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PREGLED MODELA ZRELOSTI U OBLASTI INFORMACIONIH SISTEMA: DIZAJN, STRUKTURA I UTICAJ VEŠTAČKE INTELIGENCIJE
SYSTEMATIC REVIEW OF INFORMATION SYSTEMS MATURITY MODELS: DESIGN, STRUCTURE, AND IMPACT OF AI

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REZIME: Informacioni sistemi igraju ključnu ulogu u podržavanju i strateških ciljeva i operativnih aktivnosti organizacija. Modeli zrelosti su se pojavili kao alati za procenu sposobnosti organizacije i da usmere napredak ka višim nivoima zrelosti. Ovaj rad predstavlja sistematski pregled literature usmeren na identifikaciju zajedničkih strukturnih komponenti u modelima zrelosti u oblasti informacionih sistema. Šesnaest modela, razvijenih za različite oblasti primene, analizirano je kako bi se otkrili zajedniči elementi u dizajnu, metodama procene i kriterijumima procene. Dodatno, rad istražuje uticaj veštačke inteligencije na putanje zrelosti i strukture modela, analizirajući njen potencijal da ubrza napredak i nove izazove koje uvodi.

KLJUČNE REČI: informacioni sistemi, veštačka inteligencija, model zrelosti, pregled literature

ABSTRACT: Information systems (IS) play crucial role in supporting both the strategic goals and operational activities of an organization. Maturity models have emerged as tools for evaluating organizational capabilities and guiding progression toward higher levels of maturity. This paper presents a systematic literature review aimed at identifying common structural components across maturity models within the IS domain. Sixteen models, developed for various application areas, are analyzed to identify common patterns in design, assessment methods, and assessment criteria. Furthermore, the paper explores the influence of artificial intelligence on maturity paths and model structures, analyzing both its potential to accelerate maturity progression and the novel challenges it introduces.

KEY WORDS: information system, artificial intelligence, maturity model, literature review

Introduction

Information systems (IS) are an integral component of the modern business environment, shaping the way organizations operate and create value. IS enable organizations to collect, process, and share data in an integrated and timely manner, thereby providing substantial opportunities for improving organizational performance [1]. They are typically designed to support activities within each functional area, and their quality directly influences operational efficiency and overall business performance [2].Organizations strive to keep pace with rapidly evolving business environment and seek approaches to evaluate their current capabilities and identify opportunities for improvement. Maturity models (MMs) have emerged as widely used tools that evaluate organization's position toward a desired state of maturity. They usually define a sequence of maturity levels through which an organization or process evolves. The descriptive elements of each level often serve as guidelines for achieving higher stages of maturity. During maturity assessment, a snapshot of the organization is created based on predefined criteria, serving as a basis for improvement initiatives [3]. The Capability Maturity Model (CMM) has significantly influenced the design and development of many maturity models in information systems research. The emergence of artificial intelligence (AI) marks a significant transformation in the information systems domain, enabling automated decision-making, real-time analytics, and new forms of value creation. This technological shift also has important implications for maturity model research, as it challenges the assumptions of existing models while offering opportunities for their improvement. AI may disrupt traditional maturity paths by accelerating progression through maturity stages and introducing entirely new assessment criteria that were not previously considered. Furthermore, AI can support the development and application of maturity models through advanced analytics, adaptive evaluations, and data-driven benchmarking.

The objective of this paper is to explore existing maturity models within the IS domain and determine whether common structure can be identified. For this purpose, a systematic literature review (SLR) was conducted to retrieve the largest possible number of relevant papers. Additionally, this paper examines how emerging technologies, such as artificial intelligence, influence the maturity progression. To address this objective, the paper investigates the following research questions:

RQ1: Can common structural components, such as assessment criteria, maturity levels, and model desing, be identified across maturity models in the IS domain?

RQ2: Do emerging technologies reshape the established maturity paths of IS maturity models?

This paper is an extended and revised version of a paper presented at the Skup privrednika i naučnika (SPIN'25) conference [4]. Compared to the conference version, this paper includes: (1) expanded methodology section, (2) more detailed results section with comprehensive analysis of model characteristics and limitations, and (3) in-depth discussion of the impact and implications of artificial intelligence on maturity and maturity models. The remainder of this paper is organized as follows. Section 2 provides an overview of related work in the field, while Section 3 describes the research methodology. Section 4 presents the research results, followed by Section 5, which offers a detailed discussion and recommendations for future research. Finally, Section 6 concludes the paper.

Related work

Information systems play a crucial role in enhancing organizational performance by supporting both strategic objectives and operational processes. To analyze maturity models in the field of information systems, we conducted a systematic literature review. This approach enables a comprehensive understanding of model structures and their modes of application. The selected literature reviews in the domain of IS maturity models are presented in Table 1. All included reviews provide a detailed description of the applied methodology, along with an overview of the digital libraries searched with clear, transparent, and systematic reporting of findings.

Table 1 - Selected literature review on maturity models in IS domain

Paper	Paper scope	Digital libraries	Time frame
[5]	research on maturity models; retrospection on previous and potential future research (20 articles)	ACM DL, AIS eLibrary, Emerald, ScienceDirect IEEE Xplore, ProQuest, Springer Link, Wiley	1994 – 2009
[6]	structure of maturity models, terminology, and theoretical considerations in IS research (34 articles)	ACM Digital Library, AIS eLibrary, IEEE explore, Springer Link	1999 – 2014
[7]	methodological limitations of MM research and recommendations for improving design principles (129 articles)	Web of Science, AIS eLibrary	No limitations
[8]	Research perspectives on MMs: theoretical, publication-related, and practical (76 articles)	ACM DL, AIS eLibrary, ProQuest, EBSCOhost, Wiley, ScienceDirect	1996 – 2010

The analysis of previously published systematic literature reviews highlights the importance of maturity models, while simultaneously revealing opportunities for gaining additional insights through further analysis. Particular attention is given to artificial intelligence as a relatively recent and transformative technology with the potential to reshape research in this domain. To ensure comprehensive coverage of relevant papers, the review encompasses a broad range of digital libraries and is further complemented by an analysis of references cited in the included papers, an approach not adopted in the previously examined reviews. In addition, a quality assessment was conducted for the papers identified through the literature review in order to evaluate their contribution to the overall analysis.

Research methodology

This paper employed the systematic literature review methodology proposed by [9]. The PRISMA guidelines [10] were used to improve the transparency and quality of results reporting . The search process began with the identification of relevant keywords and the formulation of appropriate search string. The term “information systems maturity model” was defined as the core concept for identifying relevant papers. The search was limited to publication titles, as applying the string to abstracts or full texts resulted in a high number of irrelevant records. An example of a search string is as follows:

TITLE ((information system OR “IS”) AND (maturit* OR capabilit* OR capacit* OR competenc* OR readiness) AND (model OR framework OR level OR assessment OR evaluation OR analysis OR measure*))

The search covered the ACM Digital Library, IEEE Xplore, Scopus, ScienceDirect, and Web of Science as primary sources, while SpringerLink and AIS eLibrary were used as supplementary sources, according to guidelines by [11]. Certain databases, such as Google Scholar, were excluded due to the inclusion of materials that were not peer-reviewed. The search was conducted between September 2 and September 22, 2025. An initial set of 254 papers was identified and subsequently imported into the reference management system Mendeley. In the first stage of the selection process, the relevance of each paper was assessed based on the title, resulting in 58 papers being kept for further consideration. In the second stage, abstracts were analyzed, leading to the selection of 29 papers for full-text review. To identify additional papers not captured in the initial search, a backward reference search of the included papers was performed. Following the full-text review, the final sample consisted of 21 papers.

Inclusion and exclusion criteria

Acknowledging the importance of the selection phase for maintaining the validity of the literature review, a set of inclusion (IC) and exclusion criteria (EC) was defined and consistently applied throughout the entire process. Studies were included if they (IC1) proposed a maturity model or framework for assessing maturity in the domain of information systems, and (IC2) were published as academic outlets, primarily in peer-reviewed journals or conference proceedings. Conversely, studies were excluded if they (EC1) focused on readiness assessment or the application of existing maturity models, (EC2) had not undergone peer review or represented earlier versions of already published work, or (EC3) were not written in English. No restrictions were applied with regard to the year of publication.

Quality assessment

Each of the 21 papers remaining after the third stage of selection was individually assessed based on a defined set of quality criteria. These criteria were used to evaluate the potential contribution of each paper to the literature review. Responses to individual criteria were scored as Yes (1), Partially (0.5), or No (0). Based on the total score, five papers were excluded (with a score lower than 2), resulting in a final set of 16 papers for further data extraction and synthesis. The quality criteria were defined as follows:

QC1: Is the objective of the paper clearly defined and aligned with the development of a maturity model?

QC2: Is the domain for which the maturity model is developed adequately described?

QC3: Does the paper describe the structure of the maturity model, including maturity levels and assessment criteria?

QC4: Does the paper explain the assessment method, including data collection procedures?

Data extraction and synthesis

The final set of selected papers was analyzed to extract information relevant for the literature review. For this purpose, a classification schema (Table 2) was employed, based on categories established in [12]. When a paper did not provide enough information for a given category, it was marked as N, while the value NA indicated that the category was not applicable to the analyzed model.

Table 2 – Classification schema

Class	Value	Description
Research method	Analytical	Conceptual, mathematical, or statistical methodologies
	Empirical	Experimental or observational approaches (i.e. case studies, content analysis)
	Theoretical	Grounded in established theories or existing maturity models (i.e. CMM)
Model design	Top-down	During the design phase, the maturity levels were established first, and then the items of assessment
	Bottom-up	The assessment items were first identified during the design phase and then the maturity levels
Purpose of use	Descriptive	Explains the current state of an organization's processes or capabilities
	Prescriptive	Provides guidance on how to progress to higher maturity levels
	Comparative	Enables benchmarking by comparing maturity levels across organizations or sectors in the organization
Assessment method	Quantitative	Relies on metrics to provide maturity score
	Qualitative	Descriptive assessments or categorical ratings to evaluate maturity
Model structure	Maturity grid	Matrix-based model aligning maturity levels with capability stages
	Structured model	Hierarchical model with formalized stages (e.g. CMM)
	Likert-like	Questionnaire-based assessment using ordinal scales
Application domain	Generic	Broad, cross-industry applicability
	Specific	Designed for a particular industry or organizational context
Number of levels		The number of maturity levels as the degree of maturity

Results

The final set of papers included in the review includes models designed for various domains, such as healthcare, education, and the public sector, as well as models developed for specific purposes, such as strategic planning and interoperability. This diversity provided a basis for examining whether a common structure of IS maturity models can be identified, thereby addressing the first research question. The analysis reveals several common characteristics in the design of IS maturity models (Table 3). Maturity models are mostly based on an analytical approach, with findings from systematic literature reviews used as the foundation for model development, often complemented by additional insights gathered through interviews with experts. In terms of design, a bottom-up approach is generally employed, where assessment criteria are identified first, followed by the definition of maturity levels. The primary purpose of these models is descriptive, representing current capabilities of an organization without providing guidance toward higher maturity levels. Only two models demonstrated prescriptive potential. Three studies propose assessment models, for which the category "purpose of use" is not applicable. Unlike maturity models, assessment models assessment models have a guiding framework and bound their analysis to an evaluative reference model [13]. Models are most often developed as staged models, with hierarchically organized levels reflecting maturity progression. The assessment method is predominantly quantitative, with models generating a score used to determine the maturity level. Finally, the number of maturity levels ranges from three to nine, with five levels being the most common.

Table 3 – Classification schema for analyzed IS maturity models (NA – not applicable, N – not enough information)

Model	Reserach method	Model design	Purpose of use	Assessment method	Model structure	Application domain	Number of levels
[14]	analytical	bottom-up	NA	qualitative	structured model	generic	6
[15]	mixed	bottom-up	descriptive, prescriptive	quantitative	maturity grid	specific	6
[16]	mixed	bottom-up	descriptive, prescriptive	qualitative	structured model	specific	5
[17]	mixed	NA	NA	quantitative	Likert like	specific	3
[18]	theoretical	bottom-up	descriptive	quantitative	maturity grid	generic	9
[19]	analytical	bottom-up	descriptive	quantitative	structured model	specific	5
[20]	empirical	top-down	descriptive	quantitative	Likert like	specific	5
[21]	analytical	NA	NA	qualitative	NA	specific	NA
[22]	mixed	NA	descriptive	quantitative	NA	specific	NA
[23]	analytical	top-down	descriptive	N	structured model	generic	3
[24]	mixed	bottom-up	descriptive	NA	maturity grid	specific	N
[25]	analytical	top-down	descriptive	quantitative	structured model	specific	5
[26]	mixed	top-down	descriptive	qualitative	structured model	specific	5
[27]	empirical	NP	descriptive	quantitative	NA	specific	NA
[28]	analytical	bottom-up	descriptive	qualitative	structured model	specific	6
[29]	empirical	top-down	descriptive	quantitative	maturity grid	specific	5

Similarly to [12], the analysis also included the identification of maturity model limitations (Table 4). Limitations such as insufficient model documentation, lack of comparison with existing models, and the absence of recommendations are present across all analyzed models, to varying degree. In addition, the analysis identified a set of common maturity model dimensions, reflected in recurring assessment criteria. These criteria indicate the presence of similar conceptual foundations across models, despite differences in their design and application domains. The most common dimensions include infrastructure, system quality, information quality, organizational structure, organizational culture, strategy and strategic alignment, human resources, communication, and skills.

Table 4 – Limitations of analyzed IS maturity models (F – full, P - partial)

Limitation Model	Development method is not specified	Lack of assessment tool	Poor documentation about model	Limited model validation	No model evaluation in real case study	No comparison with existing MMs	No recommendtions
[14]	P	P	F	F	F	P	F
[15]		F	F		F	P	
[16]			P			P	
[17]	P	P	F		F	F	F
[18]			F	F	F	F	F
[19]	P	P	F	F	F	P	F
[20]	P	P	F	P	P	P	F
[21]	F	P	P			P	F
[22]			F		P	P	F
[23]	F	F	F	F	F	F	F
[24]		F	P	P	P	P	F
[25]	F		P			P	F
[26]		P	P			P	F
[27]	P		F	F	F	F	F
[28]		F	F	F	F	P	F
[29]			F			F	F

Discussion

This literature review identified a relatively small number of maturity models, with 16 papers included in the final analysis. Although the limited number of models may limit the generalizability of the findings, the variety of application domains confirms the broad relevance of information systems maturity models. Despite differences among maturity models, the analysis revealed structural similarities. Common assessment items, together with model structure, design, and assessment methods, indicate that IS maturity models often share same foundations. At the same time, it is important to consider the impact of emerging technologies, particularly artificial intelligence, on maturity paths. Maturity models typically assume a linear progression across predefined stages and are often developed as structured models with clearly defined hierarchical levels. However, artificial intelligence has the potential to accelerate progression across these stages and may influence the design of maturity models.

According to [30], the assessment items of IS maturity models most impacted by AI are infrastructure, data, and people. AI often requires advanced computing resources, strengthening the need for robust technical foundations and changing expectations for technological capability. The reliance on high-quality data is equally important, which increases the significance of data availability, data quality, governance, and data integration within maturity assessments. From a human resources perspective, organizations must invest in employee training and skill development to enable effective AI integration into existing operations. This also includes evaluating how employees and AI systems complement one another in decision-making and task execution. In addition, artificial intelligence includes governance-related considerations, such as responsible use, data privacy, and regulatory compliance, which may redefine how governance is assessed within maturity models. Beyond existing assessment items, AI may require new ones, such as AI adoption and AI governance. AI adoption would be used to evaluate the level of integration within he organization, and AI governance should capture capabilities and risks associated with the use of AI. Apart from new assessment criteria, maturity models may require structural adaptations, including the addition of new maturity levels. [31] argues that existing maturity models are inadequate for today's AI-driven environments. The paper proposes a sixth maturity level, extending the widely accepted five-level structure, in which organizations become capable of exponential growth driven by artificial intelligence. This proposition challenges one of the core assumptions of traditional maturity models, which is that maturity follows a sequential and linear progression. In AI-driven environments, nonlinear dynamics may emerge, allowing organizations to "skip" maturity stages instead of progressing incrementally. The introduction of an additional maturity level simultaneously raises concerns about model comparability and standardization. Extending existing models may improve their applicability in modern business, but it could also limit the comparability of maturity evaluations across time and among organizations. From a practical perspective, the concept of an AI-driven maturity level implies transition from optimization to transformation. While earlier stages focus on improving efficiency and formalizing procedures, more advanced, AI-driven stages emphasize adaptability, continuous learning, and autonomous decision-making capabilities.

The impact of AI on maturity is not uniform across assessment criteria. In some cases, it may enhance maturity progression, for example advancing technological capabilities or improving process efficiency through automation. However, such growth may also create imbalances. Other assessment criteria, such as ethical governance, employee readiness, organizational culture, and change management, may struggle to keep pace. Additionally, organizational capabilities can also mature and according to [32] that maturation follows observ-

able patterns. This suggests that concept of staged maturity remains relevant, although AI may alter the speed and path of development. However, the coexistence of staged maturity and uneven AI-driven acceleration implies that maturity should not be viewed as a strictly uniform construct. Organizations may demonstrate multi-speed maturity, with different dimensions developing at different rates. This highlights the need for maturity models that can capture such variability, for example using weighting of criteria or incorporating interdependencies among them.

As a part of future work, this research will be extended to include maturity models beyond the domain of information systems. A larger and more diverse set of models will enable greater generalizability of the findings. In addition, the impact of artificial intelligence could be empirically validated by comparing organizations with high levels of AI adoption to those with lower levels, in order to examine how their maturity trajectories differ. Empirical validation may also address the adequacy of existing maturity model structures, particularly in light of the evolving nature of organizational capabilities, which may influence the structure of maturity levels. Future research should therefore investigate whether organizations adopting AI-intensive practices exhibit nonlinear growth patterns and assess whether the introduction of additional maturity levels enhances the explanatory and predictive power of maturity models.

Conclusion

Information systems support operational efficiency and overall business performance. As organizations strive to adapt to an increasingly dynamic business environment, maturity models provide a structured approach for assessing current capabilities and identifying opportunities for improvement. Therefore, we conducted this systematic literature review to synthesize existing knowledge in this domain. In response to first research question, the findings indicate that maturity models in the IS domain share several characteristics, in terms of design and structure, purpose of use, and assessment methods. Across the analyzed models, recurring assessment criteria, such as infrastructure, organizational structure, culture, strategy, people, and skills, suggest the existence of shared underlying foundations. In response to the second research question, AI has the potential to reshape established maturity paths, with infrastructure, data, and people being the most affected assessment criteria. The existing literature suggests that organizational capabilities evolve over time, which may influence both the structure of maturity models and the progression along maturity paths. In this context, AI may also necessitate the introduction of additional maturity levels, further challenging traditional model structures. However, the actual impact of artificial intelligence on maturity progression remains to be empirically validated. While AI may accelerate advancement in certain areas, it may also negatively impact others, highlighting the need for a careful and context-sensitive evaluation of its effects.

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