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Developing a Reference Model for Artificial Intelligence Management

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DEVELOPING A REFERENCE MODEL FOR ARTIFICIAL INTELLIGENCE MANAGEMENT

Research in Progress

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Abstract

The adoption and diffusion of Artificial Intelligence (AI) in organizations are significantly influenced by many sociotechnical factors such as people, processes, or regulations. However, previous research has mostly focused on a reactive description of individual influencing factors and lacks an overarching perspective that enables active management of an organization's various AI capabilities. Therefore, this paper provides a first overarching perspective by identifying all relevant activities for the management of AI in literature and grouping them into eight different fields of action. These fields of action are then evaluated by practitioners and combined into a cross-industry reference model for AI Management. While this reference model is the first of its kind and is already making a valuable contribution to the emerging field of AI Management in Information Systems Research, further insights are expected from the future refinement and application of the model.

Keywords: Artificial Intelligence Management, Information Technology Management, Reference Model, Design Science Research.

1 Introduction

Artificial Intelligence (AI) will revolutionize and transform the way public and private organizations do business (Zhang et al., 2022). Although the transfer of AI technologies from research into business practice has been pushed for several years, organizations still struggle with the adoption of AI into their business processes (Mikalef and Torvatn, 2019; Benbya, Davenport and Pachidi, 2020). This is because the major challenge in using AI is not the technical design of AI prototypes, but the development and operation of value-adding AI-based information systems (Brenner et al., 2021). The transition from AI prototypes to real, productive operation is very difficult as there are numerous complex challenges to overcome (Asatiani et al., 2021). Thereby, past studies primarily apply Diffusion of Innovation Theory (DOI), Resource-based Theory, Technology Readiness Levels (TRLs), Technology-Organization-Environment (TOE) frameworks or Maturity Models (MMs) to identify corresponding factors that influence the adoption of AI in their respective scope. However, research to date has mostly focused on a reactive description of individual influencing factors and lacks an overarching perspective that enables active management of an organization's various AI capabilities. Developing appropriate application scenarios and creating operationally functional AI applications that can be used productively is the primary challenge for achieving success in AI utilization (Brenner, van Giffen and Koehler, 2021). The productive use of applications is essential for leveraging AI in order to reduce costs through automation or to create new business models and enhance customer interaction to generate additional revenue (Berente et al., 2021; Enholm et al., 2021). Thus, AI systems must be actively managed in various fields of action to create a value proposition for organizations. For example, the proper integration of AI into business processes requires compliance with ethical principles (Eleks et al., 2022; Kortum et al., 2022), new target group-oriented explainable AI (XAI) approaches (Fukas et al., 2022; Rebstadt et al., 2022), or large, high-quality, and balanced data sets (Fukas, Menzel and Thomas, 2022). Accordingly, a new

subordinary field of Information Systems (IS) Research, namely AI Management (AIM), has emerged that aims to develop systems, models, and methods for the systematic steering of AI in organizations (Berente et al., 2021). However, previous studies have each focused on only a small and specific set of activities influencing the adoption and application of AI in organizations. For example, Monshizada, Sarbazhosseini and Mohamdian (2021) focus only on factors related to people, processes, data, and technology and neglect factors related to strategy or ethics. This raises the question that many business executives are currently asking themselves (Brenner et al., 2021): How can we do something useful with AI and what are the next steps? Therefore, the current IS body of knowledge lacks an overarching perspective that summarizes relevant activities for the management of AI and provides initial guidance to other practitioners and researchers. Our research aims to fill this research gap and provide a general guide for AIM by identifying relevant activities for managing AI in literature and inductively grouping these activities into eight different fields of action. To ensure the applicability and usefulness of our findings, the eight fields of action will be evaluated by practitioners and finally combined into a cross-industry reference model for AIM. Subsequently, the following two Research Questions (RQs) represent the problem statement of our Design Science Research (DSR) approach:

RQ 1: Which management activities can ensure the value-adding application of AI in organizations?

RQ 2: How can a reference model be developed to guide the management of AI in organizations?

To answer these RQs, we follow a multi-methodical DSR approach that includes data collection and analysis from the knowledge base of IS research and the environment of current IS and AI practitioners. In the first step, we outline the current state of research in AIM and the overall research design including its applied methods. Afterward, we successively present our results including identified management activities and the inductively grouped fields of action from literature, the evaluation results with business practitioners, and the developed AIM reference model (AIM-RM). Finally, our results are briefly discussed and placed in the current state of research before a conclusion and an outlook are given.

2 State of Research in Artificial Intelligence Management

Information Technology (IT) should effectively support corporate goals and deliver business value. To achieve this, it must be systematically managed and coordinated within organizations. This task, known as IT Management (Resch 2020), faces new challenges with the emergence of IT innovations based on various sub-areas of AI (Berente et al., 2021). The concept of "AI Management" (AIM) has been introduced to address these new challenges (Brenner et al., 2021). AIM encompasses systems, models, and methods for the systematic management of AI in organizations. It acknowledges the potential of AI for business challenges, develops effective solutions, implements, operates, and continually improves them (Brenner et al., 2021). AIM goes beyond the pure development of new algorithms, software, or hardware and ensures that AI is used productively in organizations to achieve real value contributions (Berente et al., 2021). Managing AI requires a profound understanding of the respective algorithms and the characteristics of AI methods require new processes, structures, and competences to ensure their professional handling (Monshizada et al., 2021). Thus, AIM is a component of IT management (Brenner et al., 2021). In IT management, MMs are a widely used tool for estimating and managing the maturity of technologies (Becker, Knackstedt and Pöppelbuß, 2009). Sometimes TRLs are used instead for the same purpose (Alsheibani, Cheung and Messom, 2018). Additionally, business capability models provide structured graphical representations of all organizational business capabilities, their relationships and hierarchy (Khosroshahi et al., 2018). Recently, these tools are also applied for AIM. While some rudimentary and generic models such as the AI MM by Alsheibani, Cheung and Messom (2019) were initially developed, industry-specific models such as the AI MM for smart manufacturing by Chen et al. (2022) or the AI MM for auditing by Fukas et al. (2021) have been increasingly introduced over time to ensure practical applicability for organizations. Thus, to address the concrete application of AIM in business practice, industry-specific models and descriptions of management activities are necessary, while an abstract view of management activities can provide an initial guide (Fukas, 2022).

3 Research Design

Our overall research design (cf. Figure 1) follows the evaluation activities for DSR proposed by Sonnenberg and vom Brocke (2012) and incorporates a multi-methods approach to design an instance of an IT artifact within the context of a triangulation (Brewer and Hunter, 2006). IT artifacts in the DSR sense include constructs, models, methods, and instantiations (Hevner et al., 2004). As starting point to develop the AIM-RM as an IT artifact, the research need is identified and the research problem is formulated by two RQs (cf. section 1). Then, a Systematic Literature Review (SLR) is conducted to justify the problem statement and the research gap as the first evaluation step (*EVAL 1*). Based on the analyzed literature, management activities are identified and grouped into eight fields of action to answer RQ 1 with an argumentative-deductive analysis (Wilde and Hess, 2007). As the second evaluation step (*EVAL 2*), a quantitative-qualitative online survey with business practitioners ensures that the artifact design progresses to a solution to the stated problem (Döring and Bortz, 2016). In particular, the fields of action are validated for correctness and completeness. Finally, the AIM-RM is constructed based on the knowledge generated through the SLR (*EVAL 1*), the argumentative-deductive analysis (*DESIGN*), and the quantitative-qualitative online survey (*EVAL 2*).

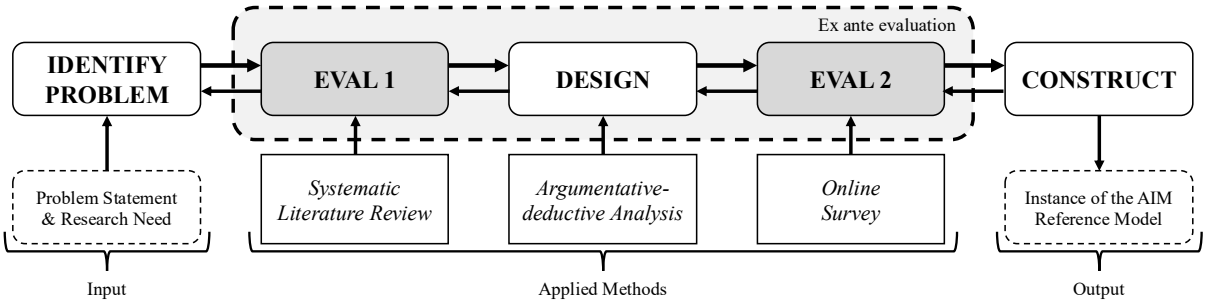

Figure 1. Design and Evaluation Activities based on Sonnenberg and vom Brocke (2012).

The process of the SLR in the first evaluation step (*EVAL 1*) followed the guidelines of vom Brocke et al. (2009) and Webster and Watson (2002) by first conducting an online search in different scholarly databases and second performing a backward and forward search over the initially achieved publications. In the beginning, the scope of the review was defined using the six characteristics of the taxonomy of Cooper (1988) and the topics were conceptualized using concept mapping (Rowley and Slack 2004). The concept mapping based on the state of research in AIM revealed that mainly the terms "*capability*", "*maturity*", or "readiness" are attributed to the study of AIM activities. Therefore, the search string was constructed as follows: *"Artificial Intelligence Maturity" OR "Artificial Intelligence Capability" OR "Artificial Intelligence Readiness"*. Other terms such as "*management*" or synonyms for AI were not used and the search string was focused on full terms to find only the most relevant contributions to the research topic. To conduct a search as extensive as possible, the literature was searched via thirteen different scholarly databases providing access to leading journals with no further source restrictions other than the search term (cf. left side of Figure 2).

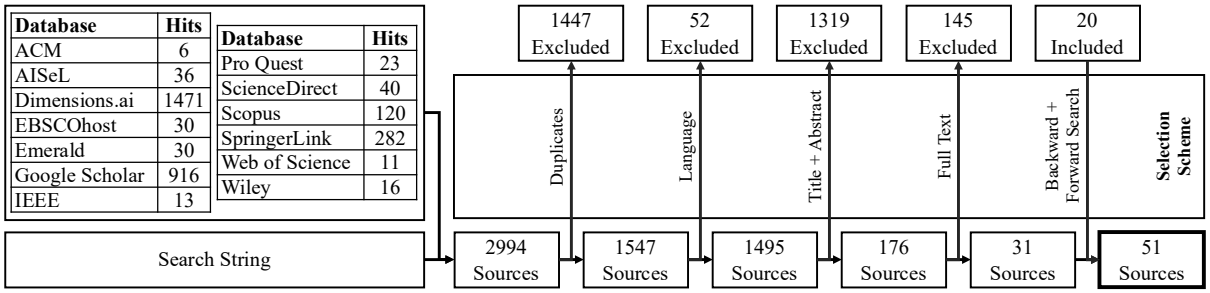

Figure 2. Visualization of the Search and Filter Steps.

In total, 2994 articles were identified. By applying several filter steps, only the most relevant contributions to the review scope are selected afterward. From the initial 2994 contributions, 1447 duplicates, 52 contributions not written in English or German, 1319 contributions not relevant based on the title and/or the abstract, and 145 contributions not relevant based on the full text were excluded (cf. right side of Figure 2). The concluding backward and forward search included 20 additional relevant contributions. Finally, 51 relevant contributions were identified, which were further analyzed using the concept matrix approach (Salipante, Notz and Bigelow, 1982; Webster and Watson, 2002). The identified management activities and argumentatively-deductively derived fields of action were afterward validated in the second evaluation step (*EVAL 2*) by a quantitative-qualitative online survey with business practitioners using a standardized questionnaire (Döring and Bortz, 2016). For a survey using a questionnaire, the research topic must be operationalized in order to be able to conduct a quantitative measurement (Stein, 2019). Therefore, the most important aspects of the research topic must be identified and defined in a scale level in the form of variables. According to Neuman (2014), the quantitative approach is deductive by defining the aspects to be investigated beforehand, for instance, based on literature. To operationalize the research objective in the best possible way but keep the length of the questionnaire feasible for the participants, the fields of action were evaluated instead of asking about each individual activity in detail. Therefore, each participant was asked to rate the relevance of the corresponding field of action regarding the use of AI in their organization based on a short description on a bipolar Likert scale from *(1) Not relevant* to *(5) Very relevant* (Likert, 1932). Afterward, each participant was asked an open question about whether it sees any other aspects that positively or negatively influence the operational use of AI in its organization. To guarantee a cross-industry evaluation, participants had to specify in which industry (or field) they are currently working and what industry knowledge they have. Finally, the participants' expertise was ensured by indicating what job or profession they currently hold, how much professional experience in years they have, and whether they have already been able to acquire profound knowledge about AI. The population of the survey represents IS practitioners or practitioners of a closely related field that already have profound knowledge of the application of AI systems. Out of this special population, a non-probabilistic sample including the snowball principle of Goodman (1961) was selected. Since non-probabilistic samples do not pursue the goal of representativeness, this type is particularly suitable for exploratory research in which an overview of the topic is to be created (Döring and Bortz, 2016). For the data collection, the standardized online questionnaire was sent to the participants. Before conducting the actual survey, a pretest was conducted to eliminate technical problems, a lack of comprehensibility, or response formats that were not appropriate. In the pretest, experts evaluated the descriptions, the questions, and the answer options in detail and conducted trial runs. After data collection with the participants was completed, data preparation was performed in which the data were processed and transformed. Since the personal data of the participants should not be collected in the first place or should be eliminated during data preparation at the latest, our questionnaire did not include any questions about personal details like age or gender (Döring and Bortz, 2016). Afterward, the processed data were analyzed by using descriptive statistical methods, visualization techniques, and one-sample t-tests with the goal to interpret the statistical results in relation to the research objective (Student, 1908). Finally, the AIM-RM was constructed using a combination of the results of the explorative SLR (*EVAL 1*), the argumentative-deductive analysis (*DESIGN*), and the evaluative quantitative-qualitative online survey (*EVAL 2*).

4 Artificial Intelligence Management Reference Model

4.1 Fields of Action from a Literature Perspective

As a result of the SLR, we found that 51 previous studies have already attempted to some extent to describe specific activities for the management of AI in organizations. All studies were published between 2017 and 2022 and hence indicate that the research on AIM emerged only recently and is still relatively new compared to other branches of IS and AI research. Most research is focused on MMs (26 out of 51 articles) followed by Readiness Level(s) (13 out of 51 articles) and Capability Models (8 out

of 51 articles). Only recently in 2021, some research (4 out of 51 articles) has explored the development of active guidelines for managing AI (cf. Table 1). Tariq and Abonamah (2021) propose a strategic framework for effective AI Adoption in the United Arab Emirates (UAE). Makasi et al. (2021) design value-based guiding principles for managing Cognitive Computing systems in the public sector. Brenner et al. (2021) present processes and structures for AIM and their ideas and concepts represent the beginning of application-oriented research. Finally, Monshizada, Sarbazhosseini and Mohamdian (2021) provide the first ideas of a conceptual framework for AIM including the fields of action people, process, data, and technology (2PDT). All 51 articles analyzed in the SLR are included in the references section of this paper. For better comprehensibility of our research, we have also listed the assigned concepts from the SLR with the respective articles in the references section.

Metadata			**Concepts**							
Type of Publication	Number of Publications	Time Period (in years)	*Budget & Investment*	*Data*	*Ethics & Regulations*	*Organization & Processes*	*People & Competences*	*Products & Services*	*Strategy & Management*	*Technologies & Infrastructure*
Capability Model	8	2018-2021	3	7	4	8	7	6	5	7
Management Principles	4	2021	3	4	3	4	4	4	3	4
Maturity Model	26	2018-2022	6	21	10	23	22	13	18	23
Readiness Levels	13	2017-2022	7	13	11	8	13	9	10	11
Total	**51**	**2017-2022**	**19**	**45**	**28**	**43**	**46**	**32**	**36**	**45**

Table 1. Cumulated Concept Matrix.

The 51 previous studies mention a multitude of different management activities for AIM in organizations. These activities are too numerous to be presented in an understandable way in this short research paper. However, since most of the studies are based on widely known research theories and frameworks like DOI, TOE, or MMs, common and overarching concepts can be identified as fields of action. The concepts were inductively defined following a bottom-up approach and then iteratively refined until the final eight concepts illustrated on the right side of Table 1 emerged. The concepts are defined as mutually exclusive and collectively exhaustive as possible to ensure a transparent structuring of the problem, an efficient solution finding and, as a result, high-quality fields of action (Rasiel, 1999). The field *Budget & Investment* refers to the amount an organization is willing to invest in AI and hence, budgeting activities for adopting AI are included in it. It also describes the economic viability of using AI and includes activities such as a Return on Investment (ROI) calculation (Botchkarev and Andru, 2011). Many AI systems rely on high-quality data management. All activities concerned with data management such as the secure and efficient collection, processing, and analysis of data are subsumed under the field *Data*. The adoption and operation of AI raise numerous ethical issues that impact corporate governance in several ways. Management activities that ensure that AI adheres to corporate values, policies, and processes that protect the privacy, security, and dignity of customers are subject to the field *Ethics & Regulations*. It addresses the establishment of ethical values and standards related to the use of AI, such as data privacy, transparency (using for example XAI), and fairness in the organization. Today, organizations are formally defined by the terms organization and business processes and managing both regarding the use of AI systems is subject to the field *Organization & Processes*. The field *People & Competences* addresses all management tasks related to an organization's human resources. This encompasses recognizing the individual abilities that employees must possess for the purpose of developing, utilizing, and enhancing AI technologies. It also involves educating current employees or hiring new employees who possess these competences. The goal of adopting AI in organizations is to achieve a positive impact on its products and services, e.g. in terms of quality or price. The field *Products & Services* subsumes all management activities that support AI technologies in becoming a critical part of product and service development and offering to clients. The field *Strategy*

& Management describes the planning and formulation of goals and strategies for the use of AI in an organization in terms of content, scope as well as temporal and spatial reference. It includes tasks to ensure that the company's management enables the adoption, diffusion, and long-term use of AI. Finally, the field *Technologies & Infrastructure* describes the management of IT infrastructure and architecture required for the use of AI on a large scale. It subsumes the necessary hardware and software components to enable the development and use of AI and the implementation of concrete AI technologies.

4.2 Fields of Action from a Business Practice Perspective

The identified management activities and overarching fields of action were evaluated with a quantitative survey with business practitioners using standardized questionnaires. In total, 58 experts have fully answered the standardized questionnaire. From these 58 participants, only 2 indicated that they do not have profound knowledge about AI and therefore, the answers of these 2 participants have been excluded from the analysis. Exemplary professions of the participants are "Data Scientist", "Software Engineer", "IT Consultant", "Business Analyst" or "Managing Director" and the average professional experience is 8.0982 years. The average time taken to complete the questionnaire was 15 minutes and 15 seconds. The descriptive statistics of the survey are visualized on the right side of Figure 3 using boxplots.

Statistics of the Single Dimensions

Dimension	Mean	Standard Deviation	p-value	Interpretation
Budget & Investment	3.418	1.212	$6.685 * 10^{-3}$	Conclude Mean > 3
Data	4.268	1.087	$2.878 * 10^{-12}$	Conclude Mean > 3
Ethics & Regulations	3.393	1.498	$2.735 * 10^{-2}$	Conclude Mean > 3
Organization & Processes	3.054	1.102	$3.588 * 10^{-1}$	Cannot conclude Mean > 3
People & Competences	3.589	1.203	$2.775 * 10^{-4}$	Conclude Mean > 3
Products & Services	3.509	1.230	$1.680 * 10^{-3}$	Conclude Mean > 3
Strategy & Management	3.411	1.203	$6.698 * 10^{-3}$	Conclude Mean > 3
Technologies & Infrastructure	3.625	1.137	$6.581 * 10^{-5}$	Conclude Mean > 3

Hypotheses for the t-test for each dimension:

H_0: The relevance of the dimension has been rated on average less than or equal to 3.
H_1: The relevance of the dimension has been rated on average greater than 3.

Boxplots of the Sample Data

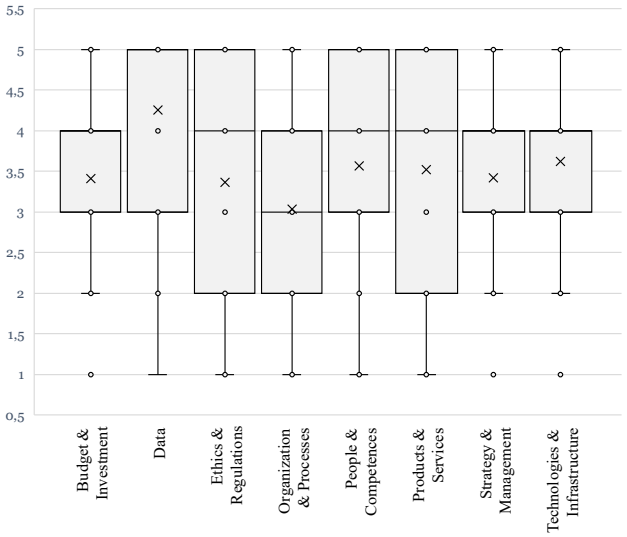

Figure 3. Statistics and Visualization of the Sample Data.

The results in the form of descriptive statistics indicate that most fields of action were evaluated as relevant by the participants. The data were further analyzed by conducting one-sample t-tests for each field of action (cf. left side of Figure 3). A field of action has high relevance for AIM if the mean value is greater than 3 since on a five-point Likert scale a value between 3 and 5 indicates a tendency toward greater relevance. However, it is only possible to choose integers (*1, 2, 3, 4, 5*). Thus, a mean of 3.5 could indicate that half of the participants rated the dimension as neither relevant nor irrelevant (depending on the distribution of the data). Nevertheless, based on our one-sample t-tests, every field of action was evaluated as highly relevant in our sample with the exception of *Organization & Processes* (p-value of 0.3588 and thus higher than the significance level of 0.05). This is surprising since management activities related to *Organization & Processes* are mentioned in 46 out of the 51 previous studies and are considered core activities for AIM. Therefore, this field of action is still part of the AI-RM. The correlation between individual fields of action ranges from 0.2700 (*Ethics & Regulations* and *Products & Services*) to 0.7152 (*Technologies & Infrastructure* and *Data*). No significant similarities or differences in visual data analysis were found between industries based on our sample. This might be due to the fact that our sample size with respect to individual industries is very small and therefore cannot provide further insights for individual industries. With an increasing sample size, it is expected

that a slight difference between the relevance of single fields of action for the different industries can be observed. Nevertheless, our results indicate that the fields of action derived from literature are also considered highly relevant by practitioners regardless of their industry. In addition, one expert stated that major problems in working with AI on a daily basis are the lack of understanding among customers of what AI is and whether it can contribute to their products, and how many AI pioneers there are in the market in the industry. These factors of customer readiness and market readiness are classical factors of adoption studies that for example use the TOE framework (Tornatzky and Fleischer, 1990). However, since these factors are external factors of the company's environment, they are not suited for the internal AI capability perspective the AIM addresses in the first place. Nevertheless, in line with the statements of another participant, the external customer readiness factor could be transformed in an internal *Marketing & Sales* field of action. Said participant states that customers of his company are always told how elementary its AI features are with the goal of better selling AI-related products and services. Therefore, the field *Products & Services* of the AIM-RM was slightly refined to cover these aspects as well. Finally, as also stated by one participant, all current aspects of AIM can be covered with the derived fields of action that were included in the survey. Moreover, every field of action except *Organization & Processes* was evaluated as highly relevant for AIM by our data sample. But since the field of action *Organization & Processes* is mentioned in 46 out of the 51 previous studies it is also included in the current version of the AI-RM. In future research, ecological consequences of AI such as higher energy consumption caused by higher computational power needed to train ML algorithms could also be considered in the AIM-RM (Fukas and Thomas, 2021).

4.3 Designing the Reference Model

The AIM-RM is designed by classifying the fields of action identified from the literature and evaluated through the quantitative-qualitative survey into *Enabling Activities*, *Value Activities*, *Governance Activities*, and *Core Activities* (cf. Figure 4). These superordinate activity classes were derived based on a combination of the SLR results and the online survey. *Enabling Activities* and *Value Activities* build the frame of why an organization – at least in the economic sense – should adopt AI in the first place. Initially, organizations must declare budgets and invest in various kinds of resources (e.g. technologies, data, employees) to develop innovative products and services enabled by AI technology, which then should guarantee an ROI and deliver added value to the company. *Enabling Activities* like budgeting, cost calculation, and resource planning are subsumed in the field *Budget & Investment*. To create business value, the use of AI must have a positive impact on the products and services of an organization. *Value Activities* like the measurement of the value contribution of AI, the design of AI-based products and services, and the marketing and sales of these products and services are subject to the field *Products & Services*. To achieve the value-creating use of AI, *Core Activities* that can be grouped into four central fields of action are necessary. The establishment of AI-related technologies (e.g. Machine Learning, Natural Language Processing, or Computer Vision) as well as a robust infrastructure (e.g. Cloud Computing or own computing centers) enables the efficient and effective collection, processing, and analysis of data. Thereby, the management of all activities that are concerned with the development, deployment, or operation of technologies and infrastructure supporting the use of AI in the organizations are subsumed under the field *Technologies & Infrastructure*. AI systems rely on high-quality data management. The field *Data* covers management activities that should ensure the amount, quality, and secure and efficient processing of the data necessary to successfully develop and operate AI systems in an organization. To develop and use AI, highly qualified internal employees or at least external consultants are necessary, which should be organized with lean structures and business processes. The field *People & Competences* includes management activities like the identification of competences that are necessary to develop, improve and use AI in an organization, the training of existing employees, or the recruiting of new employees with the needed AI competences. The establishment of collaborations with partners to externally source AI competences is also a management activity in this field of action. For the value-creating integration of AI into business (AI Business Integration), business processes and structures may need to change. Management activities concerned with these changes as well as the proactive modeling of lean, transparent, and adaptable business processes driven by AI are subject to

the field *Organization & Processes*. All *Enabling*, *Core*, and *Value Activities* should be coordinated by a central AI strategy. Therefore, *Governance Activities* like AI strategy development, the strategic alignment between business and AI (Business-AI Alignment), and the planning and management of AI projects are included in the field *Strategy & Management*. Finally, ethical guidelines and regulations for the trustworthy use of AI should be ensured across all other management activities. Therefore, the field *Ethics & Regulations* covers *Governance Activities* like the establishment of ethical values and standards regarding AI in the organization as well as compliance with all internal and external regulations.

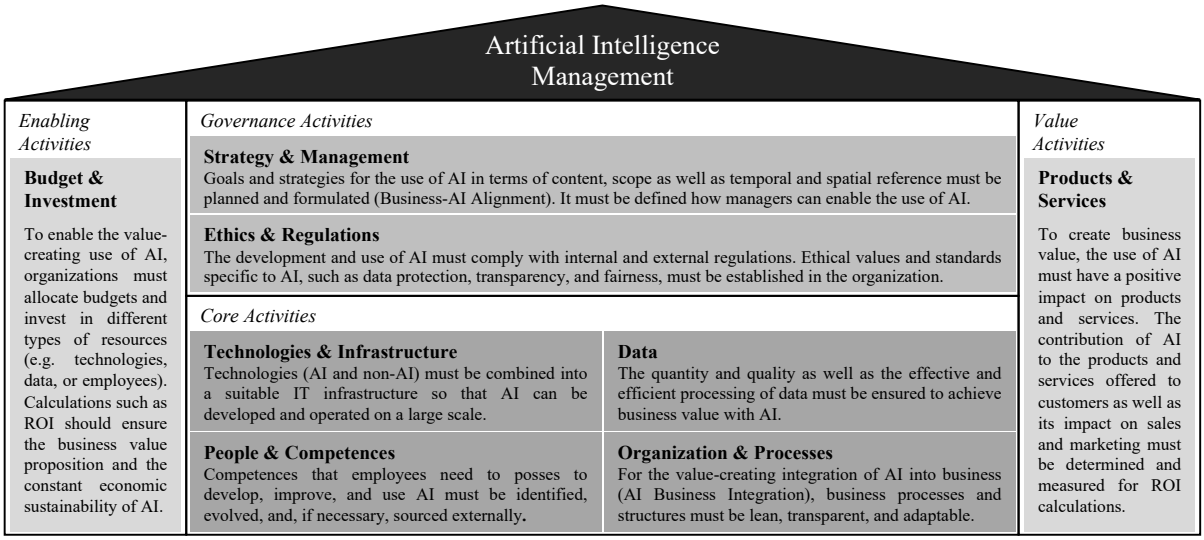

Figure 4. Artificial Intelligence Management Reference Model.

5 Artificial Intelligence Management Reference Model

In this paper, the AIM-RM was developed as an initial and general guide for the value-adding application of AI in organizations. We answered RQ 1 by systematically identifying management activities from the literature and grouping them into eight different fields of action. The fields of action were evaluated against their correctness and completeness with a quantitative-qualitative online survey by IS and AI practitioners. The design of the AIM-RM by analyzing the previously identified and evaluated management activities and fields of action answers RQ 2. Even though we followed scientifically accepted standards throughout the entire research process, our work has some limitations. The management activities and fields of action were not evaluated in a fully representative survey because a non-probabilistic sample was drawn from the population and the number of participants was too small for cross-industry findings. However, it can be stated that the quality of a scientific paper does not only depend on the number of participants but that correct execution, evaluation, and interpretation are more important (Berger-Grabner, 2016). Therefore, our results provide a valid insight and with our findings we directly contribute to the emerging field of AIM and extend the IS body of knowledge. In particular, we provided the first reference model that serves researchers and practitioners as an initial guide to AIM. Researchers can reuse the AIM-RM to design other, more specific models in the future whereas practitioners can use it to set up AIM Systems in their organizations in accordance with the ISO/IEC CD 42001 standard (ISO, 2023). The AI-RM represents a starting point for improving the strategic management of organizations with regard to the use of AI and supports practitioners in integrating AI technologies into their organizations in a long-term and target-oriented manner. Nevertheless, the AIM-RM at its current state represents research in progress since it is an instance of an artifact, which is not validated with an *ex-post evaluation* yet. The *ex-post evaluation* is subject to further research and should provide proof of applicability and proof of usefulness of the AIM-RM. Finally, while the AIM-RM is already making a valuable contribution to IS research, further insights are expected from the future refinement and application of the model.

References

Abdelkafi, N., Döbel, I., Drzewiecki, J. D., Meironke, A., Niekler, A. and Ries, S. (2019). *Künstliche Intelligenz (KI) im Unternehmenskontext*. Fraunhofer Center for International Management and Knowledge Economy IMW and Leipzig University. Concepts assigned in the SLR: *Budget & Investment, Data, Ethics & Regulations, Organization & Processes, People & Competences, Products & Services, Technologies & Infrastructure.*

Akkiraju, R., Sinha, V., Xu, A.,Mahmud, J., Gundecha, P., Liu, Z., Liu, X. and Schumacher, J. (2020). "Characterizing Machine Learning Processes: A Maturity Framework," in: Fahland, D., Ghidini, C., Becker, J. & Dumas, M. (eds.) *Business Process Management (BPM 2020)*, Seville, Spain. Concepts assigned in the SLR: *Data, Ethics & Regulations, People & Competences.*

Alsheibani, S., Cheung, Y. and Messom, C. (2018). "Artificial intelligence adoption: AI-readiness at firm-level," in: Tanabu, M. & Senoo, D. (eds.) *Pacific Asia Conference on Information Systems*, Yokohama, Japan. Concepts assigned in the SLR: *Data, Ethics & Regulations, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Alsheibani, S., Cheung, Y. and Messom, C. (2019). "Towards an Artificial Intelligence Maturity Model: From Science Fiction to Business Facts," in: Xu, D., Jiang, J. & Kim, H. (eds.) *Pacific Asia Conference on Information Systems*. Xi'an, China. Concepts assigned in the SLR: *Data, Organization & Processes, People & Competences, Technologies & Infrastructure.*

Alt, J. K., Klingensmith, K. and Faber, I. (2020). "Growing an artificial intelligence capability: challenges and opportunities," in: Pham, T., Solomon, L. & Rainey, K. (eds.) *Artificial Intelligence and Machine Learning for Multi-Domain Operations Applications II*. Online. Concepts assigned in the SLR: *Organization & Processes, People & Competences, Products & Services, Technologies & Infrastructure.*

Andrews, W., Karamouzis, F., Brethenoux, E. and Hamer, P. (2019). *Artificial Intelligence Maturity Model.* URL: https://www.gartner.com/en/documents/3885363 (visited on 31 March 2023). Concepts assigned in the SLR: *Data, Organization & Processes, People & Competences, Products & Services, Technologies & Infrastructure.*

Asatiani, A., Malo, P., Nagbøl, P. R., Penttinen, E., Rinta-Kahila, T. and Salovaara, A. (2021). "Socio-technical Envelopment of Artificial Intelligence: An Approach to Organizational Deployment of Inscrutable Artificial Intelligence Systems," *Journal of the Association for Information Systems* 22 (2), 325–352.

Seetharam, S. B. (2020). *Developing a Digital AI Roadmap for Retail*. Master's Thesis, Metropolia University of Applied Sciences. Concepts assigned in the SLR: *Data, Organization & Processes, People & Competences, Strategy & Management, Technologies & Infrastructure.*

Becker, J., Knackstedt, R. and Pöppelbuß, J. (2009). "Developing Maturity Models for IT Management," *Business & Information Systems Engineering* 1 (3), 213–222.

Benbya, H., Davenport, T. H. and Pachidi, S. (2020). "Special Issue Editorial. Artificial Intelligence in Organizations: Current State and Future Opportunities," *Management Information Systems Quarterly Executive* 19 (4), 4.

Berente, N., Gu, B., Recker, J. and Santhanam, R. (2021). "Special Issue Editor's Comments: Managing Artificial Intelligence," *Management Information Systems Quarterly* 45 (3), 1433–1450.

Berger-Grabner, D. (2016). *Wissenschaftliches Arbeiten in den Wirtschafts- und Sozialwissenschaften,* 3rd Edition. Wiesbaden: Springer.

Botchkarev, A. and Andru, P. (2011). "A return on investment as a metric for evaluating information systems: Taxonomy and application," *Interdisciplinary Journal of Information, Knowledge, and Management* 6, 245–269.

Brenner, W., van Giffen, B. and Koehler, J. (2021). "Management of Artificial Intelligence: Feasibility, Desirability and Viability," in: Aier, S., Rohner, P. & Schelp, J. (eds.) *Engineering the Transformation of the Enterprise*. Cham: Springer. Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Brenner, W., van Giffen, B., Koehler, J., Fahse, T. and Sagodi, A. (2021). *Bausteine eines Managements Künstlicher Intelligenz*. Wiesbaden: Springer.

Brewer, J. and Hunter, A. (2006). *Foundations of multimethod research: Synthesizing styles*. Thousand Oaks: Sage.

Burgess, A. (2018). *The Executive Guide to Artificial Intelligence*. Cham: Springer. Concepts assigned in the SLR: *Budget & Investment, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Chen, W., Liu, C., Xing, F., Peng, G. and Yang, X. (2022). "Establishment of a maturity model to assess the development of industrial AI in smart manufacturing," *Journal of Enterprise Information Management* 35 (3), 701–728. Concepts assigned in the SLR: *Ethics & Regulations, Data, Organization & Processes, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Coates, D. L. and Martin, A. (2019). "An instrument to evaluate the maturity of bias governance capability in artificial intelligence projects," *IBM Journal of Research and Development* 63 (4/5), 7:1-7:15. Concepts assigned in the SLR: *Ethics & Regulations, Data, People & Competences, Technologies & Infrastructure.*

Cooper, H. M. (1988). "Organizing knowledge syntheses: A taxonomy of literature reviews," *Knowledge in Society* 1 (1), 104–126.

Desouza, K. C., Götz, F. and Dawson, G. S. (2021). "Maturity Model for Cognitive Computing Systems in the Public Sector," in: *Annual Hawaii International Conference on System Sciences*, Kauai (online), USA. Concepts assigned in the SLR: *Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Döring, N. and Bortz, J. (2016). *Forschungsmethoden und Evaluation,* 5th Edition. Berlin: Springer.

Eleks, M., Rebstadt, J., Fukas, P. and Thomas, O. (2022). "Learning without Looking: Similarity Preserving Hashing and Its Potential for Machine Learning in Privacy Critical Domains," in: Demmler, D., Krupka, D. & Federrath, H. (eds.), *INFORMATIK 2022*, Hamburg, Germany.

Eljasik-Swoboda, T., Rathgeber, C. and Hasenauer, R. (2019). "Assessing technology readiness for artificial intelligence and machine learning based innovations," in: Hammoudi, S., Quix, C., Bernardino, J. (eds.) *International Conference on Data Science, Technology and Applications*, Prague, Czech Republic. Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Ellefsen, A. P. T., Oleśków-Szłapka, J., Pawłowski, G. and Toboła, A. (2019). "Striving for excellence in AI implementation: AI maturity model framework and preliminary research results," *LogForum - Scientific Journal of Logistics* 15 (3), 363–376. Concepts assigned in the SLR: *Data, Organization & Processes, People & Competences, Strategy & Management, Technologies & Infrastructure.*

Enholm, I. M., Papagiannidis, E., Mikalef, P. and Krogstie, J. (2021). "Artificial Intelligence and Business Value: a Literature Review," *Information Systems Frontiers* 24 (5), 85–97.

Etlinger, S. (2018). *The AI Maturity Playbook: Five Pillars of Enterprise Success. Altimeter Group - Research Reports*. Altimeter Group. Concepts assigned in the SLR: *Ethics & Regulations, Data, Organization & Processes, Strategy & Management, Technologies & Infrastructure.*

Fetisov, D. A. (2017). *Artificial Intelligence readiness in Russian and Swiss-based mechanical and industrial engineering companies*. Master's Thesis, St. Petersburg University. Concepts assigned in the SLR: *Budget & Investment, Data, People & Competences.*

Fukas, P. (2022). "The Management of Artificial Intelligence: Developing a Framework Based on the Artificial Intelligence Maturity Principle," in: Van Looy, A., Weber, B. & Rosemann, M. (eds.), *Doctoral Consortium Papers Presented at the 34th International Conference on Advanced Information Systems Engineering (CAiSE 2022)*, Leuven, Belgium.

Fukas, P., Menzel, L. and Thomas, O. (2022). "Augmenting Data with Generative Adversarial Networks to Improve Machine Learning-Based Fraud Detection," in: *Wirtschaftsinformatik 2022 Proceedings*, Nuremberg (online).

Fukas, P., Rebstadt, J., Menzel, L. and Thomas, O. (2022). "Towards Explainable Artificial Intelligence in Financial Fraud Detection: Using Shapley Additive Explanations to Explore Feature Importance,"

in: Franch, X., Poels, G., Gailly, F. & Snoeck, M. (eds.) *Advanced Information Systems Engineering (CAiSE 2022)*, Leuven, Belgium.

Fukas, P., Rebstadt, J., Remark, F. and Thomas, O. (2021). "Developing an Artificial Intelligence Maturity Model for Auditing," in: *European Conference on Information Systems*, Marrakesh (online), Marocco. Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Fukas, P. and Thomas O. (2021). "Innovation by Information Technology Recombination: How Artificial Intelligence Progressive Web Apps Foster Sustainable Development," in: Gesellschaft für Informatik (ed.) *INFORMATIK 2021*, Berlin (online), Germany.

Gentsch, P. (2019). *AI in Marketing, Sales and Service*. Cham: Springer. Concepts assigned in the SLR: *Data, Organization & Processes, People & Competences, Strategy & Management.*

Goodman, L. A. (1961). "On the Estimation of the Number of Classes in a Population," *The Annals of Mathematical Statistics 32* (1), 572–579.

Haefner, N., Wincent, J., Parida, V. and Gassmann, O. (2021). "Artificial intelligence and innovation management: A review, framework, and research agenda," *Technological Forecasting and Social Change* 162, 120392. Concepts assigned in the SLR: *Data, Organization & Processes, People & Competences, Technologies & Infrastructure.*

Hevner, A. R., March, S. T., Park, J. and Ram, S. (2004). "Design Science in Information Systems Research," *Management Information Systems Quarterly* 28 (1), 75–105.

Holmström, J. and Hällgren, M. (2021). "AI management beyond the hype: exploring the co-constitution of AI and organizational context," *AI and Society* 37 (4), 1575–1585. Concepts assigned in the SLR: *Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Hradecky, D., Kennell, J., Cai, W. and Davidson, R. (2022). "Organizational readiness to adopt artificial intelligence in the exhibition sector in Western Europe," *International Journal of Information Management* 65, 102497. Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Intel Corporation (2018). *The AI Readiness Model.* URL: https://www.intel.com/content/dam/www/public/us/en/documents/white-papers/ai-readiness-model-whitepaper.pdf (visited on 31 March 2023). Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

ISO (2023). *ISO/IEC CD 42001*. URL: https://www.iso.org/standard/81230.html (visited on 31 March 2023).

Jaaksi, J. (2018). *How to Define an Organization's Maturity to Adopt Artificial Intelligence Solutions*. Master's Thesis, University of Turku. Concepts assigned in the SLR: *Data, Organization & Processes, People & Competences.*

Jöhnk, J., Weißert, M. and Wyrtki, K. (2021). "Ready or Not, AI Comes– An Interview Study of Organizational AI Readiness Factors," *Business and Information Systems Engineering* 63 (1), 5–20. Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, Organization & Processes, People & Competences, Strategy & Management, Technologies & Infrastructure.*

Khosroshahi, P. A., Hauder, M., Volkert, S., Matthes, F. and Gernegroß, M. (2018). "Business capability maps: Current practices and use cases for enterprise architecture management," in: Bui, T. (ed.) *Hawaii International Conference on System Sciences*,Waikoloa Village, USA.

Kortum, H., Fukas, P., Rebstadt, J., Eleks, M., Nobakht Galehpardsari M. and Thomas, O. (2022). "Proposing a Roadmap for Designing Non-Discriminatory ML Services: Preliminary Results from a Design Science Research Project," in: *Wirtschaftsinformatik 2022 Proceedings*, Nuremberg (online), Germany.

Kreutzer, R. T. and Sirrenberg, M. (2020). *Understanding Artificial Intelligence: Fundamentals, Use Cases and Methods for a Corporate AI Journey*. Cham: Springer. Concepts assigned in the SLR: *Budget & Investment, People & Competences, Strategy & Management, Technologies &*

Infrastructure.

Lee, J. (2020). *Industrial AI: Applications with sustainable performance*. Singapore: Springer. Concepts assigned in the SLR: *Data, Organization & Processes, People & Competences, Strategy & Management, Technologies & Infrastructure.*

Lichtenthaler, U. (2020). "Five Maturity Levels of Managing AI: From Isolated Ignorance to Integrated Intelligence," *Journal of Innovation Management* 8 (1), 39–50. Concepts assigned in the SLR: *Organization & Processes, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Likert, R. (1932). "A Technique for the Measurement of Attitudes," *Archives of Psychology* 22 (140), 5–55.

Makasi, T., Tate, M., Desouza, K. C. and Nili, A. (2021). "Value–Based Guiding Principles for Managing Cognitive Computing Systems in the Public Sector," *Public Performance and Management Review* 44 (4), 929–959. Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Mikalef, P., Fjørtoft, S. O. and Torvatn, H. Y. (2019). "Developing an Artificial Intelligence Capability: A Theoretical Framework for Business Value," in: Abramowicz, W. & Corchuelo, R. (eds.) *Business Information Systems Workshops (BIS 2019),* Seville, Spain. Concepts assigned in the SLR: *Data, Organization & Processes, People & Competences, Strategy & Management, Technologies & Infrastructure.*

Mikalef, P. and Gupta, M. (2021). "Artificial intelligence capability: Conceptualization, measurement calibration, and empirical study on its impact on organizational creativity and firm performance," *Information and Management* 58 (3), 103434. Concepts assigned in the SLR: *Data, Organization & Processes, People & Competences, Strategy & Management, Technologies & Infrastructure.*

Mikalef, P., Lemmer, K., Schaefer, C., Ylinen, M., Fjørtoft, S. O., Torvatn, H. Y., Gupta, M. and Niehaves, B. (2022). "Enabling AI capabilities in government agencies: A study of determinants for European municipalities," *Government Information Quarterly* 39 (4). Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Mikalef, P. and Torvatn, H. Y. (2019). "A Configurational Approach to Task-Technology Fit in the Healthcare Sector," in: Abramowicz, W. & Corchuelo, R. (eds.) *Business Information Systems Workshops (BIS 2019),* Seville, Spain.

Miller, H. and Stirling, R. (2019). *Government Artificial Intelligence Readiness Index 2019*. URL: https://www.statista.com/study/50485/artificial-intelligence/ (visited on 31 March 2023). Concepts assigned in the SLR: *Ethics & Regulations, Data, People & Competences, Strategy & Management, Technologies & Infrastructure.*

Monshizada, S., Sarbazhosseini, H. and Mohamdian, M. (2021). "Conceptualising Management of Artificial Intelligence in Terms of People, Process, Data and Technology," in: *Australasian Conference on Information Systems*, Sydney, Australia. Concepts assigned in the SLR: *Data, Organization & Processes, People & Competences, Products & Services, Technologies & Infrastructure.*

Montoya, L. and Rivas, P. (2019). "Government AI Readiness Meta-Analysis for Latin America and the Caribbean," in: *IEEE International Symposium on Technology and Society (ISTAS)*, Medford, USA. Concepts assigned in the SLR: *Ethics & Regulations, Data, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Najdawi, A. (2020). "Assessing AI Readiness Across Organizations: The Case of UAE," in: *International Conference on Computing, Communication and Networking Technologies (ICCCNT)*, Kharagpur, India. Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Neuman, W. L. (2014). *Social Research Methods: Qualitative and Quantitative Approaches,* 7th Edition. Harlow: Pearson Education.

Nortje, M. A. and Grobbelaar, S. S. (2020). "A Framework for the Implementation of Artificial

Intelligence in Business Enterprises: A Readiness Model," in: *IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC)*, Cardiff, United Kingdom. Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Nurmaini, S. (2021). "The Artificial Intelligence Readiness for Pandemic Outbreak COVID-19: Case of Limitations and Challenges in Indonesia," *Computer Engineering and Applications Journal* 10 (1), 9–19. Concepts assigned in the SLR: *Ethics & Regulations, Data, People & Competences, Products & Services, Technologies & Infrastructure.*

Pringle, T. and Zoller, E. (2018). *How to Achieve AI Maturity and Why It Matters*. Whitepaper. Ovum. Concepts assigned in the SLR: *Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Pumplun, L., Fecho, M., Wahl, N., Peters, F. and Buxmann, P. (2021). "Adoption of Machine Learning Systems for Medical Diagnostics in Clinics: Qualitative Interview Study," *Journal of Medical Internet Research* 23 (10), e29301. Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Rasiel, E. M. (1999). *The McKinsey Way*. New York: McGraw-Hill.

Rebstadt, J., Remark, F., Fukas, P., Meier, P. and Thomas, O. (2022). "Towards Personalized Explanations for AI Systems: Designing a Role Model for Explainable AI in Auditing," in: *Wirtschaftsinformatik 2022 Proceedings*, Nuremberg (online), Germany.

Resch, O. (2020). *Einführung in das IT-Management*. Berlin: Erich Schmidt.

Rowley, J. and Slack, F. (2004). "Conducting a literature review," *Management Research News* 27 (6), 31–39.

Saari, L., Ylikerälä, M. and Siltanen, P. (2022). *Background of the AI maturity tool for the EIT Cross KIC AI activity*, VTT Research Report. Concepts assigned in the SLR: *Data, Organization & Processes, People & Competences, Products & Services, Technologies & Infrastructure.*

Salipante, P., Notz, W. and Bigelow, J. (1982). "A Matrix Approach to Literature Reviews," *Research in Organizational Behavior* 4, 321–348.

Schuster, T., Waidelich, L. and Volz, R. (2021). "Maturity Models for the Assessment of Artificial Intelligence in Small and Medium-Sized Enterprises," in: Wrycza, S., Maślankowski, J. (eds) *PLAIS EuroSymposium on Digital Transformation*, Sopot, Poland. Concepts assigned in the SLR: *Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Seger, J., Miailhe, N. and Mueller, S. (2019). *The AIGO : A Framework for Planning, Developing, and Deploying Artificial Intelligence in Intergovernmental Organizations*. Research Report, The Future Society, Harvard Kennedy School of Government. Concepts assigned in the SLR: *Organization & Processes, People & Competences, Strategy & Management, Technologies & Infrastructure.*

Siddique, S. S. (2018). *The Road to Enterprise Artificial Intelligence: A Case Studies Driven Exploration*. Master's Thesis, University of California. Concepts assigned in the SLR: *Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management.*

Sonnenberg, C. and vom Brocke, J. (2012). "Evaluations in the Science of the Artificial – Reconsidering the Build-Evaluate Pattern in Design Science Research" in: Peffers, K., Rothenberger, M. & Kuechler, B. (eds.) *Design Science Research in Information Systems: Advances in Theory and Practice (DESRIST 2012)*, Las Vegas, USA.

Stein, P. (2019). "Forschungsdesigns für die quantitative Sozialforschung," in: Baur, N. & Blasius, J. (eds.) *Handbuch Methoden der empirischen Sozialforschung*, Wiesbaden: Springer.

Stenberg, L. and Nilsson, S. (2020). *Factors influencing readiness of adopting AI: A qualitative study of how the TOE framework applies to AI adoption in governmental authorities*. Master's Thesis, KTH Royal Institute of Technology. Concepts assigned in the SLR: *Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management.*

Student (1908). "The Probable Error of a Mean," *Biometrika* 6 (1), 1–25.

Tariq, M. U. and Abonamah, A. A. (2021). "Proposed Strategic Framework for Effective Artificial

Intelligence Adoption in UAE," *Academy of Strategic Management Journal* 20 (2), 1–14. Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Tornatzky, L. G. and Fleischer, M. (1990). *Technological Innovation as a Process*. Lexington: Lexington Books.

Tu, H., Lin, Z. and Lee, K. (2019). "Automation With Intelligence in Drug Research," *Clinical Therapeutics* 41 (11), 2436–2444. Concepts assigned in the SLR: *Data, Organization & Processes, People & Competences, Technologies & Infrastructure.*

Van Noordt, C. and Misuraca, G. (2020). "Evaluating the impact of artificial intelligence technologies in public services: Towards an assessment framework," in: Charalabidis, Y., Cunha, M. A. & Sarantis, D. (eds.) *International Conference on Theory and Practice of Electronic Governance*, Athens, Greece. Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Technologies & Infrastructure.*

vom Brocke, J., Niehaves, B., Simons A. and Riemer, K. (2009). "Reconstructing the Giant: On the Importance of Rigour in Documenting the Literature Search Process," in: *European Conference on Information Systems*, Verona, Italy.

Webster, J. and Watson, R. T. (2002). "Analyzing the Past to Prepare for the Future: Writing a Literature Review," *Management Information Systems Quarterly* 26 (2), xiii–xxiii.

Wilde, T. and Hess, T. (2007). "Forschungsmethoden der Wirtschaftsinformatik," *Wirtschaftsinformatik 4* (49), 280–287.

Yablonsky, S. A. (2019). "Multidimensional data-driven artificial intelligence innovation," *Technology Innovation Management Review* 9 (12), 16–28. Concepts assigned in the SLR: *Data, Organization & Processes, Strategy & Management, Technologies & Infrastructure.*

Yams, N. B., Richardson, V., Shubina, G. E., Albrecht, S. and Gillblad, D. (2020). "Integrated AI and Innovation Management: The Beginning of a Beautiful Friendship," *Technology Innovation Management Review* 10 (11). Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Yerlikaya, S. and Erzurumlu, Y. Ö. (2021). "Artificial Intelligence in Public Sector: A Framework to Address Opportunities and Challenges," in: Hamdan, A., Hassanien, A. E., Razzaque, A. & Alareeni, B. (eds.) *The Fourth Industrial Revolution: Implementation of Artificial Intelligence for Growing Business Success*. Cham: Springer. Concepts assigned in the SLR: *Budget & Investment, Ethics & Regulations, Data, Organization & Processes, People & Competences, Products & Services, Strategy & Management, Technologies & Infrastructure.*

Zebec, A. and Štemberger, M. I. (2020). "Conceptualizing a Capability-Based View of Artificial Intelligence Adoption in a BPM Context," in: Del Río Ortega, A., Leopold, H. & Santoro, F. M. (eds.) *Business Process Management Workshops (BPM 2020)*, Seville, Spain. Concepts assigned in the SLR: *Data, Organization & Processes, Products & Services, Technologies & Infrastructure.*

Zhang, D., Maslej, N., Brynjolfsson, E., Etchemendy, J., Lyons, T., Manyika, J., Ngo, H., Niebles, J. C., Sellitto, M., Sakhaee, E., Shoham, Y., Clark, J. and Perrault, R. (2022). *The AI Index 2022 Annual Report*. AI Index Steering Committee. Human-Centered AI Institute. Stanford University.