TÜSİAD

DATA AND ANALYTICS IN TÜRKİYE

BCG

aws

KoçDigital

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Meşrutiyet Caddesi, No: 46, 34420, Tepebaşı/ İstanbul
Phone: (0 212) 249 07 23 * Telefax: (0 212) 249 13 50
www.tusiad.org

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1 Prefaces

Burak Aydın

Head of TÜSİAD Digital Economy Strategies Working Group &
General Manager of AWS Türkiye

The world is going through a new phase in which the COVID-19 pandemic has unprecedentedly accelerated digital transformation for all sectors. With the rise of new generation technologies, rapid changes in customer behaviour and expectations, the pandemic represents a turning point in the way companies do business. In light of lessons learned from the pandemic, companies need to welcome the opportunities and address the challenges in the post-pandemic recovery period.

In this context, given the rapid technological advances (Internet of Things (IoT), 5G, wireless devices, mobile phones), the amount of data being produced is rising so rapidly that big data has become a strategic priority for productivity, innovation and competition on a global scale. There is no doubt that having a great set of data would improve the growth potential and decision-making processes of companies. To this end, the report "Data and Analytics in Türkiye" in cooperation with AWS, BCG and KoçDigital aims to raise awareness on the importance of data and to analyse the maturity levels of companies by conducting a survey across 60 companies in Türkiye and interviews with the C-levels of 10 companies. As TÜSİAD, digital transformation is among our top priorities to remain competitive in the market and to boost the innovative technology ecosystem in Türkiye. Therefore, in today's global economy, all the possible consequences of emerging technologies should be closely followed so that a comprehensive agenda can be implemented in cooperation with all stakeholders, including public institutions, the business community and academia. The necessary steps should be taken to build a sustainable digital ecosystem and to promote a data-driven economy.

I would like to express our gratitude to the distinguished experts who provided their invaluable time and expertise. I would particularly like to thank the project team for their valuable efforts.

I hope the report will contribute to a greater understanding of Türkiye's data and analytics maturity level.

Burak Tansan
Chairman of BCG Türkiye

We are in the midst of one of the most transformational periods in history... With exponential technological advancement, data has become increasingly central to the way we live and operate as individuals and businesses. The speed of data collection is light-years ahead of our ability to effectively use it hence we have come to an age with a massive abundance of data with advanced capabilities to effectively use data to improve our operating models as businesses. Yet the speed of data collection is only accelerating, meaning our capability building in data and analytics needs to significantly increase requiring a highly orchestrated effort across public and private institutions.

Boston Consulting Group, in partnership with AWS and TÜSİAD, deployed its proprietary Data & Analytics Capabilities Maturity Assessment (DACAMA) tool across a rich sample of Turkish companies covering a wide range of sectors. The results provide a never seen before picture of Türkiye's data & analytics maturity level vis-à-vis regional and global markets.

We observe that while the level of awareness is high, level of capability has ample room for improvement. According to our study, Turkish companies' data maturity ranks not only below advanced economics but also emerging market peers such as Brazil, Russia, Mexico and India. Türkiye will need to double down on building its data & analytics capability in the next 5-10 years to catch and surpass its peers. To do this companies will need to position data at the core of their business and develop capabilities in a structured and holistic manner.

Yet despite these areas of improvement starting point, we see a major opportunity for Türkiye in data & analytics. Considering Türkiye's global competitiveness in skilled low-cost human capital and deterioration of labor mobility barriers, we believe with the right investments and focus, Türkiye can become one of the global hubs for data & analytics and leverage it as a catalyst for the next wave of economic prosperity.

Accordingly; as BCG we have established the BGC Tech Hub in Türkiye to support the rapid digital and technology transformation. BCG Tech Hub will focus on cutting-edge tech strategies, digital and data-oriented products, advanced IT platforms, data analytics and AI projects, technology organization transformation and enablement in order to accelerate the bionic transformation in the institutions of the future for both in Türkiye and in the wider region.

Mehmet Ali Akarca
Vice Chairman Board of Directors of KoçDigital

A study reflecting the digital commitment of the economy

In today's globally competitive environment, the most fundamental factor that drives organizational success is the capacity to access and use real information. While the findings of the Data and Analytical Capability Maturity Assessment (DACAMA) define the standing of the Turkish economy and companies in the digital universe; it also provides important clues for the future.

As the management and consultancy project team of KoçDigital, which we founded with a 100% KoçSistem investment, we are pleased to share our experience in advanced analytics with the business world through this report.

Individuals and organizations have to possess a clear position and status information and develop an action plan with certain foresight in order to reach a certain goal. The "Data and Analytics in Türkiye" report, prepared under the leadership of TÜSİAD, which pioneered much valuable research on issues concerning the business world, offers a clear direction and road map to the decision makers of our business circles regarding the future of the global digital economy and trends.

We emphasize that Turkish companies need to be responsive to "data science" in order to take their place in the digital competitive environment, and we say once again, "data science equals economic development", and we move ahead with that strategy. Seeing that this approach takes hold and is even internalized in our businesses is a pleasing development to witness indeed.

I hope this report, completed under the leadership of TÜSİAD, will deliver valuable insights and gains to the enterprises, and I present it to the evaluation of our public and private sector representatives, as it is the harbinger of an important period and points to new missions ahead.

2 Executive Summary

TÜSİAD, BCG, AWS and KoçDigital have partnered to prepare this report on the state of data & analytics in Türkiye. The objective of the report is to create awareness on the importance of data & analytics in driving business value & stimulating investments in the field.

A comprehensive data maturity assessment of the global and local context was conducted as part of this report including a DACAMA (Data Capabilities Maturity Assessment) survey across approximately 60 companies in Türkiye, interviews with the C-levels of around 10 companies and the benchmarking of +1,000 global companies in 30+ different countries.

Five key insights from our study:

1. Data & analytics is now a business imperative and core driver of enterprise value - Today 8 of the 10 largest global companies are data driven; 15 years ago, this ratio was a mere 1 out of 10.

2. Going forward, seven key trends are expected to shape the future of data & analytics. These are: smart and ethical AI, hyper-automation, augmented reality, quantum computing and data & analytics as a core business function.

3. Globally, the growth rate in data maturity has almost doubled since 2018 reflecting significant efforts and investments – Major gains in foundational capabilities (data governance, data platforms, ecosystems, and leadership).

4. In Türkiye, CXOs believe that they are doing a good job in extracting value from the data, yet our analysis indicates that local companies have up to a 50% lower maturity vs. the best practice countries and are even demonstrating a sub-par performance vs. emerging market peers.

5. To improve maturity, Turkish companies need to adopt a holistic approach – The data & analytics journey is multi-faceted across 4 key pillars:

- **I.** Vision setting & use cases: Driven by business & analytics teams
- **II.** Analytics organization & governance: Driven by HR
- **III.** Tools & technologies: Driven by IT
- **IV.** Change management: Driven by leadership

3 Global outlook for data & analytics

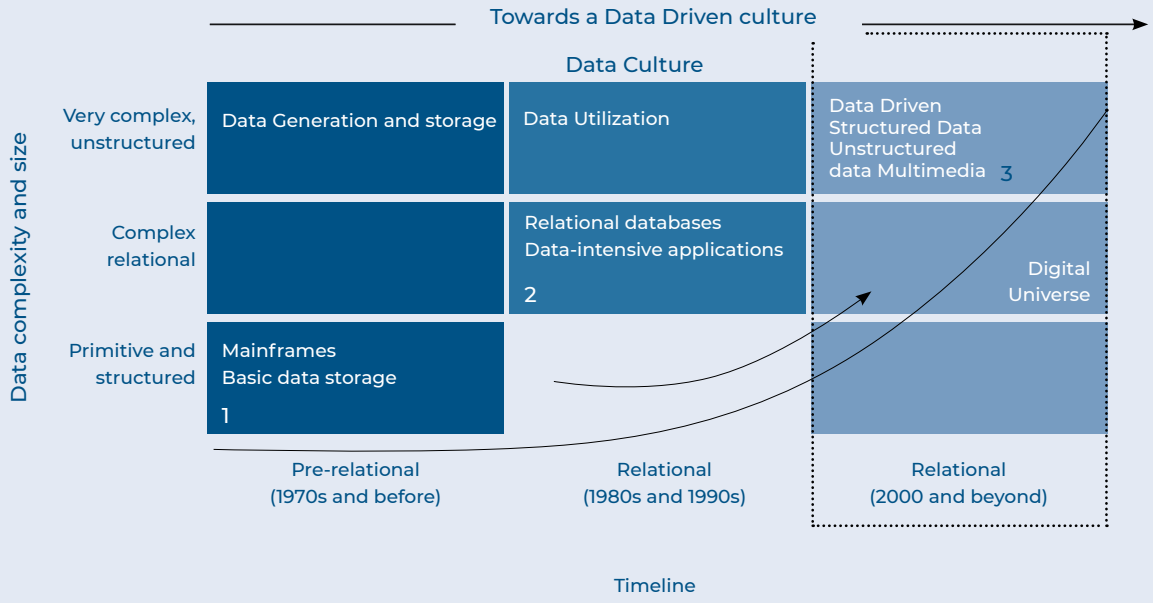
3.1 Introduction to data & analytics

According to the Oxford Dictionary, data means "facts and statistics collected together for reference or analysis," while analytics is "the systematic computational analysis of data or statistics." Data and analytics are the combination of two disciplines: An old one; statistics, and a relatively new one, computer science. Even if in the last decade it has become extremely popular with the dispersion of "big data," data analytics has a rich history.

In the 2000s, we entered the era of Big Data, where new internet-based companies, such as Google, Facebook, and Amazon started to leverage new kinds of information and became giants. This was mainly the result of effective data usage and putting data at the core of their businesses. In 2000, Peter Lyman and Hal Varian (the Chief Economist at Google since 2002) calculated the amount of stored data for the first time as 1.5 billion gigabytes. This number may seem absurdly miniscule considering that streaming only one HD Netflix movie can eat up to 4 gigabytes of data, but at that time, a standard computer had a RAM of 512 megabytes at most. In the mid-2000s, "Web 2.0," which is defined as a user-generated web, increased data volumes immensely. In 2005, "Big Data" was first explained academically as "large sets of data that cannot be analysed with traditional tools" by Roger Magoulas. In 2010, the International Data Corporation (IDC) measured that globally around two trillion gigabytes of digital information was created that year. Today, the amount of data each person creates daily is approximately 2.5 billion gigabytes.

Starting from the 2010s, data was not only being utilized by a few technology firms, but was also being adopted by all firms in every industry. Big data has become the key to optimizing processes, services, production, management, in short everything needed for companies to function. Moreover, big data is directly linked to several developments including AI/ML, Cloud computing, IoT, AR/VR, and Robotics. Data and analytics monetization has become a key value source and has led to the success of new business models like Google, Amazon, Uber, Facebook, & Alibaba. BCG analysis shows that there might be an additional $65M in potential net income for Fortune 1000 companies if they are only able to increase their data accessibility by 10%.

The evolution of Data: Moving towards a Data Driven culture



1. IDC, The Digitization of the World-from Edge to Core (November 2018)
2. Big Data and Business Analytics Market, Allied Market Research September 2020; BCG analysis

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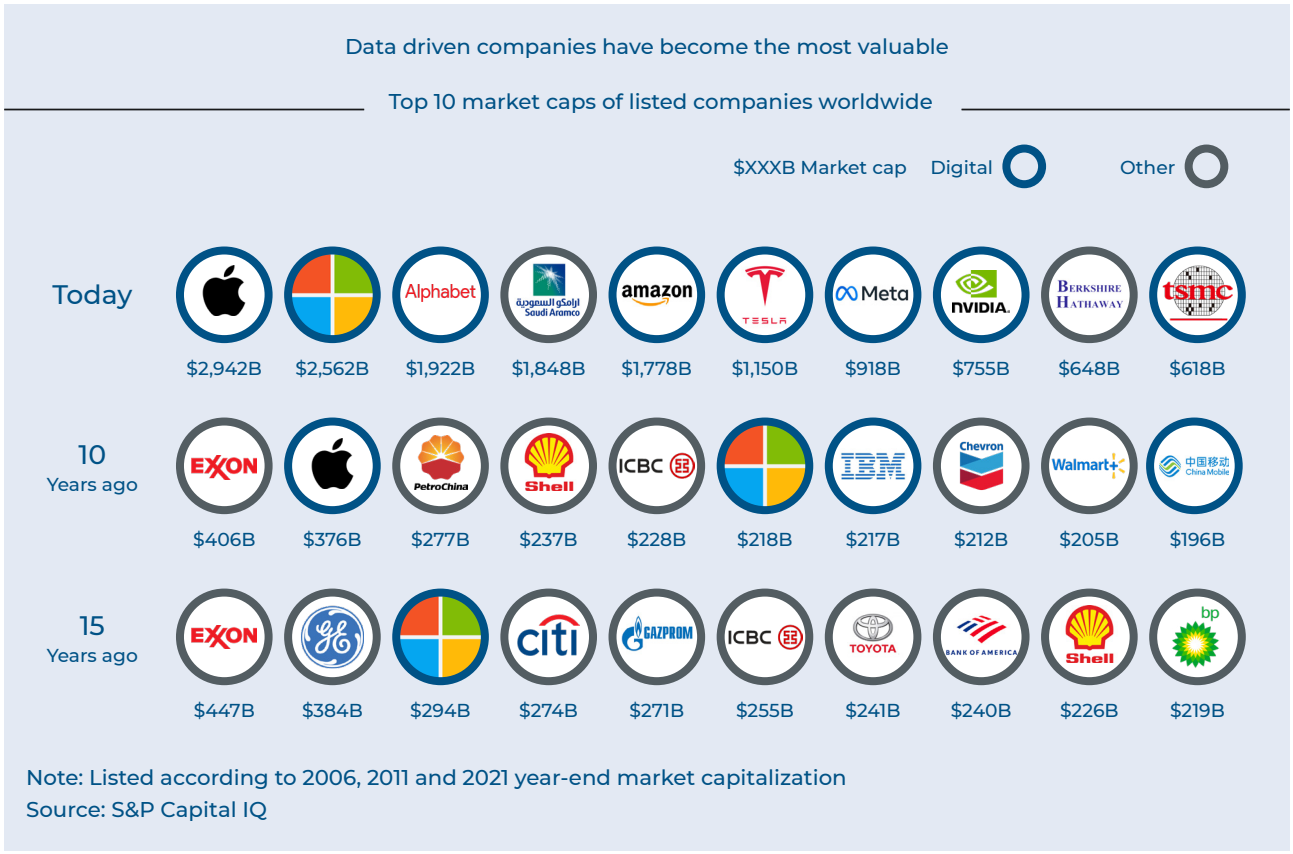
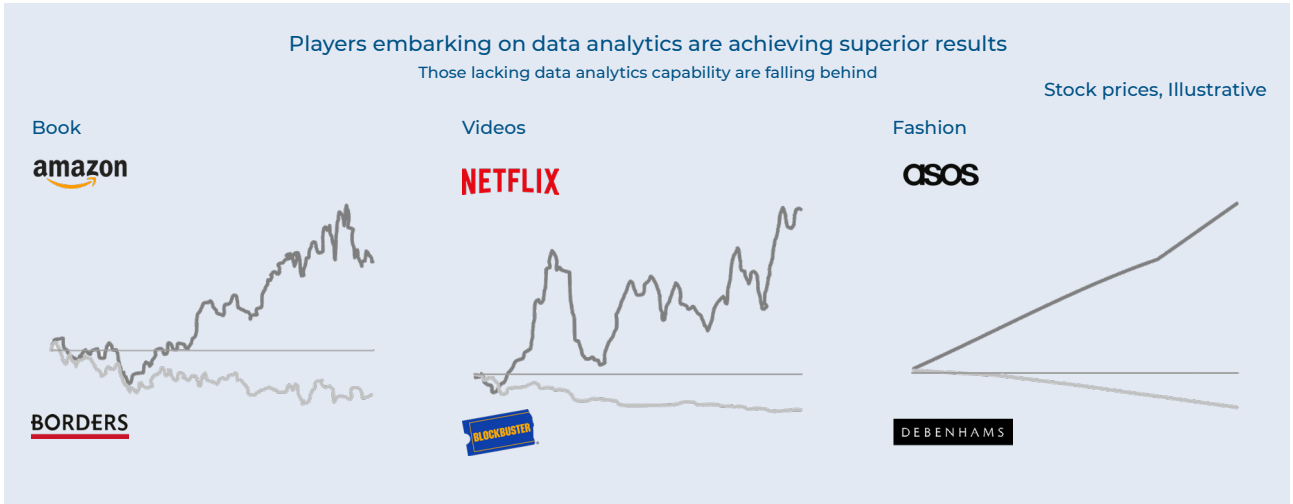


Data and analytics has evolved since the ancient times when people tried to store information with one aim in mind: finding new ways to store more data to make better forecasts for the future. Today, data and analytics is no longer "nice to have" for institutions, but has rather become a "hygiene" factor in a rapidly transforming competitive landscape.



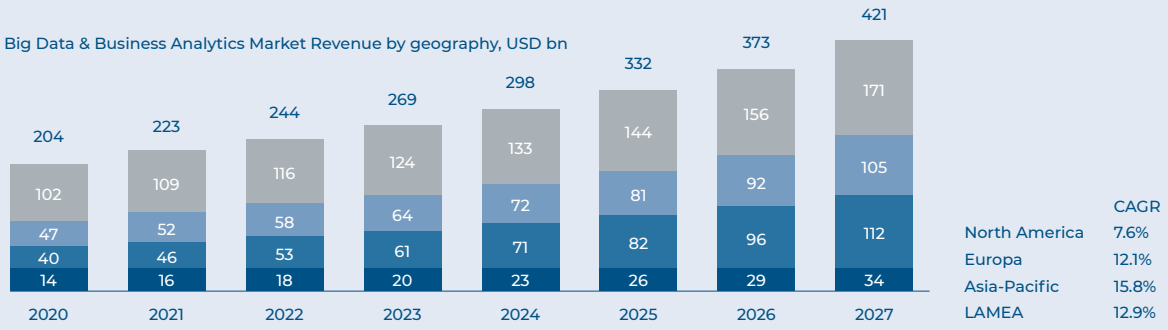
3 Global outlook for data & analytics

Data & analytics has become such an integral part of today's business world that the maturity of data and analytics directly translates into valuations and shareholder returns. Today, the global big data and analytics market is estimated to grow at a CAGR of 10.9% (2020-2027) and is expected to reach $421 billion by 2027. In 2018, North America was the leader as far as the big data market size, but the Asia Pacific region had the highest CAGR (15.8%) across all the regions.

Compared to more mature markets, Türkiye's data & analytics market has ample room to grow. The Turkish data and analytics market is 0.05% of GDP compared to 0.2-0.5% in the developed world.

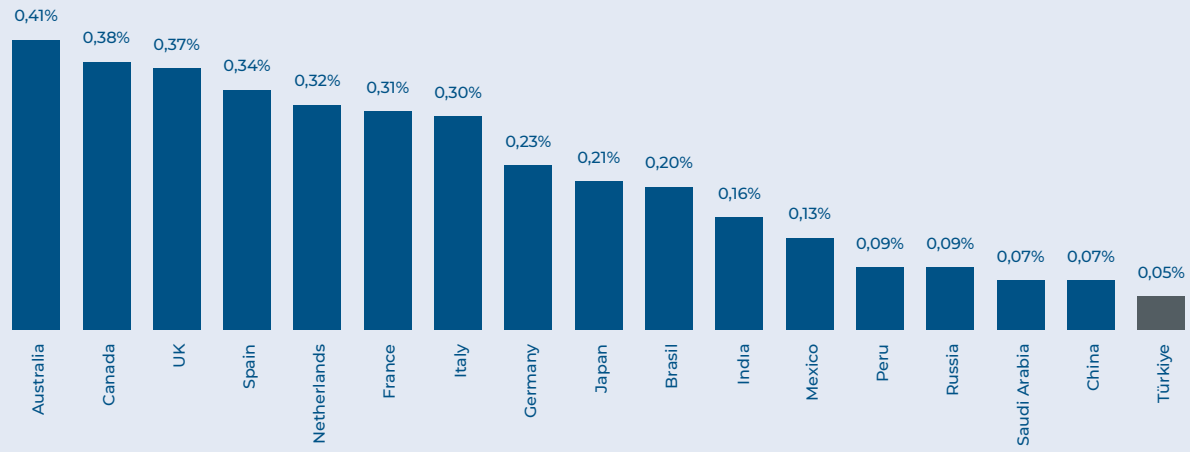
Going forward, Türkiye needs to invest significantly to catch-up to these nations. Increasing investment in data & analytics is not only critical to drive business value, but can also be a great competitive advantage for Türkiye's global economics positioning. With well-educated human capital who are highly cost competitive from a global perspective, Türkiye is well able to transform itself from an "engineering nation" to a "data nation."

Big data market is growing across regions, but Asia Pacific is expected to witness highest CAGR (15.8%)



Source: Allied Market Research "Big Data and Business Analytics Market" report

Big Data & Business Analytics Market Revenue (2020) as % of GDP



Source: World Bank; Market Research; International Data Corporation

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3.2 Global trends, use cases and best practices

Since the COVID-19 outbreak, technology has played a tremendous role in maintaining the normalcy of our everyday lives. In fact, within a few short months after the pandemic, the adoption of technologies accelerated exponentially.. Under these circumstances, more data was generated than ever before, which fundamentally changed the market.

This report will highlight the 7 key trends which are expected to shape data & analytics in the near future:

1. Data and analytics as a core business function
2. Composable and democratized data and analytics
3. Engineered decision intelligence
4. Smarter & ethical AI leveraging small & wide data
5. XOps and hyperautomation
6. The rise of the augmented consumer experience
7. Quantum computing

3.2.1 Data and analytics as a core business function

One of the key transformations that occurred almost instantly with COVID-19 was the change in the perception of data & technology among executives. Leaders from the private and public sectors understood the importance of leveraging data to speed up processes. Instead of being owned by only the Data & Analytics department, data started to be placed right in the centre of all business activities and decisions. However, this also brought about some complexities which should not be underestimated. Instead of conducting data projects for the sake of being "innovative," leaders should now strive for tangible goals and KPIs, as not to miss a chance to increase business value by a factor of 2.6X[1].

One of the best-known examples from the recent years was the practical usage of big data in the test & trial processes to accelerate the COVID-19 vaccine roll-out. Companies like Verily (formerly Google Life Sciences) also offer research solutions to increase clinical research participation while finding the most effective way to cure patients according to their own metabolisms and medical conditions via merging hardware, software and clinical expertise as well as a COVID-19 perspective. Getir was founded in 2015 to offer an on-demand "ultrafast" delivery service for grocery items. The startup leveraged advanced technologies such as route optimization and data & analytics to expand into new geographies and verticals which led them to become the second Turkish unicorn.

3.2.2 Composable and democratized data and analytics

By making data more composable and democratized, it can become the core of businesses. The ultimate goal of composable and democratized data is to leverage multiple data sources, analytics and AI solutions to create more user-friendly and predictable insights, which will eventually lead us to better business decisions. It also improves data capabilities within the organization and increases data access; thus, increasing collaboration and breaking down silos in an organization. Data can only become more democratized if it is moulded according to user needs, offering automated dashboards & graphs, and making insights easily understandable and accessible not only to a limited group of data experts, but to everyone within an organization.

UPS is an excellent example of how composable and democratized data impacts business results. UPS used advanced algorithms for continuous delivery route optimization. In 2019, UPS added a dynamic routing system to its ORION, the route guidance platform for local UPS delivery drivers, many of whom complete an average of 135 stops each day. ORION provides drivers with detailed turn-by-turn directions, not just to delivery addresses, but to specific package drop-off and pick up locations like loading docks that are not visible from the street. As a result, ORION's deployment has saved UPS about 100 million miles and 10 million gallons of fuel per year.[2]

3.2.3 Engineered decision intelligence

Since predictive analytics developed, decision-makers have been utilizing the techniques to make even more accurate, replicable choices. Decision intelligence is the future of decision-making. It is an engineering discipline that uses data science, decision theory, social and managerial science; not only for individual decisions, but for repetitive decision series and patterns. It enables organizations to understand the data and consistently make successful decisions.

Western Union is another great example of how engineered decision intelligence can be a game-changer for organizations. Western Union used big data analysis to improve the customer experience and for risk management. The company partnered with multiple trusted software and system providers to ensure data collection, analysis and storage consistency and reliability. As a result, its data hub now serves as a single repository, so that Western Union can better know its customers, impact transaction and drive customer compliance to result in better conversions for customers real-time with low Total Cost of Ownership (TCO) at scale.

[1] Gartner, 2021
[2] ORION: On-Road Integrated Optimization and Navigation tool by UPS www.aboutups.com

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3.2.4 Smarter & ethical AI leveraging small & wide data

Once the domain of science fiction movies, Artificial Intelligence (AI) is now part of our everyday lives. However, instead of becoming a sinister mastermind, AI is being designed to promote ethical values. This comes on the heels of incidents like Microsoft's Twitter bot Tay - which turned misogynistic and racist in less than 24 hours in 2016. This led to tremendous developments within five years where frameworks were created to utilize and secure ethical AI.
In the past two years, with increased uncertainty and lack of reliable data, AI now needs to operate in environments where less relevant data is available. Therefore, it needs to adopt "small and wide data" algorithms and adaptive machine learning techniques which respect and secure data privacy. Small Data, as the name indicates, differs from Big Data as it requires solving significant challenges in data scarcity. Wide Data means various structured or unstructured, but relatable data points from multiple data sources, that are necessary to enhance the decision process.

Walmart is yet another unique retail giant which creates real-time marketing campaigns using its state-of-the-art analytics hub, called Data Café. The main aim of establishing this hub is to use data in complex decision-making. It connects to over 200 internal and external sources, whichprovide data on local events, weather, petrol prices, etc. to help anticipate customers' expectations. Data Café has enabled Walmart to process approximately 25 thousand requests per hour - Over 90% of which are analysed within the first two seconds. As a result, Walmart can analyze the list of customers' previous purchases, the goods on stock, define their location, etc. in a couple of seconds and send them an ad. These smart AI actions have enabled Walmart to predict and lead customer activities seamlessly using small & wide data.

3.2.5 XOps and hyperautomation

XOps diminish the inefficiency of having multiple workforces and leverage economies of scale via merging data, machine learning, modelling and platform workforces into one coherent and cohesive workstream. The main aim of establishing XOps is to enable easy adoption and execution of data and analytics processes. XOps secure reliability, reusability and repeatability via enabling automation and synergies in decision making processes to drive value for organizations. Automation helps to contribute to the bottom line by abandoning mundane activities for more efficient processes and drives top-line growth by providing opportunities to strategically focused value added activities. A prime example is from a leading retailer that increased revenues by nearly $1.5 billion via automation tools. Automation combined with XOps increase workforce efficiency and channel employee efforts into value added tasks.

In 2019, Sanofi collaborated with Google in a new healthcare Innovation Lab to invent and innovate medicines and health services by leveraging the power of emerging data technologies. Companies apply AI across diverse datasets to better forecast sales and inform marketing and supply chain efforts. Sanofi had three main objectives in mind when it partnered with Google alongside developing new treatments. These included better understanding of patients and diseases, increasing Sanofi's operational efficiency and improving the experience of Sanofi's patients and customers. Sanofi foresaw that this partnership would accelerate and simplify legacy management, provide easy access to recent technologies and their integration into Sanofi's business plans by leveraging automation and scalability as the transition to the Google Cloud Platform would maximize operational cost efficiency and support its business objectives.

3.2.6 The rise of the augmented consumer experience

The COVID-19 pandemic changed the way businesses operate and becoming digital is even more critical than ever. In a hyper-individualized world, it is inevitable to alter the way organizations communicate with consumers. To reach them effectively and improve their experience, organizations should digitize their operations. This digitization will naturally lead to more data generation, which will thusenable organizations to better understand consumers and reach them more effectively.

One of the most outstanding examples is Spotify which uses Big Data to enhance the customer experience. Spotify adopts Artificial Intelligence and Machine Learning algorithms to develop personalized content for its users. In July 2015, the "Discover Weekly" emerged as one of Spotify's biggest trump cards, compiled fully through a machine learning algorithm. Since December 2015, Spotify has begun to report its users' activities over the past year on the platform with the "Spotify Wrapped" feature. This year Spotify Wrapped 2021 allowed the platform to grow by 21% in terms of downloads. For some users, data sharing might be intimidating; however, Spotify leverages its data flawlessly and in coherence with the purposes of the platform itself. It is therefore able to enhance its offering and reach more users.

Citi Group is yet another company where big data & analytics is used to optimize clients' access to information via Citi Velocity Clarity, a data and analytics platform which uses Big Data & an integrated suite of advanced online functionalities. Content is personalized to a client's needs by using a series of dashboards which are capable of monitoring and analysing data regarding a client's investments including portfolio analysis, valuation, holdings, net asset value, country exposures, and trading flows.

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3.2.7 Quantum computing

The term "Quantum computing" has come to forefront in the last couple of years. But what is quantum computing and how will it change our lives? Quantum computing is a type of computation that uses the quantum mechanics law to solve problems which are too complex to solve via classic computers. This advantage vis-à-vis classic computers is also defined as a "quantum advantage. "Quantum computing was first proposed as the quantum mechanical model of the Turing machine by Paul Benioff in 1980.

In 2020, investments in quantum computing tripled from the year before reaching the highest level in history. BCG estimates that quantum computing could create value of $450-850 billion over the next 15-30 years. A value of $5-10 billion could start accruing to users and providers in the next three to five years if the technology scales as quickly as promised by key vendors. Examples of possible applications of quantum computing include:

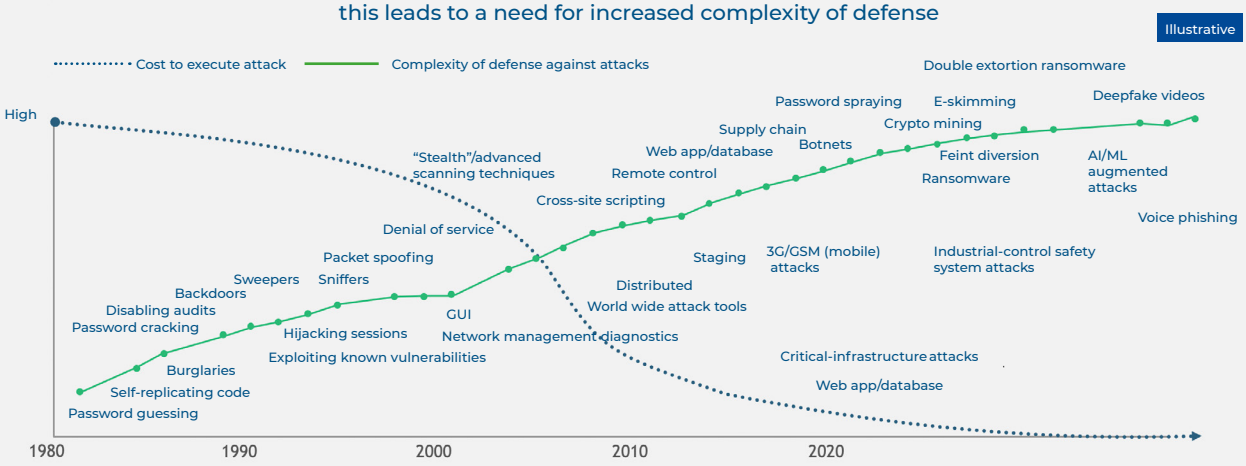
- ***Healthcare:*** Faster and more reliable development of medicines including personalized medications via "digital twin" (human body simulations)
- ***Cybersecurity:*** Quantum secured systems for voting, health data, communications and national-security related data
- ***Business:*** The use of algorithms to optimize complex problems (e.g., scheduling, sourcing)

3.3 Cybersecurity: increasingly important need for data protection and security

Cybersecurity is becoming an increasingly important large-scale problem. The global cost of cybercrime is rising precipitously, driven by the relative inexpensiveness of executing attacks and the difficulty of fending off such attacks coupled with both the private and public sectors struggles to respond. In 2021 alone, there were major cybersecurity breaches, leading to hundreds of millions of stolen data records. For example, a software-firm hack in February 2021, led to data compromises across 9 federal agencies and 18K companies. Prominent hacks in 2021 led to the issuance of the U.S. Cyber Executive Order in May, which established new rules for government suppliers for enhanced cybersecurity. Private companies as well, wrestle with the impacts as they are hit with class-action lawsuits from employees, customers, and partners after ransomware attacks (e.g., after pipeline hack, customers sue as supply dried up) and increasing regulatory fines and sanctions.

The global cost of cybercrime is projected to rise from $445 billion in 2015 to $2.2 trillion by the end of 2021, marking an approximately 5 fold increase. According to Gartner, in 2022 global cyber security spending will reach $133.7 billion.

Cyber attacks are increasingly cheaper to execute as technology advances; this leads to a need for increased complexity of defense



As pandemic drove a massive increase in digital and devices, cyber-attacks has been rising even more as the attack surface expands

- ~600%: Spike in phishing attacks in the first quarter of 2020
- ~80%: Of IT teams saw a rise in cyber-attacks in 2020
- ~50%: Increase in health care system hackings in the US in 2020

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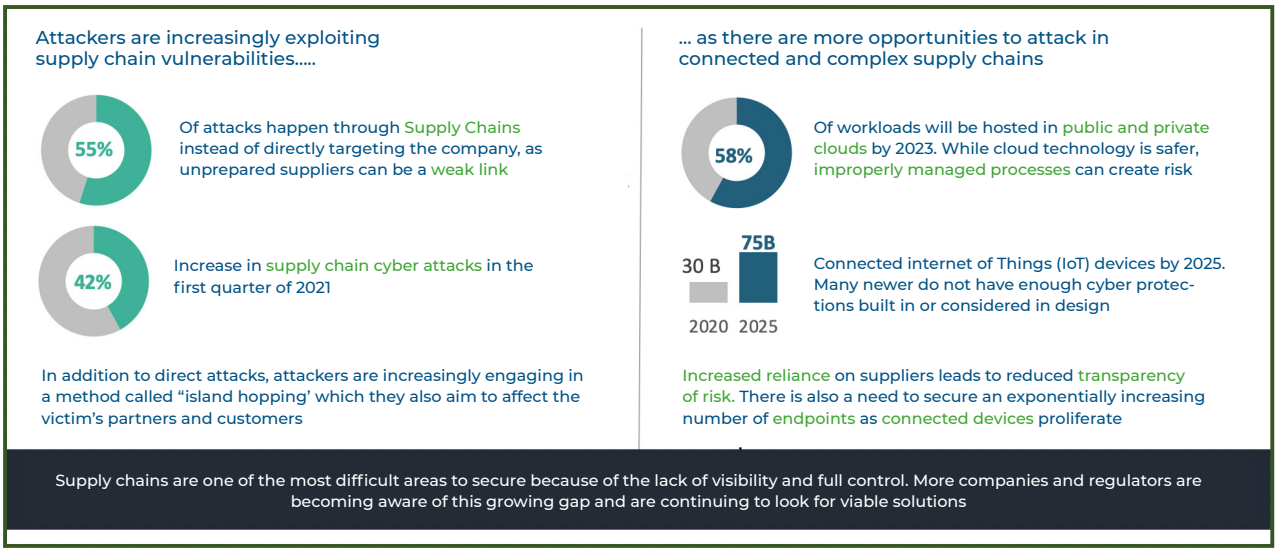
As COVID-19 expedites digital connections and increases cyber risks, the breadth of impacts from cyber attacks also expands

Yet, 84% of companies do not effectively mitigate third-party cyber risks. According to Gartner only 5% of the companies are effectively protected from cyber threats. Cyber risks are beyond financial (e.g., operations) and can threaten an organization's existence and even human safety (e.g., attacks on infrastructure/machinery, health care). Cybersecurity attacks are the top business threat in North America, #2 in Europe, and #5 in Asia-Pacific. As supply chains become more connected and complex, they are increasingly targeted.



Therefore, it is critical for CEOs to set the cyber ambition and integrate cybersecurity into their business processes and broader strategy

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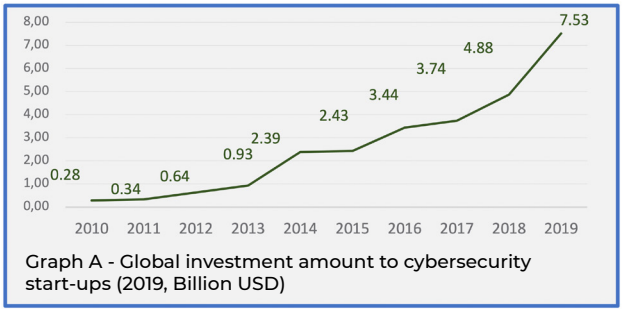
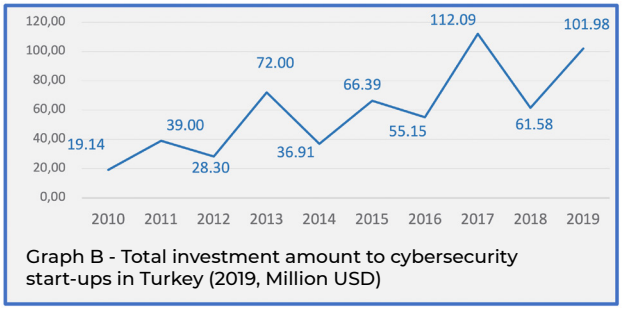
Globally, cybersecurity is becoming more and more important, but the Turkish market is growing at a much slower pace compared to global players. In order to accelerate cyber security incentives, the Department of Cyber Security, which serves under the umbrella of the Digital Transformation Office (DTO), was established in October 2019. The main target of the DTO is to define national targets, enable projects for swift progress, track action plan outputs and identify essential infrastructure to develop. Additionally, in order to improve collaboration between the public and private sector, universities and start-ups, Teknopark Istanbul is planning to establish a new cyber-security-focused incubator in cooperation with the Department of Cyber Security of the DTO, Presidency of Defense Industries and Turkish Cyber Security Cluster.

These actions have yielded positive ramifications as , investments in cyber security start-ups have increased exponentially in last 10 years globally (Graph A) and in Türkiye (Graph B), according to Crunchbase.



Graph A - Global investment amount to cybersecurity start-ups (2019, Billion USD)



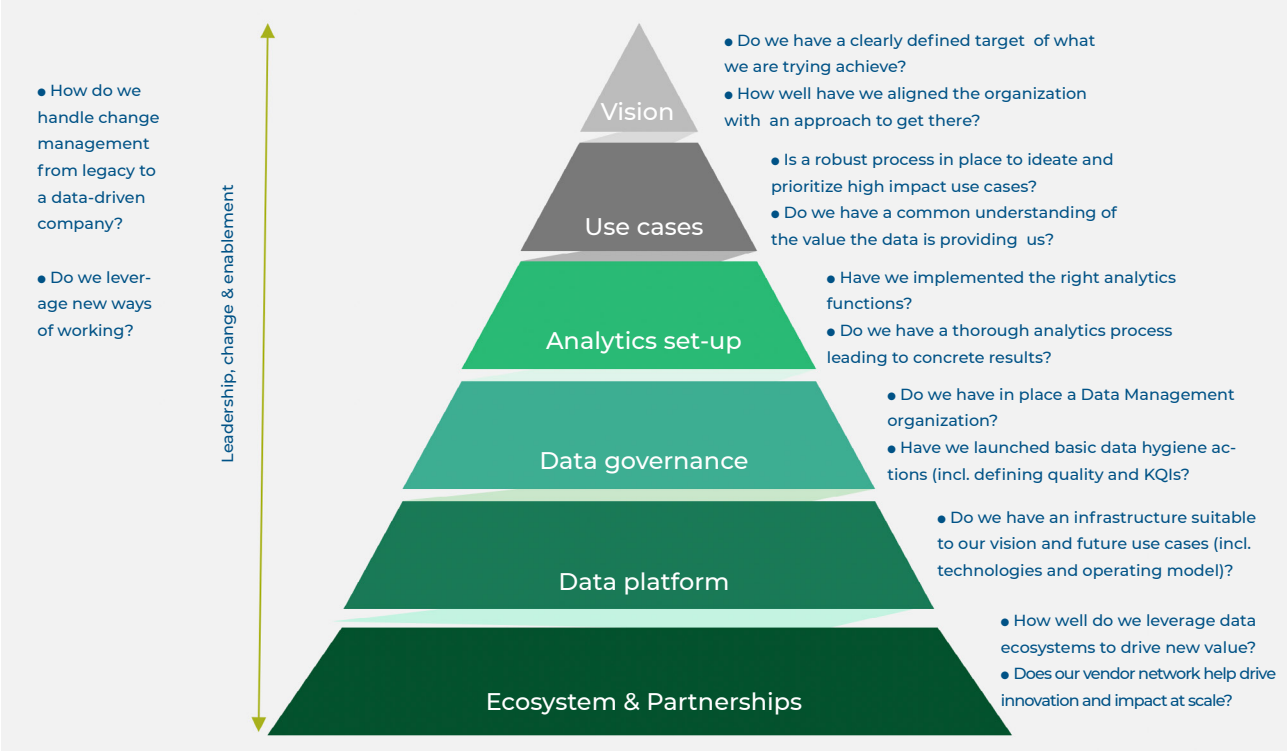
Graph B - Total investment amount to cybersecurity start-ups in Turkey (2019, Million USD)

4 State of data & analytics in Türkiye

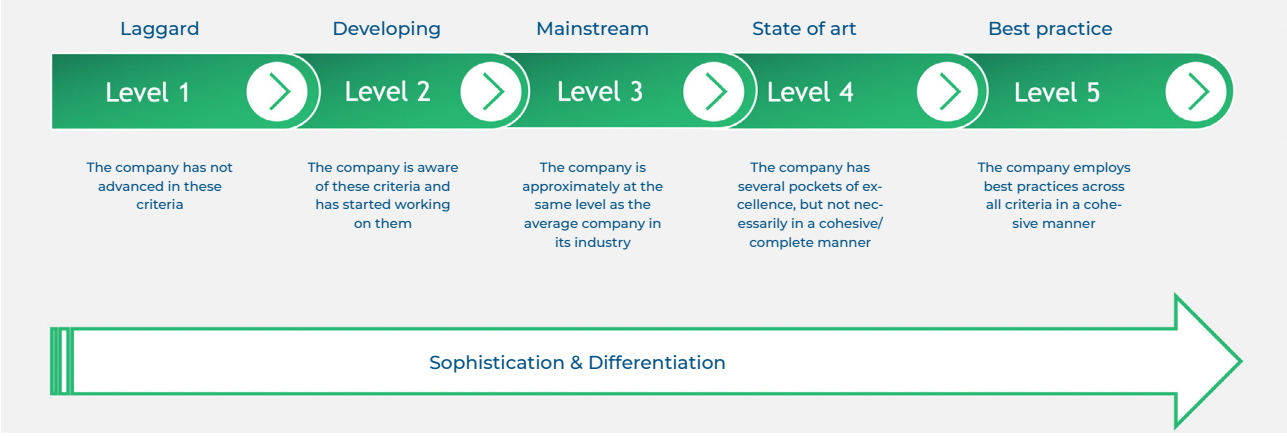
4.1 BCG's Data Capabilities Maturity Assessment approach for Turkish market analysis

Data usage is evolving rapidly and, to reflect this trend, BCG built a comprehensive capabilities model. This model is used in BCG's legacy framework called Data Capabilities Maturity Assessment or in short "DACAMA." The framework provides a thorough assessment of the maturity of an organization's data capabilities.

As of April 2021, more than 1,100 companies from 32 countries[3] aside from Türkiye had been assessed using DACAMA through BCG expert interviews and online self-assessments.



DACAMA examines the framework's 6+1 data capabilities along five maturity levels with increasing sophistication and differentiation levels using 20 dimensions and 44 criteria.



[3] Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Denmark, Finland, France, Germany, India, Italy, Japan, Kuwait, Mexico, Netherlands, Norway, Peru, Poland, Portugal, Qatar, Russia, Saudi Arabia, Singapore, Spain, Sweden, United Arab Emirates, United Kingdom, United States of America

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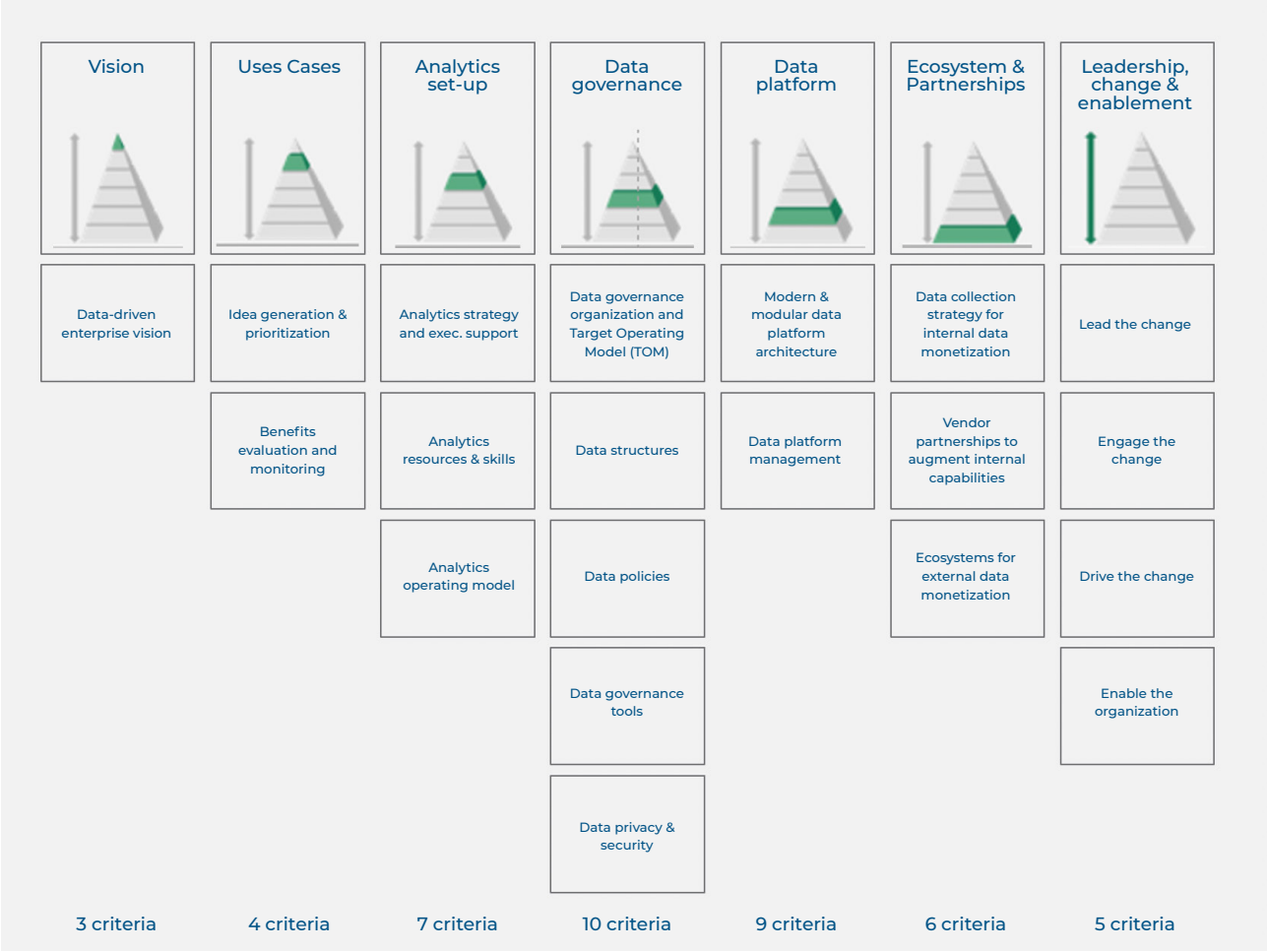


Criteria are weighted to reflect the importance and speed of market adoption. We weighted the competencies and created an index from 1 to 5 to place companies at a data maturity stage: Lagging (1), Developing (2), Mainstream (3), State of the art (4), or Best practice (5). Critically, the survey asked companies about their current performances and their aspirations for the subsequent three years. Capabilities were described through weighted criteria:

- Must-have capabilities(critical stakes) – 5 points
- Advanced capabilities (currently differentiating) – 3 points
- Prospective capabilities (found in a few leaders) – 1 point

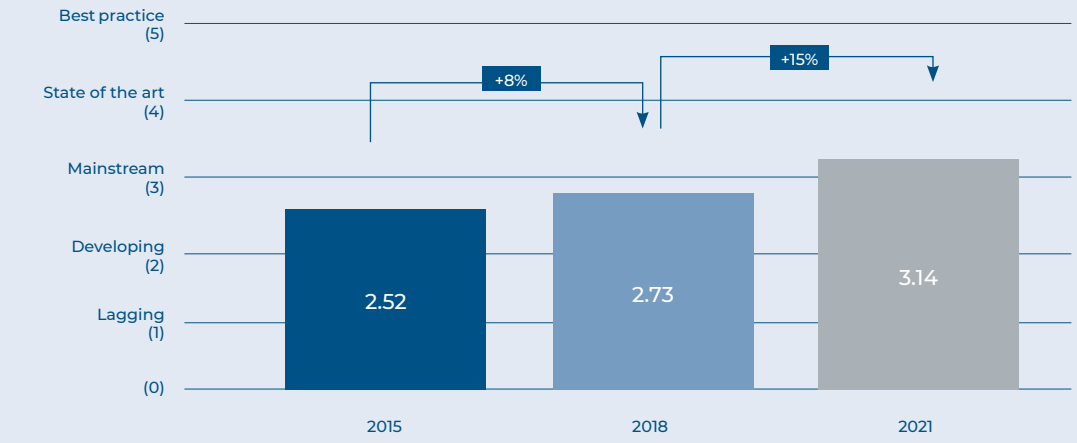
For each criterion, we asked two questions: "What level best describes the current state of your capability?" and "What level best describes your mid-term (3 years) aspiration?"

In the global DACAMA results five key trends in data capabilities were observed in 2021:

4 State of data & analytics in Türkiye

1. The market has signalled that data continues to be an essential agenda item for most companies

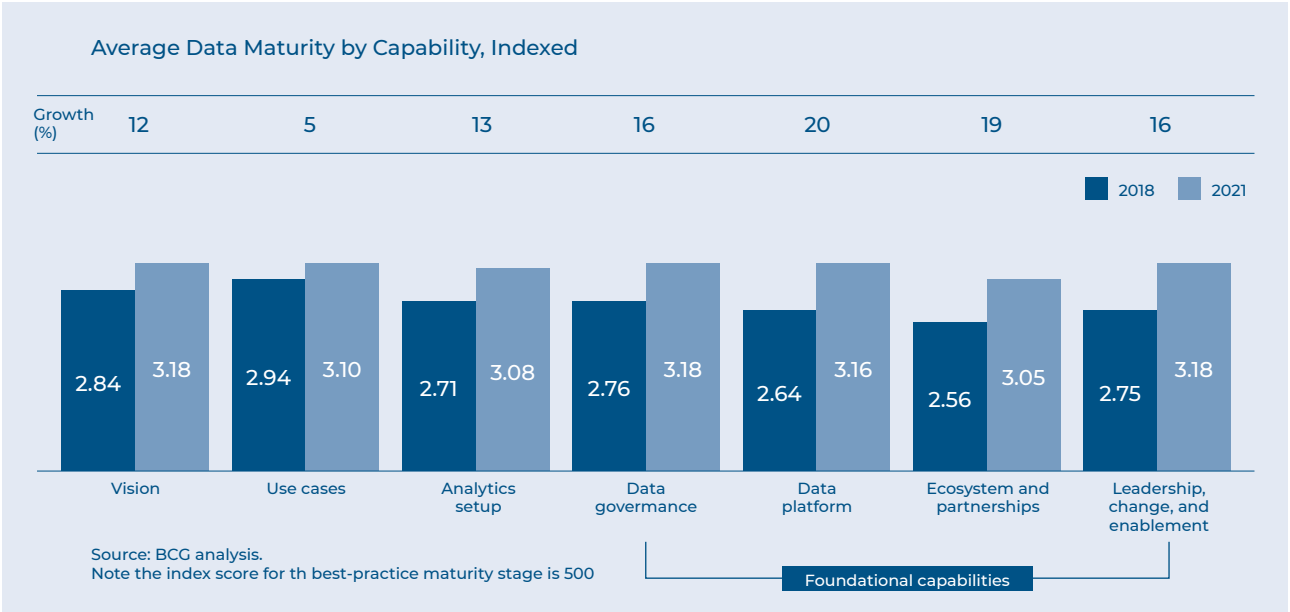
- 15% growth in the data maturity index score since 2019, 2x higher than the growth observed
- A 13x jump in players reaching state of the art data capabilities and thus demonstrating a competitive advantage over peers from the data



Source: BCG analysis.
Note the index score for th best-practice maturity stage is 500

2. Companies are focusing more on "foundational" data capabilities to drive differentiation

- All capabilities have grown in the maturity index score since 2019; however, "foundational" capabilities to help scale value from data have shown the most growth, such as Data Governance, Platforms & Ecosystems along with the Change needed in the organization



Source: BCG analysis.
Note the index score for th best-practice maturity stage is 500

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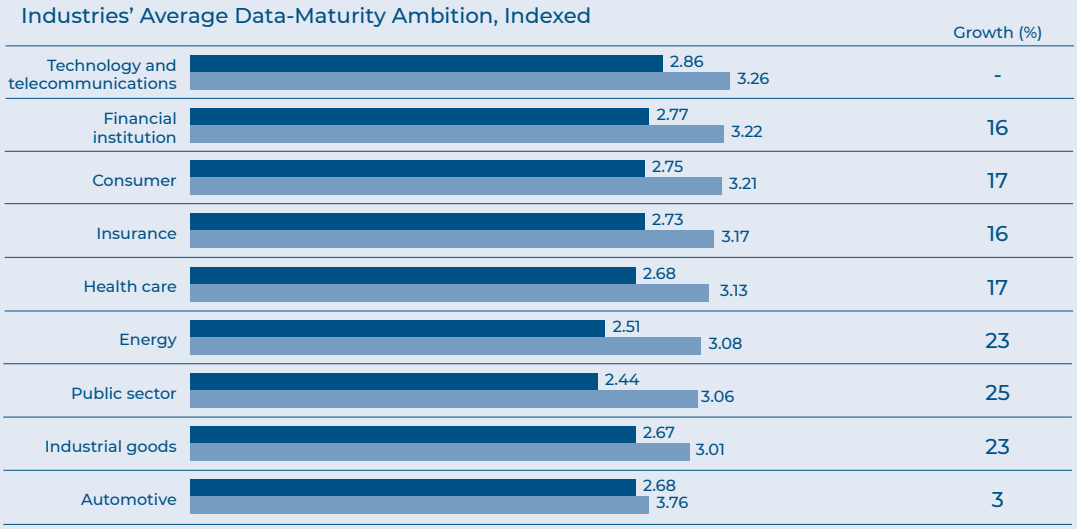
3. Industry leaders in the data remain consistent with the Energy & Public Sector having the highest acceleration

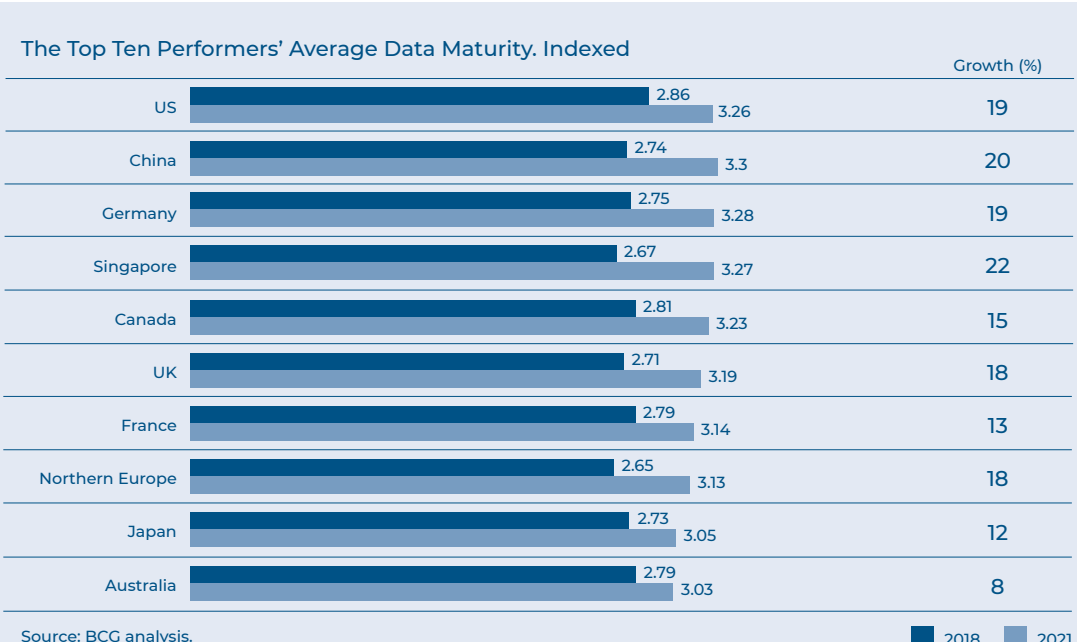
- Tech, Technology, Financial Institutions & CPG continue to lead in data maturity, as they did in 2019
- The Energy & Public Sector, however, registered the highest growth by as much as 25%. The Automotive Sector, meanwhile, lagged behind all the other industries.



Source: BCG analysis.
Note the index score for th best-practice maturity stage is 500

4. North America has strengthened its lead, but Asian countries like China and Singapore are closing in

- North America remains the leading region in data maturity; with the U.S. as the global leader
- Top ranking Asian countries, like China and Singapore, however, are closing the gap



Source: BCG analysis.
Note the index score for the best-practice maturity stage is 500. Northern Europe comprised Austria, Belgium, Denmark, Finland, Netherland, Norway, poland,Russia, and Sweden

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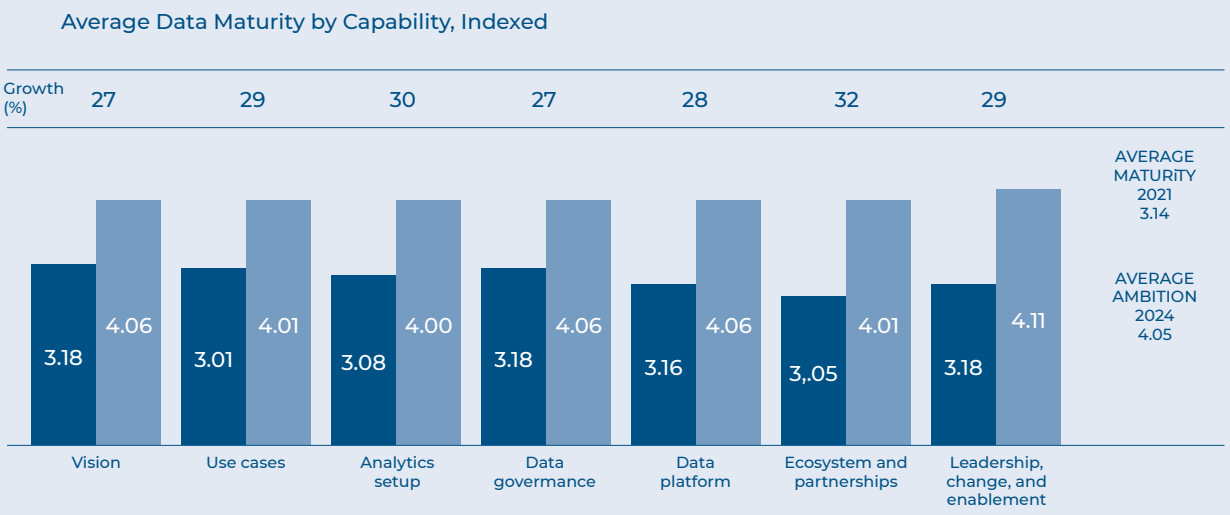
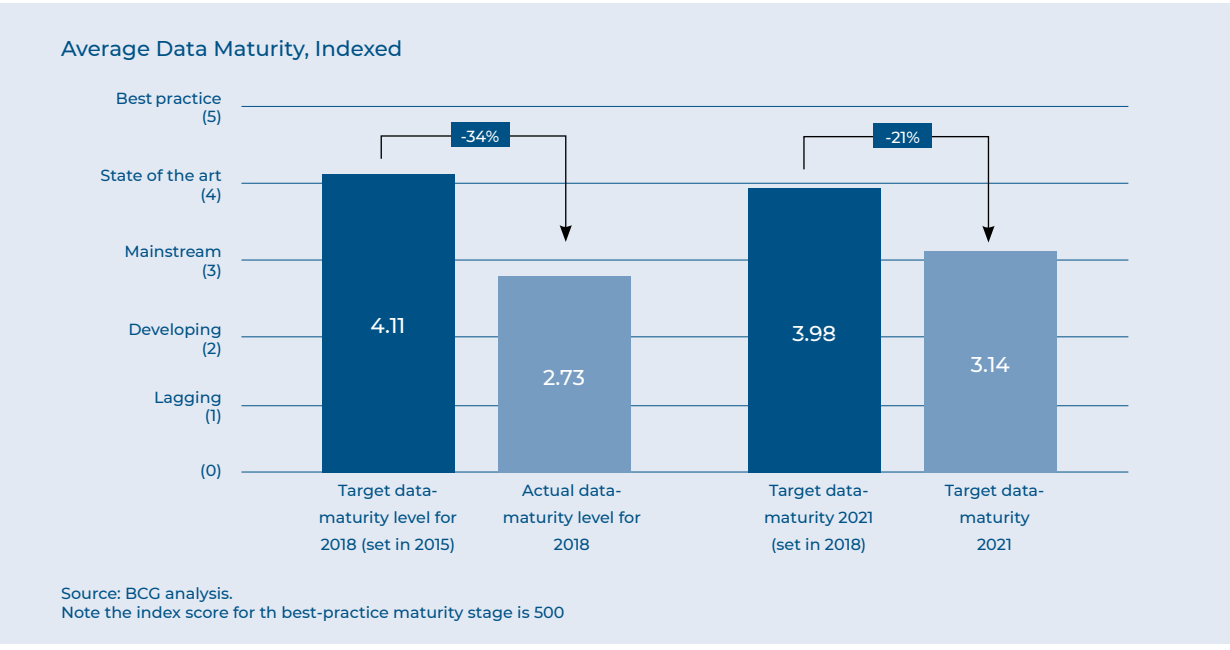
5. High ambitions regarding the data have been set for 2024; signalling it will remain a key differentiator

- The market targets state of the art data capabilities by 2024; requiring 30% growth which is 2x higher than the current growth rate



- Similarly, aggressive ambitions set in the past failed to materialize. Therefore, companies that are lagging must rethink their approach to avoid similar fates.



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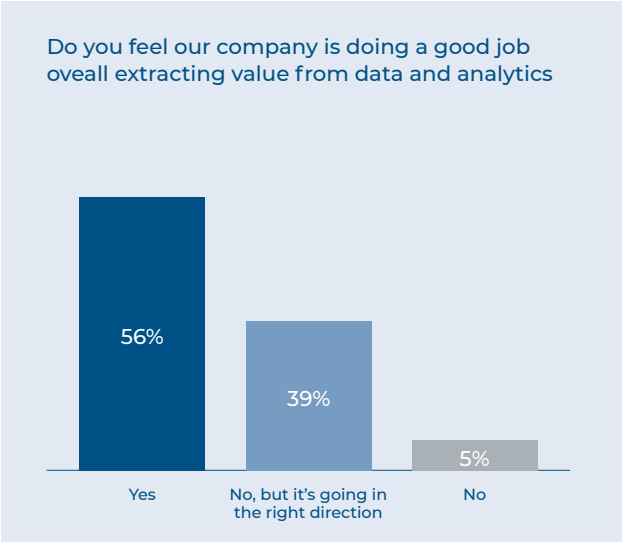
4.2 Current maturity level of data & analytics in Türkiye based on DACAMA

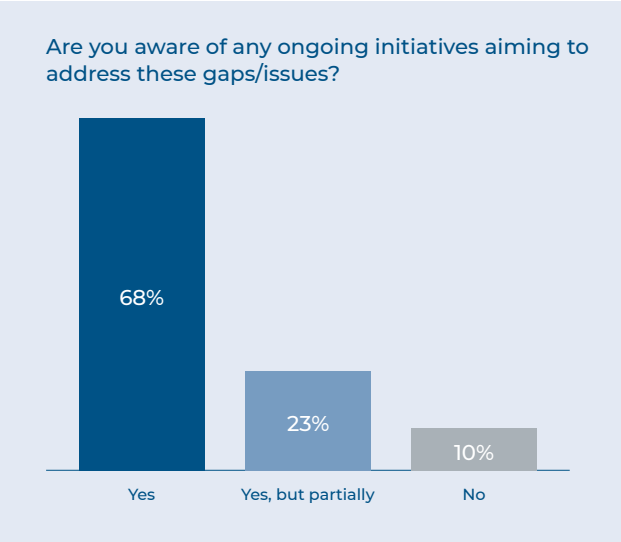
To assess and analyse the current Turkish market and future aspirations, BCG's DACAMA framework is being leveraged. In this paper, the results from 58 companies across eight different industries in Türkiye with various revenue and employee sizes are being utilized. DACAMA has been conducted for these companies at different time frames between April 2020 to December 2021. Almost 60% of the stakeholders who contributed to the DACAMA effort are CIOs, CDOs, CEOs and CTOs. The assessment also includes approximately 10 one-on-one interviews with selected executives to get more of an in-depth analysis.

In the Turkish DACAMA results, 3 key trends in data capabilities are observed:

1. Turkish companies are conscious about their data agenda and believe that they have decent capabilities regarding data and analytics; however, a huge effort is needed to reach data.

- In Türkiye, CXOs believe their companies are doing a good job in extracting value from the data and analytics
- 56% of respondents felt they are being successful with analytics, while 90% were fully or partially aware of the data agenda.





- Companies reflect that they want to utilize data in all their processes and are trying to adapt by using modern technologies. However, data initiatives lack trackable KPIs which makes it harder to assess the impact on the organization.

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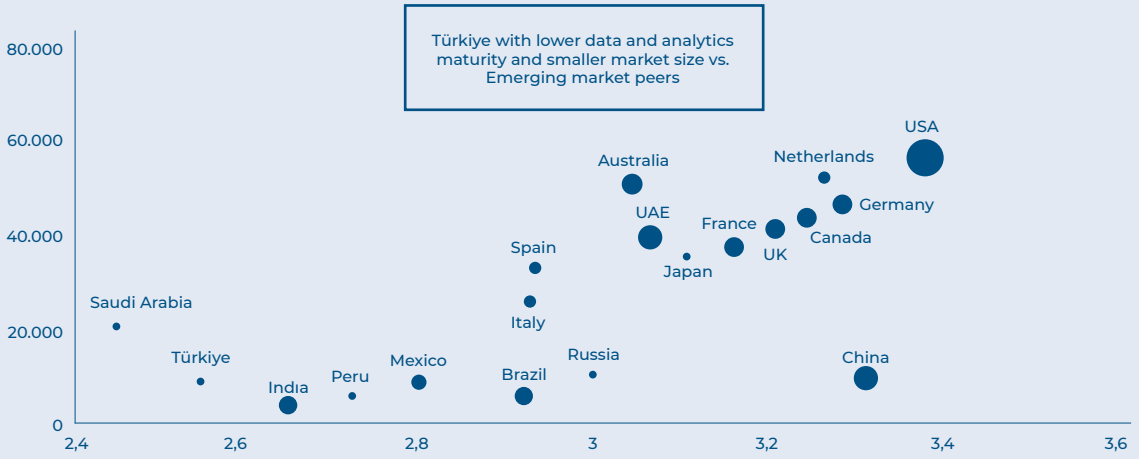
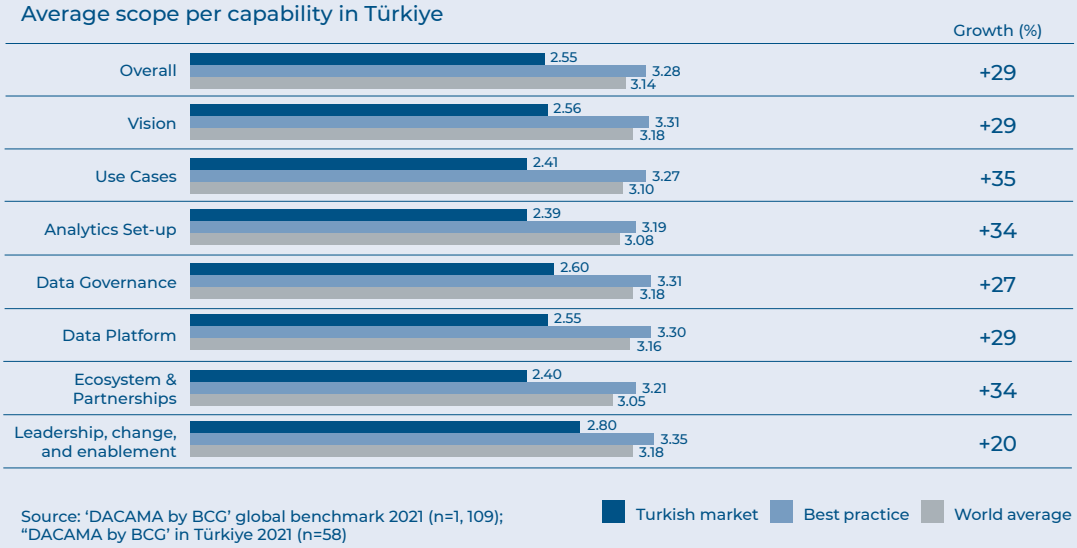
2. Turkish companies have lower data and analytics maturity vs. emerging market peers. In the DACAMA assessment, Turkish companies are lagging behind all regional counterparts.



Source World Bank; ‚DACAMA by BCG' global benchmark 2021 (n=1,109); DACAMA by BCG' in Türkiye 2021 (n=58)

3. Gaps observed across the framework yet use-case development, analytics set-up and ecosystem & partnerships are the areas for the greatest development.



Source: 'DACAMA by BCG' global benchmark 2021 (n=1, 109); "DACAMA by BCG' in Türkiye 2021 (n=58)

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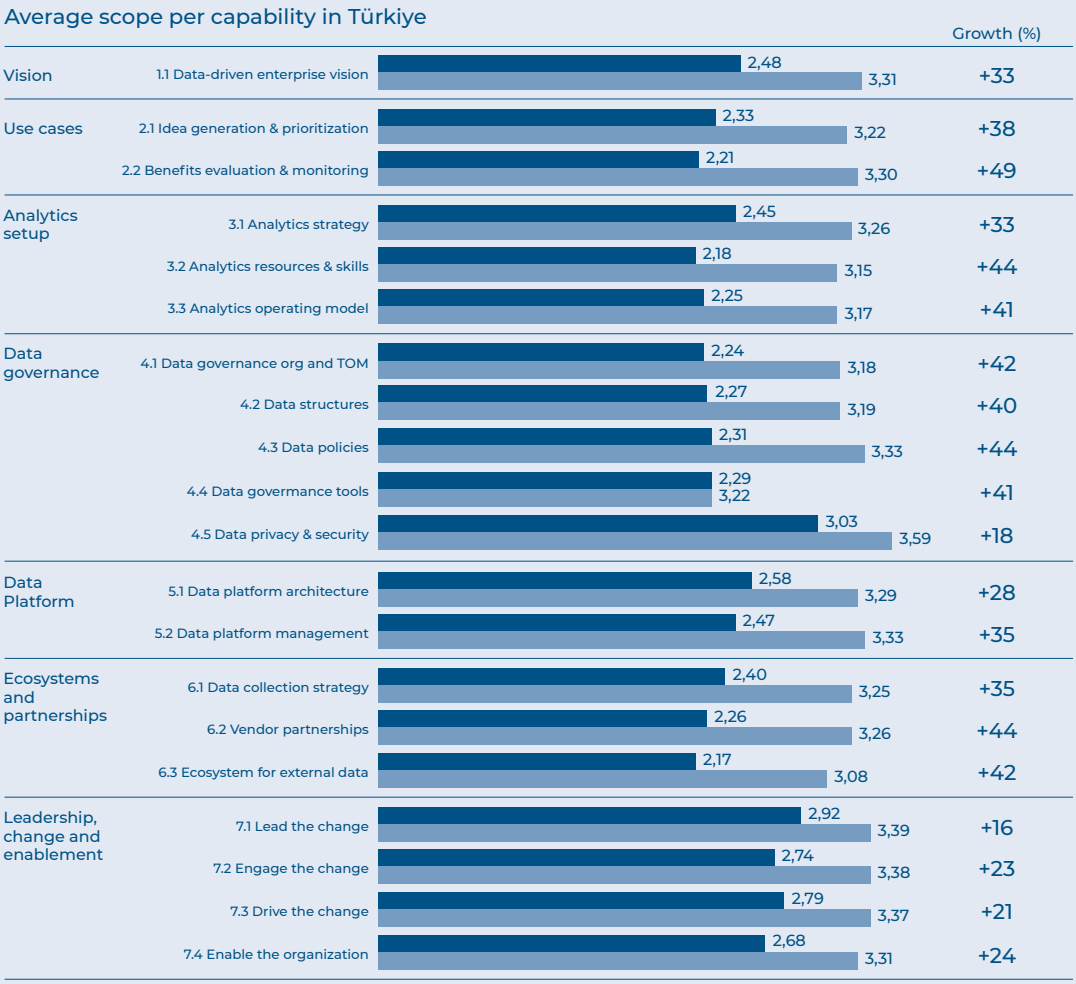

Source: 'DACAMA by BCG' global benchmark 2021 (n=1, 109); "DACAMA by BCG' in Türkiye 2021 (n=58)

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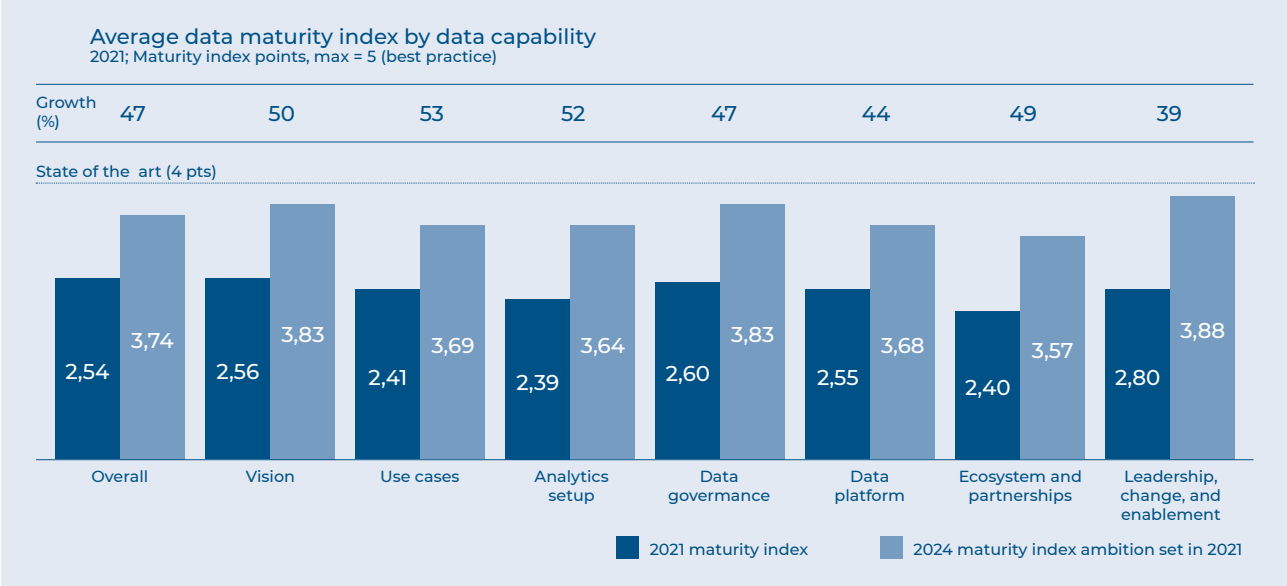
4. In the global examples, we have observed aggressive targets compared to current maturity levels. The situation in Türkiye is even more aggressive than the global benchmarks:

● Turkish companies need to develop foundational capabilities such as use-cases and analytics set-up by +50%. Moreover, Türkiye also needs to demonstrate a greater effort in ecosystem and partnerships capabilities according to the DACAMA assessment. Considering a similar realization gap in the global examples, Turkish companies should be aware of the maximum effort needed to realize these ambitions not to fall behind their global competitors.



4.3 Current use-cases in Türkiye

4.3.1 Public initiatives

On the public sector front, 6 key initiatives have contributed to the development of data & analytics in Türkiye in the last 5-10 years. These are:

1. Turkish Personal Data Protection Law (Kişisel Verileri Koruma Kanunu "KVKK")
2. Establishment of Digital Transformation Office (DTO),
3. "National Technology Initiative" and "Digital Türkiye" targets,
4. National Artificial Intelligence Strategy 2021-2025
5. Information and Communication Security Measures
6. National Cyber Security Strategy Plan (2020-2023)

1. Turkish Personal Data Protection Law (Kişisel Verileri Koruma Kanunu "KVKK")

The Turkish Personal Data Protection Law was enacted on April 7, 2016 parallel to the 1995 EU Data Protection Directive. KVKK regulates real and legal entities regarding personal data collection and processing to protect personal privacy, fundamental rights and freedom. Additionally, the transborder transfer of personal data is restricted under KVKK Article 9.

2. Establishment of Digital Transformation Office (DTO)

Across the globe, data and analytics development goes hand in hand with the public and private sector. In order to support these developments, the Turkish government established a Digital Transformation Office on July 10, 2018. In line with the Presidential Government System 2023 goals, the main aim of the office is:

● to lead fragmented workforces on digital transformation, cyber security, national technologies, big data and artificial intelligence under a single roof[4] in line with advancing technologies, social demands and the reform trends in the public sector via adopting an agile management approach

● to lead the implementation of the digital transformation ecosystem by enhancing the performance of public institutions and by increasing the efficiency and quality of their services in line with the goals, policies and strategies set by the government

● to enable building a capacity to produce innovative technological solutions standing strong in tomorrow's competitive economy.

To achieve this target, the Digital Transformation Office (DTO) aims to not only preserve but render meaningful the data and foster development in both the public and private sectors.

[4] Following departments are established: Digital Transformation Coordination, Digital Technologies, Procurement and Resource Management, Cyber Security, Big Data and Artificial Intelligence, International Relations, Information Technologies, Administrative Services and Legal Consultancy

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3. "National Technology Initiative" and "Digital Türkiye" targets

In line with the Presidential Government System 2023 goals, apart from the establishment of the DTO, Türkiye announced the "National Technology Initiative" and "Digital Türkiye" targets to clarify the strategic direction of Türkiye just as other countries have identified their own technology strategies (e.g., "industry 4.0" of Germany, "society 5.0" of Japan, "life 3.0, and the fourth revolution or individual 4.0" of the U.S.., etc.).

With the "Digital Türkiye" mission, the Digital Transformation Office aims to achieve the digital transformation of the country in collaboration with public and private organizations, universities and non-governmental organizations. Turkish president Recep Tayyip Erdoğan stressed the importance of the country-wide digitalization in one of his tweets "...In this new process which we call the National Technology Initiative and Digital Türkiye, we will prepare Türkiye for a great change by incorporating the possibilities offered by science and technology into our goals."

As a result of these efforts, the number of research and development centres in Türkiye have exceeded over one thousand and more than 300 design centres and 80 techno parks have been established.

4. National Artificial Intelligence Strategy 2021-2025

The "National Artificial Intelligence Strategy 2021-2025"prepared with the cooperation of the Digital Transformation Office and the Ministry of Industry and Technology, is the first Turkish national strategy document on artificial intelligence (AI). Türkiye is one of the pioneer countries with an AI strategy even if at present its actions have been rather limited.

The defined vision for the AI strategy is "creating value on a global scale with an agile and sustainable AI ecosystem for a prosperous Türkiye." The Strategy was designed around 6 strategic priorities:

- Training AI Experts and Increasing Employment in the Domain
- Supporting Research, Entrepreneurship and Innovation
- Facilitating Access to Quality Data and Technical Infrastructure
- Regulating to Accelerate Socioeconomic Adaptation
- Strengthening International Cooperation
- Accelerating Structural and Labor Transformation

Again Turkish President Erdoğan reiterated his commitment in one of his tweets: "Artificial intelligence is bound to be at the forefront of developments in the near future."

5. Information and Communication Security Guide

The Digital Transformation Office of the Presidency of Türkiye published Information and Communication Security Measures in July 2019. The Information and Communication Security Guide serves as the first national document in this field and was prepared with multiple stakeholder contributions from both the public and private sectors along with academia and is expected to be updated depending on technological advancements and changes in national policies and strategies.

The measures defined in the "guide" should be taken by public institutions and operators providing critical infrastructural services in order to mitigate and deactivate the security risks encountered in information systems and to secure the critical data that could jeopardize national security.

6. National Cyber Security Strategy Plan (2020-2023)

The "National Cybersecurity Strategy and Action Plan (2020-2023)" took effect on December 29, 2020. The plan addresses a variety of policies, such as shielding the cybersecurity of critical infrastructures 24/7, embracing a proactive cybersecurity approach, risk analysis of cyber-attacks at an institutional, sectoral and national basis; lowering dependency on developers of information technology, opening the cyber space to the nation as a whole and incorporating an information security culture in all institutions and organizations. With this plan, Türkiye aims to leverage information and communication technologies (ICT) and realize national cybersecurity activities effectively and continuously.

4.3.2 Private initiatives & perspectives

To understand the current market in the private domain, we both conducted online research and one-on-one interviews with selected DACAMA respondents from different industries. Selected private incentives can be found below in the 7 DACAMA capabilities.

4.3.2.1 Vision

The Vision component of the DACAMA assessment mainly reflects a company's data-driven approach. In Türkiye, global players and large conglomerates trigger market developments.

From the DACAMA interviews, we observed a different narrative than the ambitious targets in the quantitative responses (in Turkish companies, the DACAMA vision is scored 2.55 out of 5, which is 20% below the global average. However, the target DACAMA points for 2024 are only 6% below the global results).

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One major Turkish retailer explained their target as collecting and analysing as much data as possible while keeping data privacy as their utmost priority. They were committed to this target despite the fact that they were lagging behind global examples since they still did not have a data warehouse. However, managers from their online platform explained their vision which was in line with global standards as follows: "All collected data must be leveraged via utilizing AI technologies to offer the best-in-class service benefitting customer" and added that "..it is not important how much data you have collected but in which processes you can integrate them and how you leverage insights to generate value for both consumers, the company and society as a whole. We need to democratize data access in our organization to utilize data in the best manner." This example shows that even if these two entities belong to the same parent company, the maturity of their vision differs completely. In order to excel in their data capabilities and reach their ambitious targets, organizations should align capabilities across different business units and departments.

Another example comes from one of the most innovative household appliance companies in Türkiye where they underlined the importance of data not as a tool, but as a strategic entity. In 2017, their data department noticed that around 35% of the requests coming from other business units were just for basic reporting. This process was time consuming for data analysts and inefficient for the overall organization. Therefore, they modernized and improved their dashboards with better UX and trained +400 employees who are now creating more than 50% of all reports in the organization. Their next target is to establish AI based decision support mechanisms as the main goal in most analytics projects is to make data suitable for modelling purposes.

4.3.2.2 Use Cases

In the DACAMA, the capability of use cases reflects idea generation & prioritization and benefits evaluation & monitoring. We observed 3 key examples from our DACAMA interviews detailed in the following paragraphs.

A major Turkish energy company outlined their data utilization process in their primary business activities as having 3 steps: (1)Gathering & arranging the appropriate data, (2) analysing the data and (3)generating value or creating efficiency via initiating the right projects. The first step is critical and they claim that they are the market leader in that, even if they have a long way to go. Currently, in a highly regulated market like energy, they are trying to understand consumer behaviour in their retail branch via app connections. To reach their targets, they need to make infrastructural investments. Thus, they embarked on the transformation by establishing a cloud and big data platform. As a second step, they adopted Scrum practices where they have shorter (instead of yearlong projects, less than 3-monthlong mini projects), more solution-oriented projects to receive feedback and optimize more quickly to get ready-to-market products/services earlier. Finally, they believe that the success of a project is to have measurable and traceable targets with accurate KPIs. In general, to surpass global competitors with huge cost advantages like China, they believe that they should adopt best-in-class AI, data analytics, IoT, end-to-end monitoring, decision support systems, robotic process automation to reach the end-customer through customised & best-in-class products and services. As a result, over the last couple of years, they have implemented two success stories: The new discount management system and route optimization project.

A leading airline company emphasized that the opportunity in B2C industries lies in personalization. Companies may attract more consumers via customized price offerings and value propositions. Also, as all travel spending has fallen drastically after Covid 19, airline companies have no resources to waste. Therefore, effective project management is the key to achieve customer satisfaction and cost optimization. To optimize costs effectively, a company must use AI in all its processes from ticket pricing to salary optimization, from deciding aircraft parking positions to the number and variety of products to load on to airplanes. To gauge customer satisfaction, they use the Net Promoter Score: an airline gets real-time feedback from travellers just before they disembark from the aircraft. The company aims for an ideal employee count, the highest airplane utilization rate and top automation level. These are only achievable through AI, according to airline executives.

Meanwhile, one of the top communications companies' executives explained that their use-case processes are based on monetization. They underlined that there is hype surrounding data and analytics projects which sometimes drives people to take on fancy projects without considering tangible outputs. However, they believe data analytics projects have the utmost importance to identify the needs, design the project according to that need and then identify the project target & key KPIs to create real business value. For example, they started to use AI to optimize their human resources capacity. Even job offers are made via AI, so that HR team will have more time for strategic tasks. Moreover, the company is also considering external factors besides technological capabilities to launch a new product. In the event that foreign based online services stop providing their services in Türkiye, they have rolled out the Turkish equivalents to these foreign services.

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4.3.2.3 Analytics Set-up

The analytics set-up of the DACAMA investigates the analytics strategy and execution support, resources & skills and the operating model.

In Türkiye, the private sector massively increased its investments in data management and storage. According to experts of Telkoder (independent telecom operators association), it is estimated that there is approximately 40,000m2 of white space and approximately 10,000 cabins in Türkiye. About 30,000m2 of 40,000m2 are estimated to be owned by 3-4 large data centre operators. The remaining 10,000m2 is assumed to be owned by about 20 data central operators.

We have observed that companies heavily invest in resources and capabilities to achieve best in class data and analytics. A major Turkish loyalty company said that they invest heavily in infrastructure. They moved their data warehouse to the Google Cloud Platform in 2019, which was an early move considering the other competitors in the Turkish market with the same scale of business. Using Cloud platforms enabled them to optimize processes for data processing and AI projects. Plus, via using Phyton, they developed multiple analytical algorithms like assortment and affinity. They also mentioned that investing in technology is not enough unless companies also invest in their human capital to leverage these resources efficiently. Especially in countries like Türkiye where there is a growing brain drain, it is important to hold on to talent via investing in them.

Another leading telecommunications company emphasized that they are more inclined to use open-source technologies if there is no significant operational risk that will hinder operational continuity. They added that in the growing phase that they are currently in, they should continue to invest in technologies that will enable them to gather, analyse, and store the data in the best manner.

4.3.2.4 Data Governance

The data governance dimension covers the data governance organization & target operating model (TOM), data structures, data policies, data governance tools and data privacy and security.

One Turkish household appliances company previously discovered that they needed to take the necessary steps regarding data governance, but postponed these steps due to the daunting effort required for organizational transformation. However, as they experienced more and more delays in analytical and AI related projects, they acted on data governance. They observed that global best practices are democratizing data access by dispersing the data responsibility and enabling easy access to insights from all departments.

Similarly, a telecommunications company believed in the power of data, analytics & AI, so they invested in both tools and human capital consisting of AI, the consumer journey and data warehouse teams. Moreover, just as in the household appliances company above, , they enabled the whole organization to access data via trainings and easy-to-use dashboards. As a result, today they have no reporting requests coming from different departments. They have also started a trainee programme within the company where volunteers from different departments work with data teams for two weeks similar to an internship to learn a specific subject which they utilize later in their own projects.

Finally, an energy company, which is known to be rather traditional, wanted to transform itself and was struggling with personnel who were resistant to change. In order to enable the transformation, they enlisted volunteers from all departments and created a team called Digital Transformation Ambassadors. These Digital Transformation Ambassadors were from 26 business units for a total of 76 employees. This group supported the rapid adoption of technological transformation and idea generation. The company says that after they adopted the program, management observed the logarithmically increasing success by the Microsoft Power BI license count in just a couple of months.

4.3.2.5 Data Platform

Data platforms are the key to reach the beneficiary of the analysis, who can either be a data scientist or a business owner. As a reflection of the current trend towards democratised data access, data platforms have the utmost importance to reach the data user with right tools to enable the creation of valuable insights. In the DACAMA, two main points are investigated: modern & modular data platform architecture and data platform management.

One B2C customer loyalty platform manager believes that the cloud is the key enabler for all data related technologies. In the “fail fast” culture that we are living in, these enablers are the key to success. In the beginning of 2020, they have also created a look-alike engine by leveraging cloud systems. Via this engine, they identified a segment according to propensity scores, distance metrics and observed a 9 fold increase in both clicks and sales.

For a leading telecommunications company, useability is the key criteria. In the fast-changing world, the company believes they need to adapt to changes with modular systems. So far, their systems have been renewed at least three times and +300 people are working on these systems.

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4.3.2.6 Ecosystem & partnerships

Since the beginning of the 2010s, we have frequently started to hear the term "ecosystem," but with a different meaning than the traditional term. Companies, who leverage the power of data and agile management, tend to create webs of partnerships to merge their powers and drive exponential growth. This web is called an ecosystem in the business context. In the DACAMA, we observed the following in the companies: A data collection strategy for internal data monetization, vendor partnerships to augment internal capabilities and ecosystems for external data monetization.

Numerous well-known global companies manage platform-based ecosystems engaged in social media, e-commerce, transportation, banking, and even mining. These include tech leaders Google, Amazon, Facebook, and Apple, as well as more established companies, such as Maersk and Cisco. However, in Türkiye, ecosystems and partnerships are limited and only occurs within large conglomerates or global companies.

A major Turkish retailer wanted to explore an omnichannel strategy in the beginning of the 2010s. Therefore, they build e-commerce and loyalty platforms. Currently, these two platforms are providing the data on all shopping behaviours. Moreover, as they sell their loyalty platform to other firms in other industries, such as energy and food, within the limitations of KVKK, they can leverage the collected data from their B2B business partners to profile and target their B2C end-customers.

4.3.2.7 Leadership, change & enablement

Good leadership is the key to driving change and inspiring organizations to reach their ambitious targets. In the DACAMA framework, we observed leadership in 4 main actions: Leading, engaging, driving the change and enabling the organization.

We observed that there was one striking bias and resistance from employees that executives needed to target during their companies' technological transformation: The fear of losing jobs due to AI and robotic process automation. Leaders have a huge responsibility to combat this bias which hinders their technological transformation. In one energy sector company that we interviewed, the executives said that they triggered a cultural transformation project simultaneously with technological transformation to shift people's minds away from more operational tasks, which could be conducted via AI & automation, to more creative tasks where they could brainstorm and come up with innovative solutions. Moreover, they adopted the motto "decide with data" in all of their communications within the organization, organized bi-monthly meetings where they would inform each other about one revolutionary technology and fantasize as to "how the world would be in 2050" and "how the company could position itself to still thrive in 2050."

Another company added that Turkish companies need to invest in both technology and human capital at the same time to transform Türkiye into a high tech center. It was stated that the key to achieving this would be through process atomization and innovation. Türkiye can be a strong competitor to the current IT & data exporting countries with the potential of high qualified human capital.

5 Roadmap to data & analytics excellence in Türkiye

5.1 Aspired maturity level in Türkiye and next steps

In the DACAMA assessment results, one of the most striking features was that in almost[5] all dimensions Turkish companies scored their current capability almost 20% below the global average, while their 2024 targets were only 7% less than the global average which makes Turkish companies' targets 1.6 times more ambitious than global competitors. Considering the fact that global targets are already ambitious, Turkish companies need to be even more focused on developing their capabilities to achieve the targets that they have set.

5.1.1 Vision

Most organizations face similar problems, such as organizational complexity that leads to the loss of commercial opportunities, inaccurate data for decision making, increasing regulatory reporting pressure, slow time to market, agile and start-up market entrants, low speed to insight, complex data management and flat or decreasing revenues. Most of the problems that keep CEOs awake at night could be solved by embracing four business imperatives:

1. Building a seamlessly working organization across silos
- No walls between departments in sharing insights and decisions
- Open, learning culture stimulating exchanges in the organization

2. Increasing speed to insight to reduce time to market
- Front-line employees using real-time customer insights
- External and internal data assets leveraged to jointly build comprehensive market insights

3. Mastering complexity in a growingly interconnected environment
- Flexible technology architecture allowing for incremental improvement of interconnected systems

4. Leveraging Data to optimize business results across the company
- Data driven optimization of key processes, cost structure, revenue structure and customer expectations

The common thread that underlies these imperatives is data strategy. Data strategy describes the 'chain of why' from business strategy through to execution. A clear data strategy is needed to engage and mobilize the company.

5.1.2 Use cases

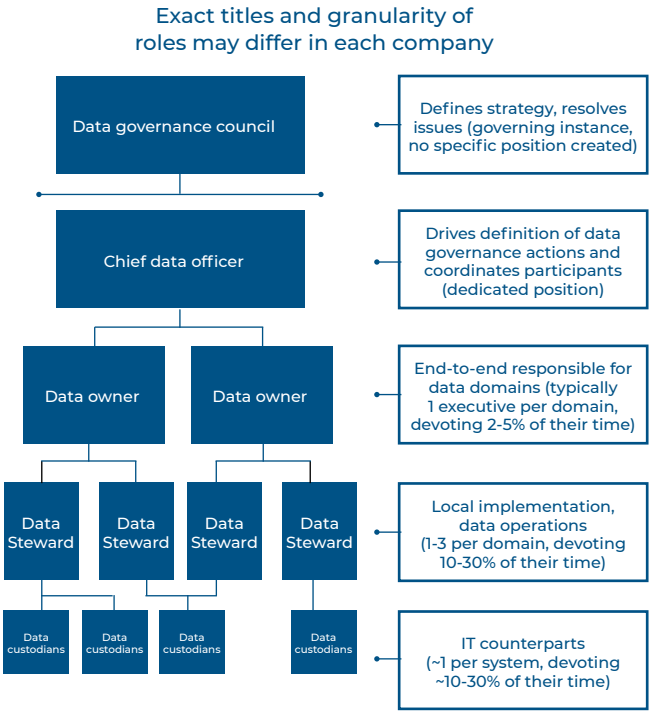
In order to develop the domain of use-cases , BCG believes value chain mapping needs to be leveraged. This process prioritizes the key capabilities and use cases, then determines the requirements. First, soft start and assess and then deep-dive and mobilize according to the following steps:

I. Refine ingoing value chain opportunity assessment and prioritisation. Later, down select to 5-6 capability areas and ~10 key use cases for further assessment.
II. Assess as-is maturity, planned initiatives and ambition for prioritized capability areas and use cases
III. Develop cost/benefits analyses for use cases based on comparative examples and down select to 2-3 priority use cases for the first accelerated delivery.
IV. Articulate business and customer requirements for priority use cases e.g., scope, outcomes, business capabilities.
V. Articulate delivery requirements for priority use cases e.g., AI and data requirements, team and delivery requirements; flow into Op Model and Digital Data Platform (DDP) workstreams.
VI. Develop strategic and tactical initiatives to deliver the needed business capabilities and use cases over time.

5.1.3 Analytics set-up

Analytics set-up is one of the key factors to drive change within an organization. There are three key dimensions to the analytics setup & operating model: organization and governance, analytics tools & technologies and analytics processes & teams.

Best practice companies have structured data governance around five key roles:



[4] Except leadership, change & enablement which is 12% below

5 Roadmap to data & analytics excellence in Türkiye

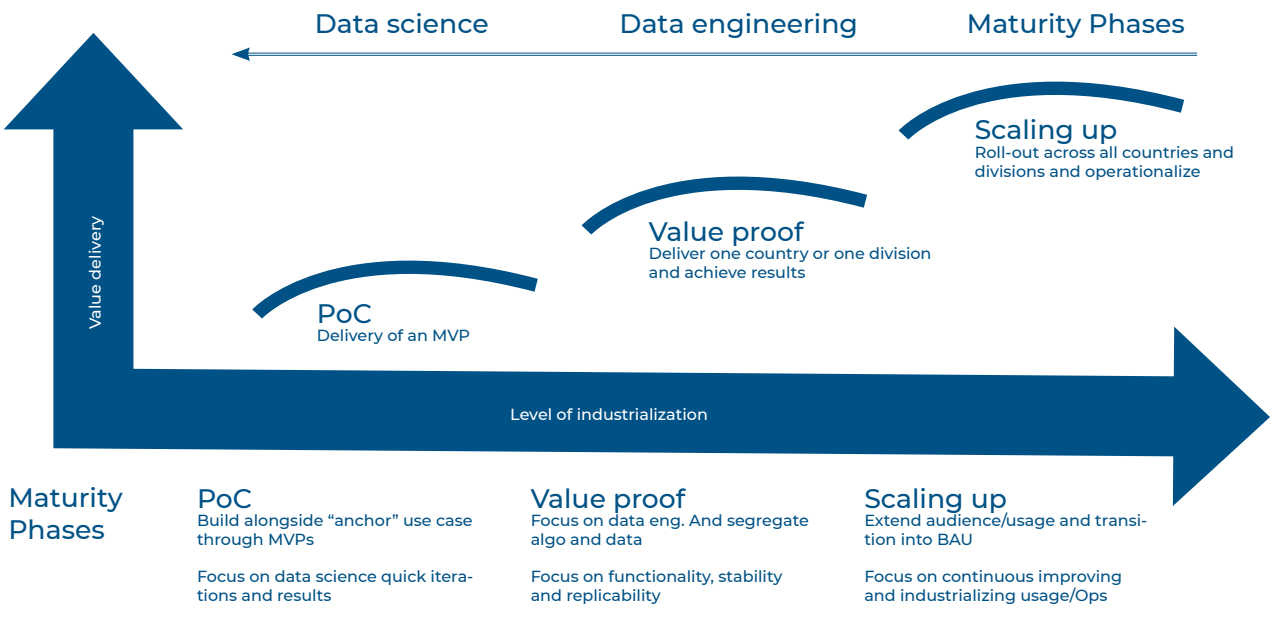
5.1.4 Data governance

Most Turkish companies that we interviewed while writing this report stated that the change towards a data culture starts with best-in-class data governance. There are 4 key building blocks for any data governance transformation:

- Data Structures: Artefacts to help understand data
  - Strategic artefacts
    - Data glossary: "What is the definition of the data?" Business terms and their commonly agreed definitions
    - Data value heat map: "What is the value of the data?" A scoring structure to help prioritize data quality issues for the most valuable data
    - Domain owner map: "Who is responsible for the data?" Indicates the data owner and steward responsible for the quality of data
  - Technical artefacts
    - Data dictionary: "What is the description of the data?" Describes the meta-data about the data (e.g. location, type, linkage, etc.)
    - Data flows: "How does data flow in our organization?" Functional and technical flows of data in our processes and systems
    - Data model: "What relationships exist in our data?" Depicts the relationships data has with other data
- Data Policies: Policies are the necessary link between Data Vision and processes relating to Data Governance
  - Rulebooks on, for example, data quality, data documentation, data accessibility, master data management
  - Policies that correspond to specific issues and root causes; no bureaucratic "Ministry of Data"
- Data Organization Participants and the Target Organizational Model (TOM):
  - Key stakeholders, mandates, R&Rs (roles and responsibilities) for each participant
  - Decision framework, specifying different levels of decision-making authority
  - Policies are the link between vision and processes
  - Policies translate vision, responsibilities and mandates into activities to be performed within the organization
- Data Tools:
  - Basic data hygiene tools supporting the data dictionaries and flow maps
  - Advanced data management tools adapted to the company's needs: MDM (master data management), lineage, KQI (key quality indicator) automation tools
    - Master Data management: Manage a company's master data (e.g. customers, products)
    - Meta-data management: Manage meta-data such as data structures, policies, processes, etc.
    - Data Quality management: Manage and report on data quality

5.1.5 Data platform

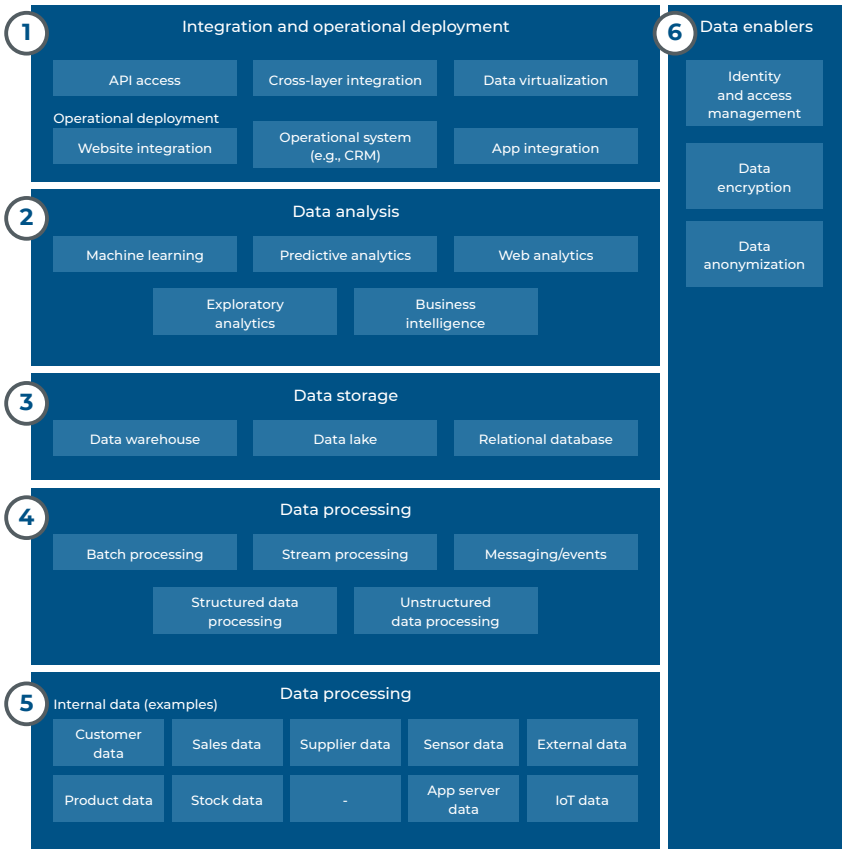
Data platform is an important component to allow data strategies to materialize. BCG's globally acknowledged and tested approach is to build the data platform and infrastructures parallel to the use cases.=



5 Roadmap to data & analytics excellence in Türkiye

BCG's Digital Data Platform reference framework, define the new target analytical data architecture along 6 layers

Capabilities of data platform and analytics reference architecture



Key layer

1) Capabilities to access analytics and data from different channels/devices

2) Analytics capabilities to draw insights and conclusions from data

3) Capabilities to store data in different ways and scale

4) Capabilities to process different types and amounts of data

5) Capabilities to leverage data from various different sources

6) Capabilities to enable the usage and protection of data

5.1.6 Ecosystem & partnerships

If designing a traditional business model is like planning and building a house, designing an ecosystem is more like developing a whole residential district: more complex, more players to coordinate, more layers of interaction and unintended emergent outcomes.

Based on an analysis of more than 100 successful and failed ecosystems across sectors and geographies globally, BCG finds that the ecosystem design challenge can be addressed by working through six sequential questions:

The six-step journey of business ecosystem design

1 What is the problem that you want to solve?

- Is the problem large enough?
- Is an ecosystem the right choice?
- What kind of ecosystem do you need?

2 Who needs to be part of your ecosystem?

- What are the players and roles?
- Who should be the orchestrator?
- How can the orchestrator motivate the other players?

3 What should be the initial governance model of your ecosystem?

- How open should the ecosystem be?
- What should the orchestrator control?

4 How can you capture the value of your ecosystem?

- What should you charge?
- Whom should you charge?

5 How can you solve the chicken-or-egg problem?

- What does it take to achieve critical mass?
- What is the minimum viable ecosystem?
- Which side of the market should you focus on?

6 How can you ensure the evolvability of your ecosystem?

- How can you scale the ecosystem?
- How can you define the ecosystem?
- How can you expand the ecosystem?
- How can you protect against backlash?

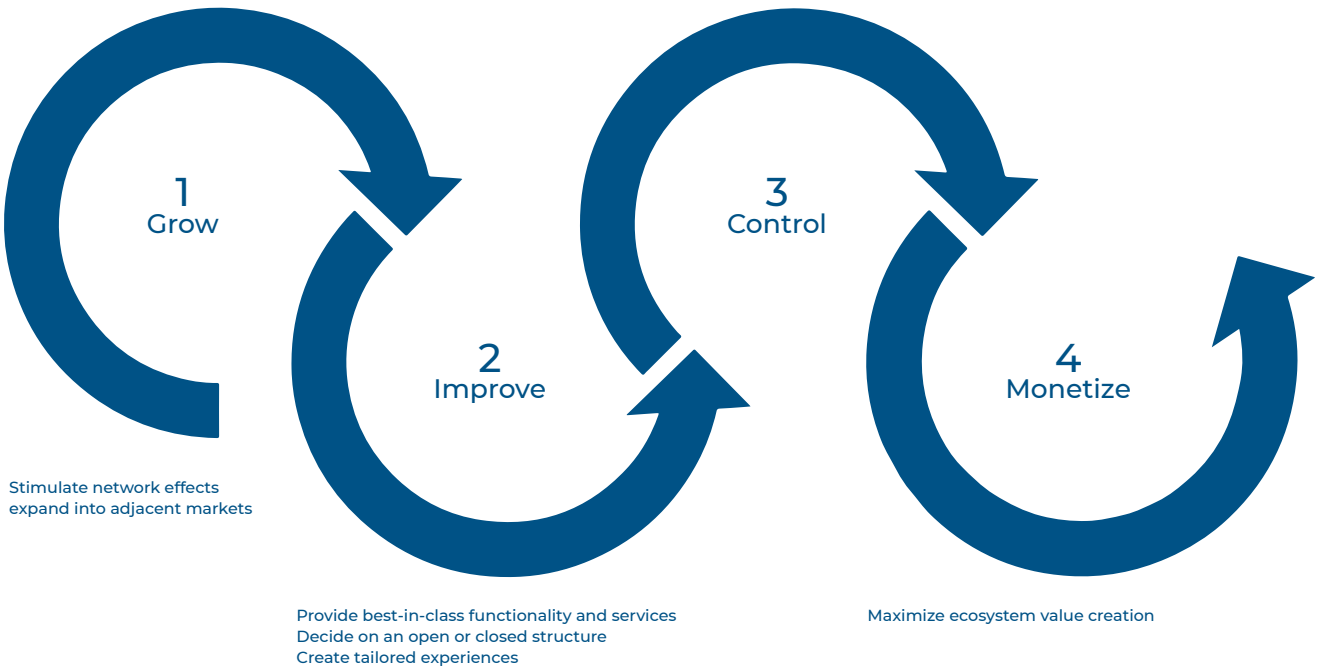
Source: BCG Henderson Institute

5 Roadmap to data & analytics excellence in Türkiye

Many companies participate in platform-based ecosystems—approximately 40% of the world's top-30 highest-valued brands and 70% of startup unicorns—few have been able to reap the benefits. Leaders of platform-based ecosystems often face challenges with scaling the ecosystem, expanding it beyond its initial use case, or with monetization and value extraction.

There are ways to overcome these challenges. Pioneers that do this successfully will gain from embracing and leading a digital business model built upon a platform, while also ensuring that ecosystem partners benefit, enhancing the scope and attractiveness of the ecosystem. What follows is a step-by-step strategic guide for pioneers (orchestrators), which will help them grow their platform-based ecosystems, attract and retain partners and customers, and maximize their share of the pie generated by the digital ecosystem.

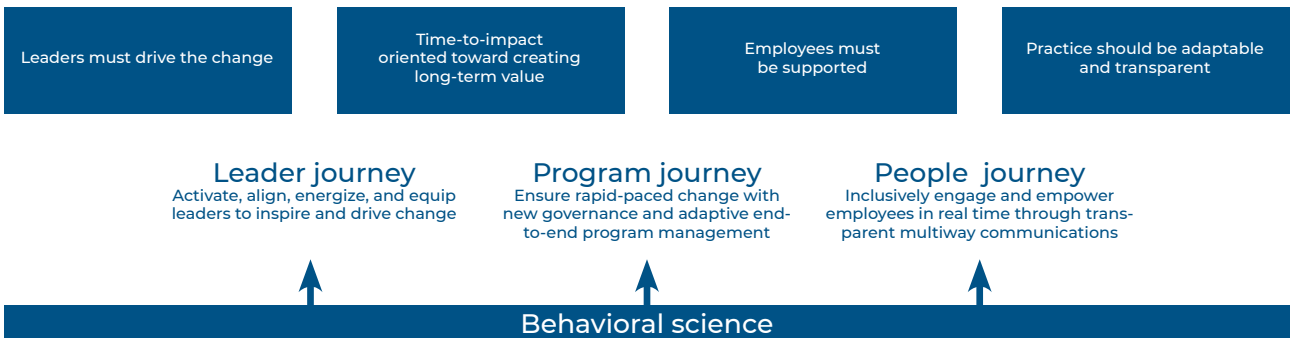
An Orchestrator's guide to Digital platform-based ecosystems



5.1.7 Leadership, change & enablement

Change is essential but far from easy. Roughly half of all change management projects—and 75% of large-scale transformations—fail to meet their objectives. BCG helps its partners through our proven three-journey approach:

Addressing the four imperatives in change management through three journeys



Source: BCG analysis

5 Roadmap to data & analytics excellence in Türkiye

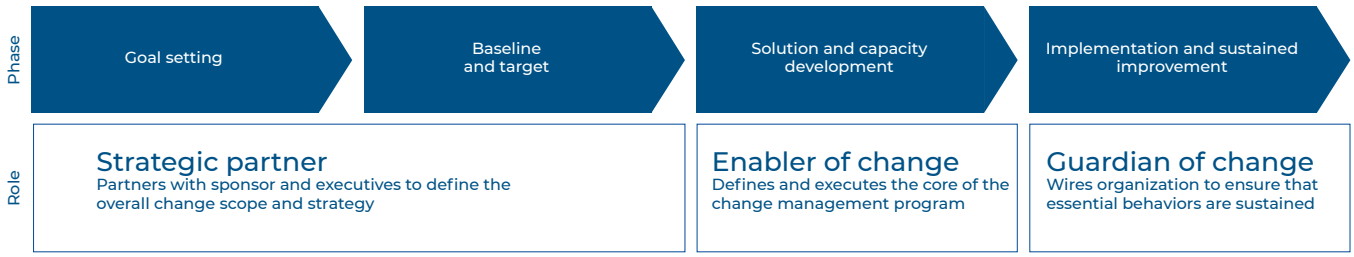
Companies that want to endure must be skilled at transformation. There are a lot of reasons why so many of the companies that were on the Fortune 500 list 25 years ago have disappeared from it. However, one common thread is a failure to adapt. Often the failure is not a matter of vision, but of execution. An effective approach to change management is especially important today since the Coronavirus pandemic is testing the adaptive skills of every organization.

Over the course of hundreds of client transformations, BCG has identified ways to minimize these problems—and strengthen companies' change management functions. Three actions are crucial:

- Ensure that the role of the change management function evolves to suit the various stages of the transformation program.
- Develop the handful of traits that are critical for any effective change management function.
- Pick an organizational structure for the change management function that has the right mix of centralization and decentralization.

Data & analytics transformations will have a crucial importance for Turkish companies in the next couple of years. These transformations should be sponsored by CEOs, but managed by the entire leadership. In order to become an organization which puts data at the core and leverages the power of analytics, Turkish companies need to adopt a holistic approach: data vision setting & use cases should be driven by business & analytics teams, analytics set-up & governance by HR and tools & technologies by IT.

The life cycle of a typical transformation comprises four phases:
Exhibit 1 | The Role of Change Management Changes with Transformation Phase



Source: BCG analysis

6 Closing Remarks

Economies as a whole have the potential to advance and achieve significant economic prosperity through data & analytics. In order to leverage data & analytics as a catalyst for economic growth, Türkiye needs to invest across the board in developing its data & analytics capabilities. Perhaps the most important element will be its ability to prevent potential brain drains and hold onto to its qualified "human capital" to serve its own local institutions. Therefore, it is critical to provide a nurturing environment with appropriate professional development and employment opportunities. Increasing investments in Techno parks, scaling up partnerships between universities and private sector companies and developing industry friendly regulations are just a few examples of the ecosystem building initiatives Türkiye needs to embark on to develop this space. Despite the starting point, with the appropriate investments Türkiye has all the right ingredients to become one of the global hubs for data & analytics and leverage it as a catalyst for the next wave of economic prosperity.

7 Co-authors and project team

Burak Aydın, Head of TÜSİAD Digital Economy Strategies Working Group & General Manager of AWS Türkiye
Esra Şenalp, Senior Manager for Digital Native Business, AWS Türkiye

Burak Tansan, Managing Director and Senior Partner & Chairman of BCG Türkiye, Boston Consulting Group
Cenk Sezginsoy, Managing Director and Partner, Boston Consulting Group
Emir Pandır, Partner, Boston Consulting Group
Elif Aksoy Yenidünya, Project Leader, Boston Consulting Group
Gamze Evirgen, Consultant, Boston Consulting Group

Serkan Sevim, President of Digital Türkiye Round Table, TÜSİAD
Nurşen Numanoğlu, Deputy Secretary General (responsible of Digital Transformation), TÜSİAD
Yasemin E. Avcı, Information Society and Innovation Director, TÜSİAD
Özge Sarı, Information Society and Innovation Expert, TÜSİAD

Mehmet Ali Akarca, Vice Chairman Board of Directors, KoçDigital
Önder Kaplancık, General Manager, KoçDigital
Vefa Erdem, CTO / Head of Technology, KoçDigital
KoçDigital DACAMA Advisory Project Team (Osman Gençoğlu, Utkan Tolga Evren, Emre Türkmen, Ali Yücel Türegün, İhsancan Özpoyraz)

8 References

Boston Consulting Group, "Executive Perspectives: The CEO's Guide to Cybersecurity", September 2021, https://media-publications.bcg.com/BCG-Executive-Perspectives-CEO-Guide-to-Cybersecurity.pdf

Boston Consulting Group, "How Do You "Design" a Business Ecosystem?", February 2020, https://www.bcg.com/publications/2020/how-do-you-design-a-business-ecosystem

Boston Consulting Group, "Four Strategies to Orchestrate a Digital Ecosystem", September 2020, https://www.bcg.com/publications/2020/four-strategies-to-orchestrate-digital-ecosystem

Boston Consulting Group, "The Emerging Art of Ecosystem Management", January 2019, https://www.bcg.com/publications/2019/emerging-art-ecosystem-management

Boston Consulting Group, "Change Management", Retrieved on Jan 10 2022, https://www.bcg.com/capabilities/business-transformation/change-management

Boston Consulting Group, "The Elements of a Good Change Management Function", July 2020 https://www.bcg.com/publications/2020/elements-good-change-management-function

Boston Consulting Group, "The Hidden Cultural Benefits of AI", November 2021, https://www.bcg.com/publications/2021/ai-benefits-company-culture

Boston Consulting Group, "What Happens When 'If' Turns to 'When' in Quantum Computing?", July 2021, https://www.bcg.com/publications/2021/building-quantum-advantage/

Boston Consulting Group, "Is Your Company Gaining Momentum in Data?", November 2021, https://www.bcg.com/publications/2021/companies-data-capabilities-progress

Fitch Ratings, "2021 Data and Analytics Sector Outlook Improving", December 2020, https://www.fitchratings.com/research/corporate-finance/2021-data-analytics-sector-outlook-improving-03-12-2020

Gartner, "Gartner Top 10 Data and Analytics Trends for 2021", March 2021, https://www.gartner.com/smarterwithgartner/gartner-top-10-data-and-analytics-trends-for-2021

Gartner," Gartner Identifies Four Trends Driving Near-Term Artificial Intelligence Innovation", September 2021, https://www.gartner.com/en/newsroom/press-releases/2021-09-07-gartner-identifies-four-trends-driving-near-term-artificial-intelligence-innovation

Forbes, "5 Leading Data Analytics Trends You Should Know About", May 2021, https://www.forbes.com/sites/alteryx/2021/05/13/5-leading-data-analytics-trends-you-should-know-about/?sh=7fc1c24c1976 Forbes_5 Leading Data Analytics Trends You Should Know About

Forbes, "A Very Short History Of Data Science", May 2013, https://www.forbes.com/sites/gilpress/2013/05/28/a-very-short-history-of-data-science/?sh=1029b8e355cf

Forbes, "Netflix Used Big Data To Identify The Movies That Are Too Scary To Finish", April 2018, https://www.forbes.com/sites/bernardmarr/2018/04/18/netflix-used-big-data-to-identify-the-movies-that-are-too-scary-to-finish/?sh=7a94a13e3990

Forbes, "How Much Data Do We Create Every Day? The Mind-Blowing Stats Everyone Should Read", May 2018, https://www.forbes.com/sites/bernardmarr/2018/05/21/how-much-data-do-we-create-every-day-the-mind-blowing-stats-everyone-should-read/?sh=6fc46f2f60ba

Forbes, "How The World Became Data-Driven, And What's Next", May 2020, https://www.forbes.com/sites/google-cloud/2020/05/20/how-the-world-became-data-driven-and-whats-next/?sh=147214df57fc

MIT Sloan School of Management, "6 trends in data and artificial intelligence for 2021 and beyond", August 2021, https://mitsloan.mit.edu/ideas-made-to-matter/6-trends-data-and-artificial-intelligence-2021-and-beyond

Harvard Business School, "Netflix: Your Data, Your Show, Your Experience", April 2018, https://digital.hbs.edu/platform-digit/submission/netflix-your-data-your-show-your-experience/

Harvard Business Review, "A Practical Guide to Building Ethical AI", October 2020, https://hbr.org/2020/10/a-practical-guide-to-building-ethical-ai

Thomas H. Davenport, "Analytics 3.0", December 2013, https://hbr.org/2013/12/analytics-30

World Economic Forum, "A brief history of big data everyone should read", February 2015, https://www.weforum.org/agenda/2015/02/a-brief-history-of-big-data-everyone-should-read/

8 References

World Economic Forum, "A brief history of big data everyone should read", February 2015, https://www.weforum.org/agenda/2015/02/a-brief-history-of-big-data-everyone-should-read/

World Economic Forum, "How much data is generated each day?", April 2019, https://www.weforum.org/agenda/2019/04/how-much-data-is-generated-each-day-cf4bddf29f/

World Economic Forum, "10 technology trends to watch in the COVID-19 pandemic", April 202, https://www.weforum.org/agenda/2020/04/10-technology-trends-coronavirus-covid19-pandemic-robotics-telehealth/

UN Global Pulse, "Big Data for Development: Challenges & Opportunities", May 2012, https://unstats.un.org/unsd/trade/events/2014/beijing/documents/globalpulse/Big%20Data%20for%20Development%20-%20UN%20Global%20Pulse%20-%20June2012.pdf

White & Case and International Comparative Legal Guides, "Data Protection 2021: A practical cross-border insight into data protection law (Eighth edition)", 2021 , https://iclg.com/practice-areas/data-protection-laws-and-regulations/1-the-rapid-evolution-of-data-protection-laws

Allen Overy, "EU – Council of the EU reached an agreement on the proposed ePrivacy Regulation", February 2021, https://www.allenovery.com/en-gb/germany/blogs/digital-hub/eu-council-of-the-eu-reached-an-agreement-on-the-proposed-eprivacy-regulation

RAND Corporation, "Benchmarking Data Use and Analytics in Large, Complex Private-Sector Organizations: Implications for Department of Defense Acquisition", April 2020, https://www.rand.org/pubs/research_reports/RRA225-1.html

World Health Organization, "Coronavirus disease (COVID-19): Vaccine research and development", August 2021, https://www.who.int/news-room/questions-and-answers/item/coronavirus-disease-(covid-19)-vaccine-research-and-development

Bloomberg, "UPS: UPS To Enhance Orion With Continuous Delivery Route Optimization", January 2020, https://www.bloomberg.com/press-releases/2020-01-29/ups-ups-to-enhance-orion-with-continuous-delivery-route-optimization

University of Michigan Information and Technology Services Safe Computing, "History of Privacy Timeline", Retrieved on January 10 2022, https://safecomputing.umich.edu/privacy/history-of-privacy-timeline

Business Insider, "The Cambridge Analytica whistleblower explains how the firm used Facebook data to sway elections", October 2019, https://www.businessinsider.com/cambridge-analytica-whistleblower-christopher-wylie-facebook-data-2019-10

Allied Market Research, "Big Data and Business Analytics Market, Global Opportunity Analysis and Industry Forecast, 2020-2027", September 2020, https://www.alliedmarketresearch.com/big-data-and-business-analytics-market

DIGITALEUROPE, "Data flows and the Digital Decade", june 2021, https://www.digitaleurope.org/resources/data-flows-and-the-digital-decade/

European Commission, "Europe's Digital Decade: digital targets for 2030", 2021, https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en

Gola/Schomerus, BDSG Kommentar, Page 47, München 2010, ISBN 978-3-406-59834-0

Presidency of the Republic of Türkiye Investment Office, "2023 Vision to be Realized with New National Cybersecurity Strategy", December 2020, https://www.invest.gov.tr/en/news/news-from-Türkiye/pages/2023-vision-to-be-realized-with-new-national-cybersecurity-strategy.aspx

Presidency of the Republic of Türkiye Digital Transformation Office, "Information and Communication Security Guide", July 2020, https://cbddo.gov.tr/en/icsguide/

Quantzig, "Big Data Challenges in the Media and Entertainment Industry", February 2018, https://www.quantzig.com/blog/big-data-challenges-entertainment-media-industry/

Cube Incubation, "Dünyada Ve Türkiye'de Siber Güvenlik Gerçekleri-1: İstatistikler, Analizler, Öngörüler", May 2019, https://www.cubeincubation.com/blog/dunyada-ve-turkiyede-siber-guvenlik-gercekleri-1-istatistikler-analizler-ongoruler

Dataconomy, "Infographic: How Netflix Uses Big Data to Drive Success", March 2018, https://dataconomy.com/2018/03/infographic-how-netflix-uses-big-data-to-drive-success/

Selerity, "How Netflix used big data and analytics to generate billions", April 2019, https://seleritysas.com/blog/2019/04/05/how-netflix-used-big-data-and-analytics-to-generate-billions/

8 References

Sanofi Press Release, "Sanofi and Google to develop new healthcare Innovation Lab", June 2019, https://www.sanofi.com/en/media-room/press-releases/2019/2019-06-18-07-00-00

Johnson&Johnson, "The COVID-19 Data Plan: 3 Innovative Ways Johnson & Johnson Is Using Data Science to Fight the Pandemic", Jan 2021, https://www.jnj.com/innovation/how-johnson-johnson-uses-data-science-to-fight-covid-19-pandemic

Hürriyet, "'Türkiye'nin teknoloji gücüne herkesi ikna edeceğiz'", February 2021, https://www.hurriyet.com.tr/teknoloji/turkiyenin-teknoloji-gucune-herkesi-ikna-edecegiz-41748664

Immuta and S&P Global Market Research, "Survey of 500+ Data Professionals Reveals Large Gap in the Data Supply Chain", August 2021, https://www.immuta.com/news/survey-of-500-data-professionals-reveals-large-gap-in-the-data-supply-chain/

IBM Cloud Education, "Relational Databases", August 2019, https://www.ibm.com/cloud/learn/relational-databases

IBM, "What is quantum computing?", Retrieved on January 10 2022, https://www.ibm.com/topics/quantum-computing

Mongo DB, "What Is a Non-Relational Database?", Retrieved on January 10 2022, https://www.mongodb.com/databases/non-relational

Verily, Retrieved on January 10 2022, https://verily.com/solutions/

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