The human factor in digital transformation: why technology is not enough

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Abstract

Despite consistent investments in technologies, most digital transformation (DT) initiatives still fail to deliver sustainable outcomes. This paper argues that the root cause of this poor performance comes from the human dimension of transformation. DT is enabled by technologies, but shaped by leadership styles, organisational capabilities and culture. These components of the human dimension work together and are reinforced by the bottom-up experiences of employees. Resistance is seen here not as an obstacle, but as a symptom of unmet needs, conflicting demands and organisational misalignments. The paper proposes a view of transformation where people and technologies shape one another over time. To succeed, organisations need to align leadership direction with malleable capabilities and behaviours embedded in the organisational culture. Future research should investigate how the human aspects evolve across roles and layers of the organisation and how leaders can actually mobilise people to enable sustainable transformation.

Keywords: *digital transformation, resistance, transformational leadership, organisational capabilities, organisational culture*

Jel classification: M10, M12, M14, M53, O33

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1. Introduction

Organisations all around the world invest considerable budgets in DT, yet the majority of these initiatives still fail or struggle. This is mainly not because of technological limitations, but because of human-related factors: resistance to change, lack of organisational capabilities and outdated organisational culture (BCG, 2021; McKinsey, 2023). According to Deloitte (2024) and Prosci (2024), DT budgets worldwide are expected to reach $3.9 trillion by 2027, while only 10% of DT budgets exceeding $10 million are invested in people aspects such as change management and workforce adaptation.

Yet real-world challenges show that technology alone does not drive sustainable transformation. With less than 30% of DT programs succeeding and many still struggling, the biggest barriers come from resistance that takes many forms and is sometimes accentuated by improper leadership styles, poor organisational capabilities and attitude towards change. There are also challenges that come from legacy IT systems and fragmented technological infrastructures, which limit scalability and integration (Lucas & Goh, 2009; Nadkarni & Prügl,

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2020). However, many leaders and organisations still follow a tech-first approach and deprioritize workforce adaptation. Deloitte (2024) reports that companies allocate 7.5% of their revenue to DT, with 5.4% coming from IT, reinforcing the technology-first mindset.

The way organisations manage resistance in particular is critical. Most DT initiatives in large organisations - the big spenders of DT budgets - follow a top-down approach. Research shows this approach is actually necessary for impact at scale and true transformation to happen, but also triggers strong resistance (Marienfeldt et al., 2024). While bottom-up approaches face less resistance, they also fail to generate measurable transformation and meaningful impact on efficiency or performance.

Fortunately, there is a growing body of literature that starts to look into the importance of humans evolving alongside digital technologies. This direction goes beyond private sector and is relevant at societal level. According to the European Commission (2023), technology cannot be separated from the human dimension and it must take into consideration values such as inclusion, transparency and shared governance.

This paper does not want to argue that only the human side of DT matters. Technology is a critical enabler, but on its own it is not enough to create sustainable transformation. Sustainable impact needs an approach where technology and humans shape each other. Having said this, the paper argues that:

1. DT has two complementary dimensions: the technological dimension, which provides the tools, and the people dimension, which determines whether transformation actually happens;
2. Resistance is inevitable and part of human nature, but is not a blocker in itself, more a symptom of organisational setup in times of transformation;
3. A human-equal approach is essential for the long-term success of DT. Leaders should shift from tech-driven DT to approaches that integrate both technology and people.

2. DT: what is important to understand about it

We start from the understanding that DT is "a fundamental change process enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity." (Gong & Ribiere, 2021, pp 12). Yet in recent years, as the literature is more interested in the managerial side of DT, more human-orientated definitions are starting to emerge, like the one provided by Nadkarni & Prügl, who define DT as "an actor-driven organisational transformation triggered by the adoption of technology-driven digital disruption" (2021, pp 240).

What comes out of these definitions and latest research is that at the centre of DT lies a mutually reinforcing cycle between disruption, innovation, experimentation, and continuous change (Vial, 2019; Nadkarni & Prügl, 2020; Hanelt et al., 2021; Guerra & Del Valle, 2024; Klein et al., 2024; Ertiö et al., 2024;

Schiuma et al., 2024). These core characteristics are important to understand, as they might represent the very essence of DT and can help navigate the complex reaction chain DT triggers in organisations.

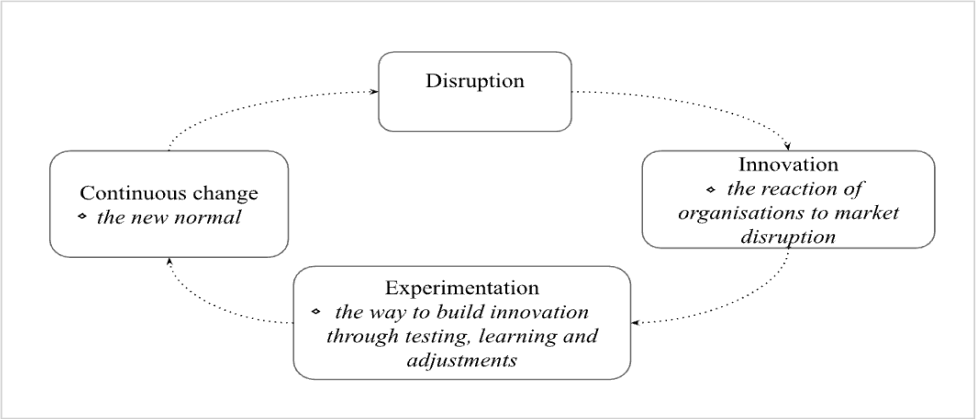

Figure 1. Hallmark of DT: a continuous state of evolution

Disruption is often used easily nowadays, describing successes regardless of their truly disruptive nature. That is why this paper will consider that a disruption is defined as a phenomenon that can produce "1) a 5-10 times improvement in performance versus an existing product, or 2) to create the basis for a 30-50% cost reduction, or 3) to have new-to-the-world performance features." (Rice et al., pp 52, 1998). This comes to show why technological disruption is the game-changer element that took DT to what it is today.

Disruption, created by technology, customer expectations, competition, makes the company react. As seen in Figure 1, the reaction often takes the form of innovation, as organisations look for new ways to renew their strategies, deliver value, improve efficiency and change business models. Innovation in this fast-paced and ever-changing environment asks for experimentation, that is, continuous working flows of testing, learning, and adjusting according to results. Finally, as organisations adopt flexible behaviours, continuous change is the new normal, and the organisation accepts that transformation never ends and it should be part of the organisational way of doing things.

However, this endless chain of changes produces strong human reactions. Recent research that focuses on the employee perspective on DT indicates that things such as technological overload, fear of inadequacy, company and personal identity threatened and perceived loss of social capital lead to technostress, inertia and resistance (Der Schaft et al., 2022; Erti et al., 2024).

3. Tech and human dimensions of DT

There are two dimensions to consider when it comes to driving DT: the technological dimension and the people dimension. In their comprehensive study on the DT literature, Nadkarni & Prügl (2020) observed that the existing research is divided almost equally between the tech-centric perspective on DT and the actor-centric perspective on DT. Recent research also indicates more interest in the latter, also because of the persistent failure rates of DT initiatives. As the micro-level aspects of DT become more evident, they indicate a strong need to see DT more through the eyes of organisational change and also explain the poor results of DT. Because even though 80% of U.S. managers consider DT a critical strategic direction, less than 30% of these initiatives led to sustainable change, even in tech-savvy industries like technology, media and telecom (Boutetière et al., 2018; BCG, 2021).

Yet this paper doesn't want to argue that technology is not important. Technology is a critical enabler; just that on its own, it is not enough to create sustainable transformation. So, it starts by giving a fair understanding also of what is the role that technology plays in DT. The European Commission frames sustainable digital transformation not only in terms of infrastructure, competitiveness - that are rather relevant for private sector - but also in terms of social equity, values, and inclusion and it highlights the need for human-centered design in both strategy and execution (European Commission, 2023).

Before analysing these roles, it's important to clarify the difference between drivers and enablers. According to the Cambridge Dictionary, a driver is "something that makes other things progress, develop, or grow stronger.", while an enabler is "something or someone that makes it possible for a particular thing to happen or be done."

The true drivers of DT are market pressures, changing customer expectations and competitive disruption, all fuelled by the technological shifts (Vial, 2019). These shifts force companies to rethink business models and respond strategically.

3.1 The role of technology in DT: catalyst and enabler, not driver

Digital technologies form the backbone of DT, providing the tools for transformation. They lead to operational efficiency, create new value streams, and even drive industry- and society-level shifts (Hanelt et al., 2021; Verhoef et al., 2021; Șișu, 2023). Technology is also instrumental in delivering on the short- and mid-term goals of the transformation pursuit. In the short term, it helps bring productivity gains and improve customer experience. In mid-term it leads to renewal in business models and growth. To deliver on the long-term and secure sustainable transformation, companies need new ways of working and being, with continuous change at its core. It depends on how well people adapt to and integrate new digital capabilities. According to Klein et al. (2022), a failed DT is when the initiatives

failed to deliver the initial goals and instead delivered on incremental, fragmented results rather than disruptive outcomes that would really reshape the organisation.

Nowadays technology can also be a barrier to DT. Organisations struggle with legacy IT systems, fragmented architectures, and lack of scalable digital infrastructure, which prevent or significantly delay integration of new technologies (Nadkarni & Prügl, 2020; Hanelt et al., 2021; Iansiti & Nadella, 2022). Because of this, many companies fall into the trap of investing large proportions of their financial resources in digital tools while neglecting change management and workforce adaptation. 90% of DT budgets exceeding $10 million are invested in technology, while people aspects such as change management and workforce adaptation get the rest (Prosci, 2024). Deloitte (2024) reports that companies allocate 7.5% of their revenue to DT, with 5.4% coming from IT, reinforcing the technology-first mindset.

Technology itself is for sure important, but there is more than just the disruption and innovation that comes from it. 87.5% of DT fail, significantly more than other organisational changes. The reason is that companies underestimate the human part: both the top-down capabilities as well as the bottom-up support and adoption. So this paper argues that the people dimension is the determinant factor for the sustainable and long-term success of DT.

3.2 The human dimension of DT: the determinant factor in DT success

As organisations react to external shifts - technological and non-technological - they need to adapt. On one hand they react through their business strategy, which focuses on the business model, budgets and processes, but they also react culturally, as shown in Figure 2. A noticeable example is Kodak. The company invested over $5 billion annually in R&D, yet failed to transition to digital photography. The reasons were related to organisational inertia, hierarchical rigidity and poor change management, not because of any limitations in accessing technology (Lucas & Goh, 2009). This famous business case shows that the true driver of transformation is not technology itself, but how organisations manage to channel employees to integrate the new normal into their work. As Mantere (2008) points out, strategies are “created, implemented, and renewed by individuals, not organisations.” (p. 297).

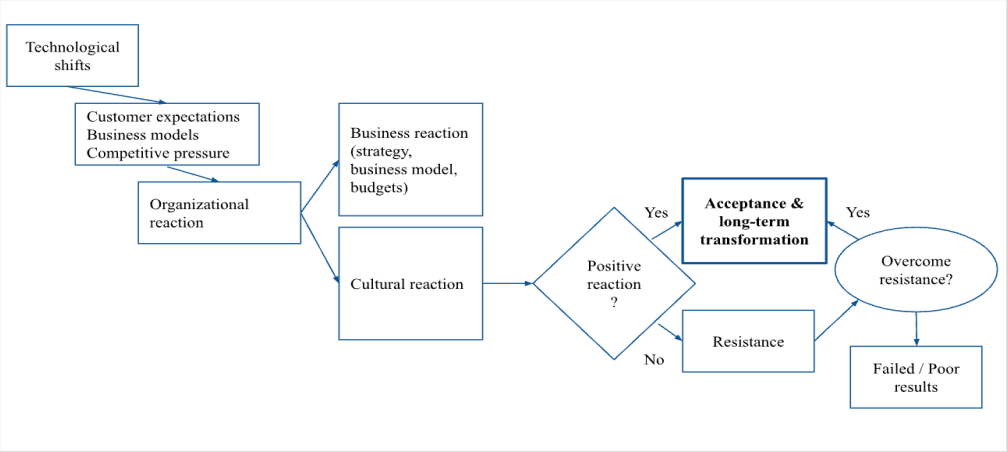

Figure 2. The impact of technological shifts on organisational behaviour

Note. While there are other shifts that impact the changing business landscape, such as political and economic shifts, the figure follows exclusively the technological path.

While the business reaction of organisations is more straightforward, the cultural reaction triggers more complex consequences. A critical step is to *understand resistance*. Resistance is not an exception, but rather it should be expected as an inevitable part of DT. Large organisations, the biggest spenders on DT, face particularly high stakes, where the success or failure of an initiative can directly impact careers and job security. According to Marienfeldt et al. (2024) findings, effective, scalable, and flexible changes require a compulsory, top-down approach. However, this approach triggers resistance by default, as employees most likely will feel forced into change. By contrast, voluntary, bottom-up DT approaches do not create the same level of resistance. They also do not lead to measurable, large-scale transformation. Instead, these efforts tend to result in incremental improvements, which is the definition of a failed DT.

Because most DT programs involve fundamental organisational changes, they will almost always generate some form of workforce resistance. There is a consistent body of research already showing that the main blockers of DT come from workforce resistance and inertia, both influenced by leadership styles, organisational capabilities and organisational culture (Horváth & Szabó, 2019; Klein et al., 2022; Funke et al., 2023; Kringelum et al., 2024; Prosci, 2024). Klein et al. (2022) argue that DT strategies inherently create "a network of reinforcing tensions" (pp 1009). These tensions come from competing demands, resource limitations, new roles and new social norms. Even employees who typically adapt well to change may experience frustration and stress due to the paradoxical nature of DT, where uncertainty and disruption challenge existing ways of working. Another cause of resistance is the disruption of an organisation's business model, as employees often

identify with it. So when the organisation goes through a major transformation, employees may struggle to find their sense of belonging with the evolving structure (Klein et al., 2022). This builds on Horváth & Szabó findings (2019) that resistance manifests in daily work, especially when employees perceive that change will disrupt their professional roles or social dynamics within the workplace. Inertia, on the other hand, is even deeper and comes from long-established behaviours and mindsets that make it difficult or even impossible for people to accept new realities (Lucas & Goh, 2009; Hanelt et al., 2021). In SMEs in particular, resistance is linked to managerial mindsets that are not aligned with the digital requirements of DT. Even when tools are available, leaders may hesitate or delay adoption because of their own limitations, fears and lack of digital capabilities (Vidu et al., 2022).

This paper argues that resistance is not a blocker in itself, but a consequence of deeper issues: leadership, culture, capabilities gaps and even a superficial understanding of employees' mindsets and micro-level experiences with DT (Klein et al., 2022; Nadkarni & Prügl, 2020). Organisations that fail to align their leadership strategies, organisational culture and capabilities with DT efforts will face higher resistance, making adoption difficult and transformation unsustainable.

4. How can organisations address these challenges proactively and drive employee support

In the previous section, the argument followed the idea that resistance is an inevitable reaction of the workforce in DT. Research consistently shows that three human components are critical for successful DT (Hess, 2015; Vial, 2019; Năstase et al., 2019; Nadkarni & Prügl, 2020; Klein et al., 2022; Feliciano-Cestero et al., 2023; Rugiubei & Cruceanu, 2024; Schiuma et al., 2024):

- Leadership, referring to the leadership behaviours that influence employee buy-in and proper execution;
- Organisational capabilities, referring to the skills and processes needed to execute the transformation;
- Organisational culture, referring to the shared values, norms, and behaviours towards change and digital.

The three are highly interconnected. Leadership gives direction, organisational capabilities enable execution, and culture sustains the change. Moreover, to reach their full potential, they need to continuously be complemented with bottom-up insights related to how employees experience the change (Klein et al., 2022).

4.1 Leadership

Leadership is the one that gives company directions and is the main trigger of change within any organisation. Leadership impacts how the transformation is perceived and supported. As Guerra (2024) puts it, leadership is "an aptitude to lead an organisation towards success through relevant and effective decision-making"

(p. 1281). In the context of DT, transformational leadership is the style that is frequently associated with successful outcomes. It has four key dimensions: idealised influence, inspirational motivation, intellectual stimulation, and individualised consideration (Schiuma et al., 2023; Șișu, 2023). Deng et al. (2023) describe transformational leadership as a style that aims to "transform and inspire followers to perform beyond expectations while transcending self-interest for the good of the organisation" (pp 629). Transformational leaders, which are highly employee-centric, communicate transparently and support development significantly increase engagement and reduce resistance (Romanescu et al., 2024). Moreover, similar to the facilitator role proposed for public institutions in entrepreneurial dialogue, leaders in DT need to create space for bottom-up insight and cross-functional learning (Gheorghiu et al., 2016). These behaviours have been empirically shown to strengthen employee trust in particular, leading to engagement and innovation, key mechanisms for consistent commitment during transformation (Eva et al., 2024).

In contrast, authoritarian styles such as transactional leadership are more often linked to resistance, burnout and stress, especially during long changes (Schiuma et al., 2023).

This leadership style needs to be shared across all managerial levels. Middle managers (MMs), in particular, have a unique role: positioned between strategy and operations, they act as sensemakers and emotional balancers, helping teams navigate through disruption and ambiguity (Huy, 2002; Vial, 2019; Der Schaft et al., 2022). As Pînzaru (2019) explains, their behaviours can significantly accelerate or slow down change and performance. Several studies reinforce this view, showing that when MMs are trusted, involved and aligned with top leadership, they become catalysts for execution and change agents (Funke et al., 2023; Hansen et al., 2024; Feliciano-Cestero et al., 2023).

4.2 Organizational capabilities

Organizational capabilities include the skills, processes and structures that enable companies to implement and sustain DT. More precisely, they refer to how organisations are designed how managers and employees are equipped with the right skills, how knowledge is shared and how transformation is planned and coordinated. In the context of DT, this component is especially important as organisations need to be faster in both strategic and implementation cycles (Nadkarni & Prügl, 2020; Guerra, 2024; Romanescu et al., 2024).

A key element is a flexible organisational design. Companies need to adopt structures that are malleable - that is, able to change frequently and permeable - that is, prepared for continuous learning and knowledge sharing (Verhoef et al., 2020; Hanelt et al., 2021; Ullrich et al., 2023). This permeability is what allows organisations to truly scale their transformation. Knowledge exchange creates trust and reinforces self-confidence among employees. It also nurtures a learning and experimentation mindset that is essential for DT success and adoption. This should

for sure not be seen as a communication tactic, but rather it should be embedded in structures that allow consensus based on constructive arguments and and mutual acknoledgement (Gheorghiu et al., 2016; Ertiö et al., 2024).

Employee skills are perhaps the most commonly mentioned organisational capability in the DT literature. Research shows that skill gaps become visible early in the transformation. Because employees feel unsure about themselves and how to contribute, most often they react through some form of resistance, more ar less subtle (Vial, 2019). Hansen et al. (2024) argue that organisations need to address these gaps early on and build capabilities across technical, methodological, social and personal dimensions. Other sources suggest the need for higher-level skills such as analytical thinking, complex problem-solving and adaptability to change (Vial, 2019; Guerra, 2024), as well as ambidexterity - the "ability to exploit existing strengths while exploring new opportunities" (Greven et al., 2023, p. 1786) - and dynamic capabilities, defined as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece et al., 1997, pp 516). These skills apply both at the individual level and at the organisational level, where agility and adaptability need to be embedded into organisational routines. Preparing the workforce for the future is a crucial aspect of broader societal transformations, as reflected in policies like the EU's 2030 Digital Compass, that targets for 80% of adults to have basic digital skills by 2030 (European Commission, 2023).

These skills need to be matched with strong managerial capabilities, particularly around change coordination, coaching, coordination and informed decision-making. As Pînzaru (2019) suggests, managers need to have and develop very clear capabilities to lead through structure, feedback and autonomy. Change management becomes a decisive factor. People's energy, focus, and emotions can easily get lost and diluted without planned orchestration, using roadmaps, stakeholder engagement and digital project management tools (Hansen et al., 2024; Prosci, 2024). Among these, planning stands out as especially important (Marienfeldt et al., 2023; Funke et al., 2023; Hansen, 2024). It helps people understand what is happening and why, giving them clarity and predictability. This, in turn, builds trust and creates the psychological space for acceptance and commitment. As Eva et al. (2024) highlight, trust is a key condition through which leadership and teamwork shape employees' engagement with transformation.

4.3 Organizational culture

Organizational culture is "the way people behave" (Guerra, 2024, pp 1281), shaped by shared norms, values, beliefs and behaviors. In the context of DT, culture influences employees' attitudes toward change, trust in leadership, psychological safety and in the end, their willingness to adopt new ways of working.

When organisations manage culture mindfully, it becomes an enabler. When they don't, culture becomes a blocker. The Kodak case remains emblematic. Despite investing billions in R&D, the company failed to shift toward digital photography

not due to a lack of access to innovation, but because of a culture characterised by inertia, rigid hierarchies and poor change management (Lucas & Goh, 2009).

The attributes of a culture that supports DT are openness to innovation, resilience, agility, collaboration and continuous change (Verhoef et al., 2021; Bagraotini & Gordienko, 2023). Recent research from Romanian companies confirms that rigid, hierarchical cultures significantly increase the risk of disengagement, while clan cultures, that focus on human affiliation, trust and support reduce the likelihood of quiet quitting, a recent form of resistance that was accentuated by COVID-19 (Rugiubei & Cruceanu, 2024).

Yet DT also challenges the social norms and identity structures. Employees often identify with the current business model, so changes to it can threaten their sense of belonging (Klein et al., 2022). Moreover, cultural transformation requires time and consistency, as messages need to be repeated across the organisation to form new behaviours (Lopez & Estevez, 2013; Nadkarni & Prügl, 2020). This makes cultural change both the slowest and the most complex of the three human components of DT.

So what enables cultural transformation? Fundamentally, it starts with the mindset. Dweck (2006) defines mindset as "a framework that helps interpret experiences." (pp 28). A digital or growth mindset encourages employees to see uncertainty and disruption as learning opportunities. To make things more complex, culture also influences how leadership strategies and communication are received and internalised by employees (Klein et al., 2022). That is why a cultural change starts with a shift in mindset towards paradox thinking, openness to contradiction and change, tolerance for ambiguity (Klein et al., 2022; Schiuma et al., 2024).

Finally, culture does not act alone. It is shaped and reinforced by leadership behaviours and organisational capabilities. For example, cultures that value collaboration rely on knowledge-sharing structures and agile organisational designs.

5. How do the human components of DT work together

An easy way to describe the relationship between leadership, organisational capabilities and organisational culture is that change is initiated through leadership, executed through capabilities and sustained through culture. By looking at them like this, one can easily understand the role each plays in DT. However, it might also suggest that the transformation is a kind of end point. In some way, it is. As Chamorro-Premuzic (2021) writes, transformation ends "when people's behaviours change" (pp 3). Culture is a strong indicator, showing when transformation is finally part of the organisational DNA. However, culture is not static and needs continuous attention. For instance, the arrival of a new CEO misaligned with existing values can negatively impact trust and disrupt norms. Similarly, even the strongest change management plan can lose traction if the culture is not supporting the change.

This is why it is important to note that the relationship between the human components is not linear, but they co-exist and co-evolve, as shown in Figure 3. Leadership decisions shape capabilities. Capabilities support behaviours.

Behaviours reinforce or challenge culture. At the same time, a strong culture enables faster capability building and creates the conditions for more inclusive, transparent leadership. Even well-intended cultures are ineffective without leadership reinforcement. Quiet quitting studies show that poor leadership amplifies disengagement, even in moderately supportive cultures (Rugiubei & Cruceanu, 2024).

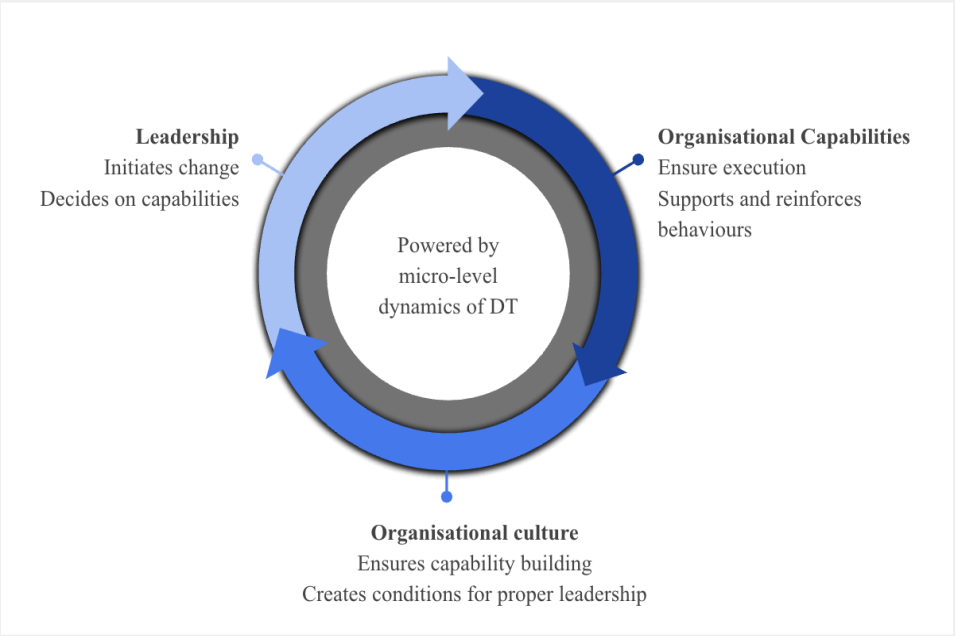

Figure 3. The human mechanism of sustainable digital transformation

This relationship is powered by the micro-level dynamics of DT: how employees make sense of changes, how they feel about their roles and how they interpret tensions. As recent research shows, organisations must actively listen to these micro-experiences to improve transformation strategy (Klein et al., 2022; Romanescu et al., 2024; Schiuma et al., 2024). Moreover, employees don't always see the whole picture or see it differently and need structures and tools to help them make sense of transformation. As Gheorghiu et al. (2016) argue, even highly networked organisations often operate with limited information about their role in broader systems. Inclusive foresight processes or knowledge-sharing behaviours provide valuable signals about what is working, what people still resist to and what is misunderstood. They also allows people to understand their position in the whole change, identify tensions and engage with change in more constructive ways.

So what really makes a difference is how coherent and consistent the components build on each other.

6. Conclusions

This paper argues that to fully understand DT, organisations need to let go of the technology-first lens. What really shapes and sustains transformation are human dynamics - leadership, organisational capabilities and culture - supported by a continuous feedback loop of bottom-up experiences. Resistance, which is generally perceived as an obstacle or a problem that needs to be solved, is rather a symptom of underlying needs, tensions and gaps that are a priceless source of learning and continuous evolution.

DT should also be accepted as an ongoing state of change that needs to be led with proper leadership, guided through the right capabilities, and reinforced until it is embedded in culture. With such alignment, organisations can truly achieve sustainable and much-wanted transformation, moving beyond fragmented, tiring efforts. Moreover, the micro-level experiences of employees should be taken seriously and be part of a continuous cycle of adaptation, as they represent an authentic, relevant source of inspiration for leaders who are willing to listen and reinvent the three-component cycle of the human side of DT. This is a game of mobilising energy and focus.

Finally, this paper is not about neglecting technology, but rather a call for a balanced approach, with equal investments in technology and people. DT requires more, not less human-centered leadership, as well as strategic and digital thinking. Moreover, like Vidu et al. (2022) argues, the next step in DT is already entering organizations through different forms taken by Artificial Narrow Intelligence (ANI). Companies need even more skilled and well prepared workforce. Additionally, the right managerial mindsets and human capabilities must evolve in parallel with the technological ones, particularly with the emergence of AI that raises complex, new challenges around trust, transparency and regulatory understanding.

Future research should continue to explore the evolving micro-level experiences of employees and how these can shape transformation in real time. It should also investigate how organisations and leaders actually become what is proposed in this paper. Organisations can truly move the needle toward meaningful and impactful transformations by being committed to understand the complexity of both human and technological aspects of them.

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