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Preventing Software Implementation Failure through Digital Maturity Assessment: A People-Process-Tools Framework

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ABSTRACT

The growing use of digital technologies means software implementation has become an essential requirement in organizational development and competitiveness. Despite its importance, failure rates currently range between 50% and 70%, with research suggesting 31% of the projects are abandoned before their completion while more than halfway were initially budgeted. This can be attributed to different organizational, human, and technological variables and processes, including planning, communication, and resistance to change within the organizational setup. Apart from losses estimated at several billion dollars, failure results in decreased employee morale.

The proposed research uses a concept called Digital Maturity Assessment (DMA) as a preventive measure before software implementation. The Digital Maturity Assessment ascertains the readiness of the business within the three key aspects: People, Processes, and Tools. According to research, 76% of the staff lack required skills in the use of technology, while 57% of the failures can be attributed to the absence of communication. The Digital Maturity Assessment enables organizations to make valuable determinations regarding shortcomings in skills and technology capabilities even before software adoption.

Keywords: Digital Maturity Assessment, Software Implementation Failure, People-Process-Tools Framework, Digital Transformation, Organizational Readiness, Change Management

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INTRODUCTION

The growing pace of the current digitally enabled ecosystem has made software an essential aid in today's organizations, helping them increase efficiency, organize processes, and ensure they are at a distinct competitive advantage. Whether it's the deployment of Enterprise Resource Planning (ERP) systems, Customer Relationship Management (CRM), and automation software or sales pipeline management tools, software is the key driver behind current business transformation. The current global expenditure for digital transformation stood at $1.85 trillion USD in 2022, which represents the utmost importance being accorded by entities to technological development and advancement [1]. Contrary to the massive investment being made in software, it has been observed that many projects are unsuccessful, as only 30% of digital transformation initiatives in SMEs are actually successful in their task [2].

The effects of such incidents can be severe, ranging from financial losses to lowered productivity and system disruption, as well as diminished employee morale and loss of reputation. Recent reports in the industry indicate that the average number of data disruption events an organization can expect in a given year is 4.2, which can include the loss of backups or system integration [3]. Organizational confidence in the pursuit of digital objectives can dwindle with the frequency of such events and hinder future development and innovation. There has been an indication of the global economic losses sustained at the rate of billions of dollars in relation to outages related to software, as experienced in the 2024 CrowdStrike event, which impacted 8.5 million Windows machines with losses of $3 billion [4].

One of the main reasons for failures is the fact that organizations are aggressively pursuing new technology capabilities while nonetheless failing to identify readiness on their own fronts. There is a lack of emphasis on human and process transformation, and knowledge and execution gaps are created. A report by the World Economic Forum states that 44% of the skills of the workforce are set to be disrupted in the next five years, thereby underlining the importance of readiness assessment [5]. Also, 36% of the leaders feel that their workforce is not capable enough to enable digital transformation, and 27% of Senior Leaders identified lack of technical knowledge as a significant barrier [6].



Figure 1: Primary Causes of Software Implementation Failure

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The figure 1 shows the main three pillars which are involved in failure of software implementation and showing detail points in each pillar and how to overcome these gaps.

A comprehensive assessment before any software implementation is recommended by this study to deal with these issues. Organizational assessment on various dimensions can help organizations prepare for a successful adoption of technology. These dimensions are consistent with the IEEE Standard P2023 for Digital Transformation Architecture and Framework, which strongly emphasized a comprehensive plan for people, processes, and technology aspects [7].

RESEARCH METHODOLOGY

This study uses a systematic literature review approach to explore software implementation failure issues, as well as digital maturity model structures. It integrates existing knowledge about digital change, a ready organization, and People-Process-Tools, enabling a whole understanding about software implementation factors. The process for conducting the research entailed the identification and evaluation of the existing literature pertinent to the subject through the use of IEEE Xplore publications, ScienceDirect, and Google Scholar. The criteria used for consideration entailed publications that occurred within the period 2018-2025 and focused on the aspects of digital maturity models, software implementation difficulties, and the elements that bring about transformations within the organization.

A systematic search was done on leading scholarly databases, such as IEEE Xplore, ScienceDirect, and Google Scholar, in order to identify literature relevant to the present study. The preliminary search was executed using broad keywords like "software implementation failure," "digital transformation failure," "digital maturity models," "organizational readiness," and "change management in software projects." About 420 studies were identified in this initial phase. Further refinement of the search retrieved about 135 papers by applying keyword combinations like "People-Process-Technology framework," "pre-implementation assessment," "digital readiness assessment," and "software adoption success factors." Further screening was conducted by applying inclusion criteria such as publication period (2018–2025), peer-reviewed sources, and direct relevance to digital maturity or software implementation outcomes, thus shortlisting 62 studies. Finally, 24 original high-quality research studies which closely aligned with the objective were identified through detailed abstract and full-text review and analyzed and synthesized in the current study.

Gap Analysis

It has been observed that there are critical gaps in the current approach to software implementation. There are a considerable number of digital maturity models, but most are not oriented to prioritize human and cultural factors as base elements for the success of transformation. Also, most of the existing frameworks lack practical insights into pre-implementation assessment but shift the focus towards post-implementation review.

The success factors in software implementation identified from the literature review and shown below indicate that very often organizational and human factors emerge as

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top determinants of project outcomes. People assessment ensures that workers possess the required competencies, attitudes, and willingness to implement new systems. Indeed, 76% of professionals show willingness to remain in those organizations which can upskill them. Process assessment detects inefficiencies and ensures that workflows are at their best before automation. Tool assessment ensures that software matches organizational maturity, integration scope, and strategic aims.



Figure 2: Key Success Factors for Software Implementation
The image provides a visual representation of a Success Factors Pyramid and lays out the foundation level required in digital or software projects. The foundation level starts with Technology Infrastructure, which supports Process Standardization and further moves to Training & Skills and Stakeholder Engagement.

RELATED WORK

Digital maturity assessment has evolved as an important tool in determining readiness levels in an organization to achieve the objectives of digital transformation. There has been an increased focus on literature related to digital maturity models, challenges in the implementation of software, and the People-Process-Tools approach.

Digital Maturity Models and Frameworks

Omol et al. (2025) introduced the Digital Maturity Assessment Model (DMAM), integrating Design Science Research and Capability Maturity Model Integration for SMEs [2]. Cifert et al. (2025) examined organizational readiness, emphasizing organizational culture, leadership, and competence in building digital advantage [10]. Maazmi et al. (2024) explored critical success factors for digital transformation in government organizations [11]. The IEEE Standard P2023 provides foundational structure addressing people, process, and technology as interconnected transformation dimensions [7]. Table I below provides a comparative analysis of the main features of popular digital maturity models, mainly focusing on their respective core areas of focus, main variables, and references. This enables the easy comparison of the differences in the coverage of the various models in terms of organizational readiness for digital transformation, mainly in their focus on Technology, Process, People, or

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the holistic People+Process+Technology approach.

Model/Framework	Focus Area	Key Dimensions	Reference
DMAM	SMEs Readiness	DSR + CMMI Integration	[2]
IEEE P2023	Enterprise DT	People-Process-Technology	[7]
DTCMM	Capability Maturity	Organizational Capabilities	[12]
TOE Framework	Industry 4.0	Technology-Org-Environment	[13]
BCG DAI	Digital Acceleration	42 Digital Categories	[14]

TABLE I: Comparison of Digital Maturity Models

Software Implementation Failure Factors

Ali (2024) demonstrated that 65% of Agile software projects fail to be delivered on time and within budget [15]. Projects with documented requirements were 50% more likely to succeed. Butarbutar and Handayani (2023) identified 13 critical success factors for ERP post-implementation within the TOE framework, revealing that organizational factors exerted more influence than technical aspects [9]. Table II below summarizes statistics on software implementation failure categorized by type of failure, including their corresponding percentage values based on recent research studies on software implementation failure.

Failure Category	Percentage	Source
Agile projects failing on time/budget	65%	Ali (2024) [15]
Projects canceled before completion	31.1%	ZipDo (2024) [16]
Projects exceeding budget	52.7%	ZipDo (2024) [16]
Failure due to poor requirements	39%	Beta Breakers [17]
Failure due to communication breakdown	57%	Beta Breakers [17]
Business transformations failing	88%	Bain (2024) [18]
AI projects that fail	85%	Gartner (2023) [19]

TABLE II: Software Implementation Failure Statistics

People and Organizational Readiness

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Salesforce's 2022 Global Digital Skills Index revealed that 76% of workers feel unequipped with digital skills needed for future work, while only 28% are actively involved in training programs [8]. KPMG's 2024 study found that 54% of employees feel unprepared for technology-driven changes [6]. Sharma et al. (2024) developed a conceptual framework for bridging digital skill gaps, integrating Resource-Based View and Technology Acceptance Model [20].

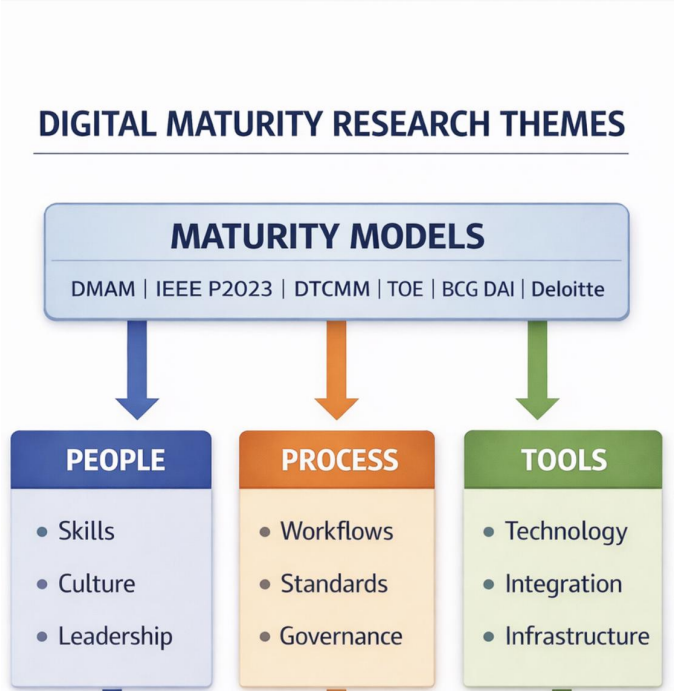


Figure 3: Research Themes in Digital Maturity Literature

Figure 3 above represents the dominant themes of research surrounding digital maturity, through which it becomes clear how the convergence of people, process, and technology represents the essential pillars of digital readiness. From the themes, it can be interpreted how organizational culture, skills, process optimization, and technology come into play as factors defining success for digital maturity initiatives.

Industry-Specific Applications

Wernicke et al. (2023) developed a digital maturity framework for construction site operations [21]. Fatima et al. (2023) applied the TOE framework to develop an Industry 4.0 digital maturity model [13]. In the ERP domain, Shajrawi and Aburub (2023) examined ERP usage impact on service differentiation [22], while Stone and Zhang (2021) emphasized change management and user training importance [23].

From the industry-specific studies presented in Table III, it is apparent that digital maturity and software implementation issues differ greatly from one industry to another, such as the construction, manufacturing, government, and ERP-based service sector. The key takeaways from the studies presented in Table III indicate that although industry-specific models have their uses in terms of gaining a contextual understanding of a specific industry, these studies have a lack of generalization capability over multiple industries. The most common strengths associated with these studies have been their applicability, whereas the drawbacks include being scoped,

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having a focus on post-implementation analysis, or being based on a specific organizational context. Table III shows a summarized comparative analysis of crucial research studies that were published between 2018 and 2025 is presented in Table III, which outlines their chief contributions, strengths, as well as some of their limitations that were identified.

Reference	General Idea	Strength	Weakness
[2]	DMAM for SMEs using DSR+CMMI integration	Tailored for resource-constrained organizations	Limited to SME context only
[10]	Organizational culture and leadership in digital readiness	Emphasizes human factors in transformation	Lacks quantitative validation
[15]	Agile project failure analysis showing 65% failure rate	Empirical evidence with large sample	Focus limited to Agile methodology
[11]	Critical success factors for government digital transformation	Addresses public sector challenges	Government-specific, limited generalizability
[9]	ERP post-implementation CSFs using TOE framework	Identifies 13 comprehensive CSFs	Post-implementation focus only
[13]	Industry 4.0 maturity model using TOE framework	Comprehensive environment dimension	Manufacturing sector focus
[8]	Global digital skills gap assessment	Large-scale global survey data	Self-reported data limitations
[12]	Digital Transformation Capability Maturity Model	Capability-based progression framework	Complex implementation requirements
[23]	ERP success factors integrating literature and experience	Practical implementation guidance	ERP-specific application

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[24]	Multi-attribute digital maturity assessment for SMEs	Practical assessment methodology	Limited to European SME context

TABLE III: Summary of Key Research Studies (2018-2025)

OUR PROPOSED FRAMEWORK

In view of identified challenges and gaps in the existing approaches, this study proposes a Digital Maturity Assessment framework as a preventive approach prior to the implementation of any software solution. DMA assesses an organization's readiness from three important dimensions of People, Processes, and Tools. Emphasizing human and cultural readiness first, the framework supports the fact that as much as technology, the success of transformation lies in the people.

The People dimension evaluates the skills, mindset, and orientation of employees to new systems. Researchers have documented that investment in re-skilling is positively related to a higher retention rate and higher rate of adoption. The Process dimension evaluates workflow for efficiency and identifies any part of a workflow that needs optimization before automation. On the other side, research repeatedly indicates that automating an inefficient process results only in faster bad outcomes. The Tools dimension checks whether the software selected aligns well with the current organizational maturity, its integration capabilities, and long-term strategic goals.

Early evaluation of digital maturity helps in the identification of gaps in capabilities, processes, training, culture, and infrastructure before finalizing or implementing technology in an organization. Incorporating DMA in the early beginning of project planning ensures the development of an informed roadmap, better engagement of stakeholders, synchronization of technology spending with business objectives, and making processes standardized.

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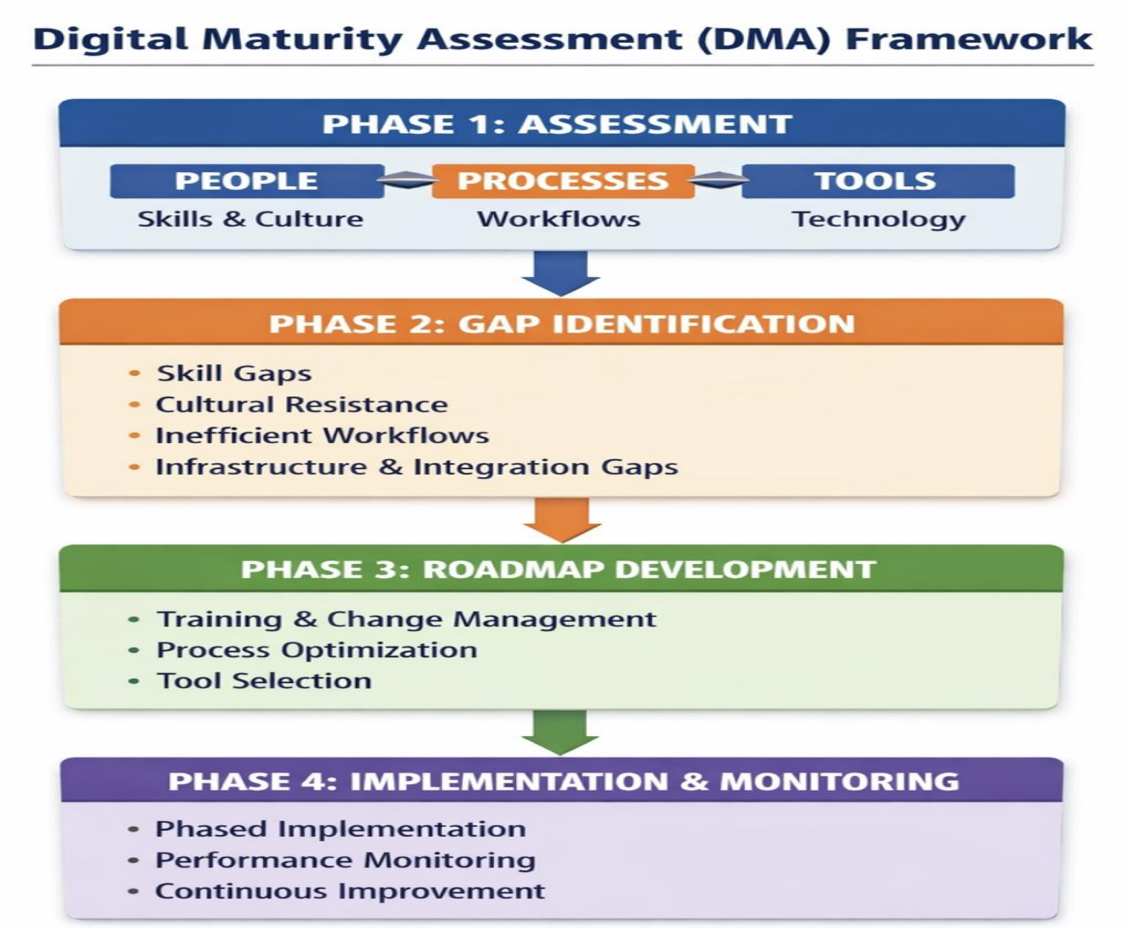


Figure 4: Digital Maturity Assessment (DMA) Framework

Figure 4 shows the proposed Digital Maturity Assessment (DMA) framework in relation to the integrated analysis of People, Processes, and Tools. This framework identifies that People, Processes, and Tools are important aspects of digital maturity in an organization that warrant analysis before software implementation to lower the chances of failure in software implementation activities.

The proposed framework of DMA, as depicted above, ensures a systematic approach to the assessment, which needs to happen prior to the implementation. The framework helps organizations analyze their current situation in all three aspects, allowing systematic decisions regarding the technology and timing of the implementation. The framework is compliant with the IEEE Standard P2023 Guide for Digital Transformation Architecture and Framework, which suggests the necessity of a comprehensive strategy, which should cover all three aspects [7]. The framework therefore ensures the prevention of the failure of software implementation as well as the optimization of the software.

CASE STUDY: IMPLEMENTATION THE DMA FRAMEWORK

The New Zealand-owned hotel chain, Sudima Hotels, partnered with Cooperative Computing to improve its overall use of digital technologies. With problems such as

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inefficient data management, non-efficient business processes, as well as ineffective management of customers' data, Sudima Hotels decided to go through a Digital Maturity Experience (DMX) process, which has strong links with our suggested Digital Maturity Assessment (DMA) Framework, with the objective of improving their overall readiness for software development projects prior to investing heavily on software development [25].

It entailed three essential phases of engagement, mirroring the DMA Framework's pre-implementation emphasis on Assessment, Strategy, and Execution. During the assessment phase, Sudima underwent a thorough analysis of its current maturity level across people, processes, and technology. Organizational personnel, operating processes, and technological infrastructure were examined through interviews with stakeholders and review of documentation, and a very detailed maturity report highlighting strategic deficiencies like a lack of an integrated data strategy and operational inefficiencies was thus obtained. The diagnostic thereby laid a clear baseline and built common understanding of existing gaps, a starting requirement for the DMA Framework [25].

On this foundation, the strategy phase consisted of conceptualization for an optimized future state. Cooperative Computing was tasked with creating visualizations that compared and contrasted the existing and future online environment for Sudima. Tailored data solutions were devised that aimed for consolidation of data into an integrated repository that featured analytical capabilities and live dashboards. The solution allowed for real-time insights into performance analytics, which was set to resolve and cater to another important bucket of the DMA Framework [25].

In the execution phase, strategic findings were converted into desired business results. Implementation involved the installation of the respective analytics dashboard, workflow automation, and staff training to ensure adoption and familiarity. Notably, in the execution phase, the focus on people and processes made in the DMA Framework is evident through stakeholder engagement in workshops and change management activities. At the end of this process, Sudima Hotels saw significant results in terms of operational efficiency from workflow automation, effective data management for informed decision-making, marketing strategies developed from behavior analysis, and revenue generated from optimized pricing and guest’s services.

In this case, it illustrates the way in which a preventive and structured assessment of digital maturity, as recommended in our DMA Framework [25], can help transform disorganized technology spending investments into a strategic process of transformation that can help achieve organizational objectives in a measurable way.

CONCLUSION AND FUTURE WORK

The research showed that the failures in software implementation remain one of the most critical challenges that, on average, are supposed by organizations from every part of the world and vary between 50% to 88% depending on the nature and scale of the transformation programs. In support, the review of existing literature shows that such failures are majorly caused by people, process, and tool-related factors, wherein the organizational and human elements usually remain more influence conducing than the technical aspects.

The proposed Digital Maturity Assessment framework presents a structured and

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preventive approach toward lowering implementation failures by checking organizational readiness prior to the deployment of software. Since it lays emphasis on human and cultural preparedness for transformation, this addresses the root causes rather than simply treating the symptoms.

Future studies can be concentrated on the empiricism of the DMA framework for organizations and sectors. Furthermore, the creation of quantitative criteria for every aspect can propose increased applicability for the DMA framework. Longitudinal studies that monitor organizational results for organizations that use the pre-Implementation maturity level and those that do not can be an effective piece of proof for the DMA framework's effectiveness.

Operationalization of the DMA framework by building a software as a service-based self-assessment tool. Such a tool would allow companies to assess their digital maturity independently in the People, Process, and Tools aspects using standardized questionnaires and scoring schemes. The tool may also provide real-time analysis and suggestions, helping companies detect deficiencies and create a data-driven transformation plan before implementing software solutions. The tool may also include aspects like benchmarking, industry-focused models, and tracking over a period of time to allow for broader applications and validation of the DMA framework. Such a tool would allow for far greater scalability and adoption of the DMA framework.

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