepreneurial mentality" are two crucial qualities leaders should possess (Klein, 2020, p. 895). At least this applies to digital leaders. But will it also have a bearing when it comes to AI?

b) *Revolutionary AI*

The digital transformation is omnipresent: laptops, smartphones, smart products. All of which have become quite familiar in recent years and are a big topic in the leadership literature. AI is just as universal in today's world, often secret and obscure to many people. This could be the reason why leadership is a major topic in studies on digital transformation, such as Kreutzer, Neugebauer, and Pattloch (2017) but less so in studies on AI, since it can be illustrated by an equally comprehensive publication by the same author on AI: Kreutzer and Sirrenberg (2020). This is surprising, as AI has far more disruptive power than the mere digitization of business models and processes.

As is often the case with jargon, the term AI "is notoriously hard to define" (Ashri 2020, 15). When it was first coined about 70 years ago, scientists were driven by the dream of soon developing machines that could compete with humans in terms of intellectual, emotional and even cognitive characteristics (Taulli, 2019). For several decades, computers were far too slow to even come close to something remotely similar to human intelligence. It is only in the last decade or so that computer performance has risen to a level that can create some kind of intelligence. However, it turned out that AI is still not quite identical to what we call human intelligence, but it shares some characteristics that scientists did not expect when AI was first conceived. To understand what AI is, it helps to describe what it does.

Recent innovation leaps have led to a sharp increase in computer power. This was not only due to Moore's law (Brock, 2006) but also because graphic processing units (GPU) have proven to be much more suitable for calculating large data blocks in parallel than the traditional central processing units (CPU) (Schürholz & Spitzner, 2019). Even before the introduction of GPUs, a method called machine learning (ML) had been developed in the 1980s. It enables computers to structure large amounts of data by breaking down terms into tiny elements. Which of these an AI uses is determined by programmers who execute algorithms with different sets of elements and who finally decide which produce the best results (Zhou & Chen, 2018). Once these elements are set, machine learning systems improve autonomously through the amount of experience they gain in resolving given data into these elements and rearranging the information of each to complete the task for which it was created.

Based on the better performance of GPUs, a new and more powerful type of AI, called deep learning (DL), has been developed in recent years. DL takes advantage of the structures of natural neuronal systems that have been uncovered by neuroscience. While ML was based on elements that require conscious decisions by programmers, DL only requires specification on how many neuronal layers are to be established between the input and the output levels of the algorithm (Sejnowski, 2018). The number of those layers determines the complexity and increment of computations that a particular DL algorithm is capable of. Their number is limited only by the power of a computer and the time taken to achieve the result (Gentsch, 2018). The big difference between ML and DL is, that in ML the analytical structure of a given algorithm is defined, while in DL the algorithm independently finds out which elements it should distinguish in order to perform the given task most efficiently. Since DL machines can not only learn how to do things, but also assess what needs to be done, they are the driving force behind the current AI evolution (Ertel, 2016; Lanzetta, 2019).

Two reasons for the dramatic increase in AI performance in recent years have already been mentioned: Processing power and intelligent algorithms. The third reason is the availability of big data (Hildesheim & Michelsen, 2019). Only with the help of huge data sets can AI algorithms be trained to function correctly. However, researchers and practitioners of AI point out, that AI is currently often over- and underestimated (Skilton & Hovsepian, 2018; Wess,

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2019). It is overestimated as there still is no well-defined way of creating a human-like machine. On the other hand, AI is underestimated because it is far more powerful and widespread in companies than most people might think. This is where leadership comes in.

III. Connecting People and Technology: how to Create A Perfect Match

a) Central Elements for a Beneficial Relationship

According to the evolution of AI, we are still in the first stage, which is called narrow AI (Hildesheim & Michelsen, 2019). Here, AI is able to perform rather precise tasks independently. The second level is the general AI, a level at which machines become similar to humans. In the distant future, there could also be a third type, called super AI, far beyond human intelligence. To date, only narrow AI has penetrated the realm of the economy. However, despite its widespread use in many industries, AI is yet to be extensively disseminated. Even narrow AI has not been realized completely. This means that the application of AI involves working, experimenting with its possibilities, trying out different algorithms, testing its capabilities, and constantly monitoring and improving results. AI is the opposite of a product that works 'out of box' (Boobier, 2018). At present, there are therefore two ways of applying AI. First, AI helps to be efficient in intellectually simple tasks with a high degree of repetition, such as in a smart factory where product assembly is done individually but in an identical framework. Second, AI can be used to analyze huge blocks of unstructured data (Hildesheim & Michelsen, 2019). For companies, both types of AI application mean that they are facing great challenges. Leadership must not only decide which path to take, but also prepare the implementation.

In recent research on AI and leadership, this period of implementation has received the greatest attention. Considering that business leaders should anticipate future developments and then motivate their employees to share this vision, the implementation of AI is an outstanding aspect of leadership (Daugherty & Wilson, 2018). The statements of this perspective on how the relationship between leadership and AI should be shaped are explained in chapter 3.2. However, this research perspective reflects little on the change that AI will bring about in the way companies are managed, once AI technology is introduced. Nevertheless, this second perspective is very important because it takes into account the consequences that AI will have for leadership in the future. This is particularly important because AI will intervene more deeply in the way companies are run than any technology has done before (Hildesheim & Michelsen, 2019). Research on this second perspective is discussed in chapter 3.3.

b) Leadership during the Implementation of AI

Since AI will change organizations profoundly, many employees and managers are reluctant to get involved in AI implementation. Simultaneously, AI is revolutionizing products, business models and markets – not to mention the efficiency gain it is causing. Finding a balance between opportunity and risk, meeting challenges and uniting all employees behind a comprehensive vision is the primary task of company leaders (Cox, 2018). The focus of leadership is on building trust (Williams, 2005). This is the critical value when organizations undergo profound changes, especially due to the fact that people trust people rather than machines or non-transparent processes (Daugherty & Wilson, 2018). Out of many similar approaches, an example from research on the implementation of AI in companies will be presented. It shows eight factors that determine success (Bughin et al., 2017; Wodecki, 2019). These factors not only capture characteristics that leaders should have, but also underline the importance of corporate culture. Leaders should possess:

- better analytical skills than their competitors,
- a board of directors with strong determination and vision for leadership during change,
- a concept for the implementation of change,
- a business strategy that is intertwined with a technological strategy.

Another four factors relate to the will and ability of a corporate culture to:

- cooperate freely and efficiently within the organization,
- accept new ideas and adaptation processes,
- change products and services for the sake of technological innovation,
- pursue comprehensive data governance.

By emphasizing the importance of corporate culture in the implementation of AI and the change it brings about, the factors also emphasize the importance of leadership. They also show that leaders direct organizations by instilling common goals, norms and values. In doing so, leaders need to overcome barriers that might hinder the implementation of AI. These include a possible lack of talents, fears among employees, lack of skills, competing projects outside AI, and lack of business cases for AI (Wodecki, 2019).

The success factors and challenges identified in the studies regarding the implementation of AI in companies are very similar to those explained (Ashri, 2020; Boobier, 2018; Bootle, 2019; Bughin et al., 2017; Burgess, 2018; Buxmann & Schmidt, 2019; Canals & Heukamp, 2020; Castrounis, 2019; Daugherty & Wilson, 2018; Davenport, 2018; Gentsch, 2018; Gläß, 2018a, 2018b; Iansiti & Lakhani, 2020; Mohanty & Vyas, 2018; Skilton & Hovsepian, 2018; West, 2018; Wodecki, 2019).

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Any company going through a period of major change must be supported by convincing leadership, whose task it is to provide employees with security and the confidence to master the transformation process. Leadership must embrace the organization and its members, allowing them to express their needs and motivating them to create a positive vision of an uncertain future.

Nevertheless, there are two reasons why the factors and challenges outlined above do not reflect the full range of disturbances and transformations that AI is likely to cause. Firstly, the circumstances associated with the implementation of AI are not different from the challenges related to any change process in the VUCA world. If AI were just another digital invention, this would not be a problem, but it is estimated that the power of AI will change businesses more profoundly than any other technology before. This profundity seems to have no equivalent in the theories of those who analyze the relationship between AI and leadership as an implementation problem of change management. This leads to the second reason why this perspective may not be convincing: it does not mention the power of AI over companies and enterprises. It does not reflect on AI as a possible team member. It does not mention the people, needed to set up, control and monitor AI software. It also fails to mention the various ethical and epistemological dilemmas that AI could pose to executives who are confronted with an opaque yet supposedly omniscient entity called AI. A deeper look at studies promoted by this second perspective will show whether any of these problems are addressed and, if so, what answers are given as to how AI can be thoroughly linked to leadership.

c) AI Guiding Leadership

While there are numerous studies that deal with the role of leadership in the implementation of AI, what is lacking are ideas about how leadership should change thereafter. This could be due to the fact that the implementation process is what every company is facing today, while the existence of a full-fledged AI is not yet in sight. However, AI is being developed very rapidly, and in other academic fields such as political economy and social sciences the consequences of the widespread use of AI are already being discussed. (LaGrandeur & Hughes, 2017). One of the crucial issues is, for example, where people will get their income from once most types of work have been assigned to machines (Santens, 2017). If these problems are already being considered, it is surprising not to find comprehensive studies on leadership changes once AI has to be led. What was said two years ago is still true: "There is a lack of research surrounding AI performance and human-led supervision" (Smith & Green, 2018, p. 86) which is needed in the next years to build a basis for the AI-induced change of leadership – the change of leadership culture will take its time. Nevertheless, here are the results of the few studies on the topic.

The studies are interested in the success factors once AI starts guiding leadership. They argue that in order to come to terms with AI, leaders should consider machines in a way they consider followers and employees (Smith & Green, 2018). This is not to say that AI will soon receive general or even super-intelligence. Rather, it means that any entity that can act independently should be designed as an entity that is integrated into the organization and influenced by the corporate culture and its vision and values. In the case of AI, this includes not only the machine itself, but also the programmers who generate, test, train and monitor AI. (Smith & Green, 2018). Since leadership is about responsibility and accountability to everyone in a company, followers are equally accountable to everyone else, including managers. This must be extended to AI as soon as AI becomes autonomous (Saurav Kumar & Banerjee, 2018). But AI won't be fully self-sufficient for a long time yet. Until then AI is not conceivable to be independent from programmers and IT engineers. They are part of the actual responsibility of the AI as a pseudo-member of a company. As long as the AI is not able to act completely autonomous, it should rather be understood as "an AI team or an AI/Human blended team" (Farrow, 2020, p. 10). In addition to the algorithm, these teams consist of programmers and post-programming controllers who manage the results and communicate them to those who need the information.

Building a responsible relationship between managers and the AI team will require ethical supervision of these teams, including the algorithm itself. Programmers will need to be trained to comply with corporate guidelines, and AI results will need to be reviewed accordingly. In addition, communication standards must be established that can be used by executives, programmers, post-programming controllers, and machines. Due to the complexity of AI-related technology, this can be a particular challenge (Smith & Green, 2018). The realization of compliance standards between AI and humans, including communication and accountability, is a prerequisite for supervision procedures, which are also of particular importance because AI algorithms can make mistakes and cause unintended output. Of course, once AI has become emotionally and consciously intelligent, the more authoritative management attitudes towards algorithms would have to change towards the same management style with which each member of the organization is treated (Smith & Green, 2018). However, this aspect of leadership is too far in the future and therefore outside the scope of this paper.

With a fully-fledged AI, leadership will experience a new diversity within the company, which will affect both the self-conception and the corporate image of the organization (Farrow, 2020). AI teams will

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depend equally on people and machines, which makes AI part of the identity of an organization. The challenge for leadership will be, that this identity could be in tension with social or religious norms, so fundamental to the employees that they cannot be neglected. In this case, leadership will have to find new answers to very old questions of security and meaning in the life of each individual (Farrow, 2020).

IV. A Comprehensive Strategy

a) *Dynamic Relationship*

Looking at the early stage of AI development today, the most revolutionary changes brought about by AI are still to come. It is still a long way from narrow AI to general or even super-intelligent AI. It´s development will therefore be highly dynamic and with it the relationship between leadership and AI. For company managers, dynamic environments are something they are familiar with in the VUCA world. Like any rapidly and constantly changing factor, AI must therefore receive special attention from management in order to maintain confidence in a company and its way of changing. Due to the unique nature of AI, it is important to ensure that it´s applications are well thought out, function correctly and are accepted by employees. "AI is less of a technology overhauling and more of a cultural shift, and both the business leadership and technology leadership have equal roles to play" (Mohanty & Vyas, 2018, p. 29).

The integration of AI into a corporate culture is particularly difficult as well as hard to communicate and supervise, as a powerful AI in the sense of DL is a "black box" (Mainzer, 2019, p. 245) where no one really knows what is actually going on inside. Under these conditions, building a trusting relationship is particularly difficult to achieve. Therefore, one of the key strategies to operate AI in companies will be transparency.

b) *Transparency Is the Key*

Calling for transparency is an important way to establish trust and efficiency between leaders and staff (Gebler, 2012; Zak, 2017). Especially in environments and interactions that are very dynamic and hardly predictable, trust is the very fabric that enables people to act together (Paxton & Ressler, 2018). The introduction of transparency as a strategy for linking man and machine builds on these findings, but extends them considerably. A strategy of transparency is not a matter of course, but a comprehensive way to connect man and machine.

Transparency is important for the AI that guides and supports leadership, but it will also be crucial if the AI is going to lead people. The reason for this is not that leaders could be replaced by machines in the foreseeable future. Nevertheless, the difference between leadership that uses AI as a source of information and leadership that is driven by AI is very blurred. In theory, the line between the two types of direction seems obvious, but in practice it will be almost impossible to portray it: "Artificial systems will become the trusted advisor to the C- level executive, and will be the ones to provide indisputable, data-driven insights" (Boobier, 2018, p. 179). Once a source of information becomes "indisputable", it will be very difficult to disregard it. As a result, executives who neglect undeniable insights tend to neglect their liability to staff. Balancing the hierarchy between man-made and machine-generated sources of information will be a major challenge for leaders in the age of AI, which can only be solved through transparency. This means that there will be no final decision on how to dispel doubts and delegate responsibilities. Rather, transparency points to the dynamic processes by which corporate agreements must be made and communicated under conditions of uncertainty and contingency of AI (Boobier, 2018). Many AI and leadership challenges may not yet be visible, but processes need to be discussed, delegated and implemented. Again, transparency will be the key value.

Within a company, transparency must take place on many levels and in many dimensions. The core idea behind this strategy is that without transparency neither trust nor efficient cooperation can be built. Without efficiency, however, no corporation could survive. In order to realize the transparency necessary for productive interaction, it must be implemented in self- management, in communication, in the interaction of employees, in the functioning of corporate strategies and also in the way companies are organized and managed. This means that the corporate culture must also be characterized by transparency. By introducing the idea of transparency into all aspects of a company, leadership will be based on four characteristics that ensure the future viability of a company. What we understand by transparent leadership is:

1. *Human:* because it is based on trust and respect and sees people as the raison d'être of a company. These people are stakeholders where employees and customers are the most important parties. AI must be set up in such a way that people are at the center.
2. *Democratic:* because it lets staff participate in the development of the company. No leader is able to understand their organization without listening to what employees have to say. AI may not override their importance, but it is another voice to be heard among many and it helps to decrease an asynchronous distribution of information and lead to a better cooperation.
3. *Able to cope with complexity:* because it enables the knowledge and experience of all employees, customers and stakeholders to be pooled equally.
4. *Flexible:* because it can and must be adapted to every company individually. Transparent leadership is not a fixed framework, but a set of values and

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goals that allow for individual solutions. This flexibility makes it an ideal strategy to integrate AI into a company.

V. Conclusion

The connection between humans and AI is deeply imbued with ethical questions. They will be a constant theme for leadership, because responsibility and trust are crucial to any leadership success, and they are fundamental ethical values. Due to its artificial origins, its supposed infallibility and its black box-like mechanisms, AI constantly questions trust, thus undermining the precondition for success. In the future, too, the power of AI will always be difficult to predict, because the essence of intelligence is to deal with unpredictable complexity (Boobier, 2018). The only comprehensive leadership strategy that seems to offer attitudes and processes that can deal with such unpredictability is transparent leadership. With its core characteristics of human, democratic and flexible structures while seizing the complexity of an organization, it can even serve as a guideline for a future in which AI itself will be able to exercise leadership.

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