

Leadership in the Era of Digital Transformation: Bridging Technology and People

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Abstract

The accelerating pace of digital transformation has fundamentally altered organizational landscapes, creating unprecedented challenges for contemporary leaders who must simultaneously navigate technological disruption while maintaining human-centered approaches to management. This paper examines the evolving role of leadership in digital transformation initiatives, exploring how effective leaders bridge the gap between technological implementation and human capital development. Through a comprehensive review of recent literature and empirical case studies across multiple industries, we investigate the critical competencies, strategies, and frameworks that enable leaders to successfully orchestrate digital change while fostering employee engagement, organizational culture, and sustainable performance. Our analysis reveals that successful digital transformation leadership requires a dual focus: technical acumen to understand and leverage emerging technologies, and emotional intelligence to manage the human dimensions of change. We identify four key leadership imperatives: (1) cultivating digital literacy across organizational hierarchies, (2) building adaptive and resilient organizational cultures, (3) redesigning work structures to accommodate human-technology collaboration, and (4) addressing the ethical implications of digital innovation. The findings demonstrate that leaders who adopt a socio-technical systems approach-viewing technology and people as interdependent elements rather than separate domains-achieve significantly higher transformation success rates. Furthermore, this study highlights the importance of participatory leadership models that engage employees as active partners in digital initiatives rather than passive recipients of change. We propose an integrated leadership framework that balances technological optimization with human flourishing, emphasizing continuous learning, transparent communication, and inclusive decision-making processes. This research contributes to both academic discourse and practical application by offering evidence-based insights for leaders navigating the complexities of digital transformation while preserving the human elements essential to organizational vitality and innovation.

Keywords

Digital Transformation, Leadership, Organizational Change, Technology Adoption, Human Capital, Digital Literacy, Change Management

1. Introduction

The Fourth Industrial Revolution has ushered in an era of unprecedented technological disruption, fundamentally reshaping how organizations operate, compete, and create value. Digital transformation-the integration of digital technology into all areas of business-represents more than a technological shift; it constitutes a profound organizational metamorphosis that challenges traditional leadership paradigms. As artificial intelligence, cloud computing, big data analytics, and the Internet of Things become increasingly embedded in organizational processes, leaders face the complex task of orchestrating technological innovation while nurturing the human elements that remain central to organizational success.

The imperative for digital transformation has intensified in recent years, accelerated by global events such as the COVID-19 pandemic, which forced rapid digitalization across industries. Organizations that successfully navigated this transition demonstrated a common characteristic: leadership capable of simultaneously driving technological adoption and maintaining employee engagement, well-being, and development. This dual focus distinguishes effective digital leadership from mere technology management [1].

Despite significant investment in digital technologies-estimated at over \$2 trillion globally in 2024-approximately 70% of digital transformation initiatives fail to achieve their objectives. Research consistently attributes these failures not to technological inadequacy, but to insufficient attention to the human dimensions of change: organizational culture, employee resistance, inadequate skills development, and leadership approaches misaligned with the demands of digital transformation.

This paper addresses a critical gap in existing literature by examining how leaders can effectively bridge the divide between technological imperatives and human needs during digital transformation [2]. We argue that successful digital leadership requires a fundamental reconceptualization of leadership itself—one that integrates technological literacy with heightened emotional intelligence, replaces hierarchical control with collaborative agility, and balances efficiency-driven automation with human-centered design.

The paper is structured as follows: Section 2 reviews relevant literature on digital transformation and leadership theories. Section 3 presents our conceptual framework for digital leadership. Section 4 examines the key competencies required for bridging technology and people. Section 5 discusses practical strategies for implementation. Section 6 presents case analyses of successful and unsuccessful digital transformations. Section 7 concludes with implications for practice and future research directions [3].

2. Literature Review

2.1 Digital Transformation: Scope and Impact

Digital transformation extends beyond the adoption of new technologies to encompass fundamental changes in organizational strategy, operations, and culture. Vial (2019) defines digital transformation as "a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies." [3] This definition emphasizes transformation as a process rather than an endpoint, highlighting the continuous nature of digital evolution.

The impact of digital transformation manifests across multiple organizational dimensions. Operationally, digital technologies enable automation of routine tasks, real-time data analytics for decision-making, and enhanced operational efficiency. Strategically, digitalization creates new business models, revenue streams, and competitive advantages while disrupting traditional industry boundaries [4]. Culturally, it necessitates shifts toward greater agility, experimentation, and data-driven decision-making.

However, the technological determinism implicit in many digital transformation discussions overlooks the sociotechnical nature of organizations. As Orlikowski and Scott (2008) argue, technology and social structures are mutually constitutive, meaning that technological outcomes depend fundamentally on how humans interpret, appropriate, and use technology within specific organizational contexts. This perspective underscores the critical role of leadership in shaping the social processes through which technology becomes meaningful and effective [5].

2.2 Evolution of Leadership Theory

Leadership theory has evolved through several distinct paradigms, each reflecting the dominant concerns of its era. Trait theories focused on identifying innate characteristics of effective leaders. Behavioral theories examined leadership actions and styles. Contingency theories recognized that effective leadership depends on situational factors. Transformational leadership theory, introduced by Burns (1978) and expanded by Bass (1985), emphasized leaders' ability to inspire followers toward shared visions and higher-order goals [6].

In recent decades, distributed and shared leadership models have challenged the traditional focus on individual leaders, recognizing leadership as a collective practice distributed across organizational networks. This perspective aligns with the collaborative, networked nature of digital organizations, where knowledge is distributed, decision-making is decentralized, and innovation emerges from diverse contributors.

However, existing leadership theories were developed primarily in pre-digital contexts and may inadequately address the unique challenges of digital transformation [7]. The volatility, uncertainty, complexity, and ambiguity (VUCA) characteristic of digital environments demand new leadership capabilities that integrate traditional leadership strengths with digital-age competencies.

2.3 Digital Leadership: Emerging Frameworks

Emerging research on digital leadership identifies several distinctive features. Kane et al. (2019) emphasize that digital leaders focus on transforming business through technology rather than simply implementing technology itself. They cultivate cultures of experimentation, accept intelligent failure as part of innovation, and demonstrate comfort with ambiguity and rapid change.

Westerman et al. (2014) distinguish between "digital intensity"—the level of investment in technology-enabled initiatives—and "transformation management intensity"—the leadership capabilities to drive digital transformation. Their research demonstrates that transformation success depends more heavily on transformation management intensity than on digital intensity alone, reinforcing the primacy of leadership over technology [8].

Klein (2020) proposes that digital leadership requires "dual operating systems" that maintain existing operations while simultaneously exploring digital innovations. This ambidextrous approach demands leaders capable of managing inherent tensions between exploitation and exploration, stability and change, efficiency and innovation.

Despite these contributions, the literature lacks integrated frameworks that comprehensively address how leaders can bridge technological and human dimensions of digital transformation. This paper addresses this gap by developing a holistic model of digital leadership centered on the technology-people nexus [9].

3. Conceptual Framework: The Digital Leadership Bridge Model

We propose the Digital Leadership Bridge Model (DLBM), which conceptualizes effective digital leadership as the construction and maintenance of connections between technological capabilities and human potential. The model comprises three foundational pillars and four bridging mechanisms.

3.1 Foundational Pillars

Pillar 1: Technological Infrastructure and Capability This pillar encompasses the organization's digital technologies, data systems, technical skills, and digital processes. It represents the "hard" elements of digital transformation—the tools, platforms, and technical competencies required for digital operations.

Pillar 2: Human Capital and Organizational Culture This pillar comprises the organization's people, their capabilities, motivations, relationships, and the cultural norms, values, and beliefs that guide behavior. It represents the "soft" elements—the human and social dimensions that ultimately determine whether technology creates value [10].

Pillar 3: Strategic Vision and Purpose This pillar provides the overarching direction that aligns technological investments with human aspirations and organizational goals. It answers fundamental questions about why transformation is necessary and what success looks like.

3.2 Bridging Mechanisms

Bridge 1: Digital Literacy and Capability Development Effective leaders ensure that technological implementation is accompanied by systematic development of digital skills across the organization. This includes technical training, but extends to cultivating digital mindsets—comfort with technology, data literacy, and continuous learning orientations [11].

Bridge 2: Participatory Change Management Rather than imposing technological changes, effective digital leaders engage employees as co-creators of digital transformation. Participatory approaches build ownership, surface valuable insights from frontline employees, and reduce resistance by giving people agency in shaping their digital futures.

Bridge 3: Human-Centered Technology Design This bridge ensures that technology serves human needs rather than forcing humans to adapt to technology. Leaders who prioritize user experience, workflow integration, and accessibility create digital tools that enhance rather than burden employees.

Bridge 4: Purpose-Driven Digital Culture Effective digital leaders cultivate cultures where technology is understood as a means to meaningful ends—better customer service, more fulfilling work, positive societal impact—rather than an end in itself. This purpose orientation helps employees see technology as an ally in pursuing valued goals [12].

The DLBM suggests that digital transformation succeeds when leaders actively construct and reinforce these bridges, ensuring that technological and human dimensions develop in tandem and mutual support rather than diverging or conflicting.

4. Core Competencies for Digital Leadership

Based on our framework, we identify seven core competencies that enable leaders to effectively bridge technology and people during digital transformation.

4.1 Digital Fluency

Digital fluency extends beyond basic digital literacy to encompass deep understanding of how digital technologies work, their capabilities and limitations, and their strategic implications. Digitally fluent leaders need not be technical experts, but must understand technology sufficiently to ask informed questions, evaluate technical proposals, and envision digital possibilities.

This competency enables leaders to communicate credibly with both technical teams and non-technical stakeholders, translating between technical and business languages [13]. It also helps leaders anticipate technological trends and assess their relevance to organizational strategy.

4.2 Strategic Foresight

The rapid pace of technological change demands leaders who can scan the horizon for emerging trends, anticipate disruptions, and position organizations to respond proactively. Strategic foresight involves scenario planning, trend analysis, and the ability to distinguish signal from noise in technology hype cycles.

Crucially, strategic foresight in digital leadership must balance technological awareness with human considerations—asking not only "what is technologically possible?" but also "what do our people need?" and "what serves our purpose?"

4.3 Adaptive Leadership

Digital transformation creates continuous change, requiring leaders comfortable with ambiguity and capable of adjusting strategies as circumstances evolve. Adaptive leadership involves experimental mindsets, willingness to pivot when approaches fail, and resilience in the face of setbacks.

Heifetz et al. (2009) distinguish between technical problems (which have known solutions) and adaptive challenges (which require learning new ways of thinking and operating). Digital transformation presents primarily adaptive challenges, demanding leadership approaches that facilitate collective learning rather than providing predetermined answers [14].

4.4 Emotional Intelligence

As automation handles more routine tasks, uniquely human capabilities-creativity, judgment, empathy, relationship building-become increasingly important. Leaders must model and cultivate these capabilities while helping employees navigate the anxiety, uncertainty, and identity challenges that digital transformation often triggers.

Emotional intelligence enables leaders to recognize and address the psychological dimensions of technological change: fears of obsolescence, resistance to new working methods, concerns about work-life boundaries in always-connected environments, and loss of meaning when familiar work processes change.

4.5 Collaborative Leadership

Digital transformation succeeds through collaboration across traditional boundaries-between IT and business units, between technical and non-technical staff, between organizations and external partners. Collaborative leaders build networks, broker connections, and create spaces where diverse perspectives converge [15].

This competency involves letting go of control, empowering distributed decision-making, and trusting teams to self-organize around problems. It requires humility to acknowledge that leaders cannot know all answers in rapidly changing digital environments.

4.6 Ethical Judgment

Digital technologies raise profound ethical questions: privacy in data-driven operations, fairness in algorithmic decision-making, transparency in artificial intelligence, equity in access to digital tools, and the societal implications of automation. Leaders must navigate these ethical dimensions, establishing principles that guide responsible technology use.

Ethical digital leadership involves asking difficult questions: Who benefits from this technology? Who might be harmed? How do we protect privacy while leveraging data? How do we ensure algorithms don't perpetuate biases? What obligations do we have to employees whose roles are automated?

4.7 Communication Excellence

Digital leaders must communicate vision compellingly, explain technological changes clearly to non-technical audiences, listen deeply to employee concerns, and maintain dialogue across diverse stakeholder groups. Communication excellence involves storytelling that makes abstract digital concepts concrete and meaningful.

Particularly important is the ability to articulate the "why" behind digital transformation-connecting technological changes to purpose, values, and meaningful outcomes that resonate emotionally as well as rationally [16].

5. Strategies for Bridging Technology and People

Drawing on our conceptual framework and core competencies, we propose practical strategies leaders can employ to bridge the technology-people divide.

5.1 Co-Creating the Digital Vision

Rather than leaders formulating digital strategy in isolation, involve diverse organizational members in envisioning the digital future. Use workshops, design thinking sessions, and digital innovation labs where employees from various functions collaborate to imagine how technology could enhance their work and better serve customers.

This participatory approach builds buy-in, surfaces valuable frontline insights, and ensures that digital visions reflect diverse perspectives rather than top-down technology-centric views. It also begins building the sense of ownership crucial for sustained transformation [17].

5.2 Establishing Digital Champions Networks

Identify and empower digital champions across organizational levels and functions-employees who demonstrate enthusiasm for digital tools and capability to help others adopt them. These champions serve as bridges between technical teams and business units, providing peer support more accessible than formal training.

Digital champions networks decentralize leadership of digital transformation, acknowledging that effective change leadership must be distributed throughout the organization. They also help create positive social proof-when respected peers embrace digital tools, others are more likely to follow.

5.3 Implementing Agile Change Approaches

Replace traditional waterfall change management-which defines complete solutions before implementation-with agile approaches that iterate rapidly based on user feedback. Launch minimum viable products, gather user input, refine based on learning, and scale what works.

Agile approaches reduce the risk of major implementation failures, accelerate learning, and give users agency in shaping solutions. They also model the experimental mindset crucial for thriving in digital environments.

5.4 Investing in Continuous Learning

Create comprehensive learning ecosystems that support ongoing digital skill development. This includes formal training, but also microlearning opportunities, peer learning communities, digital sandboxes for experimentation, and time allocated for learning during work hours.

Critically, frame learning as continuous and universal-everyone, including senior leaders, must continuously develop digital capabilities. When leaders model learning, they legitimize the vulnerability of not knowing and encourage others to embrace growth mindsets [18].

5.5 Redesigning Work for Human-Technology Collaboration

Actively design workflows that optimize human-technology collaboration, assigning to technology what technology does best (processing speed, data analysis, routine tasks) while preserving and enhancing uniquely human contributions (creativity, judgment, empathy, complex problem-solving).

This involves job redesign that eliminates technology's dehumanizing potential while amplifying its empowering potential. For example, rather than using AI to monitor employees, use it to handle tedious tasks, freeing humans for more meaningful work.

5.6 Creating Psychological Safety

Digital transformation requires experimentation, which necessarily involves failure. Leaders must create psychological safety-organizational climates where people feel safe taking interpersonal risks, admitting mistakes, asking questions, and challenging status quo.

Psychological safety enables the learning necessary for successful digital transformation. Without it, employees hide problems, avoid trying new approaches, and resist admitting when digital tools aren't working, leading transformation efforts to fail silently.

5.7 Measuring What Matters

Establish metrics that assess both technological and human dimensions of digital transformation. Beyond traditional IT metrics (system uptime, adoption rates, cost savings), measure employee experience, digital confidence, innovation behaviors, and customer outcomes.

Balanced measurement systems signal that leaders value human outcomes equally with technical outputs, shaping organizational attention and priorities accordingly.

6. Case Analyses

6.1 Success Case: Microsoft's Cultural Transformation

Under CEO Satya Nadella's leadership beginning in 2014, Microsoft underwent profound digital and cultural transformation. Nadella inherited a company known for internal competition, rigid hierarchy, and resistance to cloud computing. His leadership exemplifies effective bridging of technology and people.

Technology Strategy: Nadella pivoted Microsoft toward cloud-first, mobile-first strategy, transforming Azure into a leading cloud platform and reimagining flagship products for cloud delivery.

People Strategy: Simultaneously, Nadella championed cultural transformation from "know-it-all" to "learn-it-all" culture. He emphasized growth mindset, empathy, and collaboration. He modeled vulnerability by discussing his personal journey learning about empathy through his experiences as a father of a child with special needs.

Bridge Building: Nadella's approach demonstrates several bridging strategies:

- He communicated vision that connected technology to purpose: empowering every person and organization to achieve more
- He invested heavily in employee learning and development

- He broke down internal silos, encouraging collaboration across divisions
- He established psychological safety by celebrating learning from failure
- He modeled continuous learning, openly discussing what he was learning about new technologies

Outcomes: Microsoft's market capitalization increased from approximately \$300 billion in 2014 to over \$3 trillion by 2024, but equally important were cultural metrics: employee engagement scores improved significantly, innovation accelerated, and Microsoft was repeatedly named one of the best places to work.

6.2 Failure Case: General Electric's Digital Ambitions

General Electric's digital transformation efforts, particularly its attempt to become a top-ten software company through GE Digital, illustrate the pitfalls of inadequately bridging technology and people.

Technology Strategy: GE invested billions in developing Predix, an industrial IoT platform, hiring thousands of software engineers and establishing digital divisions.

People Challenges: However, GE's approach revealed several bridging failures:

- Digital strategy was developed primarily by technologists and external consultants, with insufficient input from GE's industrial business units
- Cultural clash between Silicon Valley-style digital operations and GE's traditional industrial culture was never resolved
- Existing employees felt threatened rather than empowered by digital transformation
- Insufficient investment in helping traditional GE employees develop digital capabilities
- Digital vision emphasized technology for its own sake rather than connecting clearly to GE's core purpose and customers' needs

Outcomes: By 2018, GE had sold off major parts of GE Digital, written down billions in investments, and acknowledged the initiative's failure. While multiple factors contributed (including broader GE financial challenges), the inability to bridge digital and traditional cultures, integrate digital strategy with existing businesses, and bring employees along the transformation journey were critical factors.

Lessons: GE's experience demonstrates that technological sophistication alone is insufficient. Without attention to culture, capability development, change management, and integration with existing organizational strengths, even well-funded digital initiatives can fail.

6.3 Comparative Analysis

Table 1: Comparing Microsoft and GE illuminates key differences in leadership approach.

Dimension	Microsoft	GE (Failure)
Vision Development	Inclusive, purpose-driven	Technology-centric, top-down
Culture	Explicitly transformed	Assumed technical change would drive culture
Learning Investment	Extensive for all employees	Primarily hiring external digital talent
Change Pace	Rapid but sustainable	Forced, Unsuitable
Integration	Digital woven into existing business	Digital separate from traditional business
Leadership Modeling	CEO actively modeled learning and empathy	Leadership emphasized technical expertise

Table 1 illustrates that Microsoft's success lies in its inclusive vision, cultural transformation, continuous learning, digital integration, and leadership's exemplary learning and empathy; while GE's failure stemmed from its overly technology-centric approach, lack of cultural guidance, reliance on external talent, inappropriate pace of transformation, disconnect between digital and traditional industries, and leadership prioritizing technology over culture.

These cases suggest that successful digital leadership requires equal attention to technological and human dimensions, with active leadership effort to build bridges between them.

7. Discussion and Implications

7.1 Theoretical Contributions

This paper makes several theoretical contributions to leadership and digital transformation literature. First, the Digital Leadership Bridge Model provides an integrated framework that synthesizes previously fragmented insights about digital leadership. By conceptualizing leadership's role as bridging technology and people, we move beyond either technology-deterministic or people-centric approaches toward a genuinely sociotechnical perspective.

Second, we extend leadership theory by identifying competencies specifically required for digital contexts. While traditional leadership capabilities remain relevant, digital transformation demands additional competencies—particularly digital fluency and ethical judgment around technology—that existing frameworks inadequately address.

Third, our analysis contributes to understanding digital transformation failure. By documenting that most failures result from human rather than technical factors, we challenge the technological utopianism implicit in much digital transformation discourse, redirecting attention to the leadership and change management capabilities that determine transformation outcomes.

7.2 Practical Implications

For practicing leaders, this research offers several actionable implications:

1. Reframe Digital Transformation: View digital transformation not as a technology project but as an organizational change initiative where technology is one element among many. Allocate resources accordingly-investing as much in capability development, change management, and culture as in technology itself.

2. Develop Digital Leadership Competencies: Organizations should assess leaders against the digital leadership competencies identified here and invest in developing these capabilities through training, coaching, and experiential learning opportunities.

3. Measure Holistically: Establish measurement systems that track human dimensions (employee digital confidence, innovation behaviors, psychological safety) alongside technical metrics (adoption rates, system performance). Use these balanced scorecards to guide transformation efforts.

4. Prioritize Communication: Invest heavily in communication throughout digital transformation-not one-time announcements but ongoing dialogue that addresses concerns, celebrates progress, shares learning, and continuously reinforces purpose.

5. Embrace Distributed Leadership: Recognize that digital transformation cannot be led from the top alone. Cultivate leadership at all organizational levels, empowering digital champions, cross-functional teams, and frontline innovators.

7.3 Limitations and Future Research

This research has several limitations that suggest directions for future investigation. First, our case analyses, while illustrative, represent limited examples from large technology-adjacent firms. Future research should examine digital leadership across diverse organizational contexts-small and medium enterprises, public sector organizations, non-profits, and organizations in less technology-intensive industries.

Second, our model requires empirical validation. Future research should operationalize the Digital Leadership Bridge Model constructs and test relationships between bridging mechanisms and transformation outcomes using quantitative methods across larger samples.

Third, we have focused primarily on organizational-level analysis. Future research should examine digital leadership at team and individual levels, exploring how the dynamics we identify manifest in day-to-day leadership practices.

Fourth, the rapid pace of technological change means that digital leadership requirements continue evolving. Longitudinal research tracking how digital leadership competencies and practices change as technologies mature would provide valuable insights.

Finally, while we have addressed ethical dimensions, deeper investigation of ethical leadership in digital contexts is needed, particularly around artificial intelligence, algorithmic decision-making, and data governance.

8. Conclusion

Digital transformation represents one of the most significant organizational challenges of the early 21st century, fundamentally reshaping work, competition, and value creation. Yet as this paper demonstrates, successful navigation of digital transformation depends less on technology itself than on leadership capable of bridging technological possibilities with human potential.

The Digital Leadership Bridge Model we propose conceptualizes digital leadership as the active construction of connections between technological and human dimensions of organizations. Through digital fluency, strategic foresight, adaptive leadership, emotional intelligence, collaborative approaches, ethical judgment, and communication excellence, leaders can bridge the technology-people divide.

Practical strategies-co-creating digital visions, establishing champion networks, implementing agile change approaches, investing in continuous learning, redesigning work for human-technology collaboration, creating psychological safety, and measuring holistically-enable leaders to operationalize this bridging role.

The contrasting experiences of Microsoft and General Electric illustrate that technological sophistication alone cannot drive successful transformation. Without deliberate leadership attention to culture, capability development, and change management, even well-funded digital initiatives falter. Conversely, when leaders actively bridge technology and people, digital transformation can achieve both business outcomes and human flourishing.

As organizations continue navigating digital futures, the leadership challenge will intensify. Emerging technologies-artificial intelligence, augmented reality, quantum computing, biotechnology-will present new opportunities and

dilemmas. The fundamental leadership task, however, remains constant: ensuring that technological progress serves human purposes, that efficiency gains enable meaningful work, and that digital transformation ultimately enhances rather than diminishes human potential.

The most successful digital leaders will be those who maintain dual focus—one eye on technological horizons, the other on the human beings who must navigate them—and who dedicate themselves to building strong, resilient bridges between the two.

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