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Digital transformation and corporate strategy

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Abstract

The term digital transformation has been widely discussed and extensively promoted both to and by companies in every industry to become overused. While generally accepted as a boon and often marketed as the only alternative to extinction for a firm, digital transformation remains a significant challenge for those assigned to implement it. We offer an alternative narrative digital transformation, which we argue is better described as going "more digital." The extent to which going more digital becomes transformative depends on the industry and the ability of a firm to change the business model and organizational skills, and corporate culture. We extend the discussion on why digital transformation is in most cases unrelated to business strategy and provide examples of when and how it may become part of a corporate strategy toolbox. A simplified model of a business as a network of processes and decisions helps illustrate why digital technologies first spread in the process domain but can become strategic and transformative when adopted to the decision domain. The latter also brings yet unquantifiable risks and uncertainties. We suggest future research to focus on the value created by going "most digital" in both process and decision domains and risks to companies and the economy.

Keywords: digital economy, digital transformation, decision-making, artificial intelligence, business model, value measurement

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Цифровая трансформация и корпоративная стратегия

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Аннотация

Термин цифровая трансформация настолько широко обсуждался и активно продвигался в последнее время консультантами и компаниями разных отраслей, что начал выхолащиваться. Признаваемый как бесспорное благо и рекламируемый как «единственный способ избежать вымирания», процесс цифровой трансформации, по-прежнему, представляет серьезный вызов для тех, кому поручается его практическая реализация. Мы предлагаем альтернативный способ описания процесса цифровой трансформации, который, на наш взгляд, точнее называть процессом создания «более цифровых» компаний (“more digital”). То, насколько повышение уровня цифровизации окажется по-настоящему трансформирующим, зависит от отрасли и способности конкретной компании изменить свою бизнес-модель, уровень организационных компетенций и корпоративную культуру. В работе обсуждаются причины, по которым процесс цифровой трансформации компании во многих случаях не имеет прямого отношения к ее стратегии, приведены примеры того, в каких случаях и как этот процесс может стать частью системы стратегического менеджмента. Упрощенная модель компании, как сетевого организма, элементами которого являются процессы и решения, иллюстрирует то, почему цифровые технологии первоначально меняют именно бизнес-процессы, но могут стать по-настоящему трансформирующими, а их роль стратегической, если будут поддерживать принятие решений. При этом мы отмечаем неизбежное появление рисков и неопределенности, которые пока не поддаются оценке. Мы предлагаем сделать фокусом дальнейших исследований стоимость, создаваемую при переходе к модели «более цифровой компании», в части процессов и алгоритмов принятия решений, а также связанных с этим рисков для компаний и экономики в целом.

Keywords: бизнес-стратегия, цифровая экономика, цифровая трансформация, принятие решений, искусственный интеллект, бизнес-модель, измерение стоимости, «более цифровые» компании

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Introduction

Digital transformation is a deceptively simple concept. Catchy as a marketing slogan and seemingly straightforward, ten years after it was first introduced, management practitioners remain not well understood. The confusion about its real meaning and how to measure the value it creates are why digital transformation does not deliver on expectations more often than not [Denisova and Lopatnikov, 2021]. Some analysts argue 2019 was the peak year for digital transformation.[1,2] A glance at the Google Ngram for "digital transformation" shows a sign of user fatigue. Yet, it may also be just a plateau before the next and maybe a more significant leg of growth.

An actively debated question remains: What is the keyword in digital transformation, i.e., is it digital or transformation? Does going more digital automatically "transforms" a business? Is digital transformation part of a strategic toolbox or a commitment to the ongoing technological upgrade of existing business processes? Is there a tipping point when cumulative changes will trigger a paradigm shift for a particular company, an industry, or maybe the economy as a whole?

The Google Ngram Viewer for "digital transformation" shows that the use of the phrase followed the tides of digitalization and computerization. From the broader adoption of the transistor and the industrial use of computers, i.e., mainframes and then mini-computers in the 1960–1970, to PC and corporate networks in the 1980s, to the Internet in the 1990–2000. The advances in computers and digital technologies in the late 20th century came along with the development of new management theories – MBO (the 1950s), sensitivity training (1960s), quality circles (1970s), total quality management (1980s), and self-managed or self-directed teams (1990s) [Lloyd and Aho, 2020; Gibson and Tesone, 2001] (Fig. 1).

Since F. Taylor and the early days of scientific management, the new technologies responded to the demand for increased productivity and operational efficiency [Lloyd and Aho, 2020]. However, there was rarely a direct connection between the ascent of innovative technologies and the emergence of new strategies.

The Internet changed the world, as we knew it. While nobody challenges the disruptive powers of the networked global economy, it is worth noting M. Porter's comment following the dot.com bubble burst in 2001: "The time has come to take a clearer view of the Internet. We need to move away from the rhetoric about "Internet industries," "e-business strategies," and a "new economy" and see the Internet for what it is: an enabling technology – a powerful set of tools that can be used, wisely or unwisely, in almost any industry and as part of almost any strategy".[3]

In late 2011 a new term, the consulting firm Capgemini in collaboration with the MIT Center for Digital Business has coined digital transformation. As defined,

[1]Sooraj Shah (2019), "Will 2019 see the end of the term "digital transformation". Is it just a buzzword?", *Information/Age*, available at: https://www.information-age.com/term-digital-transformation-buzzword-123479000/ (accessed 30.04.2022).

[2]Aran Ali (2020), "The soaring value of intangible assets in the S&P 500", *Visual Capitalist*, available at: https://www.visualcapitalist.com/the-soaring-value-of-intangible-assets-in-the-sp-500/ (accessed 30.04.2022).

[3]Porter M.R. (2001), "Strategy and the Internet", *Harvard Business Review*, available at: https://hbr.org/2001/03/strategy-and-the-internet (accessed 30.04.2022).

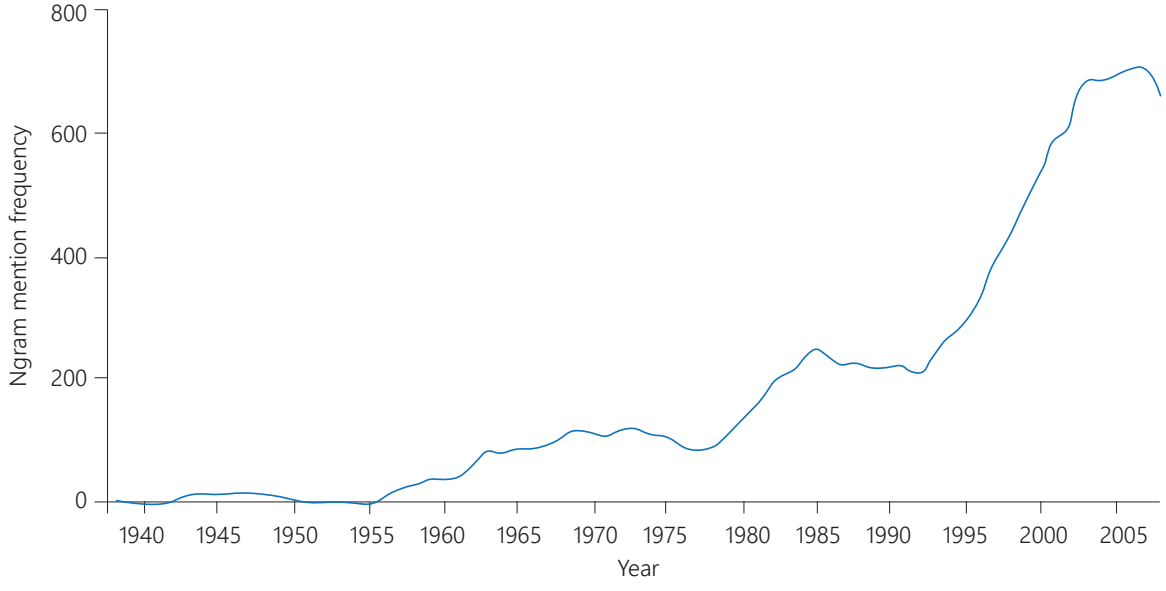

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Fig. 1. Frequency of mention of the phrase "digital transformation" according to Google Ngram

it did not have a strategic connotation "digital transformation (D.T.) – the use of technology to radically improve performance or reach of enterprises"[4] [Siebel, 2019; Araujo et al, 2020].

Management's challenges of the 2020s have changed. It is the time when more value is created by digital content than analog goods and services. Exponentially growing data is available to facilitate business decisions; most of the trading is in digital assets, more payments are made digitally online, and soon are likely to be in digital sovereign currencies. Companies are learning to thrive as owners, competitors, or contributors to platforms, the new monopolies of the Digital Age [Iansiti and Lakhani, 2020; Denisova and Lopatnikov, 2021].

So, maybe now comes the time for digital strategies? Is there a digital strategy for every industry, or is it still just a catchy slogan management consultants created to boost sales, e.g., a fad, another hype that will soon go to oblivion?

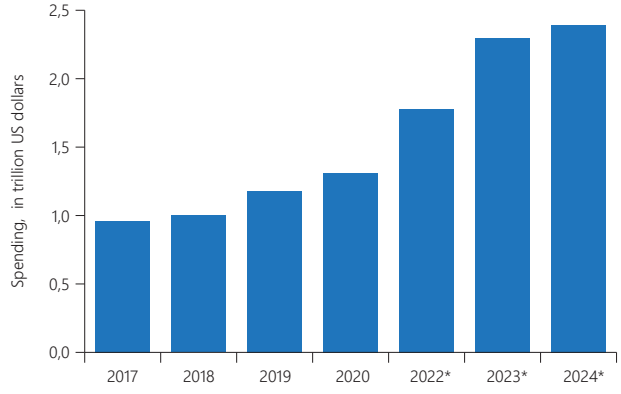
Materials and methodology

To answer the above questions, we need to revisit a definition of business strategy and what it is not. The latter is particularly relevant in the absence of a generally accepted definition. Unfortunately, the proverbial "I know it when I see it" rule does not work since the concept of a business strategy is anything but intuitive.

J. Khan and B. Greenwald noted that the word "strategic" became a replacement for "important" in many instances. In explaining the nature of strategy, they wrote, "The aim of true strategy is to master a market environment by understanding and anticipating the actions of other economic agents, especially competitors. However, this is possible only if they are limited in number. Thus, competitive advantages are actually barriers to entry. Indeed, the two are, for all intents and purposes, indistinguishable"[5] [Gupta, 2018].

A consensus view since Michael Porter's pioneering research has been that all strategy is about understanding competition and identifying the competitive advantages that create unique value for a particular set of customers.[6] In other words, a strategy is fundamentally about the choice that is outwards and market-focused.

Investments in digital technologies, including cloud, big data, digital content, and IoT, became a major expenditure category for firms and organizations all around the world. Digitalization and computerization of operations are often marketed as digital transformation, while the related plans and initiatives are called digital strategies. Global spending on digital transformation reached 1.18 trillion US dollars in 2019, an increase of 17.9 % over 2018. It further increased to 1.31 trillion US dollars in 2020, according to data published by Statista based on the estimates of International Data Corporation (IDC)[7] (Fig. 2). Between 2020 and 2024, direct investments into digital transformation are projected to reach a total of 7.8 trillion US dollars. According to Statista.com, digital transformation "refers to the adoption of digital technology to transform business processes and services from non-digital to digital." Specifically mentioned are moving data to the cloud, using technological devices and tools for communication and collaboration, and automating processes.



Source[8]

Fig. 2. Spending on digital transformation technologies and services worldwide from 2017 to 2024

Later, C. Christensen explained that innovations and technology are not strategies by themselves but the enablers for transforming firms' operations, allowing them to remain competitive in the rapidly changing marketplace. Confusing a plan for digital transformation with digital transformation as a strategy may be among the reasons why more than two-thirds of digital transformation projects did not achieve the goals.

The evolutionary pathway of technological development is evident in many industries where competition forces pave a road forward without a predefined strategy.

[4]Capgemini Consulting (2011), "Digital transformation: a roadmap for billion-dollar organizations", available at: https://www.capgemini.com/wp-content/uploads/2017/07/Digital_Transformation__A_Road-Map_for_Billion-Dollar_Organizations.pdf (accessed 30.04.2022).

[5]Greenwald B. and Kahn J. (2005), "All strategy is local", *Harvard Business Review*, available at: https://hbr.org/2005/09/all-strategy-is-local (accessed 30.04.2022).

[6] Strategy Explained, *Harvard Business School*, available at: https://hbs.me/3OnEkdK (accessed 30.04.2022).

[7] *Spending on digital transformation technologies and services worldwide from 2017 to 2025* (in trillion U.S. dollars), Statista, available at: https://www.statista.com/statistics/870924/worldwide-digital-transformation-market-size/ (accessed 30.04.2022).

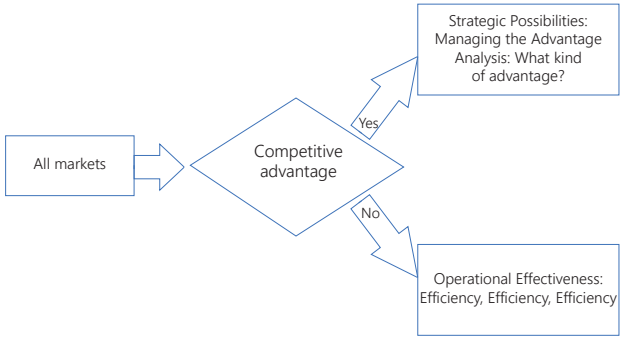
[8] *Statista, available at: https://www.statista.com/* (accessed 30.04.2022).

One example is the concept of a "more electric aircraft" (MEA) developed in the aviation industry. MEA is an aircraft where most systems or a higher percentage of systems compared to conventional aircraft are powered electrically [Porter, 1998; Seresinhe et al, 2019]. While indisputably transformative and innovative for the industry as a whole, the concept of a more electric aircraft does not fit a description of a business strategy.

A similar evolutionary transformation is a transformation in the automobile industry from combustion engines via hybrids to electric cars. The speed with which the early success of Tesla is being replicated by various industry firms is an illustration that adopting the concept of the electric car in itself is not a strategy that will create barriers and deter competition.

The net-zero GHG emission targets set by Paris Accord are to become the standard in the coming decades, impacting the mindset of regulators, investors, and consumers as well as the operations of companies in virtually every industry. While a revolutionary transformation, it will become a must-have attitude for everyone doing business in the 21st century. After all, regulatory compliance does not qualify as a strategy.

A question that follows – can digital transformation have a strategic connotation at all? The quote from Greenwald and Kahn [2005] helps understand where to look for an answer: "The reality is that there are only a few situations in which companies' strategies affect outcomes. Such situations are, however, worth trying to create since the alternative, achieving superior efficiency, is a more demanding route to success, and a more impermanent one."



Source: [Greenwald and Kahn, 2005]

Fig. 3. Operating efficiency (processes) does not create lasting competitive advantage

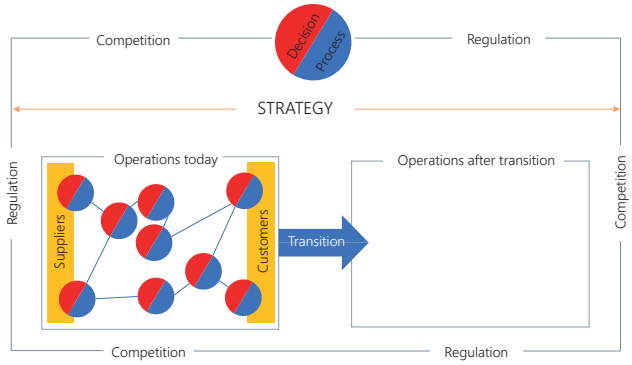
Therefore, we need to identify conditions under which digital transformation becomes a way of installing a lasting barrier to entry. In the following sections, we discuss it in more detail.

Results and discussion

In looking for a link between digital transformation and strategy, we consider a simplified model of a firm or organization as a network of two fundamental elements, i.e., processes and decisions, forming respective.

In this case, processes represent operations by which inputs or content are converted (processed) or transferred (communicated) between production or service units along the value chain or with vendors and customers. Decisions are rules or algorithms that govern how processes operate and the integration of the processes.

A division of processing units into hardware and software was used in operations analysis since the late 1940s G. Ryle's "Ghost in the machine" and the classic Von Neumann architecture that later became the hardware-software framework in modern computing. In management, the functional approach is still used in value chain analysis and business models and is a branch of strategic management [Dale, 2017].



Source: [Dale, 2017]

Fig. 4. Decision and processes in the context of strategy

Over time more and more functions, both processes and decisions, in a business were mechanized and automated in a secular transition from humans to machines and from analog to digital. Few now remember that the word computer was first used centuries ago as a job description – a professional designation of those who compute. The trend of making laborious physical work the domain of machines and robots continued with digital computers replacing human computers and, more recently artificial intelligence (AI) expanding into cognitive processes and reasoning.

Individual processes and decisions are technology-enabled, however, to a different degree. The technologies used within the process domain facilitate production operations and customer and vendor interfaces. Processes may be integrated into networked systems or even global networks, such as Internet of Things (IoT). Unless protected by patents or know-how, processes are replicable,

providing only a transient advantage. The rules or algorithms used to control processes are pre-programmed and often standardized to allow interconnection along the value chain to become an intrinsic and inseparable part of the process.

Decisions at both operational and strategic levels are expected to be rational, i.e., fundamentally normative, rules-based. However, real-life investment or management decisions are made under conditions of uncertainty. This is particularly true for strategic decisions, making it difficult to entrust them to even the most sophisticated algorithms. The fact that firms and organizations are complex systems of interacting individuals means that the efficacy of decision-making depends on corporate culture and organizational skills as much as it depends on timely and reliable information [Wilkof, 1989].

Big data was embraced as a powerful enabler for corporate decision-making. Today, managers have access to and tools for processing enormous amounts of data to track and analyze customers' behavior, search and purchase patterns. Still, access to innovative technologies is a necessary but not a sufficient condition. A whole new set of managerial competencies is required to collect, organize, and process data in a logical, timely, and cost-effective manner. Analytics is of little help unless linked to a respective element of the decision domain, i.e., preferred action option. Absent such a connection, Big Data may become too big to comprehend and will be effectively wasted [Bosch, 2016].

Automation of critical decisions is, of course, not a new idea. Both the car industry and the aircraft industry mentioned earlier have been looking to use digital technology for quite some time. In aviation, autopilot technology was successfully adopted years ago. It, however, remains under a supervision of a human pilot. The car industry is currently looking to adopt autopilot mode for cars. In addition, in this case, great hopes are for the ultimate digital technology, e.g., AI.

The existential question is yet to be answered – are we ready to entrust existential decisions to AI? After all, the autopilot of a plane is just a sophisticated calculator that allows achieving efficiencies and processing speeds impossible for a human. AI is a completely new game.

While collecting, processing, and interpreting data for a particular operation may already be challenging enough; the problems compound exponentially when the decision is related to business strategy. Investment and strategy decisions, as we know from Keynes, are not about what you should do, but what you should do, in anticipation of what other competitors will do by analyzing what you did or can do. It is a task that matches in complexity the problem of auto piloted cars.

In recent decades we saw the ascent of "born-digital" companies, such as Google, Facebook, or Apple. They produce digital content or tools for processing it, such as phones, tablets, and computers. Their distinctive feature is they are global consumer platforms. Their market capitalization is close to or more than a trillion US dollars. Their ultimate strategic goal is to enable others to create value jointly[9].

While scaling up operations born-digital companies try not to add humans. The headcount no longer reflects the success of the company[10]. They try to use software for product design, marketing, services, and financial transactions, i.e., all functions but strategy, where decisions are still human only.

Companies of the traditional economy offer commodity goods and provide services that appeared long before the digital revolution. Over time, automation and digitization significantly changed their operations, business models, and vendor and customer interfaces. However, most of them will not switch over to digital products any time soon. Billions are invested in digital transformation in anticipation of higher productivity at lower cost, but the transition to "more digital" is anything but smooth or transformative. Major international brands, including Lego, Nike, Procter & Gamble, Burberry, Ford, Hertz "invested heavily in developing digital products and infrastructure, only to run into significant performance challenges and fail to deliver the expected return on investment"[11].

A transformation of a firm, digital or otherwise, is a response to a change or expected change in the business environment. The change of regulatory environment and consumption patterns because of the net-zero GHG transition will inevitably force energy companies and other energy-intensive industries to adjust existing strategies or develop new ones[12]. The low-carbon transition and achieving net-zero targets will therefore become the

[9]Bonchek M. and Choudary S.P. (2013), "Three elements of a successful platform strategy", *Harvard Business Review,* available at: https://hbr.org/2013/01/three-elements-of-a-successful-platform (accessed 30.04.2022).

[10] Gartner (2020), 10 *management techniques from born-digital companies*, available at: https://www.gartner.com/smarterwithgartner/10-management-techniques-from-born-digital-companies (accessed 30.04.2022).

[11] Ashford W. (2020), "Risk and reward: How to succeed in digital transformation", *TechTarget*, available at: https://www.computerweekly.com/opinion/Risk-and-reward-How-to-succeed-in-digital-transformation (accessed 30.04.2022).

[12] Mckinsey and Company (2021), *As oil and gas companies respond to the current economic discontinuities, they must choose where and how to compete as the world transitions to a low-carbon future*, available at: https://www.mckinsey.com/industries/oil-and-gas/our-insights/the-big-choices-for-oil-and-gas-in-navigating-the-energy-transition (accessed 30.04.2022).

only viable long-term solution for these industries, while the new strategies they will pursue along the way are yet to be developed.

Among the industries that were not "born digital" but where digital transformation has a profound strategic impact is finance. It is also the industry where digital transformation occurs in the all-digital environment – digital assets, digital trading platforms, blockchain-backed infrastructure, and algorithmic trading strategies. However, the long-term future of traditional financial institutions is not secure. Non-financial consumer platforms are increasingly looking to enter finance, forcing banks to consider the strategic option of moving into non-financial services.

Finance is one of the most promising industries for AI backed top-level decision-making. Today algorithmic and computerized trading account for more than 90 % of all trading in securities. So far, and as in autopilot planes, the trading algorithms, also called strategies, are pre-designed by humans. The next obvious step in the making today is to move to AI backed trading and ultimately let AI design winning strategies. The "flash crash" and similar algorithmic crises showed the limits of human programming and the danger of reliance on algorithms. As usual, most traders believe the next time will be different, with the strategic focus in the decision-making domain gradually moving from "more digital decision-making" to "less human decision-making".

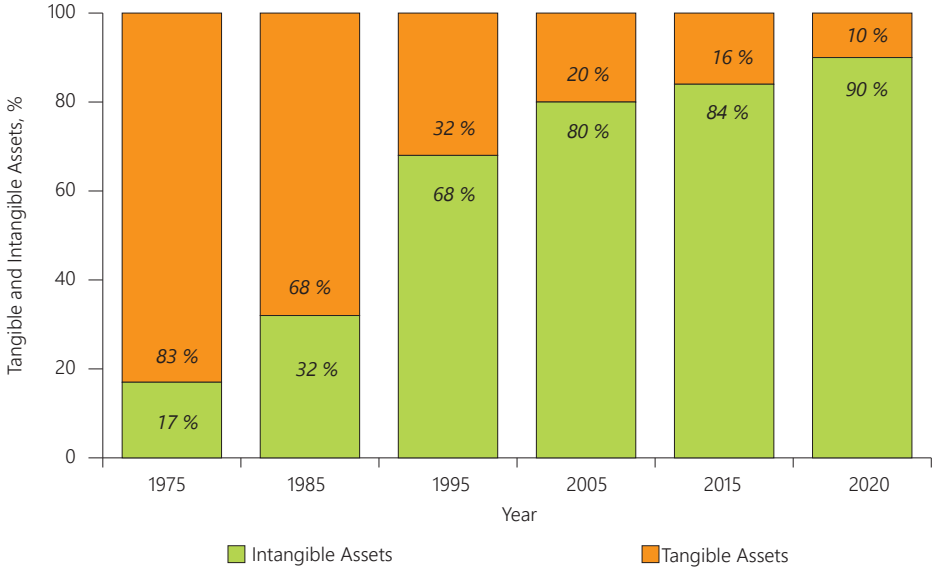
Digital technologies help identify and research the behavioral aspects of financial markets. A recent study [Gorodnichenko et al, 2021] facilitated by a deep learning model to detect emotions embedded in press conferences after the meetings of the Federal Open Market Committee examined the influence of the detected emotions on financial markets. The authors found that "after controlling for the Fed's actions and the sentiment in policy texts, a positive tone in the voices of Fed Chairs leads to statistically significant and economically large increases in share prices". The practical implications for improving the effectiveness of central bank communications raise the question – will future all-digital decision-making benefit or suffer from not having this emotional context?

Innovation has increasingly been associated with a concept of an asset-light enterprise[13]. The adoption of asset-light business models would be a natural companion to a "more digital" transformation. This transition, however, raises a concern – are asset-light models fundamentally riskier?

The longer-term robustness and risks of asset-light strategies should undoubtedly be a topic for research by economists, management academics, and strategy consultants. On the other hand, looking at the stock markets, we see that born-digital and asset-light companies have the highest valuations. Moreover, stock markets became dominated by the "most digital" or born-digital companies with the top ten by market capitalization dominated by platforms.

The analysis of the asset composition of S&P500 shows that in 2020 the share of the tangible asset fell to an unprecedented 10 % of total assets value estimated by market capitalization (Fig. 5). A large part of the market capitalization over and above the tangible assets are intangible assets, specifically digital intangible

[13] Kachaner N. and Whybrew A. (2014), "When "asset light" is right", *BCG*, available at: https://www.bcg.com/publications/2014/business-model-innovation-growth-asset-light-is-right (accessed 30.04.2022).



Source[13]

Fig. 5. Tangible and Intangible Assets S&P500

assets. Does this asset structure of the platforms make "more digital" or all-digital companies riskier?

As we can see, the companies where strategy and management are the domain of humans are not riskier than the traditional economy companies. At least the stock market valuations tell us that investors do not think so. A decisive test shows that both in relative (relative to the market as a whole as measured by stock Beta) and absolute terms (estimated by the volatility of stock prices), it does not seem to be the case. The younger and risker companies, Uber and Lyft, are not only riskier than companies of the "old economy" but also riskier than more digitally mature "new economy" leaders (Table 1).

Table 1

Comparative table of companies

Company	Stock Beta	Stock Price Volatility
Microsoft	0.79	0.2382
Apple	1.22	0.2544
Amazon	1.12	0.2303
BHP	0.90	0.2554
ExxonMobil	1.41	0.2696
Uber	1.58	0.3955
Lyft	2.41	0.4397

Compiled by the authors on the research materials

The evolution of competition will eventually bring us to AI competing against AI (assuming collusion of AI is impossible) in various areas, including strategy. Will the transition to AI based "human-light" strategic decision-making create a fundamentally riskier economic environment? Knowing the answer is critical so long as humans remain the owners of the risks to be soon managed by AI.

Historically control was the right humans did not delegate or share. A business strategy is a barrier to control the competitive environment and the future of the enterprise, or sometimes an illusion of control. In the age of AI, sharing of control will be not only at the process level, but also increasingly at the decision level looks inevitable.[15]

While going "more digital" in the process domain is generally seen as lowering risks of operations, intuition suggests that going more digital in the decision domain could have the opposite result. The increasing speed at which various processes evolve often makes real-time human control impossible. The algorithmic crashes in the stock market proved that humans are too late in identifying the flaws in the algorithms they developed in certain situations.

The development of a strategy is a low-speed process. However, strategy has lasting implications, making it difficult to predict the impact of AI. taking over the development of algorithms in the future. Moreover, the fact that AI, at least so far, is not legally liable for any consequences or potential damages of its actions makes the black box AI decision-making a real and significant challenge. It is why some of the most successful innovators and visionaries of the new economy consider AI an existential threat to humankind.[16]

A recent research initiative of the group based at the Institute for Information Law of the University of Amsterdam[17] intends to focus on AI and public values, data governance, and online platforms. They plan to research automated decision-making systems, which are set to replace human decision-makers in a range of areas, from justice to media, commerce, health, and labor.

[14] Aran Ali (2020), "The Soaring Value of Intangible Assets in the S&P 500", *Visual Capitalist*, available at: https://www.visualcapitalist.com/the-soaring-value-of-intangible-assets-in-the-sp-500/ (accessed 30.04.2022).

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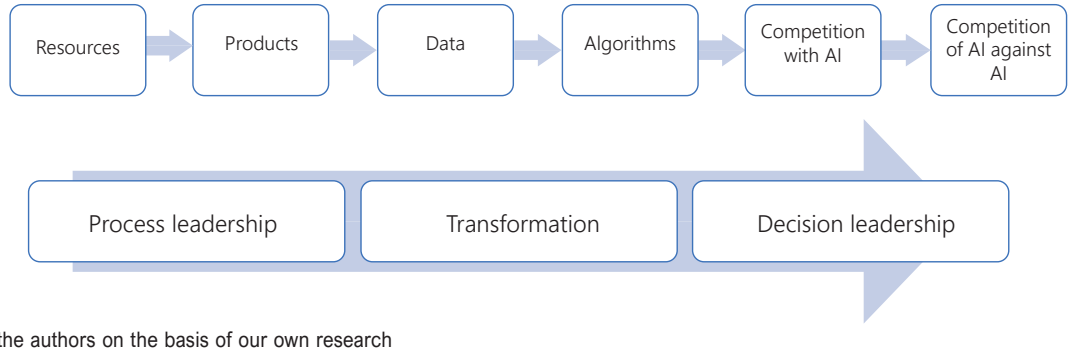

Compiled by the authors on the basis of our own research

Fig. 6. The evolution of competition

The corporate sector also needs to expand the research agenda acknowledging that the speed of change in technologies we create exceeds our ability to foresee the changes and strategize about tomorrow's markets.

Conclusion

While generally accepted as a boon, digital transformation remains a significant challenge for those assigned to implement it. We offer an alternative narrative for digital transformation, which we argue is better described as going "more digital".

We extend the discussion on why digital transformation is in most cases unrelated to business strategy and provide examples of when and how it may become part of a corporate strategy toolbox.

A simplified model of a business as a network of processes and decisions helps illustrate why digital technologies first advanced in the process domain but can become strategic and transformative when adopted to the decision domain. The latter also brings yet unquantifiable risks and uncertainty.

We suggest future research to focus on the value created by going "most digital" in both process and decision domains and risks to companies and the economy.

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