

Digital transformation and the impact on e-commerce of the disruptive technologies which are the supporting structure of the Industry 4.0



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Abstract

It is essential to obtain a clear picture of E2E value chain from the point of view of capturing the value from technology until the high-touch digital retailer performance, harmonizing technology and data on the challenging path of continuously improving CX, by implementing disrupting technology solutions in e-commerce business which has been made more agile by the new coronavirus crisis. There is a strong relationship between digital transformation, the novel economy and e-commerce. In the current times of disruption there is a key differentiator and a lantern for further action: experience design and innovation. It is obvious enterprises' challenge of opening the window of the opportunity to create a culture of innovation and disruption in this novel economy, considering evolutions in e-commerce, AI, and mobile technology in retail. There is a powerful impact on e-commerce of the disruptive technologies which are the supporting structure of the Industry 4.0 concept, and the 5Cs marketing principles for it. It is also important to better understand digital transformation as a blending of process knowledge, intelligent automation, and data, valuing and mastering data and content through disruptive technologies. Automation is reaching the service sector, and a growing trend in e-commerce is a level of automatic customization called personalization. The importance of robots enabling warehouses to scale operations in the e-commerce fulfilment market is increasing. We are witnessing the approach of specific needs of e-commerce packaging with the help of new robot technology. The new technologies are enabling the providing of the expected CX through seamless and integrated processing.

Keywords: Digital transformation; Disruptive technologies; Industry 4.0; e-commerce

JEL Classification: D21; D80; L20; M21; M31; O31; O33

Technology, a critical business capability, is changing people. The framed response considering disruption & core-technology transformation, being customer-focused based on business value and careful delivery at the front planned. Better understanding the importance of the technology forward model in driving successful digital transformations

I have recently read a newspaper article in which it was expressed the concern about the technology's potential consequences. And trying to reconstruct the overall design (both the author's purpose, and the technique used; the way he expressed his attitude, his message about the topic), that made me also recall some quotes, such as: "The Web as I envisaged it, we have not seen it yet. The future is still so much bigger than the past" (according to Tim Berners-Lee, Inventor of the World Wide Web); "The internet is no longer a web that we connect to. Instead, it's a computerized, networked, and interconnected world that we live in. This is the future, and what we're calling the Internet of Things" (according to Bruce Schneier, Security Technologist & Auth); "We want to build technology that everybody loves using, and that affects everyone. We want to create beautiful, intuitive services and technologies that are so incredibly useful that people use them twice a day. Like they use a toothbrush. There aren't that many things people use twice a day" (according to Larry Page, Co-founder Google); "Mobile is the future, and there is no such thing as communication overloaded" (according to Eric Schmit, Former Executive Chairman & CEO, Google); "Technology is dominated by two types of people: those who understand what they do not manage and those who manage what they do not understand" (according to Archibald Putt, a pseudonym of the author, a reputed PhD, of the book "Putt's Law and the Successful Technocrat: How to Win in the Information Age"); "Science and technology revolutionize our lives, but memory, tradition and myth frame our response" (according to Arthur Meier Schlesinger, American historian, Educator at Harvard University, and public official in J. F. Kennedy's White House); "Technology feeds on itself. Technology makes more technology possible"; "The great growling engine of change – technology" (according to Alvin Toffler, the well-known author of valuable books like "Future Shock", "Third Wave", "Powershift: Knowledge, Wealth, and Power at the Edge of the 21st Century", "Creating a New Civilization" etc.); "The most important thing about a technology is how it changes people" (according to Jaron Zepel Lanier, considered a digital pioneer, a technology oracle, the father of virtual reality, an AI visionary; author of the books "You Are Not a Gadget", "Who Owns the Future?", "Dawn of the New Everything", "Ten Arguments for Deleting Your Social Media Accounts Right Now"); "Once a new technology rolls over you, if you're not part of the steamroller, you're part of the road" (according to Stewart Brand, President of The Long Now Foundation, considered a legend in the technology, being the creator of the Whole Earth Catalog, The WELL, the Global Business Network, the Revive and Restore project etc.); "If you don't innovate fast, disrupt your industry, disrupt yourself, you'll be left behind" (according to John Chambers, CEO of Cisco); "Some people call this artificial intelligence, but the reality is this technology will enhance us. So instead of artificial intelligence, I think we'll augment our intelligence" (according to Ginni Rometty, CEO of IBM); "If you're competitor-focused, you have to wait until there is a competitor doing something. Being customer-focused allows you to be more pioneering" (according to Jeff Bezos, Founder of Amazon).

Fifteen years ago, the advances in technology have been seen by a 2005 Economist Intelligence Unit survey of CEOs and other senior executives as the single most important driver of change in the business environment. And with regard to (at that time) “tomorrow’s hot technologies” the findings have showed that business performance management technologies, security technology, mobile technology, converged and wireless networks, open source software, developments in autonomic technology (self-optimising, self-repairing IT systems) have been seen as the most important emerging technologies for the future. But beyond the remaining enthusiasm about new technology (considered to be an important lever for competitive advantage), it was considered more upsetting the need for many companies to properly manage risks and threats posed by new or disruptive technology (Economist Intelligence Unit, 2005).

In our last RDC Magazine issue we have reminded that Joseph Schumpeter (who coined the concept “creative destruction” in 1942) described the entrepreneurial process as one of “creative destruction” (Purcarea, 2020). It is also worth mentioning that in the last decade significant aspects have been highlighted in RDC Magazine issues, such as: “observing that the actual World is more and more difficult to rule (optimize)... in hard times, we all have to learn how the progress is still possible and especially how the miracle of switching from very low to high can be made... we will soon be almost total dependent on ICT products and services... we must think to a mature control of this dependence... the whole Earth is in a hurry and everybody is in “his race”, because we can not afford to forget that the Earth race is sure two-fold: to progress and to survival” (Greu, 2012); we need to become integrative thinkers “on the path to greater trust while going through a major transformation” (Purcarea, 2013), as confirmed, for instance, by both the Internet of Things (IoT) evolution within the context of the information and communications technologies (ICT) exponential development as the main factor of the information society transformation toward knowledge based society (Greu, 2015), one hand and the way in which ICT is driving Artificial Intelligence (AI) to leverage refined knowledge for the World Sustainable Development (Greu, 2019), on the other hand, and the last but not the least by the impact of digital transformation on the retailing value chain (Tanase, 2019).

Allow us to also remind that in the last years there were significant approaches with regard to disruption, digital transformation and digital disruption (managing digital disruption involving the use, for instance, of methods such as open innovation, co-creation and crowdsourcing), disruptive innovation (digitalization being a driver for it), and core-technology transformation, such as:

- The fact that enterprises must disrupt their products and processes in order to enable the next customer experiences (McQuivey, 2014);
- “Big data” and the information technology are partners in disruption (Smith, 2015);
- The changing customer demands, together with the new or changed competition and the technological advances, could be already considered a set triggers of this digital transformation (Wieberneit, 2016);
- When it happens the digital disruption (when an existing industry faces a challenger that offers greater value to the customer, and in a way in which existing enterprises cannot directly compete with (Rogers, 2016);

- Enterprises need to reinvent themselves by digital transformation of the core (value proposition, people, processes, and technologies, all these representing the lifeblood of their business), and taking the proper decisions accordingly (Dahlström, Desmet and Singer, 2017);

- Enterprises also need to better understand what is happening at the intersection of innovation and disruption, people being at this intersection (Bova, 2017);

- Enterprises must better understand the importance of technology in driving successful digital transformations, avoiding technology antipatterns as ineffective solutions for a problem, by paying special attention to technology choices, technology road map, technology management, and managing technologists, and urgently both identifying technology antipatterns and moving to address them. Reflecting and acting in this manner enterprises can make possible technology transformations to support the most highly praised three-part (faster customer-centric delivery, business growth, and happier employees) expected result of the digital transformation (Blumberg, Delaet and Swami, 2020).

- At the basis of the improved customer-focused solutions (from the point of view of efficiency, quality, and speed to market) there is a core-technology transformation (which involves time, effort, and investment), what presupposes a top-team mindset shift allowing the necessary match with enterprise's context, fusion between technology and business outcomes, and methodical technology-tailored approach to execution. A successful technology transformation must be approached holistically, all happening across the three vectors (reimagining the role of technology, reinventing technology delivery, and future-proofing the foundation) highlighted by McKinsey's representatives in the figure below (Carson, et al. 2020):

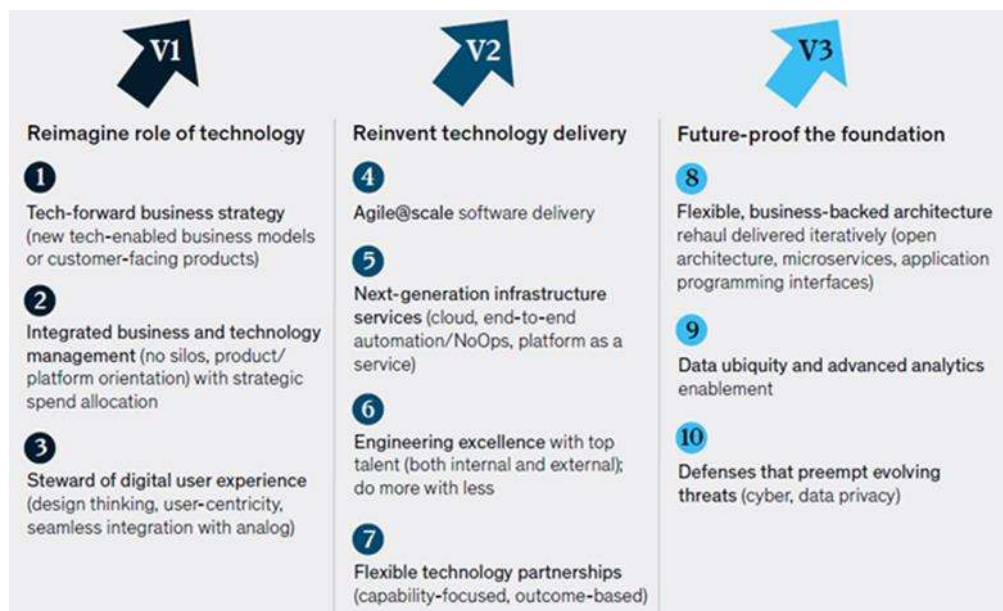


Figure no. 1: Technology transformation relies on three vectors

Source: Carson, et al. 2020. Overcoming the core-technology transformation stalemate, McKinsey & Company, September (work cited)

- Within the new urgency into modernizing the technology function (the digitizing of end-user experience being ranked, for instance, as no. 1 type of transformation most likely to

be pursued over next two years within the more focus upward along the technology stack), McKinsey Technology offered a valuable “tech forward” model which highlights the above mentioned three interconnected vectors (this model having inside ten specific domains of activity, as shown in the figure below) enabling advancing enterprise technology function so as to gain the capabilities needed to thrive, and not just survive, in challenging and constantly changing digital markets (Dhasarathy, et al. 2020).

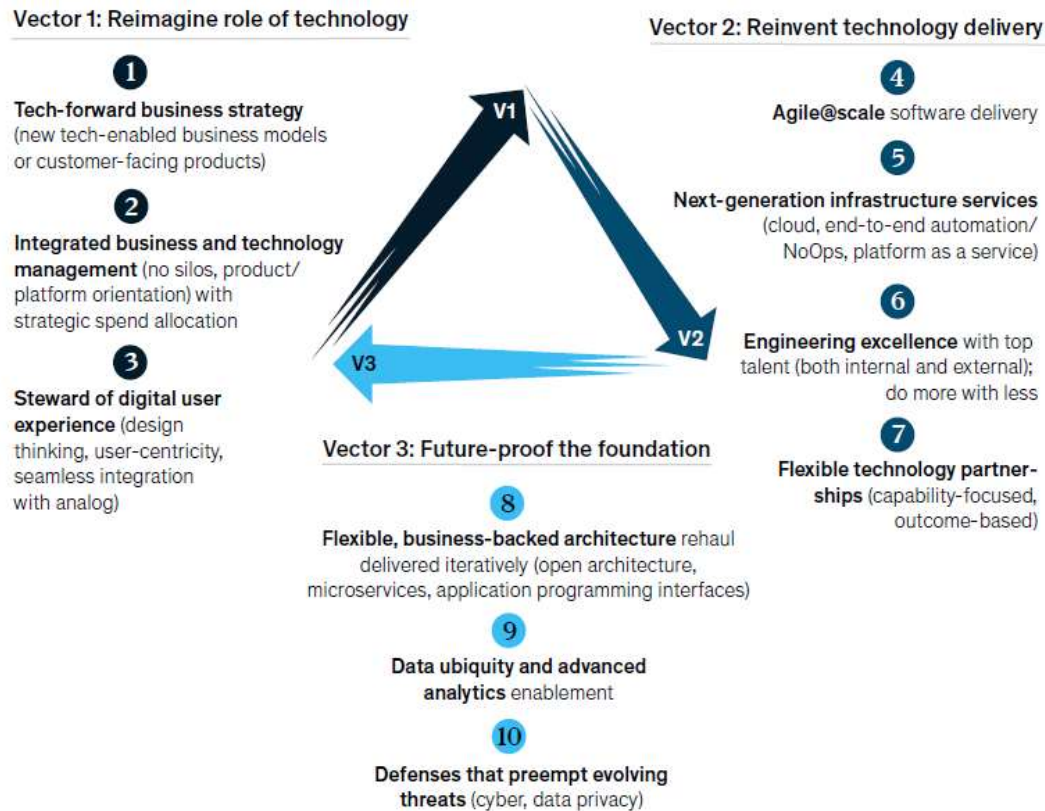


Figure no. 2: Successful technology transformations span three vectors of activity, each consisting of a specific set of plays

Source: Dhasarathy, et al. 2020. How to become 'tech forward': A technology-transformation approach that works. McKinsey Technology, November (work cited)

Within this framework, a special mention also needs to be made of the role of a new methodology brought onto the scene of tomorrow's maintenance function (which will combine the strengths of lean and agile organizations) by the growth of Industry 4.0 and related digital technologies. And this given to enterprises' challenges to achieve further performance improvements on the basis of digital solutions. According to the reputed McKinsey's expertise, it is recommendable to better understand that in order to achieve better results it is necessary to properly combine the strengths of the lean and agile methods (which beyond their different terminology are both seeking to maximize the value delivered to enterprises' customers, while safely minimizing the resources used to achieve the organization's goal), considering the increasingly potential confirmed by the agile methods show the potential to address longstanding challenges in many organizations, breaking down silos between different functions or groups of technical specialists, and aiding the efficient allocation of resources in tasks with varying or intermittent workloads. (Heitz, et al. 2020).

From capturing the value from technology until the high-touch digital retailer performance. Harmonizing technology and data on the challenging path of continuously improving CX, by implementing disrupting technology solutions in e-commerce business which has been made more agile by the new coronavirus crisis. Digital transformation, the novel economy and e-commerce

A year ago, McKinsey's representatives have underlined that if enterprises approach the transformations enabled by technology through a technology-focused lens can catch about 50% of the potential business value, but if they follow a two-step methodology (Assess: Building the strategic roadmap; Build and implement: Scaling the change) as shown in the figure below can translate their transformation priorities from strategy to action, and secure substantially more value. And this starting from the fact that enterprises' operating mode can be fundamentally changed by the digital technologies (including analytics, IoT, AI and its subset Machine Learning), these technologies (technology and data representing the backbone) being harnessed by an End-to-End transformation, and allowing capturing this way the next level of value (Atluri, Baig and Rao, 2019). So, there are valuable lessons to learn for retail industry, too.

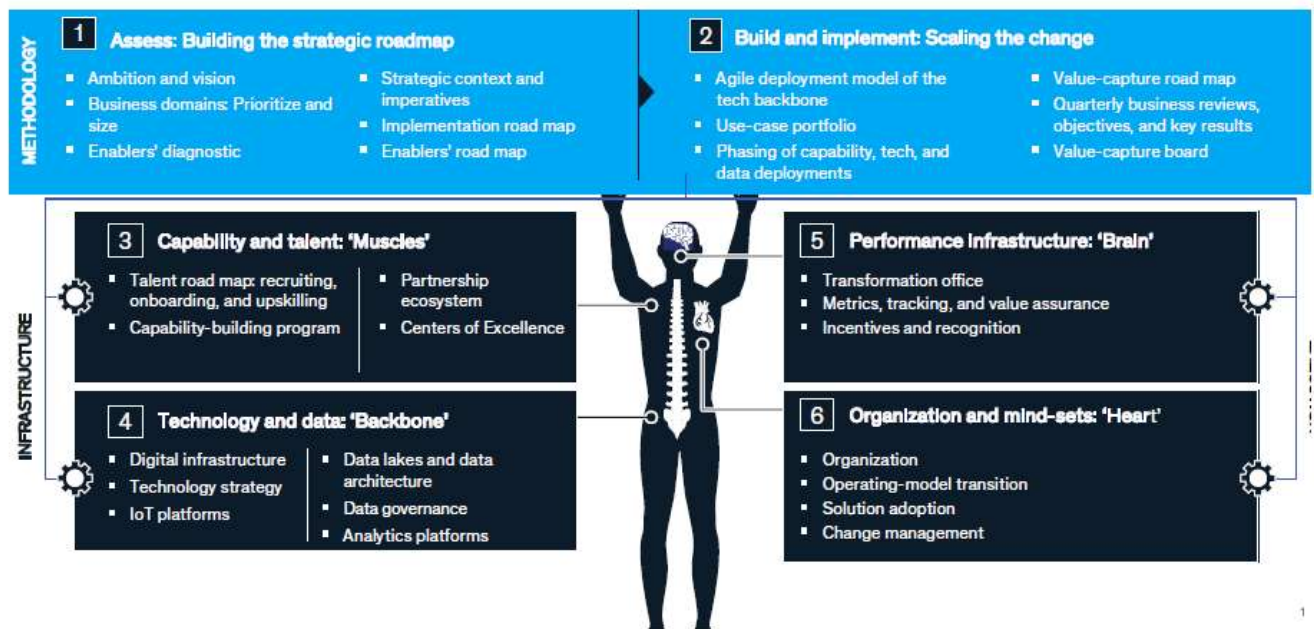


Figure no. 3: Industrial companies must follow a comprehensive transformation playbook to capture the value from technology

Source: Atluri, Baig and Rao, 2019. Accelerating the impact from a tech-enabled transformation. McKinsey Digital, September (work cited)

An interesting discussion which took place within the framework of McKinsey's "Inside the Strategy Room" (podcast) on the topic of rapidly and effectively developing a digital offering while facing the ongoing economic uncertainty revealed six archetypes of businesses likely to emerge in the post-COVID-19 era (see the figure below), one of them being the high-touch digital retailer. And in this case the identified challenge was starting

from the way chosen to create curated retail experiences in the absence of the physical element (Barnes, et al. 2020).



Figure no. 4: Six archetypes for new businesses

Source: Barnes, et al. 2020. Building a great digital business. McKinsey & Company, Strategy & Corporate Finance Practice, December (work cited)

On the webpage of the World Economic Forum it was clearly underlined that going digital is an urgent choice, the move towards digitalization being confirmed by the unprecedented growth in e-commerce businesses, e-commerce being a 20-year-old industry. For the retail industry, this digital transformation (beyond automating and digitalizing the existing systems etc.) also showed the smart use of analytics, AR, VR, AI and facial recognition in order to provide in person, Omni channel and seamless CX. (Reddy and Morelix, 2020). We also noticed within this framework an inspired message for all e-commerce enterprises concerning some useful moving steps, as the core enterprise's focus for a successful digital transformation, such as: identifying the digital transformation goals (see the digital transformation pyramid in the figure below), managing CX strategy (a four steps management process:

- customer insight, customer relationship management strategies, integrated processes, customer acquisition strategy;
- also considering Omni channel capabilities), implementing new technology solutions (including AI, IoT, cybersecurity, wearable technologies and cloud), executing the necessary today's new journey to virtual platforms (VR/AR tools ensuring an improved interaction for customers), and being always ready for digital innovation within the context in which the highly virtualized and technology-enabled ecosystem of services are serving as basis for the future e-commerce platforms (Sharma, 2020).

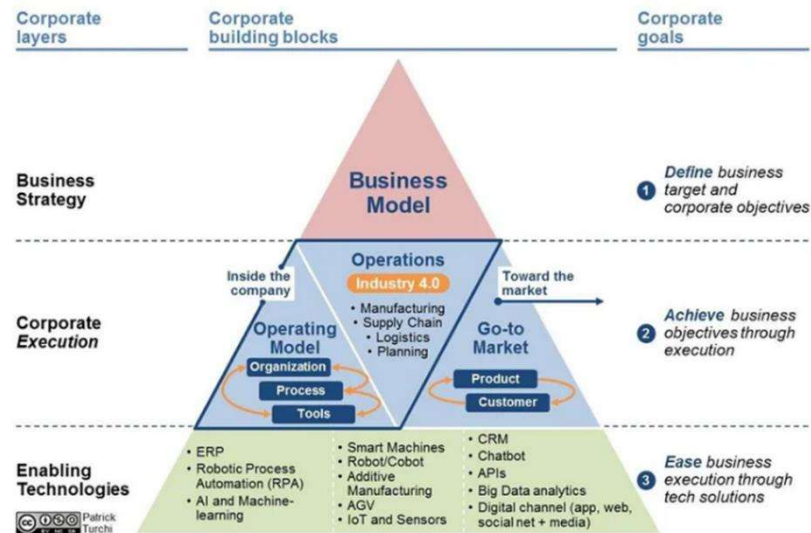


Figure no. 5: The digital transformation pyramid

Source: Sharma, R., 2020. 5 Steps to Digital Transformation For E-Commerce Businesses, YourStory, 3rd Jul (work cited)

Recently, McKinsey's representatives showed that CX and design inputs (as a significant domain which is defining user journeys and requirements based on human-centered design) are representing one of the ten domains (as shown in the figure below) across which enterprises need to have superior capabilities so as to ensure effective implementation of large technology programs in the digital era. And this within the context in which enterprises must accept the complexity, ensure the right capabilities (from the start) to act accordingly by: selecting agile methods; grounding the work in design thinking; using cloud-based services; using modular architecture to increase flexibility and vendor competition; getting people with large-program (ideally comparable) experience; being aggressive about necessary course corrections. Acting on this way enterprises can de-risk delivery by capitalizing on new digital techniques (Defossez, McMillan and Vuppala, 2020).

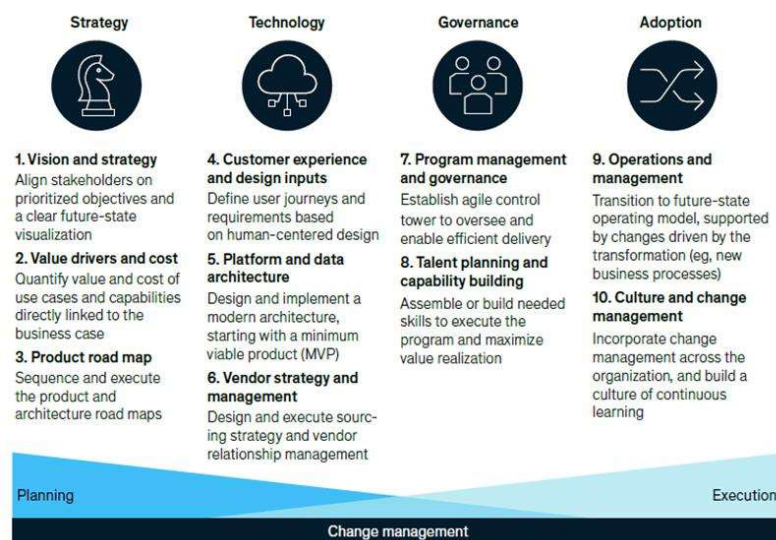


Figure no. 6: Effective implementation of large programs requires superior capabilities across ten domains

Source: Defossez, McMillan and Vuppala, 2020. Managing large technology programs in the digital era, McKinsey Digital, November (work cited)

There is no doubt that e-commerce has been made more agile by the new coronavirus crisis, this year being seen as a possible inflection point considering the acceleration signal of the upward projections of e-commerce penetration in the overall retail, as shown in the first figure below (Routley, 2020).

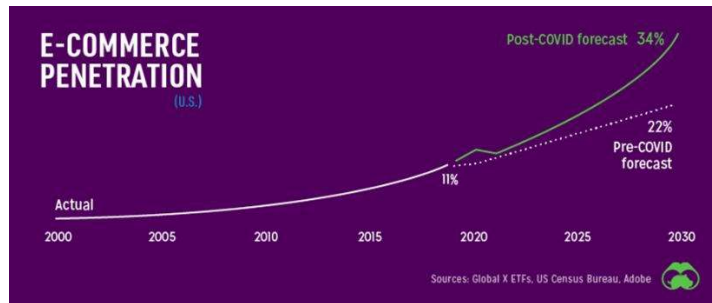


Figure no. 7: E-commerce penetration

Source: Routley, N., (2020). 5 Big Picture Trends Being Accelerated by the Pandemic, Visual Capitalist, November 27 (work cited)

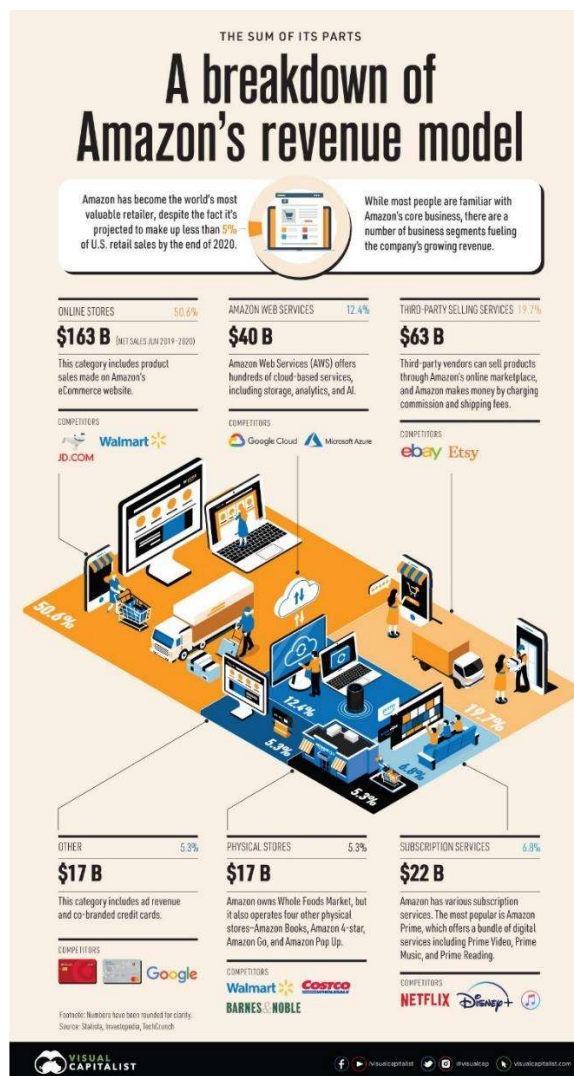


Figure no. 8: A breakdown of Amazon's revenue model

Source: Ang, 2020. Visualized: A Breakdown of Amazon's Revenue Model, Visual Capitalist, October 14 (work cited)

But beyond the above mentioned acceleration signal coming from the e-commerce, including at the level the e-commerce giant Amazon (but not only in its case) have been identified many other business segments fuelling its growing revenue, as shown in the above figure (Ang, 2020).

It is also worth underlining the following aspects:

- In June this year, the reputed Brian Sollis, Global Innovation Evangelist at Salesforce, talked with TechRepublic's Karen Roby about the impact of COVID-19 on digital transformation (which was itself digitally disrupted), starting from the importance of studying all of the trends happening in the market (going beyond making sense of them) and humanizing the next steps of both customers, and partners, ensuring moving forward by thinking about better operating (rebuilding, inventing and innovating) in the novel economy (described below in the next subchapter).

And as everything changed (including customers' and employees' behaviour), Sollis pledged for better understanding CX and optimizing productivity with the employee experience, happiness and wellness, and inventing accordingly based on new identified opportunities for growth, thinking differently about data with the help of AI and its subset Machine Learning, seeing technology as a revenue generator (within the so-called by him "bimodal digital transformation"), and optimizing infrastructure for operational excellence, and investing in business model innovation (also taking into account the current special time for human-centered innovation).

Sollis also made a special reference to e-commerce, considering some insights published by him on the basis of Salesforce's global shopping index (which revealed both how online spending had, and how it was going to continue to shift), and highlighting the special position of e-commerce on this trajectory to become a huge percentage of total sales (Sollis a, 2020);

- What the recent Gartner's 2020 Marketing Technology Survey revealed within the context of the disruptions triggered by the COVID-19 pandemic, namely more progress is being made on key actions improving marketing technology's impact across the enterprise by the marketing technology teams which are apply agile methodologies to their technology roadmaps.

Compared with all others (as shown in the figure below) these marketing technology teams take more actions across the board, by integrating different types of marketing technology based on need, adding new functionality/enhancements to existing technologies, revising their roadmap due to changes in their business, adopting new technologies in response to changes in their market, changing aspects of marketing processes/operations to adapt to etc. (Bloom, Reid and McCune, 2020).

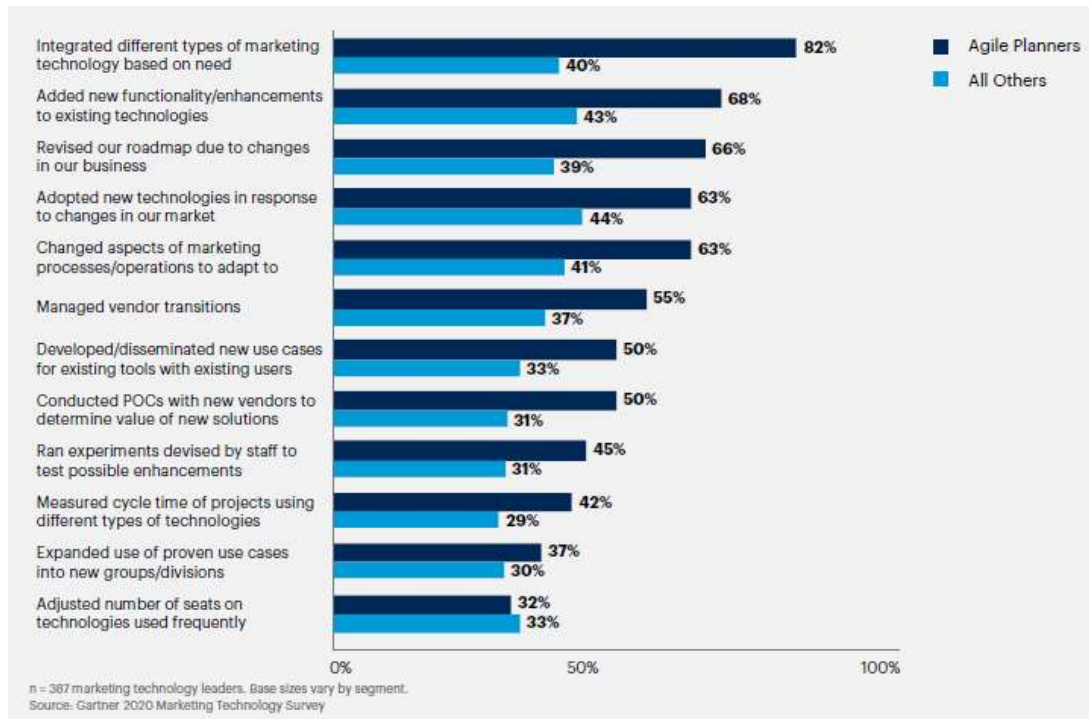


Figure no. 9: Agile planners get more done

Source: Bloom, Reid and, McCune, 2020. Gartner for Marketers. 2020 Marketing Technology Survey: Cost Pressures Force Martech Optimization and Innovation. Gartner, November, p. 25 (work cited)

In the current times of disruption there is a key differentiator and a lantern for further action: experience design and innovation. Enterprises' challenge of opening the window of the opportunity to create a culture of innovation and disruption in the novel economy. E-commerce, AI, and mobile technology in retail

Technologies' improvements are improving customer interactions' value, the return on experience (ROE) confirming more and more its status of new return on investment (ROI), the entire E2E CX being orchestrated and personalized moment to moment, at scale, on any channel, and in real-time, the gap between the customers' expected experiences and the channels where they live being better closed on the basis of the right Omni channel digital marketing approach (Martin, 2019). There are significant lessons to learn with regard to ROE (or ROX), enterprises needing: to better understand not only the correlation between different experiences, but also how CX and employee experiences affect each other; to avoid silo-thinking and sub-optimization when implementing ROE approach. (Hansen and Martinsen, 2019).

Coming back to the reputed Brian Sollis (who also pledges for attaching emotion to loyalty, customer lifetime value, growth) inspiring approach, it is worth mentioning his take on the role of innovation in both digital experience design, and measuring ROE, namely that in the current times of disruption experience design and innovation (which is pushing CX forward) is representing a key differentiator and a lantern for further action. According to Sollis:

- Generation C (the incoming wave, before Covid-19, of connected consumers) was sharing behaviours (which are creating a new standard for CX), interests and expectations of everything to be not only tailored to their needs, but also to be delivered instantaneously (Solis b, 2020);

- There are three key phases of the novel economy (coined by him, and expressing the rise of a new generation – “Generation N” – of both customers, and employees; the pillars of memorable brand experiences for this novel economy are shown in the figure below): stabilization (meaning to both survive and react to the new coronavirus crisis that changed the course of humanity and consumerism, and seek business continuity); to be alive (meaning to ensure transitions by both mastering the new normal, and starting exploring innovative ideas and business model opportunities); to thrive (in the next normal of business which could not only include improving operations, but also innovating and disrupting, considering new customer demands created by the collective pandemic experiences). In his opinion, the emergence of “Generation N” is a result of by pandemic caused new personal and societal constraints (such as: lifestyle and health traumas, mask-wearing and sudden work from home transitions etc.), Sollis using in defining this new unprecedented experience the term somatic marker (a theory hypothesizing that strong emotions is guiding behaviours and subsequent decision making) developed by Antonio Damasio (beginning with 1994) and other researchers (Jacoby, 2020).



Figure no. 10: The Pillars of Memorable Brand Experiences for The Novel Economy

Source: Jacoby, P., 2020. The Rise of “Generation Novel” aka Gen N and the Novel Economy, Frost & Sullivan, Jul 13 (work cited)

There is a clear evidence that the coronavirus pandemic made AI adoption more urgent for retailers which are under pressure of transforming from cost structures to CX, AI (which offers lower cost-to-serve, more effective promotion and merchandising, and an elevated CX) going hand-in-hand with e-commerce (McKone and Madannavar, 2020). Customers are more and more looking for answering their questions in real time, for having customized shipping rates, to benefit of product recommendations on their mobile apps or of

a new sensory experience brought on by great digital displays showcasing great brands (Ginsberg, 2020) And as underlined recently by a mobile solutions architect at Stratix (the largest pure-play managed mobility service provider in North America) retailers: are achieving significant results by providing mobile sales tools for staff, and especially by deploying mobile point of sale (POS) – according to a research from IHL Group; are planning major foundational investments in mobile POS over the next two years – according to RIS News’ 30th Annual Retail Technology Study (Sciara, 2020).

And in the evolving environment of the payments industry there are three emergent data elements: TRID (the Token Requestor IDentifier, which is represented by a unique 11-digit numeric value assigned by the TSP - Token Service Provider), WID (the Wallet Identifier, presented at the POS), and PAR (the Payment Account Reference, the unique identifier associated with a specific primary account number - PAN, regardless of device). There are two advantages for retailers accepting this form of payment: to capitalise on the new data source and co-marketing opportunities to help grow business and improve business processes; to better serve customers using mobile wallets (Vanderhoof, 2020).

Instead of conclusions: The impact on e-commerce of the disruptive technologies which are the supporting structure of the Industry 4.0 concept, and the 5Cs marketing principles for it. Better understanding digital transformation as a blending of process knowledge, intelligent automation, and data. Valuing and mastering data and content through disruptive technologies. Automation is reaching the service sector, and a growing trend in e-commerce is a level of automatic customization called personalization. The importance of robots enabling warehouses to scale operations in the e-commerce fulfilment market. Specific needs of e-commerce packaging approached with the help of new robot technology. The new technologies are enabling the providing of the expected CX through seamless and integrated processing

We have seen above that there are valuable lessons to learn for retail industry within the context of the transformations enabled by technology, different approaches arguing for harmonizing technology and data (technology and data representing the backbone) on the challenging path of continuously improving CX (by implementing disrupting technology solutions in e-commerce business). On the other hand it is well-known the reputed Capgemini’s approach according to which brand positioning is reflected by the created CX aligned with the enterprise’s purpose thanks to the right content based on the right data, and acting and re-innovating accordingly in approaching digital transformation, with agility and responsiveness (Capgemini, 2020).

The Founder and Executive Chairman of the World Economic Forum, Professor Klaus Schwab, has argued in January 2016 that the Fourth Industrial Revolution (which is evolving at an exponential pace) is disrupting almost every industry in every country. He underlined from the very beginning the unlimited possibilities multiplied by emerging technology breakthroughs in significant fields (such as AI, robotics, IoT, autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing), also expressing the conviction that the critical factor of production in the future will be represented by talent (more than capital). And approaching the impact of the disrupting technologies which are the supporting structure of this Fourth Industrial

Revolution (Industry 4.0, as the digital transformation of production and related industries and value creation processes, shifting from simple digitization to innovation based on combinations of the disruptive technologies - also see the above Figure no. 5: The digital transformation pyramid) on business, Professor Schwab highlighted the four main effects: on customer expectations (customers being at the epicenter of the economy), on product enhancement, on collaborative innovation, and on organizational forms. He did not forget to mention the need of compassion, cooperation, privacy, and of redefining the moral and ethical boundaries, assuming the responsibility for guiding the evolution of both technology, and disruption (Schwab, 2016).

In November 2019, an article published in the “Engineering Management in Production and Services” scientific journal, a quarterly published by the Bialystok University of Technology Publishing House and The International Society for Manufacturing Service and Management Engineering (ISMSME), approached the challenging topic “Marketing principles for Industry 4.0 — a conceptual framework”. The authors, Katarzyna Nosalska and Grzegorz Mazurek, have identified a gap in the scientific research with regard to the impact of Industry 4.0 on marketing, and – taking into account the impact of both the new digital technologies, and the frequently growing number of new business models – were aiming to structure marketing changes by advancing a conceptual framework for marketing in Industry 4.0 (they used valuable sources: the qualitative method putted forward by Jabareen, 2009; the Design Principles of Industry 4.0 by Hermann, et al. 2016, and the Marketing 4.0 concept by Kotler, Kartajaya, and Setiawan, 2016). The authors have gone beyond the usual scientific discourse on Industry 4.0 concept (which is focusing mainly on the technological aspects of the perceived occurring changes), and considering the holistic meaning of Industry 4.0 concept (which is suggesting a need for a multidisciplinary approach to identifying all the changes emerging in various areas of business operations; in other words, we may say now within the context of the unprecedented crisis, including both better understanding the customer’s perspective, and optimizing the customer journey), they have brought five identified main marketing principles for Industry 4.0 (as shown in the figure below): Cooperation, Conversation, Co-creation, Cognitivity, and Connectivity. According to the two authors the technologies are only enabling relationships’ development in the business ecosystems (facilitating communication between the participants on the relevant market), and enterprises must generate a strategic organisational change based on the synergistic effect resulting from the interaction between the new technologies and the innovative business solutions (Nosalska and Mazurek, 2019).

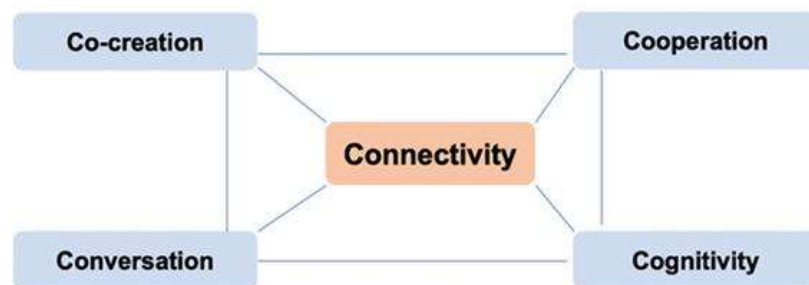


Figure no. 11: The 5Cs for the Fourth Industrial Revolution

Source: Nosalska and Mazurek, 2019. Marketing principles for Industry 4.0 — a conceptual framework, *Engineering Management in Production and Services*, Volume 11: Issue 3, 19 Nov (work cited)

In our opinion, this last approach, from November 2019, follows the above mentioned line suggested by the Professor Klaus Schwab in January 2016: “... *billions of people connected by mobile devices, with unprecedented processing power, storage capacity, and access to knowledge... Digital fabrication technologies, meanwhile, are interacting with the biological world on a daily basis. Engineers, designers, and architects are combining computational design, additive manufacturing, materials engineering, and synthetic biology to pioneer a symbiosis between microorganisms, our bodies, the products we consume, and even the buildings we inhabit... consumer engagement, and new patterns of consumer behavior (increasingly built upon access to mobile networks and data) force companies to adapt the way they design, market, and deliver products and services*”. And here we see the linkage with the conceptual framework advanced by Nosalska and Mazurek and their conclusion concerning the opportunity of further enriching the existing scientific literature with new perspectives, the more so the COVID-19 pandemic has changed the way consumers use e-commerce, speeding up the shift towards an even more digital world compared to the last year.

This year, in August 2020, the Vice President of Marketing at 6 River Systems showed that the blending of the rise of e-commerce merchants and of the increased demand by consumers for just-in-time ordering determined a pressure for the fulfilment centers to deliver goods faster than ever, one of the questions necessary to be asked within this framework by the operators (revisiting their fundamental strategies and decisions about their supply chains) being how to merge e-commerce and retail fulfilment operations (Glinn, 2020). In September 2020, The Shared Services & Outsourcing Network (SSON) reminded us the importance of better understanding digital transformation as a coming together of process knowledge, intelligent automation, and data, within the context in which there is no doubt about what a robust data strategy requires: digitized & structured data at the point of ingestion, link to business context and strategy, and guidelines on data collection and management (SSON a, 2020). While a month later, at the beginning of October, the European Business Review stated that automation: becomes increasingly more viable and necessary within the context in which the new coronavirus crisis reshape the way we work (taking into account the ability for AI and robotics tools to improve transportation, consumer processes, and manufacturing); is reaching the service sector, AI being the new standard through chatbots, account security, and personalization (as a level of automatic customization made up of personalized ads and product recommendations created specifically for someone based on his personal data) in e-commerce (European Business Review, 2020).

In the last year's summer we remarked “How Growing E-Commerce Demand is Driving Growth in Mobile Robotics”, context in which it was underlined that given this growing demand caused by increased e-commerce usage both humans, and robots are needed to meet it within the context in which in the e-commerce fulfilment market both flexibility, and efficiency have become primary differentiators (Britt, 2019). In May 2020, we find out that at a US start up from California, banking on fully automated warehouses for groceries (and not only), robots will do the shopping thanks to a new Home Delivery Service creating a touchless and robotics-powered retail model (aiming to cut out supermarkets as unnecessary intermediaries) to be launched in 2021 (The Jakarta Post, 2020).

Three days later Euronews has shown in an episode of Business Line entitled “The rise of robots, automation and e-commerce in the post-pandemic world” how within the realm

of e-commerce many companies are finding new opportunities (Euronews, 2020). While in August 2020 Automation World trade magazine, a monthly publication covering the latest developments in automation, informed in an article entitled “Robotics Special Report: E-Commerce Requires new Solutions”, about how the specific needs of e-commerce packaging are approached with the help of new robot technology (Mohan, A. M., 2020). Within this framework it was highlighted, among other aspects, that e-commerce represents one of the most significant consumer trends (at the end of Q1-2020 e-commerce sales have exploded) transforming the packaging landscape.

There is no doubt that digital transformation (which is going hand in hand with customer centricity, focusing on the customer journey) has become the imperative for maintaining an enterprise competitive advantage. Enterprises can transform their operating model via intelligent automation, driving improvements in both CX, and employee experience (and not only) on the basis of E2E process optimization (the necessary change depending on the process discovery, identifying automation opportunities across the process scope), the cultural transformation being considered key (SSON b, 2020). All the aspects above mentioned are confirming our November pledge (Purcarea, 2020) for better understanding both the new requirements of the Supply Chain 4.0 (applying Industry 4.0 innovations) & Value Chain 4.0 while implementing the ECR philosophy, and the fact that people and data are at the heart of the digital transformation which needs to be holistic.

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