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Leadership in the Digital Realm: What Are the Main Challenges?

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Abstract

The current book chapter examines how digital leaders cultivate opportunities and address risks in a fast-moving, digital market environment. The focal point is to understand if digital leaders are able to keep control over all mechanisms triggered by the turbulent business environment. The chapter's challenge is to verify how digital leadership works in the specific context of aerospace industry through the case of the Boeing Company.

Keywords: digital leadership, dynamic capabilities, ambidexterity, aerospace industry, Boeing

1. Introduction

As always more companies strive to develop new digital capabilities, digital leaders are making significant changes to their organisational culture and strategy-making process. These shifts cause the emergence of important questions about what means to lead a digital business. Digital leaders should articulate a vision people can share and also create the conditions that facilitate digital maturity.

Given these premises, this chapter deepens the theme of digital leadership by stressing the fact that building collaboration and consensus, identifying strengths of individuals and providing meaning and purpose, together with enticing visions, is necessary for organisational effectiveness in the digital realm.

The focal point is to understand if digital leaders are able to keep control over all mechanisms triggered by the turbulent business environment. More precisely, as the digital environment makes organisational practices more visible to potential masses through employee engagement, a growing interest in relational aspects of organisational life and stakeholders' expectations for increased organisational transparency.

The chapter is organised as follows. First, it starts with a literature review on the topic to after propose a theoretical framework. The chapter proceeds with the case study of the Boeing Company. Finally, the conclusions highlight the main theoretical and managerial implications.

2. Theoretical framework

In order to explore the topic of digital leadership, in the current chapter, we first clarify the meaning of digital leadership and then carry out literature review on

ambidexterity and dynamic capabilities. Subsequently, we propose a theoretical framework that integrates digital leadership with the two above-mentioned streams of research.

2.1 Digital leadership

The issue of leadership has been studied under numerous perspectives and in different contexts [1].

The actual challenge in the theoretical context is characterized by the realised transaction between the static world and the digital world. This latter requires specific competences and capabilities able to enhance organisational relationships in the referring ecosystem [2]. In other words, theorising on leadership has been transforming from a modern, static leadership theory emphasising the leader-person (e.g., traits) to increased acknowledgement of the discursive resources and the organisational relationships involved in leadership practices [3].

Moreover, digital leadership refers not only to the fact to run businesses in the era of artificial intelligence but also consists in owning the right digital skills to spur the technological changes and innovation.

Digital leadership is based on specific factors [1], p. 121, such as ‘organisational agility, engagement of skilled staff, leadership, support from technology partners, investment, culture, alignment of new digital technologies with existing IT, and learning from failed projects’. The main challenge is, indeed, to contextually manage and balance all these factors.

This kind of leadership also requires leadership pivotal capabilities in developing both internal and external collaboration in order to co-produce ideas and strategies for digital changes.

Digital leadership can be also considered a strategic factor that influences the well-being of internal human resources [4].

Following the thought of Zeike et al. [4], we share the holistic vision of digital leadership as an overlap between digital literacy (i.e., computer literacy, ICT literacy, digital competence and digital readiness) and digital leadership itself (i.e., digital leadership skills/capabilities/abilities).

Table 1 encloses definitions on the topic that share the same vision conceiving digital leadership as the ability to drive digital process as well as to create the roots for digital transformation.

Author/s	Year	Definition
El Sawy	2016	Doing the right things for the strategic success of digitalization for the enterprise and its business ecosystem
Larjovuori et al.	2016	The leaders’ ability to create a clear and meaningful vision for the digitalization process and the capability to execute strategies to actualize it
Kai-Uwe Brock and von Wangenheim	2019	Leadership provides the transformational energy for firms to be DIGITAL and, as a consequence, successful with artificial intelligence
Zeike et al.	2019	Digitally successful companies have built strong leadership capabilities to envision and drive transformation. In this context, leadership capabilities are the ways in which managers are driving change

Table 1.
Definition of digital leadership.

In this light, two important areas are highlighted in order to succeed with a digital transformation: leadership capabilities and the operationalization and implementation of digitalization (see **Figure 1**).

As for the leadership capabilities, Westerman et al. [6] refer to the ability to create a transformative digital vision, energise employees by engagement, focus on the digital governance and build technological leadership.

In particular, five factors are crucial to understand how digital leaders can positively impact on the firm's success:

1. Devolved decision making: It means that decisions are made at the appropriate level closest to the customer; in this sense, leaders have to share power and support others to make the right decisions.
2. Collaborative achievement: It refers to work together as a team to achieve shared outcomes; leaders should enable teams to operate effectively and to work well along the whole process.
3. Agility: It is related to always improve and adapt to changing circumstances in line with purpose and direction.
4. Purpose and direction: This is strictly linked to the importance of storytelling and the use of narratives in leadership work.
5. Authenticity: It is to build trust and establish a corporate reputation; in this view, leaders act with integrity and balance to build trusting relationships.

Consistent with the research carried out by Brynjolfsson and McAfee [8], the digitalization is characterised by three different drivers: (1) Exponential growth of digital technologies; (2) economies of digitization; and (3) compatibility of different technologies.

The pivotal technological aspects are the connection of people and things via Internet and cloud technology. An important role is played by social media platforms, which are establishing huge personnel networks; the same approach could be used with companies (social collaboration platforms). At the same time, the 'Internet of things' is setting up networks of machines, wearables, products, etc. Based on these networks, a very huge amount of data is produced. This big data can be used (in real time) for data analytics and business predictions. In order to do that, artificial intelligence is becoming more and more important. The industry 4.0 concept is at the centre of these technological aspects. In the Industry 4.0 era, manufacturing systems are able to create the so-called 'cyber twin' [9] of the physical world and make smart decisions through real-time communication and cooperation [10]. Industry 4.0 combines embedded production system technologies with intelligent production processes to pave the way for a new technological age that will transform business models. The technological developments impact on the competitive environment (new business models, new competitors, new products and services, etc.) based on new technological possibilities.

As mentioned by Petry [7], the digital world can be conceived as a VUCA environment. It is an acronym that stands for volatility (frequent changes), uncertainty (lack of predictability), complexity (interdependence of different elements) and, at least, ambiguity (cause-and-effect confusion).

All managers need to adopt their leadership style to the VUCA environment of the digital age. Nevertheless, it is important to stress out that all individuals are

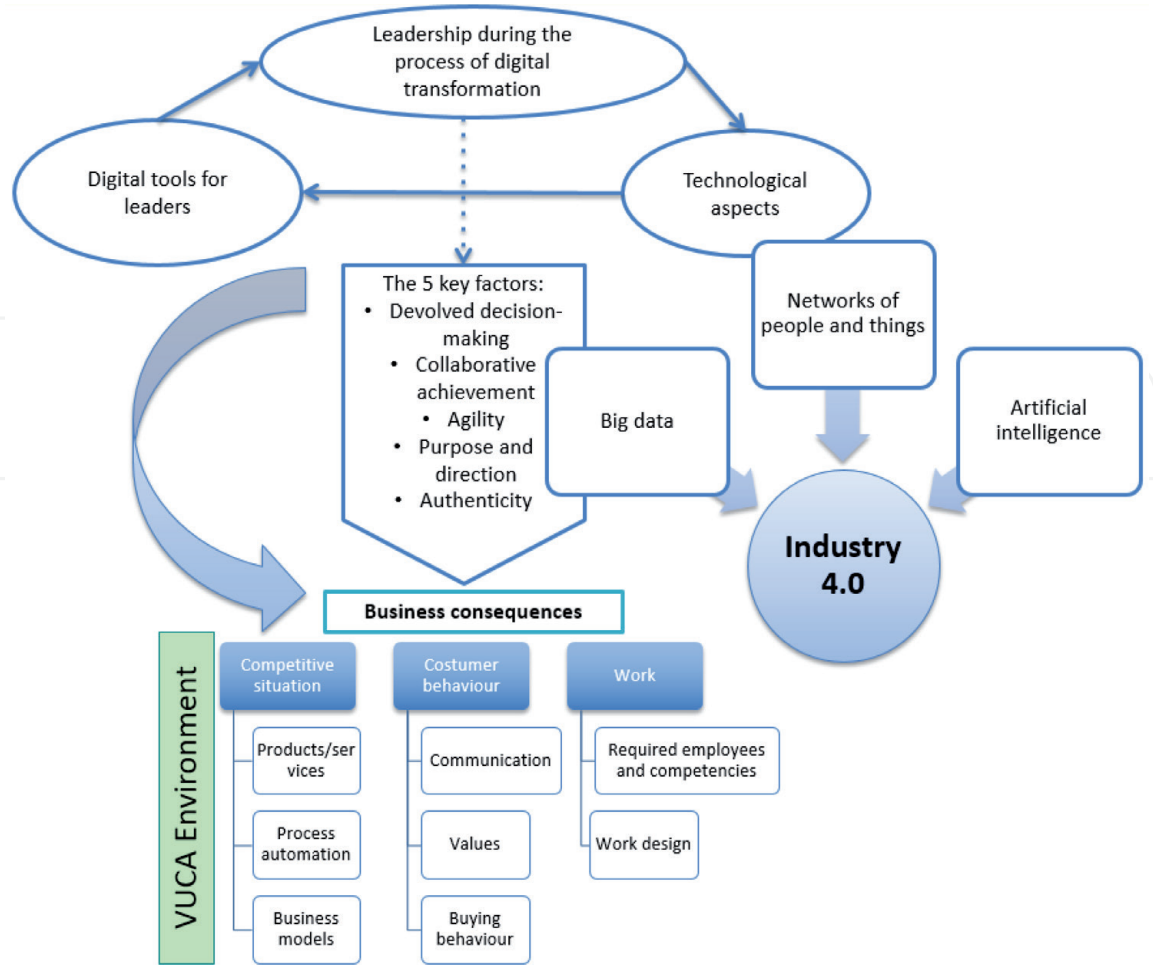


Figure 1. Leadership capabilities and digitalization: Key factors and business consequences. Source: Our elaboration from ref. [7].

overstrained in a VUCA environment. So, since it is impudent to centrally control, digital leaders need to use the collective intelligence in the company (participative leadership [11, 12]). Moreover, leaders in the digital economy need to lead openly, give and receive feedback and be open for criticism. In this sense, digital leadership is an ‘open leadership’; more specifically, a successful leader typically requires some kind of ambidexterity.

2.2 Ambidexterity

Bunch of literature has up to now defined ambidexterity, both from a strategic and an organisational point of view [13, 14]. There is still a missing issue, however, which concerns the main sources of ambidexterity in an organisation and the relative relationships between these individual sources and the organisation as a whole. The key point is therefore to apply the concept within organisations, in order to see the roots and the overall set of relationships connected with ambidexterity that can have a positive impact on firm performance.

This chapter studies, in particular, strategic human resources in ambidexterity, with specific reference to the top management.

The ambidextrous enterprise can be analysed in light of the management and decision-makers capability of research, creation and appropriation of value. In literature, the ambidextrous enterprise has been frequently related to the managerial skills to counselling/direction [15, 16], organisational skills [16] and cognitive processes [18]. In particular, we refer to top management skills.

Mom et al. [17] identify the characteristics of the ‘ambidextrous managers’ emphasising the distinctive traits. In fact, ambidextrous managers:

1. are contradictory [14, 18];
2. are multi-tasking [15, 19];
3. rapidly update their knowledge, skills and competence [19];
4. have high experiences in manage radical and unexpected changes; and
5. have specific diversity management skills.

Regarding the first trait, the ambidextrous manager is able to engage in apparently conflicting opportunities, goals and needs [17]. These contradictions mainly come out with strategic and organisational dilemmas. Accordingly, the ambidextrous manager has to balance the incongruities because recognising and accepting the contradictions can be the key of the business success [18], p. 527. In such a process, according to resource-based theory [20–22], mainly focused on the analysis of strategic resources and competences, able to create sustainable competitive advantage, dynamic capabilities are a key concept [23]. They in fact represent the organisational processes through which strategic resources are used in order to face and/or create changes in the market [24], p. 1105. They mainly refer to decision makers, at different levels.

The second trait refers to the multi-tasking nature of the ambidextrous manager. Some scholars [15] define in a broader meaning contexts and actions of managers and employees that show ambidextrous skills. Moreover, the analysis of the ambidextrous manager is closely related to his explicit and tacit knowledge exploration and exploitation [25, 26]. This aspect is also related to the capabilities of these leaders to manage diversities through a shared vision [27], emphasising the ‘unity-in-diversity’ of Dass and Parker [28]. Finally, the high experience in managing radical and unexpected changes is a distinctive trait of the ambidextrous manager, but it is the fundamental element of the ambidexterity. In fact, ambidextrous managers can be managed by both incremental and radical/revolutionary changes [14]. The relation between ambidexterity traits of project manager and the performances of the project team imply the definition of specific assessment techniques of the project success in terms of improvement of the organisational routines and of achievement of prompt results related to the project itself [13].

Blomquist and Muller [29] show that ambidextrous leaders’ behaviours are contingent to the different project typologies, thereby underlining how the reactivity of the uncertainty management of project team activities is crucial. The different structures of the project manager ambidexterity are related to the adoption of informal social integration mechanism and of horizontal integration mechanisms linking all the organisational units involved in the project. This research result is a very relevant finding, thereby highlighting the importance of balancing both formal and informal elements in order to achieve ambidexterity in the project team management. Findings of this research have been validated in the study of [30].

2.3 Dynamic capabilities

The definition of dynamic capabilities (DCs) that seems to be the most appropriate for the subject of this paper gets inspiration from that of Zahra et al. [31] as

the capabilities and competences to create and/or reconfigure firm's resources and 'in the manner envisioned and deemed appropriate by its principle decision maker'.

According to this view, in the paper, top managers' dynamic capabilities are conceived as capabilities of managing strategic resources dynamically and, more specifically, refer to:

1. the capacity to create, modify, significantly extend or replace its business model/s [32];
2. the capability of singling out 'bottlenecks and choke points' in the value chain, in order to capture value from innovation [32], p. 28;
3. the capabilities of encouraging change through specific organisational structures (incentives, career policies, etc.) and developing specific routines for a continuous shedding of radicated assets; and
4. the capabilities of developing diverse organisational capabilities [33–36];

In front of the previous literature on this topic, such dynamic capabilities refer to Collis [37]'s second, third and fourth level of capabilities, based on the creation, modification and/or extension of resource-based, as well as on 'the capability to develop the capability to develop the capability that innovates faster' (p. 148). They also refer to the first level of capabilities singled out by [38]. In any case, contrary to Ambrosini and Bowman [39], dynamic capabilities are not processes that impact on resources and on their use, just because they are dynamic: they are resources able to generate successful changes, alterations and extensions of resource based and can be subject to some changes.

However, dynamic capabilities are not sources of competitive advantage per se. In order to create value and generate competitive advantage, strategic resources have to be valuable, rare, costly or difficult to imitate and organizationally used; in the long run, however, their value may decrease and become obsolescent: it is therefore important to analyse firm's leaders' strategic capabilities of managing them properly dynamically. From this point of view, it is interesting to analyse the top managers' dynamic capabilities as well as his/her capacity of creating and sustaining them.

Considering human resource specific skills and capabilities, both in terms of initial and personal resource endowment and of capabilities in resource combination and recombination, it is important to verify: (1) if these resources and capabilities, on the other hand, are inserted in a complex set of relations and organisational procedures so to create value for the firm and (2) if the talented leader transfers knowledge and competences that are different from his/her own but are important to better manage the firm and motivate its personnel.

Top managers' dynamic capabilities are the result of their personal resource endowment and of their capability of using and bundling strategic resources dynamically, creating new organisational capabilities and favouring change through specific organisational devices.

As regards the top managers' level, some scholars ascribe the micro-level origins of value creation to the managerial ability as it plays a strategic role in identifying opportunities and reconfiguring firm's resources [40], in using DC [39, 41] and developing them [42].

Furthermore, Rindova and Kotha [43] highlight that the antecedents reside in the top management team as it is considered a key factor in the process of DC development, supported by its organisational vision.

If we consider the sensing and seizing dimensions [44] richly analysed in the DC literature, it is needful to remind some studies [31, 45, 46] as they underline the importance of manager’s ability, skills, experience and motivation level in the process of DC creation.

Besides, other works [47] specify that the CEO experience (i.e., age and CEO international experience) can be considered as an important attribute able to generate the DC.

The point is that the more these capabilities are characterised by difficult to imitate processes, especially those characterised by unique historical conditions and/or causal ambiguity, the more they could be firm specific. Others, like social complexity, depend on what they mainly refer to: if they regard the top managers’ personal relations, they can be more human specific rather than firm specific; if on the contrary, they are mainly based on a complex set of relations within the organisation and between the organisation and its stakeholders then they can be more firm specific and not so much ‘marketable’. Besides, in this case, the top manager himself may be less explicitly aware of his personal distinctive features.

Furthermore, in order to better distinguish the nature of some of the main DC of top managers, resource-based approach is applied. More specifically, in this study, strategic dynamic capabilities are considered as those that result valuable, rare, inimitable and organizationally used. Besides, with reference to the possible causes of inimitability, path dependence and causal ambiguity are considered on the one side and social complexity on the other side as different sources of inimitability. This distinction reveals to be useful in connecting top manager’s DC with value creation and appropriation: some of these strategic DC, in fact, seem to be more easily embedded in the organisation, while other (especially the more socially complex) can more often and easily (even if not always) remain strictly bound to the individual.

Of course, the concept of digital leadership requires capabilities that authors synthetize in ‘leadership capabilities to envision and drive transformation’ [1] and capability to execute strategies to actualize it [5]. It is exactly not a thorough explanation on necessary digital leadership skills/capabilities/abilities that push towards

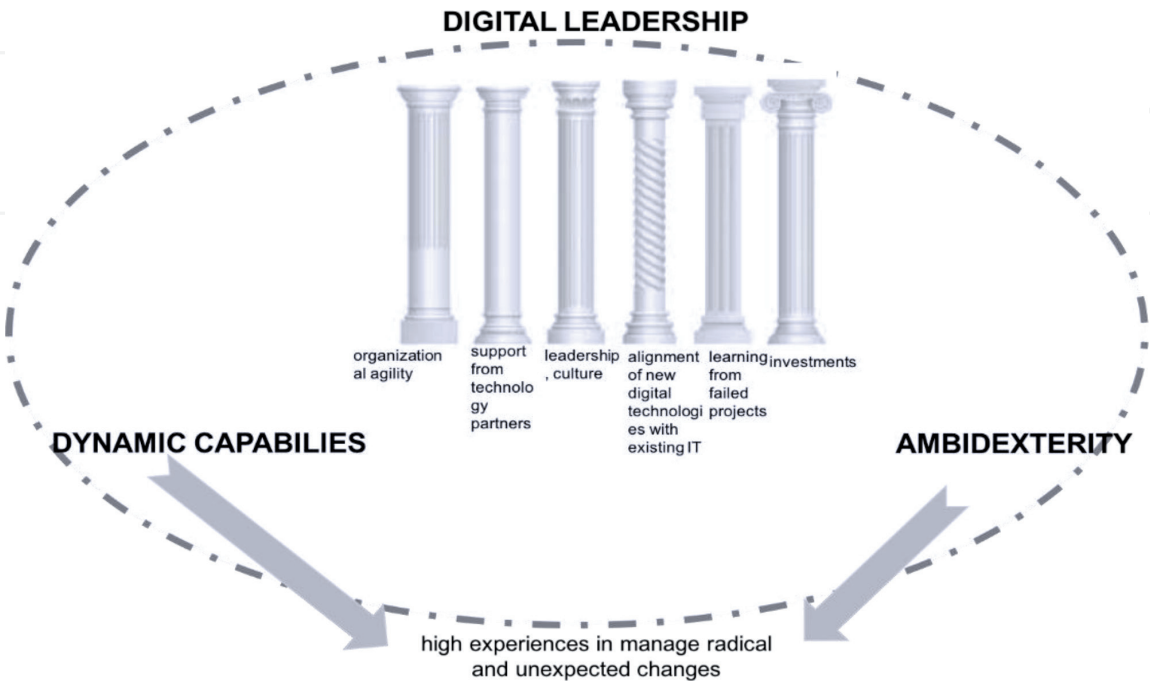


Figure 2.
Theoretical framework. Source: Our elaboration.

the integration of solid bases in strategic stream of research such as ambidexterity and dynamic capabilities. The choices on these two precise streams are due to the fact that these explain and support the cases of radical and unexpected changes either to manage or favour their creation (**Figure 2**).

3. The case of Boeing

As regards the case study, the reasons for the choice of Boeing feed their roots in some key factors:

- it is considered a pioneer in many aspects of the aerospace industry;
- it is more than 100 years old and this aspect is useful in order to understand how the company balances the past with the digital transformation;
- the aerospace industry is becoming more proactive, agile and lean since new technologies, outsourcing models and service providers have sprung out helping aerospace firms in adopting more agile enterprise culture. The case of Boeing shows how digital transformation helps in being more agile. This is one of the key factors a digital leader should possess (see also **Figure 1**);
- many scholars agree on the fact that with regard to digital leadership, Boeing offers a clear example also for companies operating in other industries [48–50].

Boeing is an aerospace company, the world's largest in terms of employees (150,000), customers in more than 150 countries, annual revenue (US\$101,1—fiscal year 2018), showing an increase in year growth of 8%, delivering 806 aircrafts in 2018 [51].

The core business of the company is shaped by commercial jetliners, defence, space and security systems and service provider of support for client companies.

Bill Boeing created the company in 1916 with the clear philosophy 'build something better'. This philosophy is always actual since the company pursues innovation and changes through the continuous challenges of the aerospace industry.

Digital leadership claims the necessity of the engagement with the staff. The Executive Director in the Office of Innovation, Niky Allen, explains how the engagement is at the base of the leadership style of Boeing. Through a starting question 'how do we go from being order-takers to leading the digital conversation?', Niky Allen goads the team to work according to a bottom-up approach. This kind of engagement is based on a call through question 'why do we do things this way?' [52]. This allows to give the power to employees and to transmit the feeling of co-creation.

The company also works with external engagement. Indeed, not only the human resources are included but also external partnership. Niky Allen also explains that their competitive advantage comes from strategic alliances. Their initial question is 'How do we leverage external partnerships to bring best of breed solutions from the outside in?' [52].

The case of Boeing is interesting for the meaning of organisational agility. Traditionally, this is connected 'with the ability to rapidly adapt to market and environmental changes in a productive and cost-efficient manner' [53], p. 6, while the company shows the capacity to provoke changes being proactive rather than to adapt the market and the environmental changes. Indeed, the company focuses on the attention of leveraging its aircraft design, generating capabilities able to support in a real time and at competitive price their clients.

This agile organisation allows to create customer loyalty and on-time delivery of quality products and services.

Actually, this agility is obtained due to the implementation of a business model that recalls the alliances with external partners as claimed in the pillar of digital leadership 'support from technology partners'.

For example, in 2017, Boeing launched the project 'the Boeing HorizonX India Innovation Challenge 1.0' that consists in launching, through an open call, challenges for IT Indian start-ups.

Just to cite one of the winning examples, the project named 'ZestIoT' is based on the idea of creating a bridge between the airport and the airplane ecosystem using Internet of Things to optimise ground handling at airports and improve on-time performance of airplanes. Another important aspect of digital leadership is learning from failed projects. For example, the company has implemented specific mandatory workshops for its engineers on problem resolutions. Indeed, Bo Bejmuk, manager of the Boeing Space Shuttle Orbiter highlights 'I wanted additional training for our engineers so that they could better solve technical problems in a team environment. What we do every day in the shuttle program requires our best engineering effort, every day. This workshop will improve the quality of support we give to our customer', (<https://boeing.mediaroom.com>).

Digital leadership also claims the existence of alignment of new digital technologies with existing one. In this field, Boeing has established digital transformation environment (DTE) that is a digital factory including application development and runtime platform, cloud systems and hardware platforms.

All these examples are the mirror of how top managers everyday work in order to implement digital transformation inside the company.

Indeed, one of the hottest topics in this industry is the environmental sustainability that Boeing Company answers with specific strategies. For example, 787 Dreamliner uses 20% less fuel than the replaced model and the new model 777X has been projected in order to be the most fuel-efficient twin-aisle airplane.

The case of Boeing also shows how the overlapping between digital leadership and the deployment of ambidexterity and dynamic capabilities lead the company to be the world's leader.

Indeed, Boeing involves highly knowledge-based activities that are vital and have a great impact on both process-level and firm-level performance. For example, best practices and R&D represent two knowledge-based activities of the company and the actual CEO, Dennis A. Muilenburg claims 'So, we ploughed a lot of those savings back into innovation and R&D. And we spend billions of dollars every year on R&D investment here in the U.S' [54], p. 4.

The steady and growing attention on lead-time reduction leads to the creation and development of new approaches by the CEO and the top management since the lead time constitutes a critical aspect in the management of this kind of industry. The fact the Boeing is able to match challenges in order to reduce the time to introduce new aircraft (time to market) show high degree of dynamic capabilities. Hence, the fact the company invents in lead time and time to market shows that Boeing owns firm specific and personnel (top managers) dynamic capabilities. According to this view, top managers' ambidexterity [14] allows balance the present strategic choice with future forecasts in terms of products innovation since they will be delivered after a long period from their order.

The case also offers an overview on the creation of a digital transformation environment (DTE). Indeed, Boeing has ideated the DTE and the Chief Information Officer and Senior Vice President, Ted Colbert describes the effort as 'a game-changer for Boeing. The productivity improvements we have seen from DTE partnering with our businesses are beyond our expectations, and we are ready

to expand the effort'. Again, according to Nicki Allen, Vice President Boeing 2CHR Program, 'We have to create our own digital factory that we can use as an accelerant to help lead us through this transformation. Technology is literally revolutionising and changing the way that we do business. If we leverage this correctly, that's how we survive another hundred years'.

DTE is shaped by infrastructure and 4.0 technologies to build innovative services, as well as a project management office to produce innovative processes.

According to executives and top managers' vision, digital transformation is based on cultural transformation and they are investing in global talents and transforming traditional IT work-spaces to modern environment.

Indeed, digital capabilities are spread at all the organisational levels [55]:

- through sprints conducted in Boeing's digital transformation environment;
- through hackathons led and driven organically by BCA millennials.
- Boeing measures the results of digital transformation through different metrics [56]:
- value: At Boeing value is measured in net new revenue reduction in cost and avoidance of cost;
- productivity: The creation of DTE labs has allowed to reach between 100 and 300% more productivity from the software development teams working;
- time on tasks: The new digital environment has allowed to accelerate the time to market. As the top manager outlines: 'We look at time to market in two ways. One is how long did it take to get a minimum viable product (MVP) out? Typically, it used to take us many months or years to get a credible MVP out into production. With this overall methodology and the new environment including the infrastructure, we were able to get MVPs out somewhere between a few days ranging to no more than three to four months, which is amazing'.

4. Conclusions and managerial implications.

This chapter shows the complexity of the topic of digital leadership. Indeed, it uses the theoretical lens of dynamic capabilities and ambidexterity in order to enrich with solid strategic management base the theoretical framework.

The analysis has been conducted on a firm operating in aerospace industry, the Boeing Company.

The reasons for the choice of this sector as major set of analysis have to be found in the following aspects that deploy high levels of digital leadership.

Even if digital leadership is an actual burning topic [1], the history of Boeing showed the importance of leadership, the one that today we label as digital leadership. Indeed, when they claim 'since July 15, 1916, we have been making the impossible, possible', this means that digital leadership has to be constantly developed with top managers' dynamic capabilities and ambidexterity. More specifically, in this sector, knowledge absorption, knowledge creation, knowledge storage and knowledge application play a key role for their own deployment. The case of Boeing showed that best practices include mechanisms able to capture internal tacit knowledge to create new knowledge and to perform

day-to-day improvements. On the other hand, R&D is a function based on organisational learning where knowledge acquisition and sharing are essential to create new innovations.

The company is proactive, agile and lean since the implementation of new technologies, outsourcing models and the right service providers have sprung out helping Boeing in adopting more agile enterprise culture.

Taylor made firms, such as the Boeing one, that operate on the basis of their customers' specific designs, and special requirements can obtain the leadership of the market.

Managerial implications show that successful digital leaders create clear and compelling visions for the future. They focus their energies on vision, long-term goals, aligning and changing systems and developing and training others.

The main contribution of this study is the further development of the concept of digitalization connected to leadership studies. However, as digitalization is a non-reversible societal effect, changing and creating new ways of communication, further research in this area is highly suggested. The process of digitalization linked to leadership is discussed for a main reason: as individuals and businesses are fundamentally changing as Kotter [57] described in a state of transformation, the highly complex situation of leading through this digital change is therefore placed on leaders of organisations: tasked to lead in a state of constant change, into an unknown digitalized future.

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