ИНФОРМАТИКА И КОМПЮТЪРНИ НАУКИ
INFORMATICS AND COMPUTER SCIENCES

ARTIFICIAL INTELLIGENCE AND RELATED IT TECHNOLOGIES TO SUPPORT THE ONBOARDING OF EMPLOYEES

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https://doi.org/10.70300/TGOZ5273

Abstract: *This article examines how artificial intelligence (AI) methods could be used to optimise onboarding processes for new employees and what benefits are associated with the use of AI. There are only a few published articles on this specific interdisciplinary area of research, most of which only touch on the topic in passing. This article deals both with AI methods to support onboarding that are directly related to artificial intelligence and with innovative IT technologies in which AI methods can be used to help optimise onboarding processes. The first step is to identify and analyse the AI and related IT methods that are suitable for use in human resources and onboarding. Machine learning, natural language processing, AI-based chatbots, computer vision, robotic process automation, data mining, predictive analytics, process mining and dashboards are described in terms of how they work and their potential applications. This is followed by explaining how these methods can be used specifically in onboarding new employees in organisations. The aim is to use these modern technologies to improve onboarding processes in order to optimise the introduction, induction and integration of new employees. The use of modern IT methods can help new employees to become productive more quickly and increase employee satisfaction and loyalty through optimised onboarding processes. This reduces staff turnover and the overall cost of recruiting, hiring and induction.*
Keywords: *Onboarding, Artificial Intelligence (AI), Innovative IT Technologies, Natural Language Processing (NLP), Data Mining, Process Mining, Robotic Process Automation (RPA)*

INTRODUCTION

Artificial intelligence (AI) and other related innovative IT technologies have recently made considerable progress in their development. They are therefore becoming increasingly important in many areas of life, especially at work. In the HR sector, for example, these technologies can be used to improve onboarding processes. However, very few scientific articles have been published that show how these IT technologies can be used to optimise onboarding processes. In an extensive literature analysis, Ritz et al. found that the potential applications of AI in onboarding have not yet been sufficiently researched. Onboarding is usually only mentioned in passing with regard to the possibilities of using AI, whereby the onboarding processes are generally not analysed in order to identify possible areas of application for AI. The authors were only able to find a few relevant

sources on the use of AI in onboarding with regard to AI-based chatbots and support for individualised training suggestions and automatic appointment suggestions (Ritz et al. 2023, 155). This article therefore aims to help close this research gap by clarifying which AI methods and associated innovative IT technologies could specifically be used to improve onboarding processes.

RESEARCH METHODOLOGY

The study is based on extensive literature research and analysis. On the one hand, this relates to the design and optimisation of onboarding processes, for which literature from the fields of HR management, HR administration and onboarding is used in particular. On the other hand, the research and analysis also refers to literature from the fields of artificial intelligence, computer science, business informatics, data management, process design and process management in order to identify recent developments with regard to AI and innovative IT methods in particular. The aim of this approach is to bring together the results from both fields through an interdisciplinary synthesis. It will be discussed how the identified and analysed AI and IT methods can be used specifically to improve onboarding processes, as this topic has so far been dealt with only superficially or hardly at all in the literature. The author's own ideas and professional experience are also included in the interdisciplinary synthesis.

RESEARCH QUESTION

How can artificial intelligence methods and associated innovative IT technologies improve the efficiency and effectiveness of employee onboarding processes in organisations?

RESULTS

Basic terms on onboarding and artificial intelligence

The purpose of onboarding in organisations (companies) is to support the introduction, professional training, and integration of new employees (onboardees) in the best possible way. Efficient onboarding processes should help employees become productive more quickly and reduce uncertainty and anxiety among onboardees, leading to greater employee satisfaction and loyalty (Caldwell & Peters 2016, 28; Korte 2019, 6). This reduces staff turnover and saves overall costs for new tenders, recruitment, and new employee training. Satisfied employees and low staff turnover promote employer branding and increase the attractiveness of the company for future candidates (Moser et al. 2018, 26).

Artificial intelligence (AI) is the ability of a machine, e.g. a computer, to imitate the cognitive abilities of humans and, in the case of large amounts of data and complex contexts, to surpass them (Croome & Gleich 2023, 55). AI systems should be able to perceive, learn, solve problems, suggest decisions or make decisions themselves in a similar way to humans. They should also be able to interact with humans or other systems (Lenzen 2018, 23).

Potential applications of AI and other innovative IT technologies in onboarding

One of the fundamental areas of artificial intelligence is machine learning. It enables software to learn independently from data without being explicitly programmed for the specific task. To learn, the software uses statistical methods to recognise patterns and correlations in (large) data sets. Based on this, it makes predictions or decisions and gradually improves its results with increasing use over time (Jorzig & Sarangi 2020, 107-108).

In onboarding, for example, machine learning could be used to learn from previous onboarding cases which onboarding activities were successful and where problems may have occurred. Based on the analysis of activities, personalised and optimised onboarding measures could then be suggested for specific employees or employee groups. For example, individual induction and training plans could be drawn up for onboardees, taking into account their qualifications or

professional background and their future work tasks. Or, based on previous experience, recommendations for changes to induction plans could be drawn up to avoid problems.

Natural language processing (NLP) is a branch of artificial intelligence or machine learning that deals with understanding, interpreting and generating human language in written or spoken form in order to enable or improve communication between humans and computers (Salah et al. 2021, 407). Linguistic, statistical and machine learning methods are used for this purpose. NLP software can be used in various applications, such as chatbots, virtual assistance systems, translation services or support in the preparation of e-mails or documents (Bruns & Kowald 2023, 17).

The use of NLP in these applications could facilitate communication between the organisation and the onboardees, resulting in qualitative improvements in onboarding and time savings in routine onboarding tasks.

AI-based chatbots are computer programs that use AI technologies, particularly machine learning and NLP, to answer questions from humans and interact with them in natural language (text or spoken language, human-like conversation). Through machine learning, AI-based chatbots are able to improve the quality of their responses and better understand users' needs with increasing use (Salah et al. 2021, 409-410).

Chatbots could be used, for example, to answer new employee questions during onboarding. The advantage of chatbots is that they are available to onboardees anytime, anywhere and can access extensive databases when answering questions. For example, they can immediately answer questions from onboardees about work processes, contact persons, administrative procedures, guidelines, etc. or compile other information from a variety of sources. This can help to simplify the onboarding process for everyone involved and disburden the onboarding and HR staff involved in the process from routine questions. AI-based chatbots can also be provided as digital assistants for content-related questions on training courses by answering comprehension questions on professional topics or providing further information on training courses or instructions.

Computer vision, an AI field that aims to interpret and understand visual data (e.g. images, videos) (Tunstall et al. 2023, 28–30), does not yet play a role in chatbots, but could be used in the future to better incorporate human emotions (facial expressions, gestures) into chats.

In onboarding, for example, chatbots could then respond more personally to the needs and feelings of onboardees, e.g. through situation-specific positive affirmations, reassuring or supportive responses.

Robotic process automation (RPA) is a method for automating repetitive and rule-based tasks in IT-supported processes (Tiemeyer 2020, 148). RPA bots (software robots) can imitate human interactions with computer systems, such as entering data, filling out forms or copying data between different applications. Using RPA for routine tasks can increase administrative efficiency, reduce the error rates and relieve employees of monotonous tasks (Lenz 2020, 340).

In onboarding, RPA could be used, for example, to create employee profiles, user accounts, assign software licences and access authorisations, validate data and documents and generate and provide information materials for onboardees. Software robots could also help to prepare and, if necessary, send special, individualised emails to welcome onboardees, ask them for necessary documents or remind them of deadlines. The time saved on routine tasks could be used by onboarding staff to focus on tasks that are expected to add more value, such as providing onboardees with more personalised support.

Data mining is a method used to identify patterns, correlations, anomalies and trends in large quantities of data in order to derive decisions. To this purpose, databases are analysed using statistical methods and machine learning algorithms (Pospiech 2019, 72–73).

In the onboarding area, data mining could be used to recognise patterns and trends in existing (historical) onboarding data (e.g. completed onboarding activities, feedback and performance data

from previous employees, application documents, information on training, current feedback). This could, for example, identify success factors and risks associated with the integration of employees (e.g. best practices, successful training, frequent challenges). The findings from data mining could then be used to design individual induction plans, training courses and support programmes.

Predictive analytics is a form of data analysis in which machine learning and statistical techniques are used to predict future events and trends from existing data and to calculate the probability of certain events. This can help organisations in making well-founded decisions or anticipating conditions that may occur (Hoening et al. 2017, 35–36). In contrast to data mining, where insights are derived from past data, predictive analytics uses these results to forecast future events so that proactive arrangements can be initiated.

In the context of onboarding, predictive analytics could be used to find out, on the basis of forecasts, which measures or training could be implemented in order to support or (individually) improve the success of ongoing onboarding processes more effectively. In addition, ongoing predictions could also enable early identification of fluctuation risks. Furthermore, adjustments could be made to existing onboarding plans or interventions could be planned if this becomes necessary due to changes in the current data situation and the resulting prognoses.

Process mining is a method for analysing and improving business processes. In order to understand how business processes in an organisation (actually) run, event logs (event data) from IT systems are examined and process flows are visualised on this basis (Gadatsch 2023, 193). This also allows to identify bottlenecks and inefficiencies in workflows so that processes can be improved on this basis (Elstermann et al. 2023, 176).

The application of process mining could enhance the transparency, efficiency and effectiveness of onboarding processes. The evaluation and comparison of data from the various onboarding processes can be used to identify and eliminate bottlenecks (particularly time-consuming steps, avoidable waiting times), redundancies (multiple processing) or inefficiencies (e.g. unnecessary steps in the processes, frequent errors in certain forms or steps) in onboarding.

Dashboards are specialised graphical user interfaces that provide a rapid and comprehensive overview of the required information (Pollmann 2020, 151). They can be updated in real time and are used for a variety of purposes by collating the essential data from different (usually extensive) data sources, aggregating it if necessary and presenting it clearly (Schmutte 2020, 47).

The use of dashboards in onboarding could help to increase the transparency of onboarding processes and improve decision-making and collaboration between the various stakeholders involved. By providing new employees with dashboards, for instance, integrated into onboarding apps or portals, they can gain a comprehensive understanding of the available information areas and the status of their own onboarding activities (e.g. documents already uploaded, information viewed, training completed). Managers and onboarding employees can use dashboards to view the current status and development of onboarding processes at a glance. This includes the number of employees in the onboarding process, the progress of onboarding activities, important deadlines and other key performance indicators. Furthermore, the dashboard enables the identification of potential bottlenecks in the onboarding process at an early stage (e.g. warnings of scheduling issues, risk of delays, backlog lists) and the implementation of more effective adjustment measures to ensure the success of the onboarding process.

The methods of artificial intelligence and associated innovative IT technologies that were identified and discussed as part of the analysis described above in order to use them to improve the efficiency and effectiveness of onboarding processes in organisations are illustrated as an overview in the figure 1.

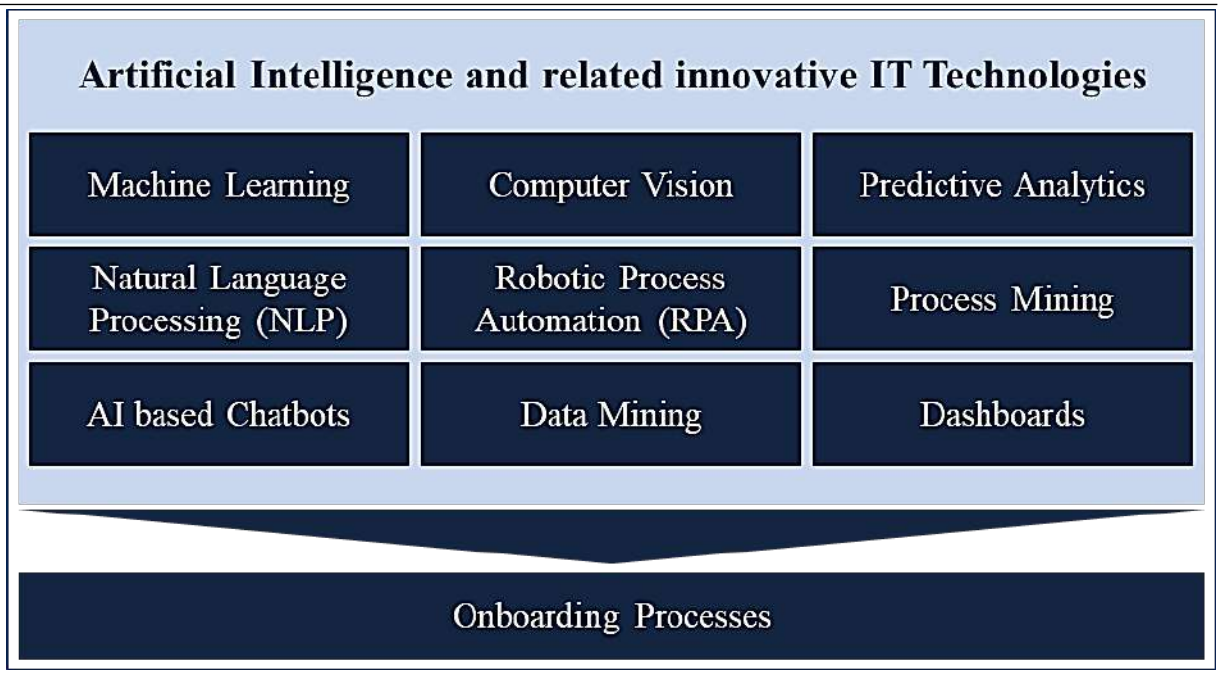

Fig. 1: AI and related innovative IT technologies to support onboarding processes

CONCLUSIONS

This article shows how the onboarding process can be supported and enhanced through the utilisation of artificial intelligence (AI) methodologies and associated innovative information and communication technologies (ICT). According to the existing literature, there are currently some gaps in the scientific discussion on this topic. This may be attributed to the fact that this is a special interdisciplinary field of research, and that AI and other innovative IT methods are currently experiencing significant progress, resulting in the emergence of new fields of application in specific professional disciplines (here: in the area of onboarding). Both the scientific discussion of the possible application of the new and improved methods and the software realisation in various application areas are currently in a (dynamic) development process.

The applications of AI and associated innovative IT methods in the onboarding process proposed in this article and the resulting benefits could be the subject of future qualitative and quantitative studies in order to empirically test the statements made and potentially identify and analyze further or future optimization options for onboarding processes.

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ИЗКУСТВЕН ИНТЕЛЕКТ И СВЪРЗАНИТЕ С НЕГО ИТ ТЕХНОЛОГИИ В ПОДКРЕПА НА ОНБОРДИНГ ПРОЦЕСА НА СЛУЖИТЕЛИ

Резюме: *В тази статия се анализира как методите на изкуствения интелект (ИИ) могат да се използват за оптимизиране на процесите на въвеждане на нови служители и какви ползи произлизат от използването на ИИ. Съществуват само няколко публикувани статии за тази специфична интердисциплинарна област на изследване, повечето от които само бегло засягат темата. В настоящотата статия се разглеждат както методите на ИИ за подпомагане на онбординг процеса, които са пряко свързани с изкуствения интелект, така и иновативните ИТ технологии, в които методите на ИИ могат да се използват за оптимизиране на процесите на онбординга. Първата стъпка е да се идентифицират и анализират ИИ и свързаните с него ИТ методи, които са подходящи за използване в областта на човешките ресурси и онбординга. Машинното обучение, обработката на естествен език, чатботовете, базирани на ИИ, компютърното зрение, автоматизацията на роботизирани процеси, извличането на данни, прогнозният анализ, извличането на данни от процеси и информационните табла са описани от гледна точка на начина им на работа и потенциалните им приложения. След това е обяснено как тези методи могат да се използват конкретно при въвеждането на нови служители в организациите. Целта е тези съвременни технологии да се използват за подобряване на процесите на онбординг, за да се оптимизира въвеждането, обучението и интеграцията на новите служители. Използването на съвременни ИТ методи може да помогне на новите служители да станат по-бързо продуктивни и да повиши удовлетвореността и лоялността на служителите чрез*

оптимизиране на процесите на въвеждане в организацията. Това намалява текучеството на персонала и общите разходи за набиране, наемане и въвеждане в работата.
Ключови думи: *онбординг, изкуствен интелект (AI), иновативни ит технологии, обработка на естествен език (NLP), извличане на данни, извличане на процеси, автоматизация на роботизирани процеси (RPA)*

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