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Winter 12-1-2022

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### Recommended Citation

Maccioni, Samuele and Ghiringhelli, Cristiano, "Organizational Unlearning Dynamics Emerging During Digital Transformation: Implications for Organizational Change" (2022). *IT AIS 2022 Proceedings*. 13. <https://aisel.aisnet.org/itais2022/13>

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# Organizational Unlearning Dynamics Emerging During Digital Transformation: Implications for Organizational Change

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**Abstract.** In this paper, we investigate the arising of organizational unlearning dynamics during transformations enabled by digital technologies, and their implications for organizational change effectiveness. First, we carry out a desk analysis to explore the radical changes enabled by digital technologies that impact organizations multidimensionally. Afterwards, we investigate how this scenario creates the need for organizational unlearning dynamics, to overcome the interplay between path dependencies and organizational deep structure. Thus, we analyse four cases from the literature, with the aim of highlighting the impacts of digital advance over organizational culture, structure, strategy, control systems, and power distribution arrangements.

This study brings the following main findings. First, changes related to digital transformation impact organizational deep structure. Second, organizational unlearning dynamics arose from these changes, creating the need to overcome path dependency mechanisms that could inhibit the organization from embracing innovative arrangements. Altogether, this study contributes to making awareness of the critical role played by organizational unlearning practices within organizational change related to advances in the deployment of digital technologies, also suggesting a first set of insights relevant from both the theoretical and managerial perspective.

**Keywords:** Digital transformation, Organizational unlearning, Path dependencies, Deep structure, Organizational change, Organizational learning.

## 1 Introduction

Organizations can be viewed as organisms that learn from their experience [3]. However, once the environment inside and outside the organization changes, the old experience and, consequently, the beliefs associated with it are devalued [25], rendered obsolete [76] or even misleading [50].

The current scenario, characterized by a high level of uncertainty, enhanced by the recent dynamic further accelerated by the pandemic, has created the conditions for a necessary and widespread adoption of digital solutions. This adoption, most of the time,

is called Digital Transformation (DT). DT is gathering the attention as well as the planning of academics and practitioners. This is even more glaring when we consider that in the course of just ten years it has catalyzed a hundredfold more attention than the one originally obtained [33]. Despite this, scholars currently engaged in deepening the topic agree that it is complex to give a comprehensive definition of what it is because of the multidimensionality [37; 88] and multifacetedness [11; 83] of the phenomenon. Although the debate about what DT actually is, is still ongoing, in our study we will adhere to one of the most recent definitions provided in this regard. This definition, although perfectible, is in our opinion a good encapsulation of the complexity of the phenomenon. Therefore, basing on this definition, we will consider DT as "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 (an entity could be: an organization, a business network, an industry, or society) and redefine its value proposition for its stakeholders"[29]. About this definition, we find the first part particularly appropriate, namely the fact that this phenomenon is identified as a fundamental process of change, enabled by the adoption of digital solutions.

Despite the lack of clear positions on this issue, since DT is an incredibly topical and enormously reality-conditioning phenomenon it is increasingly becoming a new research paradigm [33]. Indeed, recent studies show that 40 percent of all technology spending globally has been invested in digital transformation, with companies spending more than \$2 trillion, in 2019 alone [17]. Furthermore, while 52 percent of companies plan to cut or postpone investments due to COVID-19, only 9 percent will make such cuts in digital transformation projects [45]. Continuing further, according to the World Economic Forum [54], it is predicted that, by 2025, interactions occurring on the basis of any platform will generate about two-thirds of the value of the \$100 trillion brought into play by digitization. It also seems clear that, again by 2025, about 90 percent of new business applications will incorporate artificial intelligence (AI) technology into their processes and products. However, what is interesting is the fact that despite these investments, only 21 percent of companies have, so far, completed their digital transformation process. Finally, it is also worth noting the paradox of how despite 87 percent of companies globally believe that digital will disrupt their industry, for now only 44 percent are ready to respond or lead this process [2]. Thus, the data reported, show how despite the attention and resources put into this process, not only are there more failures than successes to date, but also how DT generates perceptual distortions and sheds light on the weaknesses inherent in many organizations. These dynamics translate into a perceived and factual uncertainty that permeates organizational becoming and hampers planning processes. Therefore, research in this regard becomes crucial and necessary not only for the impact it generates but to cope with the uncertainty it brings [2].

DT is the bearer of multiple and equally important changes that hit organizations at different depths. On the surface it impacts the environment in which organizations are embedded (society, its structure, interactions, and existing regulations) [1; 26]. In depth it impacts the organizational deep structure [28]. The deep structure is composed by: organizational culture, structure, strategy, power distribution and system of control [82]. Deep structure can be defined as "the set of fundamental "choices" a system has made of the basic parts into which its units will be organized and the basic activity

patterns that will maintain its existence” [28, p.16]. Thus, to cope with DT, not only is necessary to have a strategy that is able to embrace transformation while ensuring performance [37]: an organization must also be able to change the ways in which generate value [70], its structure [61], culture [41] as well as its processes [15]. Therefore, to face DT-related changes organizations need a holistic and deep approach to the phenomenon [85]. Standing on these assumptions, we need to expand our comprehension about the existing relationships between DT and organizational deep structure. In order to answer this goal, our first research question is the following:

*RQ1: How Digital transformation processes trigger change in the organizational deep structure?*

Accordingly to the literature [82; 28; 71], the organizational elements of the deep structure are firmly entrenched through reiterated reinforcement mechanisms [71] that derives from positive feedback that reinforces earlier events and supports the direction of change. In addition, since deep structure is defined as a set of fundamental choices that help the organization maintain its existence, it anchors the organization to the routines and beliefs that have allowed the organization to survive to the present. Although these dynamics can deliver benefits over the short term, the organization needs to be alert that they could deliver suboptimal outcomes over the longer term. These path dependencies keep the organization anchored in the past [60]. Since the moment that these path dependencies hinder the organization to adopt new creative forms and innovations we believe that challenging this past is the gateway through which the success not only of organizational change but also of effective digital transformation passes.

To overcome this past and decrease its influence it seems that organizations have to challenge the path dependencies to creatively address the future. In this gaze it would seem that from DT related changes emerge the need to implement organizational unlearning dynamics [35; 58; 80; 9]. Although this construct is also relatively young in the literature, with no unified definitions for it, in most empirically demonstrated cases organizational unlearning can be defined as "eliminating outdated knowledge and routines [89; 7; 56; 80], further promoting knowledge acquisition". In our view deploying organizational unlearning processes could be a fruitful strategy for dealing with changes related to digital transformation. Therefore, our second research question is as follows:

*RQ2: Does the need for organizational unlearning emerge during digital transformation processes?*

By analyzing through these questions the correlations between digital transformation, deep structure and organizational unlearning, we believe that our study can shed light on some as yet unexplored dynamics. Although exploratory, this could be the first step of a more structured research project that can be carried out in the field in the future. As it is still in the exploration and testing phase, this article applies this questions to an in-depth desk analysis of four DT cases already in the literature [64; 23; 20; 26] to explore how organizations undergoing DT could be an arena in which organizational unlearning comes to life as a fundamental tool for success. Therefore, this article, starting from the cases, is structured as follows. First, DT as a radical change will be analyzed with the paradigmatic lens of organizational change; second, the dynamics inherent in DT as a radical change that goes to affect the deep structure of

organizations will be analyzed; third, we will then go into how changes in the deep structure necessitate organizational unlearning dynamics; fourth and last, based on the findings we will then go on to discuss the implications that this perspective generates.

## 2 Theoretical framework

To understand and react to the dynamism, uncertainties, tensions, opportunities and threats introduced by Digital transformation [2;49] the vision proposed by open systems theory [42] is particularly generative. This view allows to conceive organizations as a complex systems connected with other complex systems and the surrounding environment through transactional relationships. In fact, DT is a multidimensional phenomenon that generates different frameworks that must be kept in mind simultaneously. Although technologies previously performed a function mainly as passive support for human activities by ensuring the storage, access, process and communication of information [55], to date Digital Technologies are generative, malleable and combinatorial [39]. Moreover, they do not remain confined to their scope: their ductility allows them to bypass the boundaries in which they are initially inscribed to go on to influence a broader ecosystem [33], which in turn creates perpetual motion by impacting not only businesses but everyone [75]. One of the most recent unified definitions provided regarding the phenomenon defines it as "a fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leveraging of key resources and capabilities, aimed to radically improve an entity (an entity could be: an organization, a business network, an industry or a company) and redefining its value proposition for its stakeholders [29]. This definition is particularly fitting for the purposes of the study since it defines the phenomenon as a fundamental process of change, thus making it clear how it should be read using the lens of organizational change [33].

For a long time, organizational change has been interpreted as a cumulative arrangement [13] suggesting that individuals and organizations innovate, reinvent themselves, and experiment gradually, until significant change is achieved. To respond effectively, organizations must therefore prospect to interpret a posture of continuous change [86]. However, such a view has been challenged by other perspectives. Burke [14], for example, asserts that although such a view is desirable, it is nevertheless incapable of generating meaningful paradigm shifts. In fact, to overcome the inertia that limits change, discontinuous jolts capable of shaking the foundations of the organization are required. Placed in this context, organizations are thus subjected to an unprecedented challenge that forces them to abandon the view of gradual, cumulative, continuous change [59]. Such a view embodies the essence of the punctuated equilibrium paradigm [77; 28]. However, today both views, the cumulative and the punctuated approach to change, are challenged in the DT scenario [33]. Indeed, while theoretically, the punctuated approach defines a rhythm characterized by long periods of equilibrium dictated by inertia and short revolutionary periods of discontinuous change, it would seem that the environment and the need for organizations to grapple with paths of DT are making these radical changes anything but brief. At the same time, episodic burst and ongoing dynamics, the two main characteristics of each approach, do not happen separately or

individually, but together. Therefore, another particularity of DT is to stimulate a holistic approach to change that integrates both paradigms. To move into this scenario, a first theoretical basis for reflection, that belongs to both paradigms, could be found in the organizational deep structure. Organizational deep structure can be defined as “the set of fundamental “choices” a system has made of the basic parts into which its units will be organized and the basic activity patterns that will maintain its existence”. In this gaze the organization appears to be composed in its foundations, the deep structure, of five essential aspects that maintain organizational existence: culture, strategy, structure, power distribution and control systems [82]. Adopting a sports analogy, the deep structure can be thought of as the rules of the game [28], so while incremental changes may go to affect variables within the game (ex. Performance), radical changes go to alter the structure of the game itself (ex. the rules or the way for scoring). DT-related changes, despite embodying both metaphors, with their layered and multidimensional nature often fall into categories of the latter order. Therefore, these changes, given the radical nature they possess, not only impact the organization into its three levels (individual, groups, whole organization) but force them to modify their deep structure [82] making this challenge even more difficult and multifaceted. Since, as reported by the inserted definition, the ultimate goal of DT is to redefine the value proposition to stakeholders, this process must inevitably remain in step with the times. While deep structure ensures the existence of organizations, it also risks anchoring them to their past through mechanisms of path dependencies [60]. Path dependence can be defined as a rigidified, potentially inefficient action pattern built up by the unintended consequences of former decisions and positive feedback processes [71]. These mechanisms, by inhibiting the organizational ability to learn and evolve, risk hindering DT processes by greatly affecting the success of the process.

The past then, however much it creates the foundation for present organizational existence, is likely to become harmful and misleading, especially in the face of organizational changes such as those generated by DT. Unlearning that past might therefore be a profitable strategy for readily and unconstrainedly confronting the changes generated by new digital arrangements. The literature on organizational unlearning, though recent, shows several parallels that would seem to outline it as a profitable strategy to adopt in this scenario. Unlearning was first addressed by learning reformers such as Dewey (1938) and Toffler (1971) within their writings. In particular, Toffler believed that the rate of knowledge obsolescence had increased due to the increasing pace of mechanization and industrialization. Therefore, to improve learning efficiency, students must instigate the tendency to understand the relevance of new ideas and revitalize them by discarding obsolete ones, taking care not to overload themselves with information [62]. This concept, using studies done on Swedish firms that avoided failure due to changes in the external environment, was introduced in organizational studies by Hedberg and associates [36; 58; 67]. While there are many, and often conflicting, views on the subject, one of the major definitions demonstrated empirically [7; 8; 80; 84] sees organizational unlearning as eliminating outdated knowledge and routines [89; 7; 56], further promoting knowledge acquisition." Organizational unlearning then, marked by strong awareness in contrast to organizational forgetting [43], would thus promote the abandonment of old beliefs, knowledge and routines, in favor of new

learning. Firms unlearn to manage a crisis [63; 65], change [8] and increase organizational effectiveness [21]. Since successful DT, as a fundamental change process that restructures the organization at different depths, requires the learning of new ways of doing and thinking, organizational forgetting would seem to meet this need. If new learning is necessary for successful change, unlearning practices must therefore target the elements that hinder this process. These elements, as seen earlier, are the mechanisms of path dependencies generated by the deep structure of the organization. Although the deep structure ensures the existence of the organization, it inhibits new learning. Therefore, applying organizational unlearning processes could overcome these bonds by making the organization more likely to change and adopt the new arrangements dictated by the adoption of new technologies.

In order to obtain an initial support for this interpretation, we have analyzed some cases from the literature using as focal lenses the different dimensions that characterize deep structure and how each of them plays a key role within DT-related changes. The analysis will be structured as follows. First, given the characteristics of the cases they will be addressed separately. The DBS, LEGO and AUDI AG cases will be addressed together as they focus on the dynamics occurring within the organization. The UBER case, on the other hand, which is more particular in nature, will be analyzed separately. As UBER is in fact a born digital organization, the observations focused not on internal organizational dynamics but rather on how UBER, given its nature, has become the digital variable that has digitally transformed the environments in which it is embedded. Therefore, first the cases will be briefly contextualized and introduced; and then, using the elements of deep structure as categories, the cases will be analyzed by treating the impacted dimensions (organizational culture, structure and strategy, control systems, and power distribution) separately.

### **3 How radical changes generated by DT affect the deep structure of organizations: marks from the field**

#### **3.1 Methodology**

The methodological choice, as this research is in the early stages of development, fell on an in-depth desk analysis of cases already in the literature. This exploratory phase of research, being inscribed in a larger design, aims to lay the groundwork to go on to perform field research in the coming years. Therefore, performing a narrative literature review [6] we went in search of cases already in the literature that could allow us to perform an initial comparative analysis. First, having to explore complex social phenomena in real-life contexts, the first discriminating factor was to find papers that had used case-study methodology [24; 87]. The second criterion was to find cases that dealt with Digital Transformation processes. The third criterion was to find organizations that met basic conditions to be included within the analysis: number of employees, revenue, longevity, and complex organizational structure. Finally, the last criterion, used as a deterrent to ensure the quality of the cases analyzed, was to identify cases that had been published by top journals. The search performed using the following criteria

resulted in the selection of four cases representing the realities of Audi AG, Lego, DBS Bank, and Uber. Although other cases were found in the search, the selection fell on these four because they allow for a multisectoral analysis by investigating the hypotheses within different contexts. In fact, they belong to different sectors: banking, manufacturing and services. For the final part of the research, on the other hand, to find the corresponding assumptions that demonstrated the need to apply organizational unlearning practices, the selected cases were compared with empirical cases of unlearning to date seminal in the literature [7; 78; 79; 53].

The cases reviewed [64; 23; 20; 26] show evidence to support the thesis that DT related changes impact the deep structure. The first case [64] describes how DBS, a large Asian bank, responded to threats and opportunities imposed by the environment through the adoption of a digital strategy that required an organizational response structured on multiple levels and dimensions to be effective. The second case [23], on the other hand, describes how LEGO used digital leadership to enable digital transformation; this process involved the entire organization in a process that proved to be modifying toward the economy, society, and culture. The third case [20] located within the manufacturing industry, studied how AUDI AG, a luxury segment of the company, introduced Big Data Analytics within its DT and how this process strongly impacted the structure and processes of the entire organization. Finally, within the fourth case [26], the most original in terms of perspectives, explore how Uber Technologies, as a service-providing tech company, was able to digitally change the transportation service through its sharing economy model. It becomes necessary to specify how, if the first three cases demonstrate the impacts that DT generates within the organization, the last one reverses the perspective by showing how a born-digital company acts as an agent of digital transformation within the context in which it is embedded.

### **3.2 DT impact on Organizational Culture**

A questionnaire submitted in 2015 to 4,800 U.S. management professionals suggest that the keys that could open the door to DT success involved strategy, culture, and talent development rather than the implementation of the technology itself [40]. In the cases analyzed within the article it appears that for a DT process to be successfully applied it must be supported by a solid culture that can endure over time.

In DBS [64], which considers a solid, structured, and sometimes rigid environment such as banking, DT generated change that forced the organization to field solutions that emerged from the bottom up. In this case, DT forced the organization to value and consider the visions of stakeholders not only external to the company but also internal, encouraging people to speak up, open up, and bring into the debate their own point of view with the aim of making them feel co-actors, promoters, and co-responsible for the change agenda. In addition, through the implementation of a Digital Business Strategy DBS was able to move beyond the old framework oriented only toward achieving excellence in customer service to embrace a holistic vision that, through the use of digital, enabled new and valuable customer experiences. In addition, DT has enabled DBS to shift from an intuitive management culture to one based on data evidence. In fact, from the data collected by the digital tools, the highest value-added areas and customer usage



habits were identified, and these became the basis on which to build a successful effective and efficient management, as well as capable of grasping abruptly the changes taking place.

In LEGO [23], the implemented DT, which mainly involved the implementation of digital leadership, found fertile ground because LEGO's culture has famously always been based on openness, trust, and key values such as creativity, imagination, fun, quality, and care. Despite being full of positive values, such a strong culture was nevertheless a hindering element in some ways precisely because of the depth with which it was embedded in the company. Indeed, this self-centered and internally oriented culture made the organization close to the innovative potential coming from outside. DT impacted LEGO by forcing the organization to make a mindset change that would enable the path to become digitally dynamic. Specifically, through coaching interventions, aimed at a successful DT, it worked on risk-taking, experimentation, and learning in a more externally focused orientation. MINDSTORMS, a robotics platform where users can submit their own creations, is an evidence that change has taken place. The creation of a community of practice represents an important cultural shift in which LEGO has abandoned a culture of control in favor of one that is more relational and open to change. Indeed, for a DT to be successful, LEGO shows it is critical that the organizational culture acquire adaptability and antifragility to deal and communicate not only with a rapidly and continuously changing environment but also with different stakeholders.

At AUDI AG [20], DT has impacted organizational culture as it has introduced, through the use of Big Data Analytics, the need to move to a more data-driven decision making process. To do this, AUDI has created selection processes designed to enlist employees with structured quantitative skills and, above all, an orientation that can grasp the potential inherent in data analytics. Specifically, to enable this cultural change, the company implemented workshops and guidelines to accompany employees along this path. A key piece was to emphasize the importance of data sharing, with a view to enhancing data as decision-making tools that can increase human capabilities. By working on people's perceptions of data, AUDI AG ensured that it was seen as a strategic tool capable of increasing competitive advantage. Moreover, by making different organized instances dialogue, it ensured that failure was encouraged as it was conceived as a means of gaining new learning and enabling employees to innovate. Thus in the AUDI AG case, it shows how DT changed the culture through these deep and highly impactful dynamics.

In the UBER case [26], it appears clear how since the company was born already digital, the cultural change did not affect it so much as the environment in which it was embedded. By proposing a digital service platform-based service, UBER generated cultural dynamics that changed the rules and cognitions of the cities in which it inserted itself. Using camouflage strategies, UBER has silently impacted the collective imagination acting as something already existing [31; 34] and then unleashed its innovative potential. Its presence has caused people and institutions to change culturally to conceive of a totally new way of understanding transportation. A new model that horizontalizes relationships and liberates licenses, in ways that are sometimes not quite legal.

### 3.3 DT impact on strategy and structure

The strategy and structure of an organization, interpreting it as an organism [3], can be made to match, respectively, to the mind and body of a living being. Therefore, these two organizational aspects are not only closely related but also mutually modify each other in a bond of mutual interdependence [74]. Adaptation of strategy and structure, as with the other elements of the deep structure, are key variables to be considered in implementing a successful digital transformation process.

In DBS [64] for strategy and organizational structure to work harmoniously and interrelatedly within the DT process, changes were carried out taking into account the degree of influence these aspects exerted on each other. Indeed, within organizations, especially within a bank, the implementation of a digital strategy must necessarily be inextricably linked to a business strategy [10]. Not only that, the DBS case demonstrates how building such an arrangement cannot be viewed as a one-shot initiative, but must impact the entire organization at the level of structure, technology and people-related elements. In DBS, the implementation of a digital business strategy required merging departments, analyzing the management styles of top management, as well as hiring talent from outside the organization. This came about because DT imposes cross-functional change that requires simultaneous development and reconfiguration not only of digital functions but of multiple organizational processes. Indeed, it is not simply a matter of implementing digital tools but of rethinking the entire organization. DBS has pursued this by cultivating digital leadership (achieved through a visionary CEO), the development of agile and digital working models (implemented through the merger of certain functions such as technology and operations), creating new customer experiences (by creating an ad hoc unit to deal only with this aspect), and finally by stimulating the acceleration of digital innovations (through the creation of a new innovation council and the creation of a new office).

In LEGO [23], DT was generated by rapidly growing digitization and the changing needs of customers and various lines of business. This process was facilitated in this case due to LEGO's organizational structure, which being already understood as a "wheel" was able to change rapidly by reducing silo dynamics and improving knowledge and idea sharing processes through group plenaries. Moreover, to ensure speed of response LEGO acted on the structure in order to increase its visibility and transparency so as to increase the influencing effect of the commitment put in place by top management to achieve the goal. The DT thus generated a dynamic in LEGO that led to changing the organizational structure in harmony with the digital assets in order to improve the core business and create a corporate business strategy that would realize itself through digitization. To do so, the organization had to adopt a digital mindset that expanded its organizational boundaries to benefit from the support and creativity brought by partners and customers themselves.

At Audi AG [20], DT required the implementation of new roles and an organizational reorganization, particularly with the aim of aligning the structure with the dynamics imposed by digital services and the formulation of a digital business strategy. Indeed, AUDI AG's structure was initially verticalized and did not include the involvement of IT within production dynamics. However, through DT this aspect had to change

radically. Through a three-stage change model (Advancing, Enabling, Leveraging) the organization was restructured by completely reviewing both the structure and hierarchical dynamics that prevented cross-functional collaboration. In particular, to align strategy and structure, in a new Big Data-driven arrangement, they had to free employees from the constraints imposed by existing structures, roles, and processes. This process of change generated cross-functional generative dynamics that led the company to transform digitally with a more horizontalized structure and a data-driven decision making system.

In contrast, the case of UBER [26] shows how by moving with the advantages of the pioneer it reshaped the transportation service market, profoundly changing its logic, and how it forced institutional structures to change to conceive and include the digital service it was disruptively injecting into the environment. In the case of both San Francisco (a city with more restrictive regulators) and New York City (known instead for a more accommodating structure), however, regulators had to restructure themselves to deal with the variables introduced by UBER. UBER's strategy, characterized by a willingness to subvert the rules up to the limit allowed by law, required institutions to take an informed approach that could pragmatically consider both historical and emerging contingencies [5; 27].

### **3.4 DT impact on power distribution and systems of control**

Just as structure and strategy are interrelated and connected by causal links, the same are control systems and power distribution [28], so again they will be considered together.

In DBS [64] to mobilize the change generated by DT one of the most important steps was to horizontalize the hierarchy by systematically cascading the entire organization and not just senior executives. Collaborative technologies generated peer control dynamics based on mutual coordination and feedback, as well as generalized information distribution dynamics, and thus also power. This has made it possible to speed up the organization while avoiding the risk of incurring siloed dynamics that are detrimental, especially within DT-related changes.

In LEGO [23], where restrictive control logics were initially implemented, these logics had to be overcome for DT to occur successfully. In particular, individuals were encouraged to take responsibility and attempt from a perspective of learning from error and experience. To achieve this, hierarchies were flattened through constant encouragement of delegation and coordination. Control systems were made more loose so as to encourage a rotation of personnel within various units and roles, so as to create generative dynamics of blending and mutual influence. In addition, a collaborative posture was strongly promoted, which in the most extreme cases led some units to give up their best staff in favor of functions that needed support at that particular time. Finally, through these dynamics, policies were promoted that balanced freedom and control while ensuring employee well-being and performance.

In AUDI AG [20], the implementation of Big Data Analytics helped create an interesting observatory for understanding the dynamics regarding systems of control and power distribution. In particular, from this case it can be seen that one should not run

the risk of investing IT with excessive power, since in most cases it turns out to be the protagonist and promoter of DT processes, as this dynamic could generate resistance from the rest of the organization. An IT function invested with too much power could generate dynamics of fear of loss of power and especially delegitimization, which would inevitably go to affect the success of the process. Therefore, management, through trust, coordination, and collaboration must carefully attend to the imbalances generated within the control-power continuum in order to implement a socially recognized and, above all, balanced solution.

The UBER case [26] demonstrates how a digital organization can play the role of a disruptive variable within the context in which it is embedded. UBER by entering radically and disruptively within the marketplace broke pre-established regulations wherever it emerged, to the point that some scholars agree that if not for its speed, the company would have been brought down. Indeed, the distribution of power and control systems in a city, which are usually vertical and rigidly hierarchical, turn out to be ill-suited to react to the speed of thought and execution deployed by these players. In UBER, the processes of control and power distribution are highly delocalized and substantially reversed from a traditional setup (in fact, it is the local teams that determine how and when to launch into new cities). This speed allows them to creep into the environment while dodging the slow countermeasures that institutions can and do deploy.

#### **4 Unlearning deep structure: an approach to Digital Transformation**

In a romantic view of Newton's third law, we might say that the only way humans have found to move forward is to leave something behind. In organizations, such a view is in line with that of unlearning [35; 58; 80; 9]. Organizational unlearning describes the mechanism of abandoning old beliefs and routines in favor of new learning. This approach is necessary because psychological commitment to past decisions [68; 69] along with commitment escalation [46] as well as the gambler's fallacy [19] often anchor organizations to their past preventing them from evolving, especially in rapidly changing environments such as those generated by DT. DT changes generate a completely new and unprecedented scenario, potentially bearer of black swans [72]. Therefore, in this scenario, the tendency to make decisions based on past situations [22] could add further complexity. Old routines, knowledge and beliefs if guarantee the existence of the organization risk to become misleading coping with a fast changing scenario. These elements intertwine to the deep structure of organization through self-reinforcing sequences [60] generated by feedback loops [71] creating path dependency mechanisms. In the view of unlearning applied to organizational change, path dependencies mechanisms must be challenged as they inhibit an organization's innovative capabilities. The size of the challenge is made possible by the particular nature of path dependencies mechanisms. Indeed, they are not visible a priori, but are gradually revealed along the way. Therefore, thanks to this gradualness inherent in the process they can be questioned and modified [71].

Since a misalignment between an organization's deep structure and its environment generates changes of a radical order [86] it is necessary for the organization to count tools in its arsenal that enable it to deal with such scenarios. The risks related to path dependencies during radical changes amplify their scope as they keep the organization tied to a past that is dated and misleading [50; 76] through negative transfer processes that inhibit innovative and divergent thinking while slowing down learning processes. Negative transfer occurs when previous learning inhibits learning in new contexts [4]. Therefore, to be overcome, we believe that these mechanisms must be challenged. Since old learnings cannot be completely forgotten, or intentionally discarded [12], through the dimension of challenge they can be recognized and overcome. One of the defining aspects of unlearning is the intentionality inherent in the process, so if originally this phenomenon indicated abandonment processes, which turn out to be cognitively implausible [38] because humans do not possess the counterpart of the delete key possessed by computers [84], the challenge dimension could provide the intentionality sought. Challenge action in fact allows the actors involved to negotiate meanings and new learning related to change through a process of participatory [52; 73] co-construction [47] that makes change more effective. The challenge dimension, combined with the processes of co-construction, would help the organization not only to unlearn but also to consciously use its knowledge and learning skills competitively and strategically [16]. At this point many researchers would argue that it is therefore not necessary to distinguish between learning and unlearning, because the moment something new is learned unconsciously the old is unlearned. However, this lack of recognition is referred to as the "clean state fallacy" [57]. In fact, the processes of unlearning and learning, although they often occur simultaneously, they must be considered separately. In fact, the process of unlearning must be viewed from the perspective of facilitator of new learning, change and innovation [7]. Both in the organizational setting and at the individual level in fact, old learning is not erased, but is retained for use in situations that do not require a change of perspective [44]. In fact, in order to grow and develop, especially within digital transformations, it is not enough to replace and replace one behavior or skill with another, but rather a change of frame or mindset is required [44]. By challenging previous constructs this becomes possible through the reflection that ensues. Acknowledging old habits and knowledge that are no longer optimal is critical to having them disappeared and abandoned [58; 32].

From the analysis of the cases it would appear that during DT phenomena the old arrangements hinder new learning thus hindering successful implementation. Unlearning is a process that shows people that they should no longer rely on current beliefs and methods [66]. For since present beliefs and methods change perceptions, they prevent people and managers from interpreting even obvious facts. Despite this, present beliefs and methods are preferred because they seem to lead to reasonable results [48]. One of the basic requirements of unlearning is doubt. The changes triggered by DT, in addition to requiring the acquisition of new knowledge, also require that old constructs be questioned. Therefore, this situation generates not only a need for unlearning but also the conditions for initiating such a process. Thus, if DT processes go to affect elements of the deep structure of an organization through recursive reinforcement processes, organizational unlearning could be an effective strategy to implement to address changes of

this kind. This perspective is particularly fitting since it can refer to the organization at the three levels of which it is composed: people, groups and organization. Path dependencies subjected to unlearning processes, after being challenged and reflected upon may in fact turn out to be the very elements on which to base an organization's future success and strategies.

## **5 Discussion and contributions**

The cases analyzed provide great support for the view that DT generates radical changes capable of dynamically restructuring the organization at different levels and dimensions. Given the rapidity that pervades markets and environments, the ballasts that keep the organization anchored to the status quo must be challenged as they risk creating misleading and harmful anchors [71]. Taking the perspective of punctuated equilibrium change [30] together with the cumulative one [13] we believe that DT is a strong representation of a moment characterized by revolutionary and highly impactful changes. In our perspective this generates repercussions that require changing the deep structure of the organizations [28]. Thus, the cases analyzed within the article seem to confirm how DT can be defined as a change of radical order that impacts the deep structure of organizations. Impact of which, as with the butterfly effect, it is often difficult to define the origin. Although, from a managerial perspective, tracing the origin of change is crucial to generate social negotiation dynamics that lead to the construction of reflexively and collectively recognized meanings [73]. In this way management could address path dependencies before the lock-in phase since they are unfolding enactments. Cultivating unlearning practices that trains management and employees to question and challenge the current scenario could be an effective strategy to deploy. This, along with the other dynamics described contributes to further tracing the features of this complex framework. Another element to take into account is that DT changes often occur during periods of strong divergence, where there is an increasing misalignment between the organization and the demands fielded by the environment [86]. While this was true for the cases examined, which tended to occur between 2010 and 2020, it is interesting to note how this statement is charged with a deeper meaning when situated in the modern post-pandemic scenario that is experiencing the warnings of the consequences that the recent geopolitical upheavals underway will bring. Both in the cases analyzed and in the current context, companies must necessarily transform themselves. Individuating in the deep structure the elements that need to be challenged constitute a strong support to define a clear agenda to lead and feed the change. Indeed, DT combined with environmental contingencies not only requires organizations to change their deep structure, it embodies the paradox of being both the threat and the opportunity within the future. The four cases analyzed show how overcoming these elements organizations could implement a DT change of success reacting to digital disruptions. In the table below, divided in the element of the deep structure, we summarize the actions implemented in each case analyzed to overcome these challenges.

**Table 1.** Summary of the impacts generated by DT to the deep structure in relation to the DBS, LEGO, AUDI AG and UBER cases.

	<i>DBS</i>	<i>LEGO</i>	<i>AUDI AG</i>	<i>UBER</i> (external impact)
<b><i>Organizational culture</i></b>	Valuing the views of internal and external stakeholders. Encouragement of dialogue and information sharing Co-participation in the change process Focus on customer experience Data-driven decision making	Implementing digital leadership Coaching to become digitally dynamic Creating an open approach to risk, experimentation and learning Involving customers in the ideation process Adaptive and anti-fragile orientation	Decision making based on Big Data Analytics Selection processes based on data usage orientation Promotion of information sharing Encouragement of experimentation and learning through failure	New way of understanding individual transportation service Rendering existing regulations obsolete Relationships between individuals that do not require the presence of the institution as a regulatory body
<b><i>Strategy and structure</i></b>	Merging digital strategy and business strategy Merging departments Analysis of management styles Introducing agile structure and work models	Strengthening of a circular and flat structure Implementation of transparent and visible intra organizational models Full involvement of top management at all levels Implementation of a corporate digital business strategy	Revision of organizational structure from vertical to horizontal Involvement of IT at all organizational levels Strategy based on evidence provided by Big Data Analytics and close collaboration among collaborators	Restructuring of regulatory bodies Imposed analysis of the area's environmental and historical contingencies Changing the logic and rules behind the transportation service
<b><i>Power distribution and systems of control</i></b>	Horizontal hierarchy Encouragement of coordination and mutual feedback Distribution of information Dismantling of organizational silos	Encouragement of responsibility and error Loose control systems to encourage generative employee turnover Analyzing and balancing the freedom-control continuum	Analysis of the power given to the IT function Management based on trust, coordination and collaboration Presiding over the balance of power exercised	Demonstration of the inadequate responsiveness of current institutional hierarchies in place Palpation of the slowness of highly verticalized institutional control systems

Since the organizational elements of the deep structure are firmly entrenched through reiterated reinforcement mechanisms [71] they keep the organization anchored in the past through path dependency mechanisms. Believing that overcoming this past is the gateway through which the success not only of organizational change but also of effective digital transformation passes we believe that organizations need to deploy unlearning dynamics [35; 58; 80; 9] so as to overcome that past and creatively address the future. Organizational unlearning, as an emerging need, would seem to be an effective perspective to apply to phenomena concerning DT. By stimulating organizations to reflexively question their past, the ability to unlearn, given the uncertainty that permeates the environment, turns out to be an increasingly fundamental skill for organizations. Around the phenomenon of unlearning, however, opinions and views that are universally recognized by the scientific community are lacking to date. The inherent difficulty in empirically demonstrating unlearning processes certainly adds complexity to the overall picture. Organizational unlearning being related to changes generated by misalignment between organization and environment could be a highly generative approach to DT. Realizing the limitations inherent in this study, as it is based on an on-desk analysis, we nevertheless believe that research in this direction should be conducted to provide interesting and useful insights to both the academic and management communities.

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