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Success Factors to Deliver Organizational Digital Transformation:
A Framework for Transformation Leadership

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ABSTRACT

Many digital transformation initiatives of traditional firms fail. This research proposes a framework that identifies the need for corporations willing to transform to look beyond technology. This research moves beyond the firm-wide level recommendations to increase the likelihood of success of digital transformation initiatives. It focuses on two dimensions of corporate transformation—governance and culture—and analyzes across four identified stages of digital transformation: discovery, development, demonstration, and deployment. It identifies specific challenges at each of the identified stages. Therefore, it provides a useful structure for academics to further explore the challenges of digital transformation in firms and for corporate leaders to increase the likelihood of success to transform and capture the opportunities offered by artificial intelligence.

KEYWORDS

Artificial Intelligence, Culture, Demonstration, Deployment, Development, Discovery, Governance, Leadership, Project Stages, Supply Chain, Vekia

INTRODUCTION

Why is digital transformation (DT) so hard? 70% of digital transformation initiatives fail (Tabrizi et al., 2019). Moreover, research firms like Garner predict the rate of failure of a digital transformation project to be higher than those of classic IT projects, with only a 15% success rate (Gartner, 2018). Field observations show that too few companies have the leadership capabilities to make digital transformation a success. A study in the finance industry reveals that 77% of firms deploying digital transformation solutions have not obtained the expected results (Sparks, 2018). Buvat et al., (2018) found that 65% of businesses believe they do not have the right leadership abilities to succeed in their digital transformation journey.

This paper intends to identify key success factors at each of the critical phases of a digital transformation initiative to allow existing firms to leverage the value creation potential of digital transformation successfully. In this research, we focused on DT aimed at improving forecasting and order placement using which is broadly called artificial intelligence (AI), a subset of DT using large

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sets of data to recognize patterns to allow computer systems to make autonomous recommendations (Helm et al., 2020; Niessing & Ho, 2020). In the supply chain, its purpose is often to deliver more accurate order planning and management.

Hence, the research question is: "Beyond technology elements, what are the key success factors at the main stage of a digital transformation initiative".

LITERATURE

What is Digital Transformation?

Digital transformation (DT) is broadly defined as a transformation undergone by firms that adopt data-driven innovation to create more value for the firm and its stakeholders, altering business processes, products, services, relationships (Morakanyane et al., 2017; Osmundsen et al., 2018; Verhoef et al., 2021). DT encompasses multiple technologies and processes around the collection of data, its analysis, and the extraction of value (Magistretti et al., 2019).

The drivers for AI-based transformation are either external pressures, either opportunities to improve offer or react to competitive threats, or internal, increase efficiency and enable organization leverage (Loonam et al., 2018). Considering the far-reaching impact, and often the significant resource commitment of developing a digital-driven business model, the initiatives are usually driven at the C-Suite level, by the CIO or the CEO. Unfortunately, both CIO and CEO often admit to having only a superficial understanding of the challenges (Solis, 2019).

Firms that have mastered the implementation of DT have achieved significant benefits, becoming more agile, more profitable, and improving their offer, as well as capitalizing on digital innovation for their sustainable business growth (Dash et al., 2019; Sultana et al., 2021). These pioneering firms have already seen the results of their first projects and are now set to make their business model evolve, widening the gap with the followers. They have understood that the key success factor is to focus on competitive dynamics rather than cost optimization" (Ransbotham et al., 2019). For the firms that successfully overcome the transformation challenges, the benefits of DT is forecast to increase by 10% to 100% in most industries (Bughin et al., 2019; Purdy et al., 2017).

Transformation is a fundamental change that involves multiple dimensions (Muzyka et al., 1995). The pace of digital evolution adds a layer of complexity, requiring swiftness and agility. To deliver significant impact, technical experts and focused project managers must manage the transformation comprehensively at firm level with a new leadership that is shaped around the challenges of the digital evolution. The study of organizational aspects of DT, analysed separately from the technology aspects (Mhlungu et al., 2019) is only emerging, but has not allowed the development of a clear roadmap aimed at assisting corporate leaders in their transformation journey. Exchanges between academics and practitioners identified the gap between the challenges of field management and the body of academic research that can contribute to solving those problems.

Success Factors of Digital Transformation

Practical, industrial applications of DT have become common only recently. Therefore, few studies have explored the success factors of digital transformation. Consultants or academics who explore the topic of digital transformation tend to provide generic recommendations that should be applied across the entire evolution process (Forth et al., 2020; Martin, 2018; Nambisan et al., 2019; Sousa & Rocha, 2019). Systematic reviews identify research that focuses on the contextual conditions, the mechanisms, and the outcome (Hanelt et al., 2021), but few explore the success factors as their core objectives. Most of the success factors identified are organization-wide such as customer centricity, governance, supportive and agile organizational culture that engage managers and employees (Mhlungu et al., 2019; Osmundsen et al., 2018). Others identify the different dimensions of DT, such as analytics, business elements, customer-related drivers and digital components (N. Sahu et al., 2018) without decomposing those into specific traits or actions at the project management level.

Broadening our exploration to IT projects that do not qualify as digital transformation such as projects related to Enterprise Resource Planning systems shows the same firm-wide exploration of success factors rather than the finer transformation step success factors (de Waal, 2018; Ngai et al., 2008; Pecherskaya et al., 2016). While those works offer useful insights, their broad, firmwide perspective, do not delve deep enough in the DT initiatives to provide guidance for practitioners navigating the different stages of a transformation initiative.

Analysis of DT success at specific stages in the transformation journey is uncommon, although research exists in the case of project definition, with an outsourcing perspective (Yadav et al., 2009) applied to software development rather than DT. Therefore, a more in-depth analysis is required to identify the success factors at the consecutive stages of the project with distinct levels of interaction across the enterprise's ecosystem, and the internal stakeholders.

Two Exploratory Lenses: Governance and Culture

Research in IT-mediated organizational change identifies that the human agency factors more than technology explain the outcome of implementing new technology in organizations (Boudreau & Robey, 2005; Volkoff et al., 2007). If we extend that concept to the implementation of large scale ERP systems, we can establish two lenses to develop our research framework: governance and culture, both of which are already identified as drivers of digital advantages (Babin & Grant, 2019; Levstek et al., 2018; Osmundsen et al., 2018; Philip & McKeown, 2004; Westerman & Mcafee, 2012).

Governance includes the policies and objectives, monitoring and feedback, clarification of roles and responsibilities for initiative success and long-term sustainability and transparency of deployment and accountability. One of the characteristics of the digital economy is the reliance on platforms and ecosystems with data, hosting, and algorithm providers, orchestrated by integrators. The traditional governance of firms is pyramidal, with the interests of the shareholders at the top, and the internal constituencies, such as labour at the bottom. The platform governance differs significantly as it is linking communities without the traditional capitalistic allegiances of traditional corporations. (Fenwick et al., 2019; Hinings et al., 2018). New sources of conflict, diverging perspectives on control, timing, are some of the complex sets of requirements and leverage points that DT governance must address (de Reuver et al., 2018; Huber et al., 2017; Wareham et al., 2014).

The role of corporate culture has been amply documented as a key success factor of change (Aguirre et al., 2017; Day & Atkinson, 2004). It includes the implicit, informal beliefs, norms and values strongly held, shared and promoted in the organization that guide the behaviour of individuals (O'Reilly, 1989; Scholz, 1987). It will condition the way stakeholders interact to cope with problems of external adaptation and internal integration (Camerer & Vepsalainen, 1988). It facilitates the understanding of diverging interest and mechanism to reach a consensus.

METHODOLOGY

The research employs case study approach within a single environment and investigates projects over a 2 years period by a firm offering AI-based SaaS solutions to optimize supply chain decisions. The approach is hypothetico-deductive (Blichfeldt & Andersen, 2006; Yin, 1981b), starting with a clear conceptual framework as a hypothesis, essential in case study to structure narrative into readable, organized concepts (Yin, 1981a). The benefits of a single case to study digital transformation was demonstrated in prior researches that sought to understand the different stakeholders in a transformation ecosystem (Ali et al., 2021; Klein et al., 2014). It is well suited to exploring a field that has not yet received as much attention, the success factors at the distinct stages of digital transformation rather than the broader firmwide perspective found in earlier researches.

Vekia, an Artificial Intelligence forecasting and replenishment solution provider, was our primary research field. Vekia began developing forecasting and inventory software in 2010, building

a portfolio of clients in retail and service industries (Gately, 2017). Their solutions are supporting supply chains with forecasting management, inventory size optimization, automated ordering and more. Vekia offered a fertile ground for investigation because they had already identified the value of non-technical elements in the success of the projects with their clients with a transformation analysis focusing, in their terms, on "People", "Process", "Data" and "Algorithms".

Twenty recent AI implementation projects were scoped by interviewing the Vekia leadership team. Those projects were all in France. to enhance the ability of Vekia's clients to serve internal stakeholders and external customers with more responsive supply chains. For confidentiality reasons, details that could identify those firms are omitted. Out of those 20, 11 could be analysed with enough depth to provide the material necessary to validate the proposed framework for successful digital transformation and identify the drivers of success or failure in the project. In the following discussion, the cases are referenced by their abbreviation (Table 1). This number of observations is sufficient to provide insights, as demonstrated in past research in the field of information technology (Dolci et al., 2015; Safari & Qingquan Jiang, 2018). The situations observed provided a range of industries, from infrastructure operators to retailers, and multiple outcome, from failure in the initial stage to full implementation, which increases the confidence in the broad applicability of our findings.

Semi-structured interviews with either Vekia staff and their client staff probed the key elements that drove to success or failure of the projects and the pace at which those projects were progressing versus initial expectations. For the projects that failed, the research attempted to identify the roadblocks preventing completion of the digital transformation and the stage at which the project stopped. Our

Table 1. Transformation initiatives analyzed

Project Reference	Industry	Outcome
C1	French brand of retail stores specialized in home goods, including furniture, large and small appliances, and consumer electronics	Failure after pilot
C2	The network maintenance division of a French leader in telecom. Although it operates in multiple countries, the scope of the project is France	Decision to deploy after pilot
C3	The home maintenance and service division of a French multinational utility company.	Success
C4	The retail division of a French leader in telecom. Although it operates in multiple countries, the scope of the project is France	Success
C5	A French leader in retail, pioneer of large retail stores	Failure at PoC
C6	A French leader in home improvement, DIY	Failure at Pilot
C7	A French leader in home appliance, electronics, and computer equipment	Failure at onset
C8	A French upscale department store	Pilot successful, but not implemented
C9	The aftermarket division of a French based global automotive leader	Blocked at pilot
C10	The infrastructure division of a French leader in telecom. Although it operates in multiple countries, the scope of the project is France	Success
C11	A French regional medium size retailer	Ongoing in pilot
C12	A century old French manufacturer of tableware	Ongoing in Pilot

approach was explanatory, identifying the specificities of AI implementation, the success or failure factors for the firms that had initiated the projects, the stages in the process that were completed successfully and the levers that made the transformation successful.

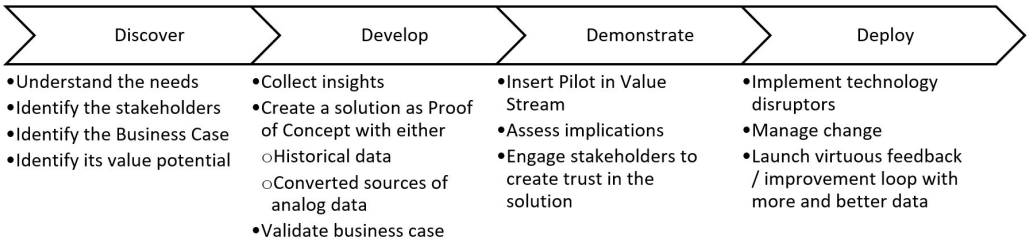
We confronted the results with the available literature and some transformation narratives, often from consulting firms, master project reports of students working in disruptive technology environments, and conversations with industry, consulting and academic experts during workshops, such as a workshop organized with the largest French employer federation during its "Cité de l'IA" (AI City) initiative. This allowed us to add two more sets of interviews, one of which sufficiently deep to contribute significantly (C12), the other one confirming our initial findings. They were also presented to two other service providers in digital supply chain solutions, in Switzerland and the United Kingdom, hence adding other anecdotal evidences to support our initial findings.

Digital Transformation Stages

The most common discussion about stages in digital transformation focuses on the mindset of the organization. Are they enthusiastic early adopters, more enthusiast innovators, early adopter, or laggards, following the transformation stages from the adopter categorization model (Bernstein & Singh, 2008; Moore, 2014). In our research we observed the need to analyse how the project was evolving from the initial idea to the full implementation. Different challenges and success factors are identified. To provide the most effective guidance, we needed to identify those different stages and explore the success factors as organizations progressed from stage to stage.

Going beyond the firmwide observations identified earlier to address the complexity of digital transformation requires to identify discrete stages in the process each with a specific team structure, scope and stakes. Some intermediate models identify the evolution from a stage of internal promotion of the digital transformation to data-driven enterprise (Berghaus & Back, 2016; Mitra et al., 2019), an approach that is similar to documented processes of change management in supply chain, like the approach to category management (Clegg & Montgomery, 2005). Those researches all identify 3 to 7 stages from preparation to understanding of stakes, solution development, testing and implementation. A four stages approach was frequently used (Layne & Lee, 2001; Uhl & Gollenia, 2016) and matched the observations of Vekia. To structure our interviews, we defined the stages as follows: first, a vision or option setting, then a tinkering stage to identify the feasibility, followed by a limited implementation before a full-scale transformation. This decomposition in four stages is sufficiently discriminant to document specific insights, without being overly complex to allow practitioners to exploit our research. Vekia's leadership validated this sequence. Those stages were also validated it in subsequent discussions with industry experts in a workshop at "Cité de l'IA". The experts at the workshop validated that the stages as we had defined them were sufficiently clear to be used to structure interviews. We labelled and defined the four stages as follows:; Discover, Develop, Demonstrate, and Deliver, as illustrated in Figure 1.

Figure 1. The four stages of Digital Transformation



Case Analysis: Identification of Drivers of Success

The challenge of digital transformation is often the result of conflicts between the governance and culture of three "identities": the firm, the project, and the target organization. Traditional firm identity has evolved to capitalize on physical resources, capital and supply, and human resources. The project team's identity is entrepreneurial, with a loose structure, an important level of confidence in the potential of untested ideas. The target identity results from the digital transformation of the firm, which has adapted its governance and culture to leverage data that has become a new source of value, the promise of future benefits that does not appear on the balance sheet.

Through interviews structured along the four stages defined above, we explored the critical elements that allowed the transformation initiatives to progress. Defining those stages and leading the discussion systematically around them was the only formal structuration of the interviews.

Discovery

In the "Discover" stage, the AI transformation project sponsors have identified a loosely defined opportunity. The project team must focus on understanding the organization and its clients' needs and constraints to validate organizational feasibility. One of the common elements in the firms that have been able to achieve a successful transformation (cases C2, C3, C10) with AI was a good understanding by the leadership in the potential of AI but also that prediction is only one element of a decision (Agrawal et al., 2019). Most importantly, it is during this stage that the leaders identify the opportunities to capture competitive advantages as opposed to an industry wide progress. A pure technology focus may miss opportunities to define a gap by failing to protect the valuable external resources and make them rare, inimitable, similar to what has been done in supply chains with the extended resource-based approach (Arya & Lin, 2007; Barney, 2012; Sun et al., 2014). During this stage, leaders develop a shared understanding of business and technology objectives to develop or alter the business model and base it on intangible rather than tangible assets: data (Haskel & Westlake, 2017) and ecosystem relations (Philippart & Vieira, 2014). So, the governance focuses on competitive advantages and identification of the organization assets and constraints as well as the acceleration of decision-making processes.

The culture must blend the ability to self-challenge with team debates around the possible outcomes and the best approach to identify the opportunities adapted to the firm's data resources, organization challenges and customer's unsatisfied needs. The companies that successfully transformed viewed the transformation as an opportunity for multiple stakeholders, who were feeling the pain of inefficient processes and accepting the ambiguity associated with this new opportunity. With the least successful companies (cases C5, C6, C7, C8), the need for change was not widely shared across the organization, had limited inter-functional trust and a bureaucratic rather than an entrepreneurial culture. In other cases, successful organizations adapted their culture to welcome exploration of multiple, ambiguous possible value creation opportunities with limited references (Courtecuisse, 2019; Wellman, 2014). AI systems are probabilistic models, a fact documented from the first articles on AI results to the most recent applications (Lindley, 1987; R. K. Sahu et al., 2018). Furthermore, executives have a bias for certainty in data treatment in a world where the accounting systems and spreadsheet-based tools tent to establish a certainty of outputs. Proper understanding by executives about the inherent uncertainty of AI-based solutions facilitates the transformation by setting expectations adapted to the nature of AI recommendations.

Another consequence of the ambiguity of the AI transformation is the need to see the external partners as supports rather than suppliers. In Cases C3, C5, C8 the purchasing department wanted to drive the relation with Vekia as it would handle any supplier. At C3, the issue was quickly solved by the leadership. On the other hand, it was one of the main reasons the project stopped early at C5 and C8 where the organization was convinced it was always right against the supplier, with a strong-arm negotiation culture firmly entrenched. It slowed the process, reduced the trust between parties and ultimately made any progress almost impossible.

One of the benefits of a trusting relation is the ability of the service provider to begin by a data and process assessment, during the discovery stage, to identify potential issues if data is too siloed, or if the distinct functions do not communicate effectively (Cases C2, C10). The contribution of the ability to leverage internal and external knowledge is confirmed by multiple communications at ICIS conferences (Osmundsen et al., 2018).

It is also at this stage that the full impact of the AI-based solution on the entire organization must be considered. C1 ignored the weak signals announcing the significant challenges for transforming the entire organization, while those were already identified by the service provider. It ultimately stopped the full implementation of the identified solution. C10 identified the need to build a consensus amongst the impacted functions before proceeding to the next stage, identifying field-based volunteers to join the transformation initiative, the support from the IT department to organize data gathering and management, including the necessary IT resources, the purchasing department, the regional and local operational teams, etc.

Development

The second stage "Develop" focuses on proving the feasibility to capture the opportunities identified in the first stage. At this stage, the team builds and tests a "proof of concept" (PoC). The PoC tests and validates the design ideas, the assumptions to demonstrate the usefulness of the identified DT proposition. It bridges the concepts and practical constraints in a laboratory like setting where the parameters are controlled and insulated from the actual business environment (Ben-Ari et al., 2016; Fosso Wamba & Boeck, 2008). It can use historical input data and compare the AI system output to the historical decisions. In settings where data was not previously available, often the case when applying AI solutions to industrial systems, the PoC tests the feasibility of digitalization and compares it to the earlier decisions based on analogic information, experience and empiricism. It is not intended to provide operationally usable results.

The AI transformation leaders need to validate the business case with multiple scenarios, including the least favourable ones. It is at this stage that explores the implications of digital transformation on risk and ethics are explored in detail. Indeed, the concept of big data ethics (Zwitter, 2014) is receiving renewed attention from practitioners and consultants. Data ethics was considered very important by Vekia and its clients leveraging consumer-based data. At this stage, observations show that poor data is a driver of failure (Case C5). That project team collected "dirty data", harvested with a protocol not sufficiently structured to achieve repeatable and documentable results. While most organizations have developed product and or service quality protocols, some fail to apply the same rigor to their newly developed data collection. Those that accurately assess the quality of their data and launch a specific effort to insure coherence of data progress (Cases C9, C10, C12) have seen their effort paying off in the later stages of the initiative, with more robust results and less resistance from stakeholders. This was done in project teams and was sufficiently cross-functional to make multiple points of view converge. Elements of data quality include the process, its legitimacy and its fit for the intended purpose. Considering the pace at which data can be harvested, once the firm understands those new standards, it must embed the validation of the data quality in its artificial intelligence system, giving quality experts, like a quality department, a supervisory role. One of the outputs of this stage is a formalization of procedures to collect them before moving to the pilot, the next stage. The data governance develops protocols for validation, risk assessment and mitigation, and quality.

On the culture side, leader understand the decision-making process evolution with digital transformation such as AI. During this stage, leaders begin to identify the required organization changes, by integrating the points of view of the different stakeholders, such as the staff, the clients, or the supply chain. Assessment of the current technology and organizational infrastructure ascertains if legacy systems can become foundations of the new model or an impediment. Challenged organizations realize that each function has focused on the results it wanted to obtain, trusting to other functions, loosely defined, the plugin of gaps in the development. Organizations

able to break organizational silos succeed, while those maintaining fiercely independent functions whose influence is a function of the staff employed fail. This is observed both in the supply functions, where managers can perceive that the number of planners will decrease, as AI-based systems replace them, and in IT, who fear a shift from solutions embedded in heavy corporate infrastructures to solutions hosted in the cloud, for instance. Therefore, leaders must conduct a culture-centric diagnostic identifying their relative strengths or weaknesses vis-à-vis the digital strategy and the challenges they present and the limitations for an effective inter functional collaboration. The successful culture adapts to manage intangible assets, dealing with colleagues across continents, time zones, organizational divisions, systems, people employed by partner firms, contractors, and even gig workers stressing skill-based rather than function-based approaches, encouraging transparency and constant feedback (Petrucci & Rivera, 2018). The leader must also encourage the exit from the ERP-centric vision of the corporate systems, to integrate multiple technologies from different partners, often with limited history, unlike the behemoth companies dominating the ERP field. In the successful transformation initiatives, this stage ended with a collegial decision to proceed (Cases C10, C11).

It is also in this stage that the competitive implications identified in the discovery stage are structured, with an assessment of the fit between current and required business model. Leaders set objectives of market leadership, pre-empting competitors in customer, supplier, and labour markets to replicate the firm's efforts by anticipating how to lock in those resources and consider financial, legal or social linkage in addition to controlling information leakage from less strategic minded team members. In that respect, AI will often require an effective engagement of the firm's ecosystem.

Demonstration

The next challenge, in the "Demonstrate" stage is to motivate the organization to go along the new path, to define the new business model clearly, identifying the interdependencies, understanding and anticipating the transformation path. From PoC the team moves to a pilot, with live implications, for instance 100 references in 4 stores for the case of retailer C11. In one case, the difference between "Development" and "Demonstration" did not appear clearly until two key elements were highlighted: in "Development" the project team used dead data with no intention to use the results for operating decisions. In "Demonstration" the project team, who used live data and provided recommendations applied to the operational environment, were able to create enthusiasm from the multiple stakeholders to proceed.

At this stage it is important to tailor communication that goes beyond the logic of the move to begin to address the emotions created in those that could feel threatened by this new approach: clear target pictures for every function, ambitious but achievable targets and a clear roadmap leading to them. The governance adapts to develop objectives to motivate all stakeholders on the transformation by setting a clear path to new achievable and acceptable performance targets.

No projects that can so radically alter the nature of the asset base happen without bumps. On the culture side, the leader must develop a failure friendly environment, where those issues are opportunities for learning. This new culture must not be limited to the front lines of the organization but permeate to the C-Suite. The cultural transformation must begin with the executive suite, but because of the slow rate of replacement, boards and the executive suite are often ill equipped to lead the digital change (Cheng et al., 2021). Another key success factor identified is the culture of transparency. Many, in the organizations willing to transform, express mistrust when facing this transformation. This can hamper successful implementation internally or successful adoption by the firms under analysis. Improving the transparency will contribute to the trust internally and externally. It is especially relevant as it applies to the evolution of the job content for the workers strongly impacted by the transformation initiative (Cases C3, C4).

Delivery

Finally, the fourth stage "Delivery" engages the organization to capture the promised benefits and manages the expected resistance to change, considering how organizations move from the stages of negative energy, i.e. what they see as a threat, to positive energy, i.e. what they will benefit.

In this stage, interviews revealed a need for a strong institutional communication and the availability of the leadership committed to supporting implementation (Cases C3, C4, C10). It sounds obvious but only 36% of companies believe senior executives and managers share a common vision of transformation. 38% have a formal program in place to reskill employees (Buvat et al., 2018). The successful organizations moved from an approach based on implementation of technology tools to a culture change where all employees feel involved in the success of the initiatives. Indeed, typically the first stages are just the beginning of the journey, the DNA of the organization must change to encourage constant learning and agility.

The implementation of disruptive IT-driven technologies generates also a new social structure, and new channels for exchange of information (Leonardi, 2007). If they are properly recognized, even institutionalized, that can increase greatly the success rate of transformation. The transformation leaders must assess if those new informal channels are key elements of long-term progress and how they can be formalized, or if they are project driven with a limited duration. In most cases those new channels represent a desirable evolution of the organizational information flow and must be encouraged, even if they disrupt existing hierarchical and organizational patterns. The success cases showed that the implementation happened progressively rather than via a "big bang" approach. Communication on a regular basis, either weekly, monthly or quarterly, allowed them to keep up the momentum, with the results, whether they were positive or negative, shared broadly to alleviate fears in the organization. The interviews with clients stressed the need to maintain a very engaged attention to the noise coming from the front lines of the enterprise.

AI-based tools can significantly impact the company culture and the relationship of trust between employer and employee (Hirsch, 2019) with a de-siloed organization. Knowledge and service work is growing less structured and roles are becoming blurrier. Completing tasks means dealing with stakeholders across continents, time zones, organizational divisions, systems, people employed by partner firms, contractors, and even gig workers. The very concept of the organization is morphing. Leaders encourage a focus on the task and provide clarity of purpose for those involved. It is also essential at the delivery stage to create an understanding of the implicit trust required between the individual data providers and the organization that will convert it into value (Abraham et al., 2019). Rather than relying on the experts, who are sometimes intimidating, it is better to have a new group of professionals, who are simply comfortable in basic AI, to drive the transition and help educate business team members throughout the organization (Case C3).

In case C10, the solution was constantly enriched with products as confidence in the results increased. If this agility is not present, once successful disruptors become enamoured with their business model, they institutionalize it, creating new institutional rigidities which will make them struggle to remain relevant (Browne et al., 2018).

Once AI becomes natural for the firm, it must encourage the creation of new usages around digital products and services within a culture of intrapreneurship. As the transformation takes roots, more, better quality data becomes available. The routines have been adapted, which allow the company to envision new value creation opportunities. At this stage, the firms that had successfully transformed also understood the fluid nature of AI value capture. As more data and more experience was available, processes constantly readjusted, new opportunities were uncovered. As one stakeholder put it, AI transformation never ends. So, firms with a constant improvement bias succeeded better at maintaining the momentum to identify and capture new opportunities.

At this stage, the firms must also assess the dependency to external contractors. Are they true partners with a long-term engagement participating in the business model? Or temporary resource providers? What can be internalized, or at least moved out of "market" to what the Transaction Cost Economics calls "hybrid" transaction structure (Williamson, 1991)? The relation with external contractors is ambivalent across many of the cases analysed, with some stakeholders aiming at reducing the potential power of the suppliers involved and forcing them to assume the responsibility of the success of the project as much as possible, even if the drivers are mainly internal.

DISCUSSION

Success at the end of one stage is no guarantee of success for the entire initiative, as the functions and people involved increase when the project moves from stage to stage. The case C1 had a remarkably successful stage 1 and stage 2, began to wobble in stage 3 as the different parties involved began to filter information to support a political agenda, then collapsed in the last stage as the deep transformations required in terms of job responsibilities became clear to those who would be most impacted. The cultural changes may appear minor at the "Discovery" stage, when the project team is small but create major resistance leading to failure at the "Deployment" stage. Operational and cultural practices that are antagonistic to what is required to implement the transformation become critical at this stage.

To increase the likelihood of success in projects, delivering value creation from digital transformation requires companies to adapt their culture and governance. The approach in four stages provides a useful framework to structure the transformational project leveraging AI, with the key points summarized in Table 2.

The last point, the continuous improvement culture, was unexpected and worthy of further exploration. Unlike classic projects that have a beginning and an end, digital transformation with artificial intelligence solutions is a constant improvement process. It is a cultural change: the objective is not to move from a stable situation to another stable situation that is better than the previous one, but to accept an ambiguous end, where new data can always improve models. Hence, solutions are temporary.

The research identifies the definition of a new relation with the service providers that deliver the building blocks of the solution. Supplier relations inherited from a world of physical assets do not fit well in this environment, where the levers of success are intertwined between internal and

Table 2. Key Success Factors for Digital Transformation

	Governance	Culture
Discovery	Seeking long-term transformation and sustainable competitive advantages. Defining the role of ecosystem partners.	Accepting ambiguity on the long-term benefits
Development	Empowering cross functional teams sufficiently broad to build a successful coalition. Ensuring that ethics and quality issues integrated early, with an emphasis on rigorous data validation processes	Developing agility to operate across functions and to combine physical and intangible assets to develop a solution.
Demonstration	Motivating all the stakeholders. Setting a clear path to an achievable and acceptable target.	Ensuring transparency towards all stakeholders. Integrating human concerns in the communication of the project benefits.
Deployment	Ensuring the effective communication from the leadership about the resolve to implement broadly.	Adopting a continuous improvement culture: the AI solution is never stabilized but offers new opportunities as it is enriched by data and experience.

external project actors involving tangible and intangible elements, hence, making accurate timing and performance outcome difficult. Firms that accepted this ambiguity delivered successfully, while those that stuck to a rigid governance either aborted the project before it delivered or significantly scaled down its scope. As digitalization implies the incorporation of skills, knowledge, data from outside the enterprise, new strategic alliances become essential contributors to firm success (Galera-Zarco et al., 2020).

With this approach, organizations can begin to map the essential elements that will condition their successful transformation. By complementing the technical capabilities newly acquired with digital transformation leadership, they will reshape their governance and their culture to support the transformation imperatives and increase the likelihood of success.

For scholars, this conceptual framework can help build the foundation of a research agenda for all those interested in impacting the way large organizations evolve in the Artificial Intelligence age and to explore the determinants of successful digital transformation. It offers an easily adaptable framework that can be applied easily to other researches in DT, regardless of the underlying technologies, the industries or functions considered, or the national context.

LIMITATIONS AND FURTHER RESEARCH

This research is focusing on a specific scope of digital transformation: the use of artificial intelligence to improve operations and supply chain activities such as forecasting, order planning and order management. So, its applicability to digital transformation projects applying other technologies such as the Internet of Things or the use of chatbots in customer services could be deemed limited or not relevant. As this research focuses on the human and organizational aspects of the transformation, this limitation does not appear to be an obstacle to a broader application to other digital transformation initiatives.

However, this focus on human and organizational aspects creates another limitation: Vekia and its clients are all French. Country culture has a strong influence on technology adoption with different cultural dimensions impacting adoption of new models (Cagliano et al., 2011; Özbilen, 2017). So, conducting a similar research in other environments will provide useful insights about the possibility to generalize our findings.

The research identified also new topics worthy of further investigation. The transition from a system of stable, steady solutions, to a system where many achievements in the capture of value from DT opens new doors to harvest more value from emerging opportunities can become a topic of research. Continuous improvement and evolving targets are emerging topics (Buer et al., 2018). Likewise, a better understanding of the sources of shareholder value when solutions imply data, algorithms, ecosystem partners, culture and governance can become a topic of investigation (Riasanow et al., 2021; Wareham et al., 2014).

CONCLUSION

In the current environment, many firms will need to adopt digital technologies to remain competitive. Through the analysis of 12 cases of digital transformation, this research has identified 4 distinctive stages that exhibit specific challenges. Those four stages are the first contribution of this research.

The second contribution of this research is the identification of two distinct categories of success factors: governance and culture. DT challenges can be addressed from the governance point of view, for instance with formal adaptation of rules, specific guidance given to the different stakeholders. It is also to move from a cost centre perspective where the initiative is managed by its budget constraints and operational returns, to a transformation agenda for the organization. This must be complemented with a special attention to the informal environment, the way the firm's culture needs to evolve to accept the recommendations issued from the digital transformation initiative. Successful transformation

relies on the integration of the human elements, at the interface with the customer touch points, but also internally with the infrastructure, manpower and technical architecture, as the project grows and involves more and more of the organization's collaborators.

Therefore, the research provides a useful structure to assist organization leaders alike to guide transformation efforts, and to manage the evolution projects, from the initial impetus to the full deployment of complex DT initiatives, identifying when projects can move forward. For researchers, it and to encourage studies to deepen the understanding of the challenges of digital transformation projects in broader settings than those presented here, such as other national culture contexts, industries, or technologies involved.

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REFERENCES

Abraham, C., Sims, R. R., Daultrey, S., Buff, A., & Fealey, A. (2019). How Digital Trust Drives Culture Change. *MIT Sloan Management Review*. https://sloanreview.mit.edu/article/how-digital-trust-drives-culture-change/

Agrawal, A., Gans, J. S., & Goldfarb, A. (2019). Artificial Intelligence: The Ambiguous Labor Market Impact of Automating Prediction. *The Journal of Economic Perspectives*, *33*(2), 31–50. doi:10.1257/jep.33.2.31

Aguirre, D., von Post, R., & Alpern, M. (2017). *Culture's Role in Enabling Organizational Change*. Katzenbach Center.

Ali, M., Tarhini, A., Brooks, L., & Kamal, M. M. (2021). Investigating the Situated Culture of Multi-Channel Customer Management: A Case Study in Egypt. *Journal of Global Information Management*, *29*(3), 1–29. doi:10.4018/JGIM.2021050103

Arya, B., & Lin, Z. (2007). Understanding Collaboration Outcomes From an Extended Resource-Based View Perspective: The Roles of Organizational Characteristics, Partner Attributes, and Network Structures†. *Journal of Management*, *33*(5), 697–723. doi:10.1177/0149206307305561

Babin, R., & Grant, K. (2019). How Do CIOs Become CEOs? *Journal of Global Information Management, 27*(4). 10.4018/JGIM.2019100101

Barney, J. (2012). Purchasing, supply chain management and sustained competitive advantage- The relevance of resource-based theory. *The Journal of Supply Chain Management*, *48*(2), 3–6. doi:10.1111/j.1745-493X.2012.03265.x

Ben-Ari, D., Frish, Y., Lazovski, A., Eldan, U., & Greenbaum, D. (2016). Artificial Intelligence in the Practice of Law: An Analysis and Proof of Concept Experiment. *Richmond Journal of Law & Technology*, *23*(2), 2–55.

Berghaus, S., & Back, A. (2016). *Stages in Digital Business Transformation: Results of an Empirical Maturity Study*. Academic Press.

Bernstein, B., & Singh, P. J. (2008). Innovation generation process. *European Journal of Innovation Management*, *11*(3), 366–388. Advance online publication. doi:10.1108/14601060810889017

Blichfeldt, B. S., & Andersen, J. R. (2006). Creating a Wider Audience for Action Research: Learning from Case-Study Research. *Journal of Research Practice*, *2*(1), D2–D2.

Boudreau, M.-C., & Robey, D. (2005). Enacting Integrated Information Technology: A Human Agency Perspective. *Organization Science*, *16*(1), 3–18. doi:10.1287/orsc.1040.0103

Browne, S., Scott, P. S., Mangematin, V., & Gibbons, P. (2018). Shaking up business models with creative strategies: When tried and true stops working. *The Journal of Business Strategy*, *39*(4), 19–27. Advance online publication. doi:10.1108/JBS-08-2017-0121

Buer, S.-V., Fragapane, G. I., & Strandhagen, J. O. (2018). The Data-Driven Process Improvement Cycle: Using Digitalization for Continuous Improvement. *INCOM*, *2018*(51), 1035–1040. doi:10.1016/j.ifacol.2018.08.471

Bughin, J., Deakin, J., & O'Beirne, B. (2019). Digital transformation: Improving the odds of success. *The McKinsey Quarterly*, *4*, 1–5.

Buvat, J., Bonnet, D., Crummenerl, C., Puttur, R. K., Slatter, M., & Westerman, G. (2018). *Understanding Digital Mastery Today*. Cap Gemini Digital Transformation Institute. https://www.capgemini.com/resources/understanding-digital-mastery-today/

Cagliano, R., Caniato, F., Golini, R., Longoni, A., & Micelotta, E. (2011). The impact of country culture on the adoption of new forms of work organization. *International Journal of Operations & Production Management*, *31*(3), 297–323. doi:10.1108/01443571111111937

Camerer, C., & Vepsalainen, A. (1988). The economic efficiency of corporate culture. *Strategic Management Journal*, *9*(S1), 115–126. doi:10.1002/smj.4250090712

Cheng, J. Y.-J., Frangos, C., & Groysberg, B. (2021, March 12). Is Your C-Suite Equipped to Lead a Digital Transformation? *Harvard Business Review*. https://hbr.org/2021/03/is-your-c-suite-equipped-to-lead-a-digital-transformation

Clegg, H., & Montgomery, S. (2005). 7 Steps for sourcing information products. *Information Outlook*, *9*(12), 34–39.

Courtecuisse, M. (2019). Le saut cognitif (1st ed.). Academic Press.

Dash, R., McMurtrey, M., Rebman, C., & Kar, U. K. (2019). Application of Artificial Intelligence in Automation of Supply Chain Management. *Journal of Strategic Innovation and Sustainability*, *14*(3), 3. Advance online publication. doi:10.33423/jsis.v14i3.2105

Day, M., & Atkinson, D. J. (2004). Large-scale transitional procurement change in the aerospace industry. *Journal of Purchasing and Supply Management*, *10*(6), 257–268. doi:10.1016/j.pursup.2004.10.003

de Reuver, M., Sørensen, C., & Basole, R. C. (2018). The Digital Platform: A Research Agenda. *Journal of Information Technology*, *33*(2), 124–135. doi:10.1057/s41265-016-0033-3

de Waal, A. (2018). Success factors of high performance organization transformations. *Measuring Business Excellence*, *22*(4), 375–390. doi:10.1108/MBE-08-2018-0055

Dolci, P. C., Maçada, A. C. G., & Grant, G. G. (2015). Exploring Information Technology and Supply Chain Governance: Case Studies in Two Brazilian Supply Chains. *Journal of Global Information Management*, *23*(3), 72–91. doi:10.4018/JGIM.2015070104

Fenwick, M., McCahery, J. A., & Vermeulen, E. P. M. (2019). The End of 'Corporate' Governance: Hello 'Platform' Governance. *European Business Organization Law Review*, *20*(1), 171–199. doi:10.1007/s40804-019-00137-z

Forth, P., Reichert, T., de Laubier, R., & Chakraborty, S. (2020). *Flipping the Odds of Digital Transformation Success*. https://www.bcg.com/publications/2020/increasing-odds-of-success-in-digital-transformation

Fosso Wamba, S., & Boeck, H. (2008). Enhancing information flow in a retail supply chain using RFID and the EPC network: A proof-of-concept approach. *Faculty of Engineering and Information Sciences - Papers: Part A*, 92–105.

Galera-Zarco, C., Opazo-Basáez, M., Marić, J., & García-Feijoo, M. (2020). Digitalization and the inception of concentric strategic alliances: A case study in the retailing sector. *Strategic Change*, *29*(2), 165–177. doi:10.1002/jsc.2319

Gartner. (2018, February 13). *Gartner Says Nearly Half of CIOs Are Planning to Deploy Artificial Intelligence* [Press Release]. Gartner. https://www.gartner.com/en/newsroom/press-releases/2018-02-13-gartner-says-nearly-half-of-cios-are-planning-to-deploy-artificial-intelligence

Gately, C. (2017). Vekia: Pioneering machine learning in retail supply chain. *Small Enterprise Research*, *24*(3), 326–332. doi:10.1080/13215906.2017.1396243

Hanelt, A., Bohnsack, R., Marz, D., & Antunes Marante, C. (2021). A Systematic Review of the Literature on Digital Transformation: Insights and Implications for Strategy and Organizational Change. *Journal of Management Studies*, *58*(5), 1159–1197. doi:10.1111/joms.12639

Haskel, J., & Westlake, S. (2017). *Capitalism without Capital: The Rise of the Intangible Economy*. Princeton University Press. doi:10.2307/j.ctvc77hhj

Helm, J. M., Swiergosz, A. M., Haeberle, H. S., Karnuta, J. M., Schaffer, J. L., Krebs, V. E., Spitzer, A. I., & Ramkumar, P. N. (2020). Machine Learning and Artificial Intelligence: Definitions, Applications, and Future Directions. *Current Reviews in Musculoskeletal Medicine*, *13*(1), 69–76. doi:10.1007/s12178-020-09600-8 PMID:31983042

Hinings, B., Gegenhuber, T., & Greenwood, R. (2018). Digital innovation and transformation: An institutional perspective. *Information and Organization*, *28*(1), 52–61. doi:10.1016/j.infoandorg.2018.02.004

Hirsch, P. B. (2019). Tinker, Tailor, Soldier, Spy. *The Journal of Business Strategy*, *40*(4), 53–56. doi:10.1108/JBS-04-2019-0077

Huber, T. L., Kude, T., & Dibbern, J. (2017). Governance Practices in Platform Ecosystems: Navigating Tensions Between Cocreated Value and Governance Costs. *Information Systems Research*, *28*(3), 563–584. doi:10.1287/isre.2017.0701

Klein, A. Z., da Costa, E. G., Vieira, L. M., & Teixeira, R. (2014). The Use of Mobile Technology in Management and Risk Control in the Supply Chain: The Case of a Brazilian Beef Chain. *Journal of Global Information Management*, *22*(1), 14–33. doi:10.4018/jgim.2014010102

Layne, K., & Lee, J. (2001). Developing fully functional E-government: A four stage model. *Government Information Quarterly*, *18*(2), 122–136. doi:10.1016/S0740-624X(01)00066-1

Leonardi, P. M. (2007). Activating the Informational Capabilities of Information Technology for Organizational Change. *Organization Science*, *18*(5), 813–831. doi:10.1287/orsc.1070.0284

Levstek, A., Hovelja, T., & Pucihar, A. (2018). IT Governance Mechanisms and Contingency Factors: Towards an Adaptive IT Governance Model. *Organizacija*, *51*(4), 286–310. doi:10.2478/orga-2018-0024

Lindley, D. V. (1987). The Probability Approach to the Treatment of Uncertainty in Artificial Intelligence and Expert Systems. *Statistical Science*, *2*(1), 17–24. doi:10.1214/ss/1177013427

Loonam, J., Eaves, S., Kumar, V., & Parry, G. (2018). Towards digital transformation: Lessons learned from traditional organizations. *Strategic Change*, *27*(2), 101–109. doi:10.1002/jsc.2185

Magistretti, S., Dell'Era, C., & Messeni Petruzzelli, A. (2019). How intelligent is Watson? Enabling digital transformation through artificial intelligence. *Business Horizons*, *62*(6), 819–829. doi:10.1016/j.bushor.2019.08.004

Martin, J.-F. (2018). *Unlocking success in digital transformations*. McKinsey & Co. https://www.mckinsey.com/business-functions/organization/our-insights/unlocking-success-in-digital-transformations

Mhlungu, N. S. M., Chen, J. Y. J., & Alkema, P. (2019). The underlying factors of a successful organisational digital transformation. *South African Journal of Information Management*, *21*(1), a995. doi:10.4102/sajim.v21i1.995

Mitra, A., Gaur, S. S., & Giacosa, E. (2019). Combining organizational change management and organizational ambidexterity using data transformation. *Management Decision*, *57*(8), 2069–2091. Advance online publication. doi:10.1108/MD-07-2018-0841

Moore, G. A. (2014). *Crossing the Chasm* (3rd ed.). Business.

Morakanyane, R., Grace, A., & O'Reilly, P. (2017). Conceptualizing Digital Transformation in Business Organizations: A Systematic Review of Literature. *Digital Transformation – From Connecting Things to Transforming Our Lives*, 427–443. 10.18690/978-961-286-043-1.30

Muzyka, D., De Koning, A., & Churchill, N. (1995). On transformation and adaptation: Building the entrepreneurial corporation. *European Management Journal*, *13*(4), 346–362. doi:10.1016/0263-2373(95)00029-K

Nambisan, S., Wright, M., & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. *Research Policy*, *48*(8), 103773. doi:10.1016/j.respol.2019.03.018

Ngai, E. W. T., Law, C. C. H., & Wat, F. K. T. (2008). Examining the critical success factors in the adoption of enterprise resource planning. *Computers in Industry*, *59*(6), 548–564. doi:10.1016/j.compind.2007.12.001

Niessing, J., & Ho, M. (2020, August 10). *The State of AI-Driven Digital Transformation* [Blog]. INSEAD Knowledge. https://knowledge.insead.edu/blog/insead-blog/the-state-of-ai-driven-digital-transformation-14921

O'Reilly, C. (1989). Corporations, Culture, and Commitment: Motivation and Social Control in Organizations. *California Management Review*, *31*(4), 9–25. doi:10.2307/41166580

Osmundsen, K., Iden, J., & Bygstad, B. (2018). Digital Transformation: Drivers, Success Factors, and Implications. *Digital Transformation*, 16.

Özbilen, P. (2017). The Impact of Natural Culture on New Technology Adoption by Firms: A Country Level Analysis. *International Journal of Innovation and Technology Management*, *8*, 299–305. doi:10.18178/ijimt.2017.8.4.745

Pecherskaya, E. P., Averina, L. V., Kamaletdinov, Y. A., Tretyakova, N. V., & Magomadova, T. L. (2016). Assessment of Critical Success Factors Transformation in ERP Projects. *International Electronic Journal of Mathematics Education*, *11*(7), 2608–2625.

Petrucci, T., & Rivera, M. (2018). Leading Growth through the Digital Leader. *The Journal of Leadership Studies*, *12*(3), 53–56. doi:10.1002/jls.21595

Philip, G., & McKeown, I. (2004). Business Transformation and Organizational Culture: The Role of Competency, IS and TQM. *European Management Journal*, *22*(6), 624–636. doi:10.1016/j.emj.2004.09.026

Philippart, M., & Vieira, D. R. (2014). Measuring and Managing Projects in Extended Enterprise: A value creation focus based on intangible assets. *Journal of Modern Project Management*, *1*(3).

Purdy, M., Daugherty, P., & Davarzani, L. (2017). *How AI Boosts Industry Profits and Innovation*. Accenture.

Ransbotham, S., Gerbert, P., Reeves, M., Kiron, D., & Spira, M. (2019). Artificial Intelligence in Business Gets Real. *MIT Sloan Management Review*, *60*(2), 1–20.

Riasanow, T., Jäntgen, L., Hermes, S., Böhm, M., & Krcmar, H. (2021). Core, intertwined, and ecosystem-specific clusters in platform ecosystems: Analyzing similarities in the digital transformation of the automotive, blockchain, financial, insurance and IIoT industry. *Electronic Markets*, *31*(1), 89–104. doi:10.1007/s12525-020-00407-6

Safari, M. R., & Jiang, Q. (2018). The Theory and Practice of IT Governance Maturity and Strategies Alignment: Evidence From Banking Industry. *Journal of Global Information Management*, *26*(2), 127–146. doi:10.4018/JGIM.2018040106

Sahu, N., Deng, H., & Mollah, A. (2018). Investigating The Critical Success Factors Of Digital Transformation For Improving Customer Experience. *CONF-IRM*, *2018*, 14.

Sahu, R. K., Gerussi, A., Dhaenens, C., Zhang, J., & Davy, M. (2018, July). Multi-Objective Optimization of Retail Promotional Ordering with Probabilistic Forecast. *ILS2018 - International Conference on Information Systems, Logistics and Supply Chain*. https://hal.archives-ouvertes.fr/hal-01940457

Scholz, C. (1987). Corporate culture and strategy—The problem of strategic fit. *Long Range Planning*, *20*(40), 78–87. doi:10.1016/0024-6301(87)90158-0

Solis, B. (2019). *The 2018-2019 State of Digital Transformation*. Altimeter. https://www.briansolis.com/2019/01/the-2018-2019-state-of-digital-transformation/

Sousa, M. J., & Rocha, Á. (2019). Digital learning: Developing skills for digital transformation of organizations. *Future Generation Computer Systems*, *91*, 327–334. doi:10.1016/j.future.2018.08.048

Sparks, E. (2018). How CFOs Can Drive Success in Digital Transformation. *ABA Banking Journal*, *110*(2), 35–35.

Sultana, S., Akter, S., Kyriazis, E., & Wamba, S. F. (2021). Architecting and Developing Big Data-Driven Innovation (DDI) in the Digital Economy. *Journal of Global Information Management*, *29*(3), 1–23. doi:10.4018/JGIM.2021050107

Sun, L., Huo, B., & Xu, D. (2014). Relationships between intra-organizational resources, supply chain integration and business performance: An extended resource-based view. *Industrial Management & Data Systems*, *114*(8), 1186–1206. doi:10.1108/IMDS-05-2014-0156

Tabrizi, B., Lam, E., Girard, K., & Irvin, V. (2019, March 13). Digital Transformation Is Not About Technology. *Harvard Business Review*. https://hbr.org/2019/03/digital-transformation-is-not-about-technology

Uhl, A., & Gollenia, L. A. (2016). *A Handbook of Business Transformation Management Methodology*. Routledge. doi:10.4324/9781315570631

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Qi Dong, J., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, *122*, 889–901. doi:10.1016/j.jbusres.2019.09.022

Volkoff, O., Strong, D. M., & Elmes, M. B. (2007). Technological Embeddedness and Organizational Change. *Organization Science*, *18*(5), 832–848. doi:10.1287/orsc.1070.0288

Wareham, J., Fox, P. B., & Cano Giner, J. L. (2014). Technology Ecosystem Governance. *Organization Science*, *25*(4), 1195–1215. doi:10.1287/orsc.2014.0895

Wellman, M. P. (2014). Qualitative Probabilistic Networks for Planning Under Uncertainty. In *Uncertainty in Artificial Intelligence* (Vol. 2). Elsevier.

Westerman, G., & Mcafee, A. (2012). The Digital Advantage: How digital leaders outperform their peers in every industry. Academic Press.

Williamson, O. E. (1991). Comparative Economic Organization: The Analysis of Discrete Structural Alternatives. *Administrative Science Quarterly*, *36*(2), 269–296. doi:10.2307/2393356

Yadav, V., Adya, M., Sridhar, V., & Nath, D. (2009). Flexible Global Software Development (GSD): Antecedents of Success in Requirements Analysis. *Journal of Global Information Management*, *17*(1), 1–31. doi:10.4018/jgim.2009010101

Yin, R. K. (1981a). The Case Study Crisis: Some Answers. *Administrative Science Quarterly, 26*(1), 58–65. 10.2307/2392599

Yin, R. K. (1981b). The Case Study as a Serious Research Strategy. *Knowledge (Beverly Hills, Calif.)*, *3*(1), 97–114. doi:10.1177/107554708100300106

Zwitter, A. (2014). Big Data ethics. *Big Data & Society*, *1*(2). doi:10.1177/2053951714559253

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